



PROPOSED REDEVELOPMENT OF St. ANDREWS CHURCH, KEIGHLEY STRUCTURAL SUMMARY REPORT

**St. Andrews Church,
Keighley,
BD21 5HT**

**Prepared for:- Church on the Green Neighbourhood
Foundation**

Project	St. Andrews Church, Keighley
Project Number	2024 / 249
Date	18 th June 2025
Revision	1

SGM Structural Design Ltd is a Structural Engineering Design Consultancy based in Huddersfield, West Yorkshire

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We undertake a wide variety of work, including new build schemes and renovation/restoration projects as well as feasibility schemes. We work closely with Architects to achieve aesthetically impressive engineering solutions but also have an innovative approach to design solutions whilst being conscious of cost implications.

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Huddersfield New College
Main Entrance Extension



Shelf Village Hall, Halifax
Library Extension



West Park School, Derby
New Classroom Block



Costa Coffee, Heckmondwike
New Retail Unit



**St Mary's High School,
Chesterfield**
Main Entrance Extension



Polyseam, Huddersfield
New Manufacturing Unit

St. ANDREWS CHURCH, KEIGHLEY REDEVELOPMENT STRUCTURAL SUMMARY REPORT

1.0 INTRODUCTION

- 1.01 SGM Structural Design Ltd. have been appointed by Church on the Green Neighbourhood Foundation (“Foundation”) on behalf of St. Andrews Church, Keighley (“Church”) to produce an outline structural summary to determine the most suitable construction techniques for the scheme proposal, as set out by Halliday Clark Architects.
- 1.02 The redevelopment proposals include two main sections:-
- Internal redevelopment and front elevation entrance extension to the main church building.
 - Demolition of the existing church hall (“Hall”) and construction of a new multi-use space.
- 1.03 The current scope of works is to provide a study on the proposals in order to assist the Foundation, the Church and the professional team of advisors with their decision-making process on the construction techniques that are most suited whilst also reviewing likely costs and sustainability of the construction from the information available at present.
- 1.04 Following instruction, we have undertaken an initial design team meeting and walkover site visit to review the existing building layout & form of construction in the areas intended for the redevelopment works and new construction.
- 1.05 A ground investigation has been instructed and concluded by Mr. Russell Bowman of Soils and Structures Ltd. to help determine the existing foundation construction details of the church hall and to devise suitable foundation solutions for the redevelopment works. A brief overview of the findings was provided by Russell with the main finding results. Please see the full report in Appendix B.
- 1.06 A drainage survey of the existing system has been completed by Drainage Consultants Ltd. in order to determine the existing discharge details of both the surface water (rainwater run-off from roof and hardstanding areas) and foul water (discharge from toilets and kitchen waster outlets). The findings are appended to this report.
- 1.07 As requested an additional trial hole investigation has been concluded in order to review the existing formation level of the church tower construction as part of the verification of the proposed alterations and not impacting on the current foundations.

2.0 SCOPE & LIMITATIONS

- 2.01 The inspection was carried out during fine dry weather.
- 2.02 The inspection was limited to immediately visible and accessible areas only. No high-level access has been carried out, only inspection from ground / floor level.

- 2.03 No intrusive exploratory work was carried out during the inspection. Trial holes have been excavated to expose existing foundations and review the area of proposed car park extension.
- 2.04 This report does not provide a comprehensive list of all structural or potential structural defects, which may be present with the buildings.
- 2.05 No materials testing has been carried out unless specifically stated.
- 2.06 This report is for the sole use of the Foundation, the Church and their professional advisors and should not be reproduced in whole or in part or relied upon by any third parties for any use without the express written approval of SGM Structural Design Ltd., save as permitted in accordance with our terms of engagement.
- 2.07 The findings of this report are based on information supplied by the Foundation and its professional advisors. The information has been accepted and used in good faith and unless otherwise stated no attempt has been made to verify the information provided.
- 2.08 The findings and recommendations are considered to be valid and appropriate at the time of preparation.
- 2.09 This report should be read in conjunction with all relevant Appendices.

3.0 VISUAL SURVEY

- 3.01 The main church building was built circa 1848 and is Grade 2 Listed. The main construction is of coursed dressed stone and graduated stone slate roof. There is a large clock / bell tower to the main front entrance elevation with the main long construction behind including the nave, chancel and various ancillary rooms.
- 3.02 Internally there is a suspended timber floor construction to the tower with 4No. floors including the sloping pews. The sloping pews cover the initial entrance lobby, kitchenette area and small classroom. These are supported off timber trusses and cast iron posts.
- 3.03 the main nave space is open with large stone pillars extending up to support the roof construction of timber roof trusses and rafters.
- 3.04 A spiral stone staircase provides access to the upper floors within the clock / bell tower. The floor construction is primarily timber floor joists supported on various timber beams.
- 3.05 There is a clock mechanism and a number of bells to the upper rooms, both supported off, presumably, steel beams.
- 3.06 The existing vestry and office space is believed to have been a later construction, but matches in appearance and construction techniques.
- 3.07 The Hall to the side of the main Church was built circa. 1980.
- 3.08 The Hall is single storey in nature, with coursed cut stone walls, internally, it was found to have an inner skin of blockwork. The roof construction is of slates on timber rafters supported off steel trusses and beams.

- 3.09 Trial pits were completed by Soils and Structures Ltd. to determine the existing construction details of the Hall to determine suitability of reuse of foundations and also the expected formation that could be adopted for the proposed construction.
- 3.10 It was found that the existing foundations were relatively deep; it is believed that this was dictated by the adjacent retaining wall and lower lying graveyard area.
- 3.11 The additional trial pit excavated within the cellar was positioned against the front wall, below the main entrance doors at ground floor level. This location was dictated by the existing gas meter and boiler. See Appendix D for trial hole photos.
- 3.12 The excavation uncovered an existing widening of a foundation stone bearing onto a formed foundation of large aggregate bound together with a type of lime mortar mix. This foundation was again widened from the overall wall width, based on the visible wall width at ground floor level, the overall width of the foundation can be considered as approx. 1.590m wide with an approx. overall depth of 3.4m below ground floor level. The formation level was seen to be on natural ground, namely sedimentary materials of sand and gravel in 'medium-dense' to 'dense' consistency, which matched the description of the material as described within the ground investigation of Alluvial Fan Deposits. This material will have been deposited following glacial movement following the Ice Age. This level, below the external ground level, is evidence of the level of the natural ground, namely sedimentary material (Alluvial Fan Deposits), as referred to within the ground investigation report from the dynamic probing and local borehole records.
- 3.13 The natural ground, Alluvial Fan Deposits, are seen to provide an adequate bearing combined with the wide footing, to spread the high loading, for a construction of this nature of mass masonry and aligns with the expectations of a construction of this age.

4.0 PROPOSED STRUCTURAL DESIGN PHILOSOPHY

- 4.01 Refer to Appendix A, drawing number 2024/249 – SK01, showing the existing structural layout, together with basic schematic feasibility proposals for the alterations and new build hall space etc.
- 4.02 Halliday Clark Architects have prepared a schematic layout indicating the proposals for the proposed internal alterations and the new build construction.
- 4.03 The proposals for the alterations and extension works to the main church building comprise:-
- New glazed extensions to the front elevation to form a new entrance lobby and staircase.
 - Extension and alterations to the first floor pews area.
 - Reordering of the existing vestry and office space.
 - A new lift is proposed to provide access onto the altered first floor pew area.
 - Break through to South side elevation to provide access into the proposed new link space.
- 4.03 The proposals for the new build multi-use space adjacent to the main church building comprise:-
- Single storey flat roof 'link' space between the existing church and multi-use hall space.

- Single storey pitched roof vaulted ceiling multi-use hall, kitchen and office space.
- 4.04 The proposed work to the glazed entrance extensions lends itself to a steel frame construction being provided within the proposed glazed line. This will provide a suitably rigid / robust construction to provide lateral and vertical support to the glazing. Steel framing will minimise potential deflection under loading and also limit potential expansion issues due to any solar gain which other building material may be subjected to.
- 4.05 Foundations to the proposed glazed box extension will take into account the formation level as witnessed within the Hall trial holes, but also the adjacent cellar areas below the tower. Due to the cellar space, the use of deep trench fill, deep pier and ground beams or piled ground beams should be considered.
- 4.06 Subject to our comments in paras 4.04 and 4.05 above, and based solely upon our walkover site inspection, together with the information and documentation made available to us at this time, in our opinion there is nothing contained within the project concept designs and related drawings which leads us to question the viability of removal of part of the original church walls in relation to the proposed two new glazed extensions to the north and south faces of the west tower. The technical details of how such intervention will be achieved can only be considered at the technical design stage (RIBA stage 4), in due course.
- 4.07 The alterations and opening up works proposed to the historic church walls will suit installation of steel beams and masonry piers / steel columns. This is due to the level of expected loading, especially considering the height of masonry above the proposed openings in the clock / bell tower. Halliday Clark have suggested an aspiration to provide feature stone elements, as part of the alterations / new openings, to tie into the existing historic construction. To this it would be our recommendation for feature elements to be provided in a cosmetic / aesthetic way as non-load bearing elements below the main structure.
- 4.07a The design of the proposed steelwork will fully take into account vertical and lateral loading forces from the structure above as well as from wind loading. Lateral and dynamic loading from actions of ringing the bells along with natural frequency of the steelwork / construction will also be considered to ensure that there are no undue affects to the existing / proposed construction following completion under the intended usage of the development.
- 4.07b Following the full design review and completion of load chase down, additional assessment of the existing foundations will be concluded to ensure that the change in load transfer does not increase the applied foundation loading unduly. Any requirement to increase foundation size will be determined and designed accordingly at the technical design stage (RIBA stage 4) in due course.
- 4.08 The extended / altered first floor pew area would lend itself to be constructed in a similar fashion to the existing pew area. With edge beams and new posts as necessary. The new posts would be provided adjacent the existing large stone pillars to avoid disruption and damage to the existing historical stonework. Alternatively, it would be suggested to approach a stone mason specialist in order to determine the potential of 'pocketing' the new steel work into the existing pillars.
- 4.09 The alterations to the existing vestry / office area have recently been adapted to avoid having to change the existing load bearing elements and will not require major structural intervention.

- 4.10 For the proposed new build construction, care and consideration is to be given with regards the sustainability of the construction, along with issues of embodied carbon etc. of the material. All construction materials have varying levels of embodied carbon; there is also a difference in anticipated operational carbon during the lifetime and usage of the construction to take account of. Ultimately, the Foundation and the Church will need to balance their wish to minimise embodied carbon against their desire to create a new multi-purpose new Hall space, whilst having regard to anticipated operational energy savings and overall cost projections. Therefore, a number of construction techniques will be discussed below all with various pros and cons of construction, cost, maintenance and eventual demolition and removal etc.
- 4.11 The size, shape, profile and usage of the construction are the main factors which will determine construction techniques, these can be outlined as follows:-
- Large, unobstructed lobby space with flat roof and roof lanterns.
 - Open hall space (with potential to sub-divide with folding partitions).
 - Steep pitched roof and high vaulted ceilings.
 - Large glazed openings with minimal structural surrounds.
 - External cantilevered canopies.
- 4.12 The lobby roof could take the form of either soft-wood or engineered roof joists. The benefit of engineered joists is the increased possible span, without additional support whilst also allowing space to more easily pass services. This would however potentially increase the overall construction build up depth compared to a soft-wood timber roof, but does have the benefit of avoiding additional supporting elements.
- 4.13 This roof can be supported on either steel beams or Glulam timber beams. The steelwork would allow shallower section sizes, more easily hidden, and benefit from being able to be spliced and have smaller length sections delivered to site. The length of the required Glulam timbers would also increase the cost and likely lead time of sourcing the material.
- 4.14 The multi-use hall space with steep roof pitch and vaulted ceilings dictates that the construction will need to be of a framed nature; two types of construction that would be suitable are a steel frame or a timber Glulam portal frame.
- 4.15 The use of steel framing has the benefit of being able to finish the building either with or without the steelwork on show dependent on what type of finish is required. The construction allows for the vaulted ceiling along with providing all of the openings as required. This also allows for easier construction details to provide the cantilevered canopy area.
- 4.16 With the use of a Glulam portal structure, the structural elements will remain on show, but this can tie in with the Gothic aesthetics of the archways in the curved haunches of the post and rafter. A material consideration if using this form of construction will be the delivery and installation of the frame; as the post and rafter of each frame will come pre-fabricated, this may increase manufacture, delivery and installation / craneage costs.
- 4.17 Both of the forms of construction noted above will required infill panels to the external walls between frame lines. This could be formed in either traditional masonry cavity wall construction or insulated timber framing or SIPs panels. The best option can be chosen to provide the most thermally-efficient construction which can then also offset the sustainability of the choice of the main framing construction.

- 4.18 The completed ground investigation has suggested that there is the likely possibility of an amount of reuse of the existing foundation construction to the Hall. This can be where the existing and proposed walls line through. This will then limit the amount of excavation works following the initial demolition of the existing construction. It should be noted, however, that due to the proposed 'framed' construction, there will be the potential need for enlarged pad bases below the posts of the frame, which will mean the existing foundations would need altering in these locations.
- 4.19 Due to the level of the existing foundations, as taken from the completed ground investigation information, it is recommended that the new construction is formed on a suitable piled foundation. The form of piles would be devised by a specialist piling contractor, likely to be mini piles or small steel driven piles. The piles would support reinforced concrete ground beams to align with the walls and structure over.
- 4.20 Due to the proposed foundation type and likely fill material to upper layers a suspended floor construction should be considered. The most suitable form of construction is likely to be precast concrete Beam and Block floor, which would be to a specialist design. This comprises reinforced concrete inverted T shape beams which concrete blocks are set into to form the floor deck. Suitable screed, insulation, underfloor heating and finishes are then applied to the top of this.
- 4.21 Any timber structure set externally will require suitable specification in terms of treatment and finishes to limit future repair and maintenance works and aesthetics purposes.
- 4.22 Any steelwork set externally will require galvanising with any final finishes & cladding for aesthetics that will need further consideration.
- 4.23 The form / type of lift proposed for the vertical travel between ground & altered first floor pews area will need consideration. It may not be suitable to provide a lift that requires the forming of lift pit due to the proposed location within the existing church building and the adjacent cellar space. It would be prudent at this stage to discuss with a number of lift manufacturers their recommendations to suit the lift service requirements and expected occupancy etc.
- 4.24 Site access is to be considered due to the nature of the location and existing arched gateways into the car park and footpath adjacent the tower. Limitations of size of vehicle and crane access will require determination to ensure the proposed construction, i.e. Glulam frames, can be achieved. It is recommended to discuss with manufacturers with suitable experience of this form and size of construction to determine the overall suitability in terms of delivery and installation.
- 4.25 Access and safe routes for delivery of materials and goods is limited. It is envisaged that the steelwork would be delivered in smaller more manageable sections or as individual elements to facilitate erection and installation on site. If the Glulam option is chosen it must be considered that the length / size of the structural members will be larger as these can not be cut down into smaller pieces and assembled on site as per the steelwork option.
- 4.26 It is recommended that the advice of an experienced contractor familiar in these types of builds be consulted to ensure full viability of the scheme and to ensure the works can be fully facilitated.

5.0 DRAINAGE

- 5.01 Drainage information was obtained on site via the use of a CCTV survey, report findings are provided within Appendix C to include potential maintenance and repair strategy that will need to be considered alongside the proposed drainage design and installation works.
- 5.02 It was found that there were two main drain runs present on the site.
- Adjacent the main tower, a foul drain run exits below the wall of the south stairs, presumably from the kitchen, this run then goes in the direction towards Church Street and presumably connects into a public sewer.
 - The second drain runs in between the Church and Hall, having various rain water pipe connections from both the Church and the Hall. Towards the car park there is a foul connection into this drain, thus becoming combined. This falls in the direction towards Market Street. Whilst not witnessed within the survey, due to the next manhole being covered by a skip, it is presumed that this drain discharges into a public drain run within Market Street.
- 5.03 The scheme proposal will need acceptance of the local wate authority, and may require a reduction in discharge flow. This can be achieved by providing an attenuation tank and flow control device to help slow the final discharge rate of surface water.

5.0 POTENTIAL RISK / RESIDUAL RISK

- 5.01 Access and/or sufficient access to allow for the delivery and installation of the new proposed construction due to the limitations of the existing stie.
- 5.02 Access and full viability of works will need to be fully assessed and reviewed by competent contractors, familiar with undertaking these types of builds prior to progressing further.

For and on behalf of SGM Structural Design:



Darren Ford

MEng (Hons)

Director

SGM Structural Design Ltd

Appendices

Appendix A – Structural Schematic Plans

Appendix B – Ground Investigation Report

Appendix C – Drainage CCTV Survey Report

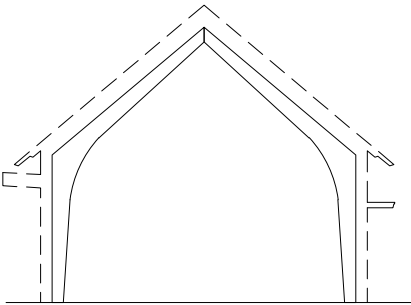
Appendix D – Cellar Trial Hole Photos

APPENDIX A

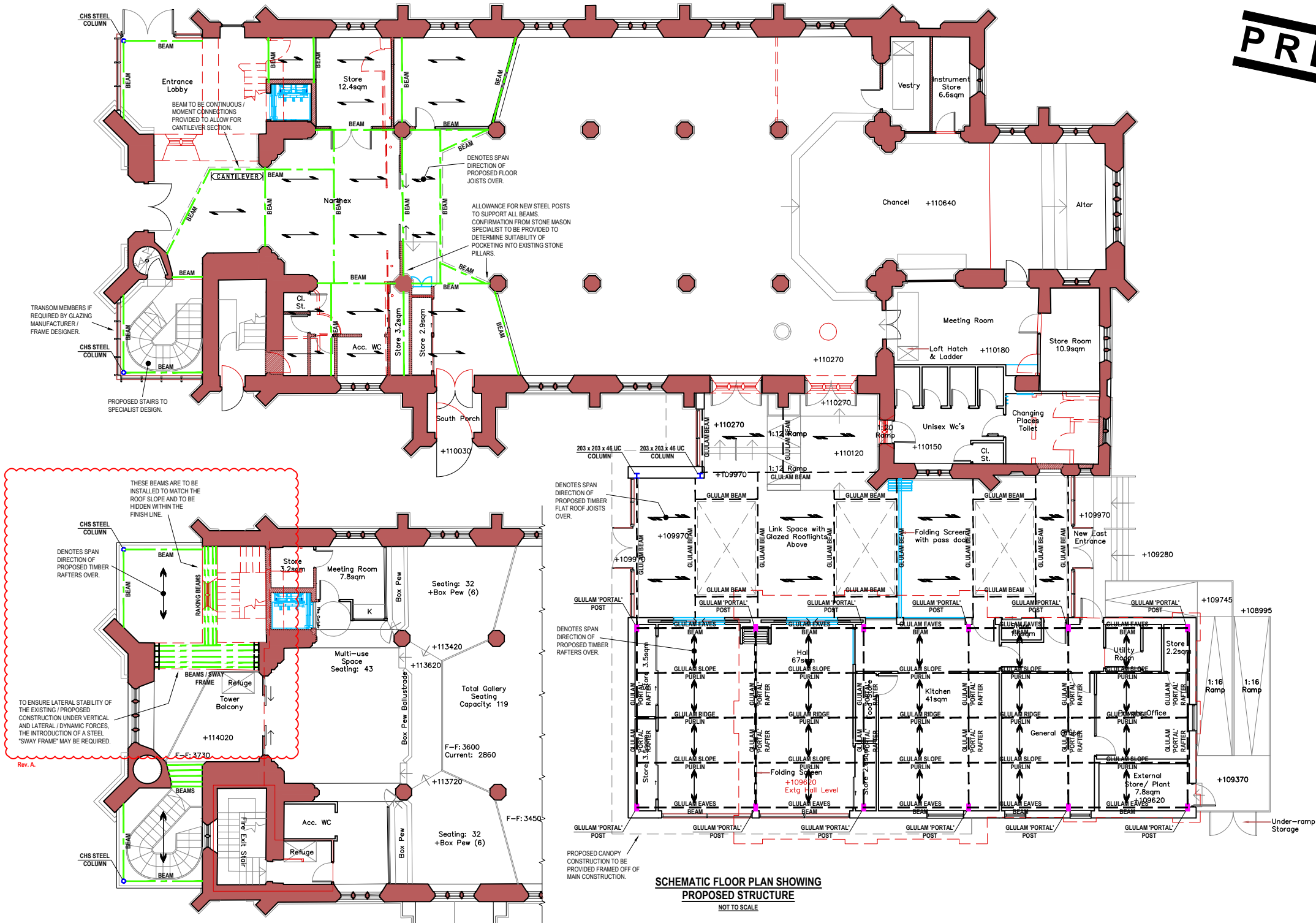
SCHEMATIC STRUCTURAL PLAN – 2024/249 – SK01

DRAWING STATUS	SHEET SIZE
PRELIMINARY CONCEPT	A3
NOTES	
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS.	
2. CONCRETE AND WORKMANSHIP TO BE IN ACCORDANCE WITH BS 8110, BS 8500 Part 1, AND BRE SPECIAL DIGEST No. 1.	
3. CONCRETE TO BE A DESIGNATED MIX SUPPLIED IN ACCORDANCE WITH THE RELEVANT CLAUSES OF BS 8500 Parts 1 AND 2: 2002.	
4. CONCRETE TO MASS BASES AND FOOTINGS (UNLESS NOTED OTHERWISE) TO BE GRADE RC 30-X0. MAXIMUM AGGREGATE SIZE TO BE 20mm TO BS 882. CONSISTENCY CLASS TO BE S3. BLINDING CONCRETE TO BE GEN 2 WITH A REQUIRED STRENGTH CLASS C12/15, HAVING A MINIMUM CHARACTERISTIC STRENGTH OF 15N/mm ² AND A MAXIMUM CEMENT CONTENT OF 200kg/m ³ . CONSISTENCY CLASS TO BE S3.	
5. BASES TO BE FOUND ON UNDISTURBED NATURAL GROUND HAVING AN ALLOWABLE GROUND BEARING PRESSURE OF 100N/mm ² . FOUNDATION TO BE INSPECTED BY THE ENGINEER PRIOR TO CONCRETING. OBTAIN ENGINEER'S GUIDANCE IF THE REQUIRED ALLOWABLE BEARING PRESSURE IS NOT ACHIEVED AT ANTICIPATED DEPTHS.	

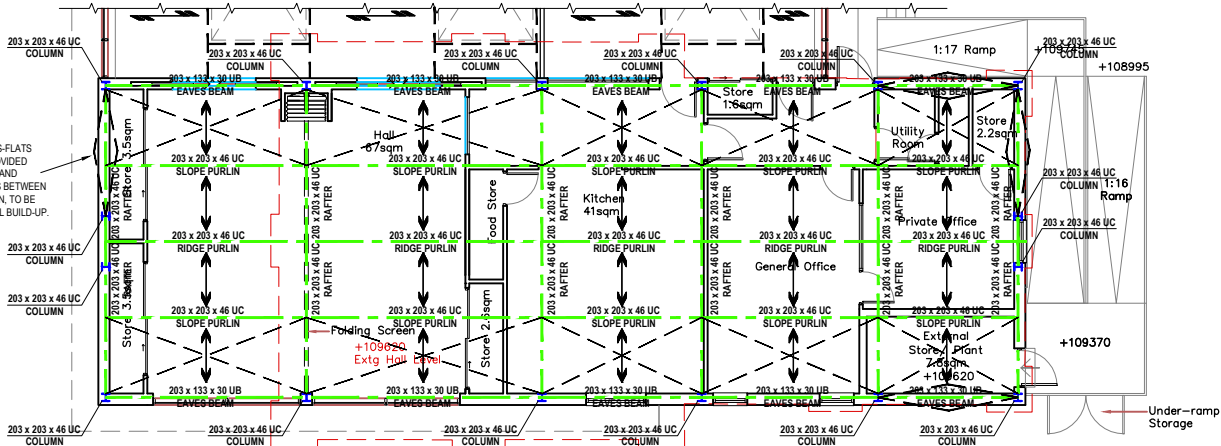
"PRELIMINARY DRAWING" TO ONLY BE USED TO DETERMINE CONSTRUCTION PROPOSALS - FULL DESIGN TO BE COMPLETED PRIOR TO CONSTRUCTION / FABRICATION. NO OTHER USE OF THIS DRAWING IS PERMITTED.



SCHEMATIC SECTION THROUGH PROPOSED GLULAM PORTAL
NOT TO SCALE



SCHEMATIC FLOOR PLAN SHOWING PROPOSED STRUCTURE
NOT TO SCALE



SCHEMATIC FLOOR PLAN SHOWING PROPOSED STRUCTURE (Steel Framed Construction)
NOT TO SCALE

SCHEMATIC FIRST FLOOR PLAN SHOWING PROPOSED STRUCTURE
NOT TO SCALE

PROJECT St. Andrew's Church, KEIGHLEY, BD21 5HT				
TITLE PRELIMINARY CONCEPT FLOOR PLANS SHOWING STRUCTURE OVER				
PROJECT No. 2024/249	DRAWING No. SK 01	AMENDMENT A	DATE DRAWN 10 DEC 24	DRAWN BY DF
Amendment Note A - Amended as clouded.			Date Revised 06 / 08 / 2025	

SGM

STRUCTURAL DESIGN

SPRINGFIELD LODGE
4 THORNHILL ROAD
EDGERTON
HUDDERSFIELD
HD3 3AU

Tel 01484 435876

APPENDIX B

GROUND INVESTIGATION

Ground Investigation Report (intrusive)

St Andrew's Church, Keighley



Ground Investigation Report [intrusive]

St Andrew’s Church, Keighley

Report Status

Project Number	20442
Report Number	001
Revision	V01 – Issue for information
Date Issued	16 December 2024 (V01)

Report Author

Russell Bowman (Director) BSc (Hons) MSc CEng CWEM MCIWEM

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Appendices Drawings > Exploratory Hole Logs > In-Situ Testing Results

Annexes Guidance Notes on: Unexpected material encounters; and, material suitability.

Appointment

Soil and Structures Ltd were instructed by Church on the Green Neighbourhood Foundation (the Client) in October 2024 to prepare a Ground Investigation Report (this Report) in support of planned development works at St Andrew’s Church, Keighley (the Site).

Development proposals include for extension of the existing church building, including a connection into the main church structure, as well as the expansion of car parking facilities.

Reliance on the advice presented herein rests solely with the Client and the Parochial Church Council of the Ecclesiastical Parish of Keighley.

Ground Investigation Reports

In the ground everything is inter-related: from strength to pollution potential; through to, stability and drainage characteristics. Any groundworks completed as part of a development project will therefore influence, and be influenced, by all these inter-related elements.

This Report presents: an overview of the Site setting, the anticipated ground conditions and, where structures are present, the anticipated foundations. The Report also offers more specific advice as discussed below.

Scope and Context

The Ground Investigation Report offers ground engineering advice with respect to the proposed development of the Site.

This intrusive ground investigation offers a snapshot of ground conditions at discrete locations across the Site and seeks to reconcile these findings with the Site setting to offer as complete a picture of the ground as possible. An assessment of the likely consistency of ground conditions is offered however, variations between exploratory hole positions cannot be ruled out.

The legal context of this advice relates to an assessment of:

- i) Potential ground-related hazards that may affect the development that is governed by health and safety law (various acts and regulations).

Fieldwork

This Report references intrusive investigation fieldworks that were scoped and supervised by the author of the Report.

Background to this Report

This Report is preceded by various, non-intrusive archaeological investigations completed across the Site but no other ground-related reporting.

References

The Ground Investigation Report has been written with reference to various sources of information. These are either appended or included as footnotes at the base of each respective page.

Guidance notes for: i) unexpected material encounters; and, ii) material suitability are included as annexes. These are intended to offer further context and advice on these different aspects of site investigation and groundworks.

Ground Investigation Report [intrusive]

St Andrew’s Church, Keighley

1.0 The Site and Proposed Development

1.1 The Site

Location and size: The Site comprises an existing church (St Andrew’s Church, Keighley), adjacent church hall building and associated hardstanding and soft landscaping.

Access: At the point of the fieldworks, the Site was accessed on foot and vehicle via a gated entrance on the eastern boundary of the Site off Church Street / Market Street. The gate has height and width restrictions.

Topography: The surface topography of the Site is generally flat but, along the midline of the church hall building, falls steeply towards the south.

Utilities: Below ground utilities are understood to be present beneath the Site.

Existing structures: At the point of the fieldworks, the Site was occupied by the existing church structure and church hall building. No obvious signs of structural distress that might be associated with ground movement were observed on the latter with localised, minor signs of structural distress noted on the south-eastern corner of the church¹.

1.2 Proposed Development

Development proposals: include for extension of the existing church building, including a connection into the main church structure, as well as the expansion of car parking facilities as illustrated in Figure 1.

① Development works and risk: An appreciation of the construction processes is essential for development-related risk assessments given the groundworks stand to meaningfully alter the level of risk, e.g. unstable slopes being removed by earthworks, or unsuitable material being exposed as part of the works.

To enable this development, the following groundworks are likely to be required, N.B. listing is outline only.

- > **Preparation:** Site strip of surface materials and vegetation over the proposed development footprints.
- > **Earthworks:** Given the relatively flat topography across the proposed extension, no cut and fill operations are anticipated to be required with any level changes likely accommodated as part of the structure, mimicking the existing church hall building.
- > **Utility Excavations:** Excavation of drainage and other utility alignments.
- > **Foundations:** Construction of new sub-structures (foundations and floor slabs) followed by construction of the structures.
- > **Surfacing:** Formation of hardstanding and soft landscaping areas.

① Risk profile of the proposed development for human health: The proposed development would see an existing place of worship extended. The sensitivity of the development therefore remains unchanged. Given it age (c. 1800s) the use of coal fires to heat the church stand to have degraded soil quality across the Site however, these are general hazards that relate to all buildings of this age.

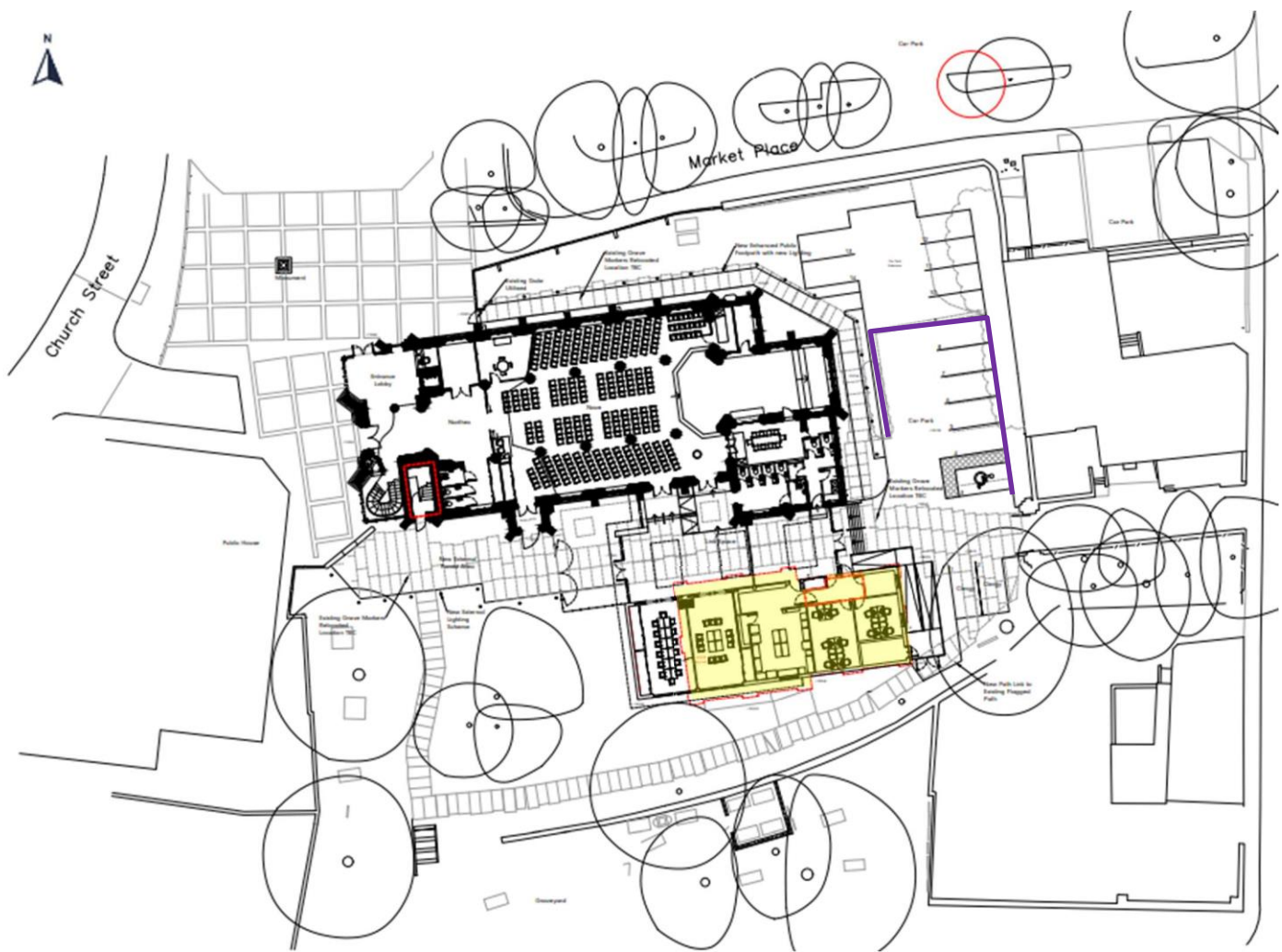


Figure 1: Location Plan

- > Extract from appended drawing
- > Approximate footprint of existing structure highlighted yellow and outlined in red
- > Northern edge of existing car parking provision illustrated by purple line
- > Site approximately centred on NGR 406084, 440988

¹ This commentary does not represent a structural condition survey with the advice of a structural engineer recommended to accurately assess the performance of the existing structures



Photograph 1: Stitched panorama from the western portion of the Site looking east towards the existing church hall



Photograph 2: View from the eastern portion of the Site looking west towards the existing church hall

Ground Investigation Report [intrusive]

St Andrew’s Church, Keighley

2.0 Site Setting

2.1 History

The Site has been subject to one phase of use since the 1850s (the earliest ordnance survey mapping):

> **The first phase – 1850s to present day:** St Andrew’s Church

Evidence of potentially harmful material and **evidence of potentially gas generating material:** Through this phase of use there is a low likelihood that potentially harmful material would have been introduced into the Site’s soils.

Given it age the use of coal fires to heat the church stand to have degraded soil quality across the Site (spreading around the structure is common) however, this is a general hazard that relates to all buildings of this age.

The adjacent church hall building (former methodist church) appears to have been constructed at some point after the 1950s.

Evidence of mining activities: No evidence of coal or non-coal mining features, e.g. old shafts or soughs, is recorded on the Site over this period.

Evidence of unexploded ordnance: Military land use: There is no evidence of the Site having been put to military uses on historical mapping or on internet searches. History of bombing: local features, e.g. industrial centre of Keighley, would have been strategic targets during both the First and Second World Wars however, none are recorded locally to the Site with bombing density expected to have been low in this area based on National Archive data.

The surrounding area is currently characterised by land uses consistent with a predominantly commercial economy being located within the centre of Keighley. Former and current works buildings are noted to the south-west and south-east of the Site.

2.2 Geology

Recorded geology: The Site is recorded being underlain by:

- > Superficial soils comprising: the Alluvial Fan Deposits (sand and gravel)
- > Bedrock comprising; the Doubler Stone Formation (Sandstone)²

Given the marked change of ground levels towards the south of the Site, it is likely that ground levels were historically lifted to form the more level plateau onto which the existing church hall building is constructed. On this basis Made Ground deposits were anticipated with depths of up to circa 3.00 m predicted based on a comparison of ground levels on adjacent sites.

Exploratory holes: Exploratory hole records are not available for the Site itself but are present locally within the same geological unit (close enough to be representative).

A brief synopsis of these borehole logs is presented on Figure 2 noting that the relative elevations compared to the Site are estimated based on satellite imagery.

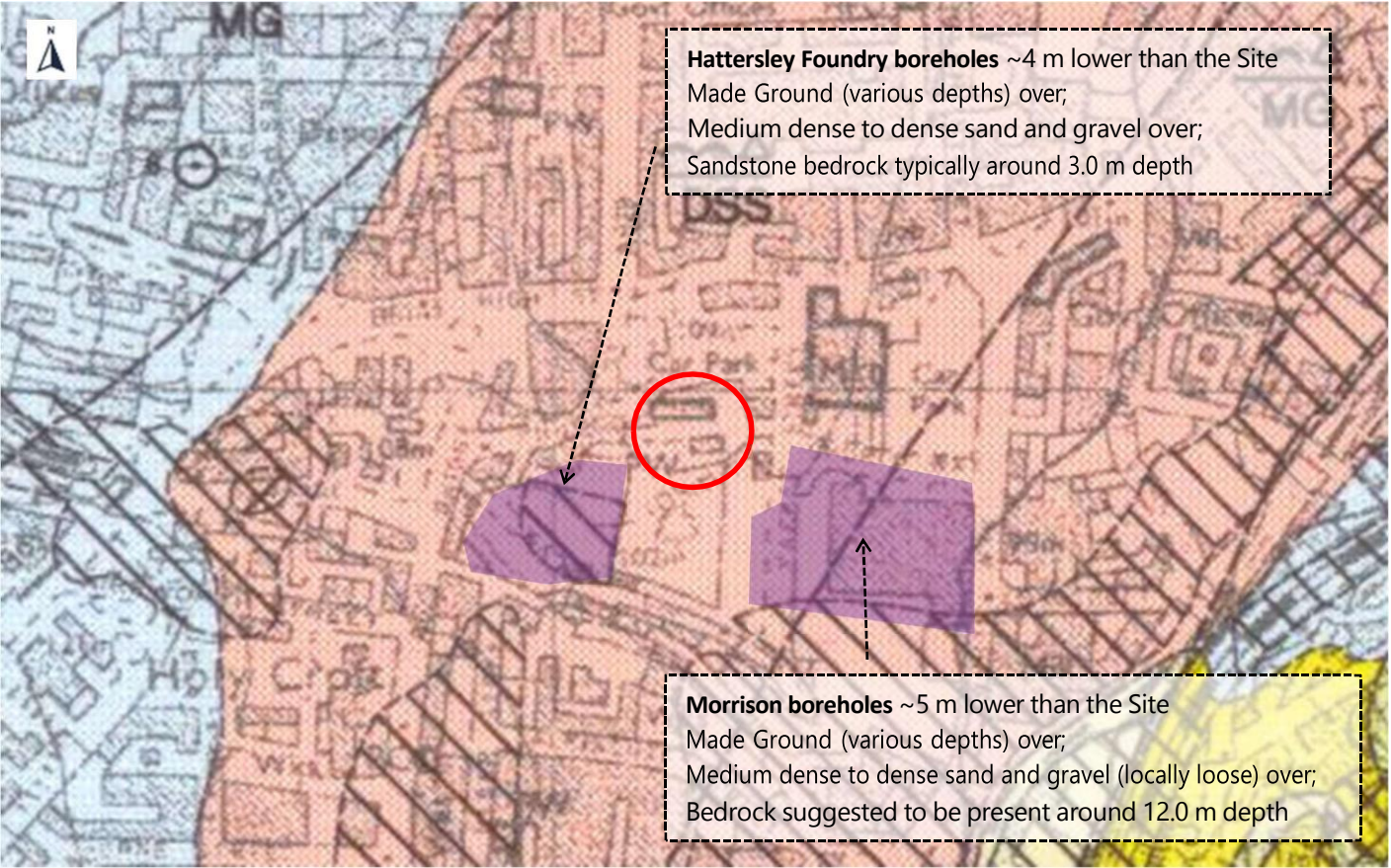


Figure 2: Geological Mapping

- > Extract from the BGS 1:10,000 map solid and drift edition, reproduced under Open Government Licence (v3.0).
- > Location of the Site identified by red circle.

Geological hazards: Based on this recorded geology, it is generally unlikely that most geological hazards will impact the Site (running sand, collapsible soils, landslips) with the typically moderate strength characteristics of the Alluvial Fan deposits resulting in more favourable ground conditions. The possible exception to this is the possible Made Ground deposits that would be anticipated to be more variable in composition and strength characteristics.

Coal and non-coal mining: No coal or non-coal mine workings are recorded beneath the Site³ nor are they anticipated.

² [BGS Lexicon of Named Rock Units - Result Details](#)

³ [Interactive Map Viewer | Coal Authority \(bgs.ac.uk\)](#)

2.3 Recorded Hydrogeology & Hydrology

A water catchment is divided into two main elements; groundwater (hydrogeology) and surface water (hydrology). The groundwater regime is primarily governed by the geology and the surface water regime by the topography and surface cover. For any given site, these regimes are likely to influence each other and be influenced by off-site factors, e.g. groundwater levels being ‘recharged’ higher up a catchment.

The Site’s drainage regime is influenced by:

- i) Its location at the watershed of two, heavily modified, urban catchments of; North Beck from Source to River Worth⁴ and, Worth from Brighouse Beck to River Aire⁵;
- ii) The Site’s predominance of ‘hard’ cover (structures and hardstanding) and varied topography, resulting in a tendency for surface water to likely; drain to the existing piped networks for the structure (outfall unknown) or, across areas of soft cover, drain to ground.

It is understood from discussions with the caretaker of the church that localised flooding previously occurred to the east of the existing car park (likely due to inadequate/blocked drainage) that has since been resolved though an upgrade to the pre-existing, dilapidated drain;
- iii) The anticipated ground conditions are expected to exhibit variably rates of infiltration with ‘f’ provisionally estimated to be between 10⁻³ to 10⁻⁸ m/s within what is anticipated to be Made Ground deposits;
- iv) The Site being classified at very low risk with respect to river, reservoir and surface water flooding⁶.
- v) The Site being located on a Secondary A Superficial and Bedrock Aquifers and outside of Source Protection Zones (SPZs)⁷; and,
- vi) Historical borehole records locally indicating groundwater is likely deeper than 5 m below ground level across the Site.

The nearest surface water feature is an open watercourse (North Beck) located around 90 m south of the Site at its nearest point.

2.4 Environmental Setting

The environmental setting relates to land designations either on-site or within the surrounding area that have the potential to influence or present a risk to the proposed development.

Landfills (historic and active) are not recorded within 250 m of the Site^{8,9}, the distance across which viable pathways for gas migration are more likely.

Historic infilled land, e.g. ponds and quarries (excluding landfill above) are not evidenced within 100 m of the Site noting that historic filling operations are suggested to have occurred across the Site to create the more level plateau across which the existing church hall building is present.

Historic and current industrial sites are not recorded on the Site with a former warehouse structure previously present immediately south-east of the Site.

Statutory protected areas, e.g. SSSI are not recorded on the Site¹³ noting that the ground is likely partially or fully consecrated.

Radon is emitted from naturally sources within a range of geologies. The United Kingdom Health Security Agency (UKHSA) data¹⁰ indicates between 3 to 5 % of dwellings are expected to be above the Action Level (200 Bq m⁻³).

This wouldn’t necessarily guide the requirement for basic radon protection to be included as part of the proposed extension given the higher workplace limits however, given the low cost of protection measures, they are recommended.

⁴ [North Beck from Source to River Worth | Catchment Data Explorer | Catchment Data Explorer](#)
⁵ [Worth from Bridgehouse Beck to R Aire | Catchment Data Explorer | Catchment Data Explorer](#)
⁶ [Your long term flood risk assessment - GOV.UK \(check-long-term-flood-risk.service.gov.uk\)](#)

⁷ [Magic Map Application \(defra.gov.uk\)](#)
⁸ [Historic Landfill Sites - data.gov.uk](#)
⁹ [Permitted Waste Sites - Authorised Landfill Site Boundaries - data.gov.uk](#)
¹⁰ [UKradon - UK maps of radon](#)

3.0 Intrusive Investigation and Laboratory Testing

The intrusive investigation (Table 1) was designed in general accordance with guidance for site investigation¹¹, with reference to the Site setting, the anticipated ground conditions, access arrangements and responding to the revealed ground conditions.

① Comments on the scope of works: The presence of an existing structure, the stability/condition of which was considered generally ‘good’, guided foundation investigations to establish a viable solution for the proposed extension.

Investigation of the existing church’s foundations was not scoped by the Structural Engineer but commentary on their anticipated nature and depth is included within Section 4.0.

The access arrangements and local experience of the Author also guided the use of easily deployable, portable investigation techniques to obtain deeper data from the ground.

Unexpected or unforeseen ground conditions may be encountered even when extensive investigation is completed.

In this scenario, further investigation may be warranted to refine the recommended piled foundation solution.

Exploratory hole locations are illustrated on the Ground Model in Section 5.0 with descriptions of the materials encountered detailed within the following section, Section 4.0.

The exploratory hole logs are appended.

Permits: No specific permissions were required for the intrusive investigation fieldworks.

Table 1: Scope and Rationale of the Intrusive Investigation

Activity	Ref.	Rationale
Exploratory Holes		
3 hand excavated trial pits	HP101 to HP103	To investigate the existing foundations and ground conditions locally to the existing church hall building (HP101 and HP102) and ground conditions across the proposed car park extension (HP103).
In-Situ Testing		
3 dynamic cone penetration tests (TRL Probing)	DCP101 to DCP103	To investigate the density profile of the ground conditions locally to the proposed car park extension.
Logging of soil arisings from exploratory holes.	All holes	To characterise: ground conditions; existing foundations; and support classification of materials present in the ground. Material descriptions are detailed in the notes on the Ground Model in Section 5.0, the accompanying exploratory hole logs and strata depths on the plan itself.

Geotechnical samples were not obtained given the nature of the materials encountered within the exploratory holes (construction materials, e.g. pea-gravel and, debris from the original construction of the church hall) and the Author’s experience of testing the Alluvial Fan Deposits within the Keighley area (within which sulphate concentrations and pH levels remain with DS-1 AC-1 classifications).

¹¹ Code of practice for site investigations. BS 5930 (2015)

Environmental samples were not obtained given the absence of potentially harmful or polluting material.

Ground gas monitoring was not undertaken given the lack of landfills or other sources of potential ground gas identified within 250 m of the Site or within the Site’s soils (no evidence of potential ground gas ‘hazards’).

4.0 Ground Conditions & Existing Foundations – Anticipated and Revealed

Anticipated ground conditions: Based on the Site setting the presence of three main materials were anticipated across the Site: (1) **surface coverings**, e.g. Topsoil or hardstanding over; (2) **Made Ground** deposits likely recovered as reworked natural soils and construction materials from either the church’s original construction or the subsequent development of the church hall building); over, (3) **Alluvial Fan Deposits** that locally are recorded as sand and gravel with localise cobble beds and cohesive lenses (silt/clay).

Revealed ground conditions: The intrusive investigation undertaken on Site confirmed the anticipated conditions with one variation and two observations:

- > Variation 1: The presence of Alluvial Fan Deposits was inferred by a marked increase in density within the dynamic probing with these soils typically having ‘good’ strength characteristics (well graded granular material);
- > Observation 1: Groundwater was not encountered within 4.0 m of the ground surface (deepest depth exploratory holes were taken) with the groundwater table anticipated to be at least 5.0 m below ground level locally; and,
- > Observation 2: No evidence of potentially harmful or polluting material was encountered within the exploratory holes.

The Ground Model for the Site is presented in Section 5.0 and includes further commentary on the ground conditions.

Anticipated foundations: Based on the above ground conditions but with specific reference to the local ground levels, the existing church hall structure was anticipated to be ‘deeply’ founded on spread footings.

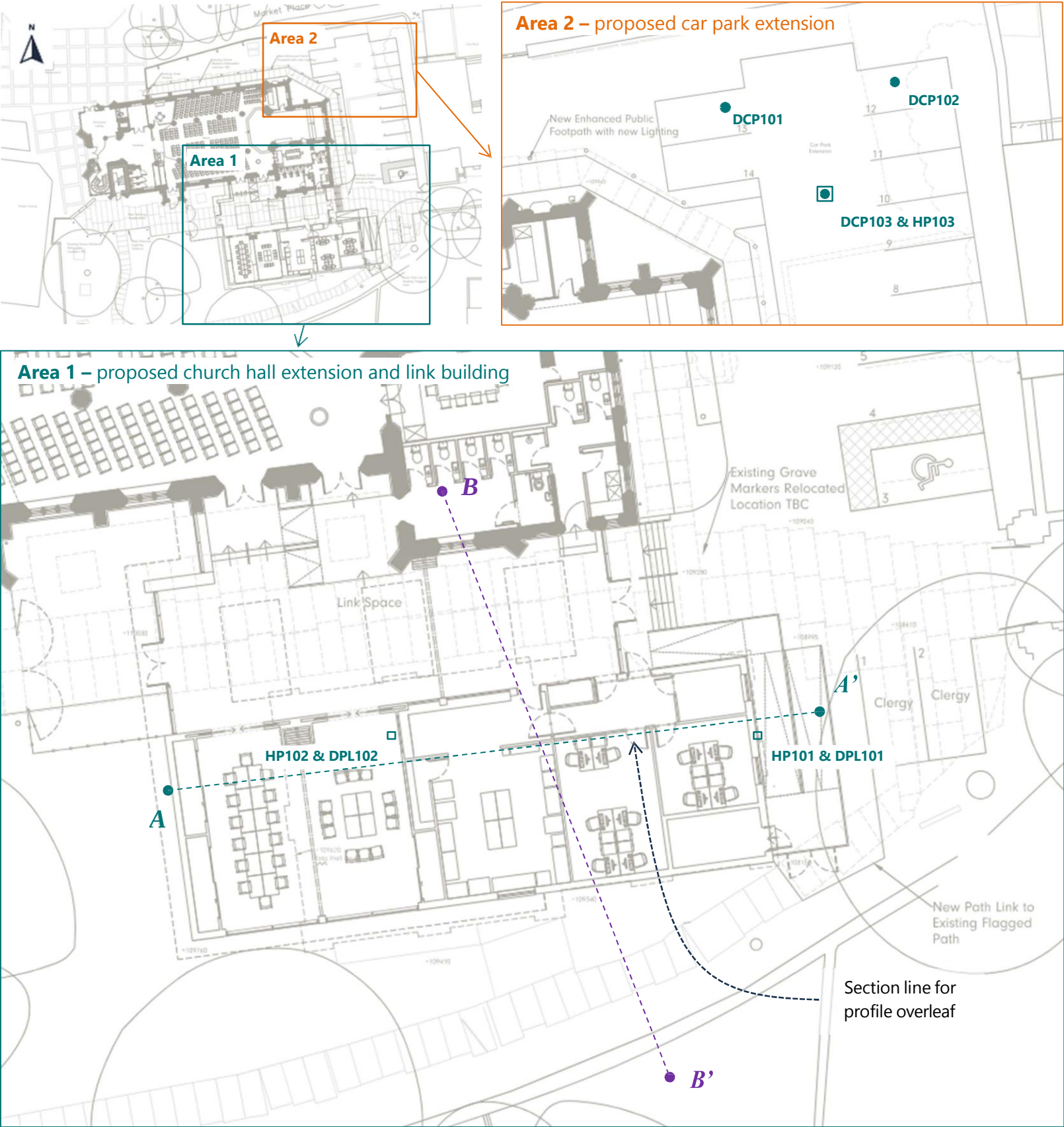
The depth of the church hall foundations was anticipated to be primarily guided by the proximity of this structure’s south-eastern corner to the adjacent retaining wall (former warehouse wall) as well as the proximity of the retaining wall south of the church structure.

The depth of the church’s foundations was anticipated to be ‘shallow’ (within 2.00 m of the ground surface) and comprised of ‘spread’, likely corbelled or flagstone supported footings.

Revealed foundations: Foundation investigations (HP101 and HP102) across the church hall confirmed ‘deep’, spread footings (at least 1.85 m below ground level; HP101, but likely deeper than 2.50 m below ground level).

Evidence of the former church hall having been constructed within temporary formwork was noted, i.e. the breezeblock wall on the outer face of the mass concrete footing, suggesting that ‘deep’ temporary works were employed when the church hall was constructed.

5.0 Ground Model – Plan



Key

Soil and Structures – October 2024 investigation

- Hand excavated trial pit (HP) with follow-on dynamic probe light (DPL) in HP101 and HP102
- Dynamic cone penetration test location (DCP)

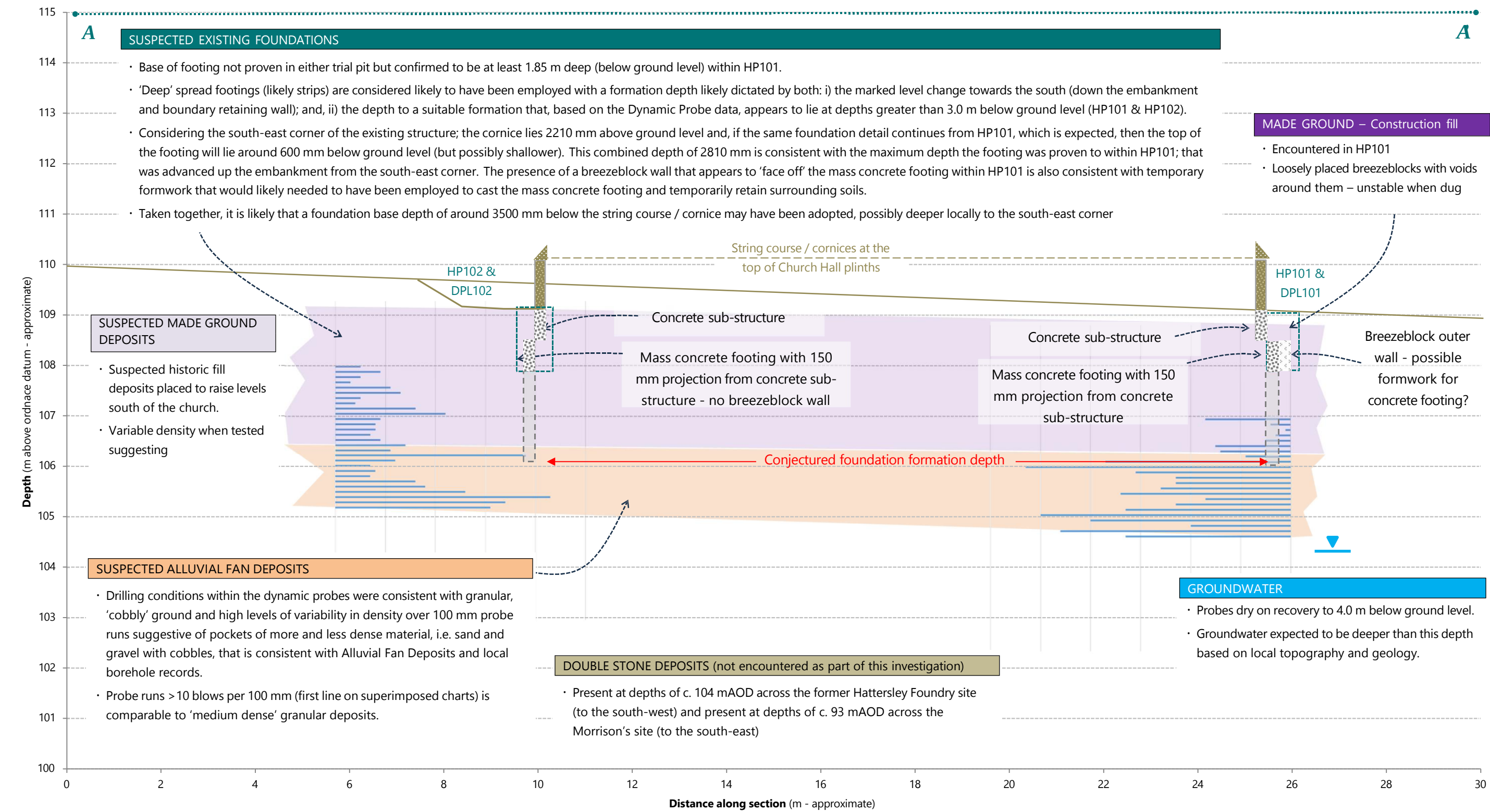
Ground Conditions

- > **Surface cover** across both areas comprised a thin Topsoil cover (with paving slabs noted in HP102)
- > **Made Ground** deposits were encountered within all exploratory hole locations.
Across Area 1 (proposed church hall extension and link building) these deposits comprised construction materials associated with the church hall’s original construction and were proven to a depth of 1.20 m below ground level.
Across Area 2 (proposed car park extension) these deposits comprised ‘ash fill’ over ‘sandstone fil’ that likely relates to the original church’s construction.
- > **The suspected Alluvial Fan Deposits** were inferred to be present within DPL101 and DPL102 based on the marked increase in density at depths that are consistent with the anticipate depth of Made Ground deposits.
Geotechnical characteristics:
 - ‘Medium dense’ to ‘dense’ consistency with an angle of internal friction (F) indicated to be upwards of 33 degrees based on the dynamic probe results;
 - Low sulphate content (<500 mg/l); and
 - Near neutral pH (pH 6 to 8).Based on exploratory hole logs and Author’s experience of testing this geology locally.
- > **Groundwater** was not encountered within 4.00 m of the ground surface locally to the church hall.
- > Apart from the ash content within HP103, no visual or olfactory evidence **potentially harmful or polluting material** was encountered on the Site or within any of the exploratory holes.
- > Apart from roots relating to former trees within HP103, no evidence of **degradable material** was encountered within the exploratory holes.

Screening of Ground Related Hazards

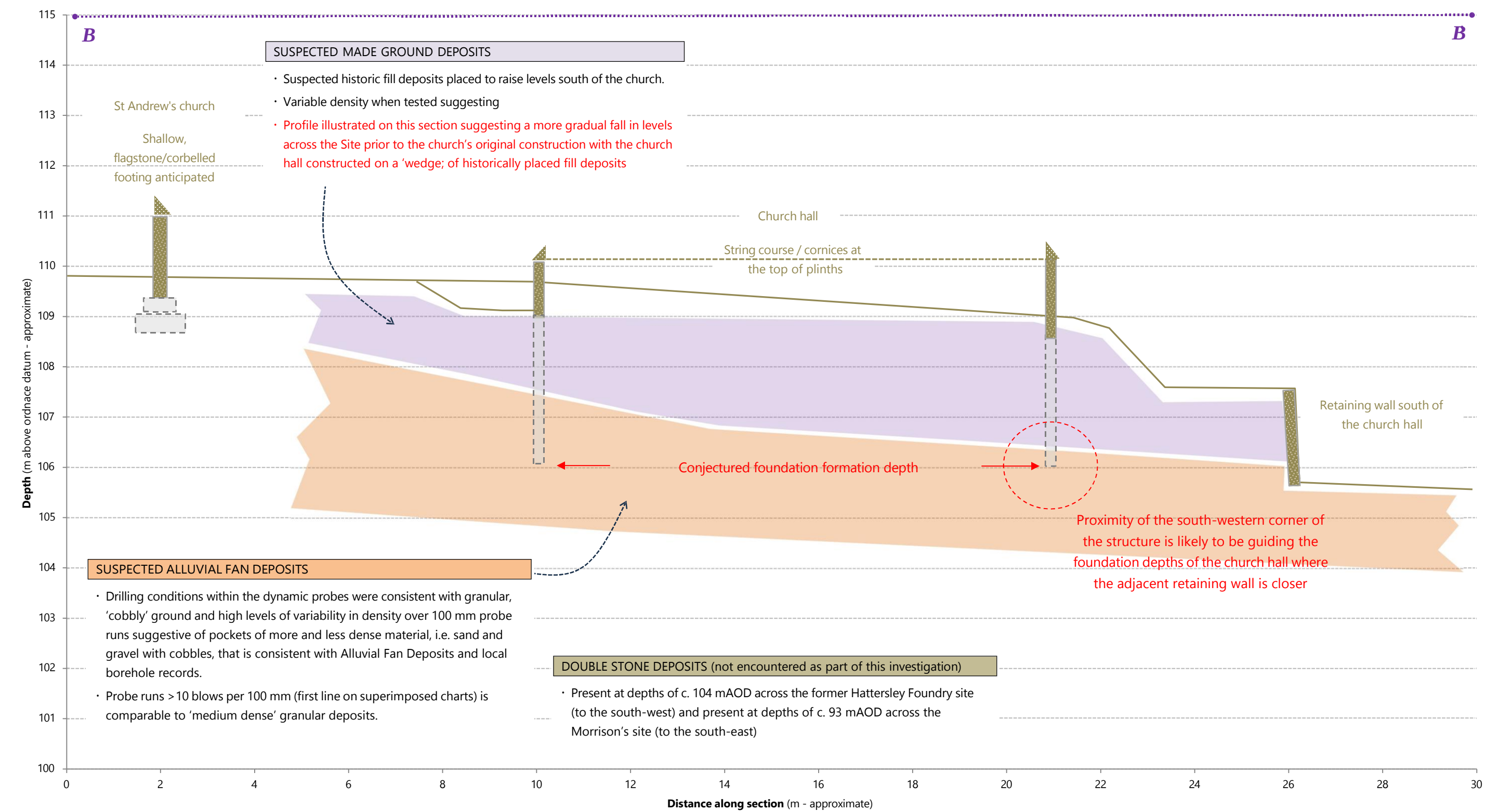
Based on the revealed ground conditions, ground-related hazards identified that could influence the proposed development all relate to the presence of the Made Ground deposits with the depth and inherent variability/instability of these soils informing design decisions.
Please refer to Section 6.0 for further commentary and advice.

5.0 Ground Model – Profile



Illustrative / conceptual only – do not scale from drawing

5.0 Ground Model – Profile



Illustrative / conceptual only – do not scale from drawing

6.0 Ground Engineering – Risk Management & Design Considerations

④ Topographical survey and development levels: The following design advice carries through assumptions and estimations of existing ground levels and proposed formation levels from satellite imagery. In general, the advice is not expected to vary should more accurate, surveyed levels become available however, attention is drawn to this.

The main design considerations include, but are not limited to;

- > Low to moderate imposed loads of the proposed extension;
- > Anticipated ‘shallow’ spread footings supporting the existing church;
- > ‘Deep’ spread footings supporting the existing church hall; and,
- > The presence of moderate to high strength bedrock deposits (Doubler Stone sandstone) at depths that locally lie between 93 and 104 mAOD (based on satellite imagery data).

Ground-related hazards: Based on the revealed ground conditions, ground-related hazards identified that could influence the proposed development all relate to the presence of the Made Ground deposits with the depth and inherent variability/instability of these soils informing design decisions.

④ Utilities: Utility strikes represent one of the highest background threats of injury, death and programme delays of all the ground-related hazards. The presence of existing utilities is a hazard that presents for all groundworks activities and hence is generally subject to separate investigations and assessments by utility specialists. Reference is included within this Report for completeness.

6.1 General Groundworks

Excavations are expected to be progressed at typical rates through the shallow Topsoil into the Made Ground deposits employing a medium sized excavator, e.g. 3CX with any bucket.

Excavations taken deeper than 1.00 m below ground level are expected to be subject to increasing instability within the Made Ground deposits and are therefore likely to require short-term temporary support.

④ Excavation access personnel access into any excavations should only be undertaken with adequate support and appropriate risk assessment. Further guidance is available¹².

Excavations are expected to be generally free draining in the Made Ground deposits with a pump unlikely to be required unless more silty deposits are encountered.

Earthworks (cut and fill). No cut and fill operations are expected to be required as part of the proposed development (beyond shallow surface scrape to achieve formation levels across both development areas).

Material suitability for re-use (geotechnical and environmental).

Re-use of excavated materials is unlikely to be sought in this scenario with most excavation arisings likely to be removed from Site.

④ Materials management planning: For all scenarios, developing a strategy for management of materials and waste streams in advance of the works is recommended to minimise handling and maintain soil conditioning, e.g. not repeatedly handling or compacting.

Waste classification of excavation arisings for any material surplus to requirements (requiring disposal) will need to be agreed with the groundworks contractor in line with current guidance¹³. Groundworks contractors have access to waste brokerage firms and landfills directly where acceptance criteria can vary and, as such, are generally best placed to confirm waste classifications. On this basis, it is recommended that any waste classification is confirmed in advance by the groundworks contractor with the following advice offered on a preliminary basis.

Any Made Ground deposits recovered from Site are likely to comprise construction materials placed as part of the church or church hall’s original development, e.g. sub-base deposits beneath hardstanding surfaces, but may also include discarded construction materials placed as part of the structures’ original construction. Overall, these materials are anticipated to be natural, and therefore also likely to be classed as Soil and Stones (EWC 17 05 04) if requiring off-Site disposal however, attention should be given to the potential presence of discrete pockets of material that may change this classification, e.g. asbestos containing material.

The waste classification of soils is something that should be approached in a step-wise manner first confirming whether or not a soil is Hazardous or Non-Hazardous (through solid soil testing) followed by Waste Acceptance Criteria testing only when and where off-Site disposal is confirmed as the fate for the material.

If and where there are any questions relating to the waste classification process, these can be referred to the Author of this Report.

6.2 Structural Engineering

Proposed foundations (church hall extension): Foundation options in this setting but will be guided by the presence of a deep profile of low, or variable, strength soils (likely Made Ground deposits) across the existing church hall footprint.

④ Foundation optioneering: Decisions on a foundation solution are guided by both technical and financial constraints. The advice below sets out lines of evidence for what the Author considers likely to be both the most technically suitable and cost-beneficial foundation solution. It should be borne in mind that other factors, e.g. contractor preferences or lead-in times and construction speeds, can have equal bearing on the ultimate decision.

The use of a **piled foundation solution** is recommended in this scenario guided by:

- a) The requirement to transfer structural loads onto the Alluvial Fan Deposits (or deeper sandstone of the Double Stone Formation) that, across the southern portion of the proposed extension, may be as deep as 3 m below ground level;
- b) The requirement to limit total settlement to levels that are a low as practicable given the potential for otherwise acceptable levels of settlement across a detached structure to give rise to excessive differential settlement, N.B. limiting the likelihood of excessive differential settlement be achieved with spread footings through construction sequencing and provision of adequate movement joints; and,

¹² CIRIA Report 97 - Trenching Practice - Second Edition (1992)

¹³ [Waste classification technical guidance - GOV.UK](#)

- c) The requirement for extensive and likely costly temporary works associated with a spread footing, as indicated to have been required as part of the original church structure’s construction

Alternatives to a piled foundation solution are not considered further for the following reasons.

- > The use of a rafted foundation solution is not recommended here given the apparent presence of a ‘wedge’ of Made Ground deposits across the proposed extension footprint that would likely give rise to excessive levels of differential settlement.

Very conservative design assumptions and/or extensive additional investigations, e.g. cone penetration testing could be employed to explore this option further.

- > The use of linear or square, spread footings is not recommended here given the requirement for ‘deep’ formation depths that give rise to the requirement for extensive temporary works (deep, supported excavations).

Piling systems are continuously evolving and it is therefore recommended that the advice of a piling contractor is sought to confirm the viability/suitability of different systems.

Specific advisories:

- > Based on the revealed ground conditions and anticipated nature of the Alluvial Fan deposits (that can include discrete cobble beds) the use of steel driven piles is likely to be the most favourable piling system; and,
- > For preliminary design purposes, bedrock (target depth for piles) could be taken as depths of between 93 to 104 mAOD that, with reference to the ground level across the church hall, would result in maximum pile lengths of around 16 m. It is noted that bedrock was present within 3 m of ground level across the former Hattersley Foundry site to the south-west that, relative to the Site, would translate to pile lengths of between 5 and 6 m.
- > It is understood that the proposed link structure will impart new structural loads onto the existing church structure that are either relatively low (< 15 % increase in imposed load) or, where necessary, can be provided cantilever support from piles remote from the existing church structure.

Floor slab design will be guided by the selected foundation solution.

Specific advisory:

- > The revealed ground conditions and recommended use of a piled foundation solution guides the adoption of a suspended ground floor slab.

Proposed foundations (ancillary structures): The inclusion of a new ramp access to the eastern elevation of the church hall will require a new foundation or foundations. The exact details of this ramp structure are unknown but it appears to comprise a ‘solid’ structure supported by load bearing masonry.

A present, the ground conditions locally comprise variably dense, openly voided fill deposits comprised of discarded construction materials, e.g. intact breezeblocks and concrete cobbles.

This material stands to give rise to levels of settlement that are more than 25 mm when loaded.

Similarly, the proximity of the adjoining retaining wall guides the requirement for a deep formation depth to avoid excessive lateral loading on this adjoining structure. This appears to have been the same design principle applied to the construction of the existing church hall.

It is therefore recommended that this access ramp is also piled. Attention will need to be given to vibration tolerances/loadings.

For vibration loadings, peak particle velocities (PPV) degrade logarithmically with distance with the threshold for residential dwellings (as a reference for the adjoining retaining wall) being 5 to 15 mm/s with other mitigation measures, e.g. cut-off trenches, possible where necessary. In any case, the acceptable limit will need to be set by the appointed piling contractor and the structural engineer.

Buried concrete placed in all soils encountered as part of this investigation is recommended to be conservatively designed to suit DS-2 AC-2 classifications¹⁴ based on the Author’s experience of testing the Alluvial Fan Deposits locally and the anticipated variability in the Made Ground deposits.

For buried concrete design purposes, groundwater should be regarded as ‘mobile’.

6.3 Civil Engineering

Hard-standing sub-grades will be subject to final design levels being agreed however, based on the revealed ground conditions and likely formation levels, the sub-grade across the car park extension is expected to comprise ‘sandstone fill’ that is expected to offer ‘good’ levels of support with a preliminary CBR of at least 4.0 % recommended when hardstanding is constructed from this formation (minimum depth 0.50 m below ground level).

Specific advisory:

- > The presence of former tree roots and relic roots within HP103 will guide the requirement for ‘chasing out’ this and other degradable material from the formation. The main mass of root systems are typically within 1 m of the ground surface and therefore deeper excavations outside of the main root ball are unlikely.

General advisory:

- > Through the process of the groundworks this material is expected to be extensively disturbed and/or compacted resulting in changes to its in-situ strength and therefore proof rolling of all formations using a minimum 500 mm wide vibratory roller is recommended to locate any soft spots and allow treatment (excavation and replacement with a suitable granular fill).

Drainage of the existing Site is expected to be controlled by drainage to the existing piped network.

Drainage to ground has not been explored in this scenario given the space restrictions / proximity of any drainage to ground infrastructure to existing structure ground.

The proposed car park extension replaces an existing area of soft landscaping across which drainage to ground is expected to be occurring in all but prolonged periods of heavy rainfall. The use of permeable paving is suggested to limit total piped discharge volumes.

Water supply pipes will likely all be laid within Made Ground deposits (c. 700 mm depth) the nature of which could vary across the pipe run.

Where laid at these depths, in these deposits, the soils are expected to present a low risk to water supply pipes (low likelihood of free phase hydrocarbons etc.) however, chemical testing is likely to be required by the water supplier to

⁵ 4.2 Building near trees - NHBC Standards 2021

¹⁴ BRE Special Digest 1 (2005) Concrete in aggressive ground, 3rd Edition. (2017).

Ground Investigation Report [intrusive]

St Andrew’s Church, Keighley

confirm this. At this stage this has not been completed with the cost of such testing commonly more than precautionary selection of material for new supply pipes.

On this basis, the use of barrier pipe (PE/Al/PE) is recommended for water supply pipes.

6.4 Landscaping

Soft landscaping formations are expected to be close to the existing levels within the soft landscaping potentially remaining largely unchanged/unaltered through the development works.

If required, imported soil forming materials should be sourced from a reputable supplier and tested ‘at source’ to confirm they are suitability for use. The suitability of the imported soil forming material should be confirmed in line with the local planning authority’s guidance.

6.5 Mechanical Engineering

Ground source heat pumps: Open loop ground source heat pumps screen as being favourable on the Site¹⁵. Closed loop systems are generally viable across a much broader range of geological and hydrogeological conditions.

Further testing, including a field trial would be recommended to confirm the performance of any borehole-based ground source heat pump system and the advice of a specialist consultant sought.

Attention should be given to:

- > Drilling conditions are expected to be generally favourable on Site noting that casing through the Alluvial Fan Deposits would be required; and,
- > The Doubler Stone Formation is a sandstone dominated sequence of rock. Sandstone typically has thermal conductivity of 2.80 W m⁻¹ K⁻¹ and thermal diffusivity of 1.645 x 10⁻⁶ m² s⁻¹¹⁶.

Artesian conditions could be encountered in this steeply profiled catchment.

Further guidance is available^{17, 18}.

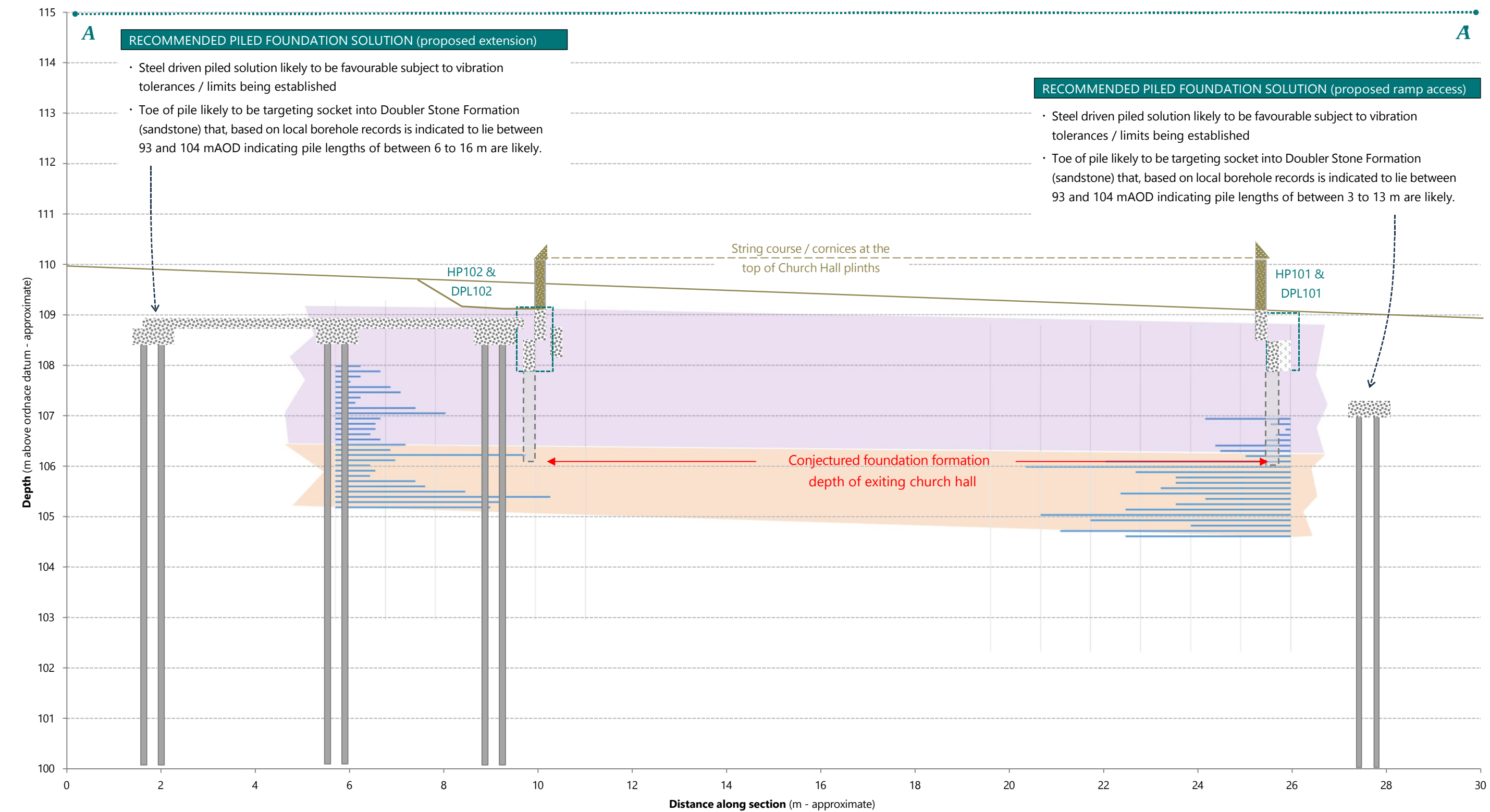
¹⁵ GSHP (bgs.ac.uk)

¹⁶ Busby et. Al. (undated) Initial Geological Considerations before Installing Ground Source Heat Pump Systems

¹⁷ Geothermal energy - British Geological Survey (bgs.ac.uk)

¹⁸ Who Are The Ground Source Heat Pump Association | GSHPA

Post-Development Conceptualisation



Illustrative / conceptual only – do not scale from drawing

7.0 Conclusions and Recommendations

7.1 Conclusions

In conclusion, the Ground Investigation Report finds;

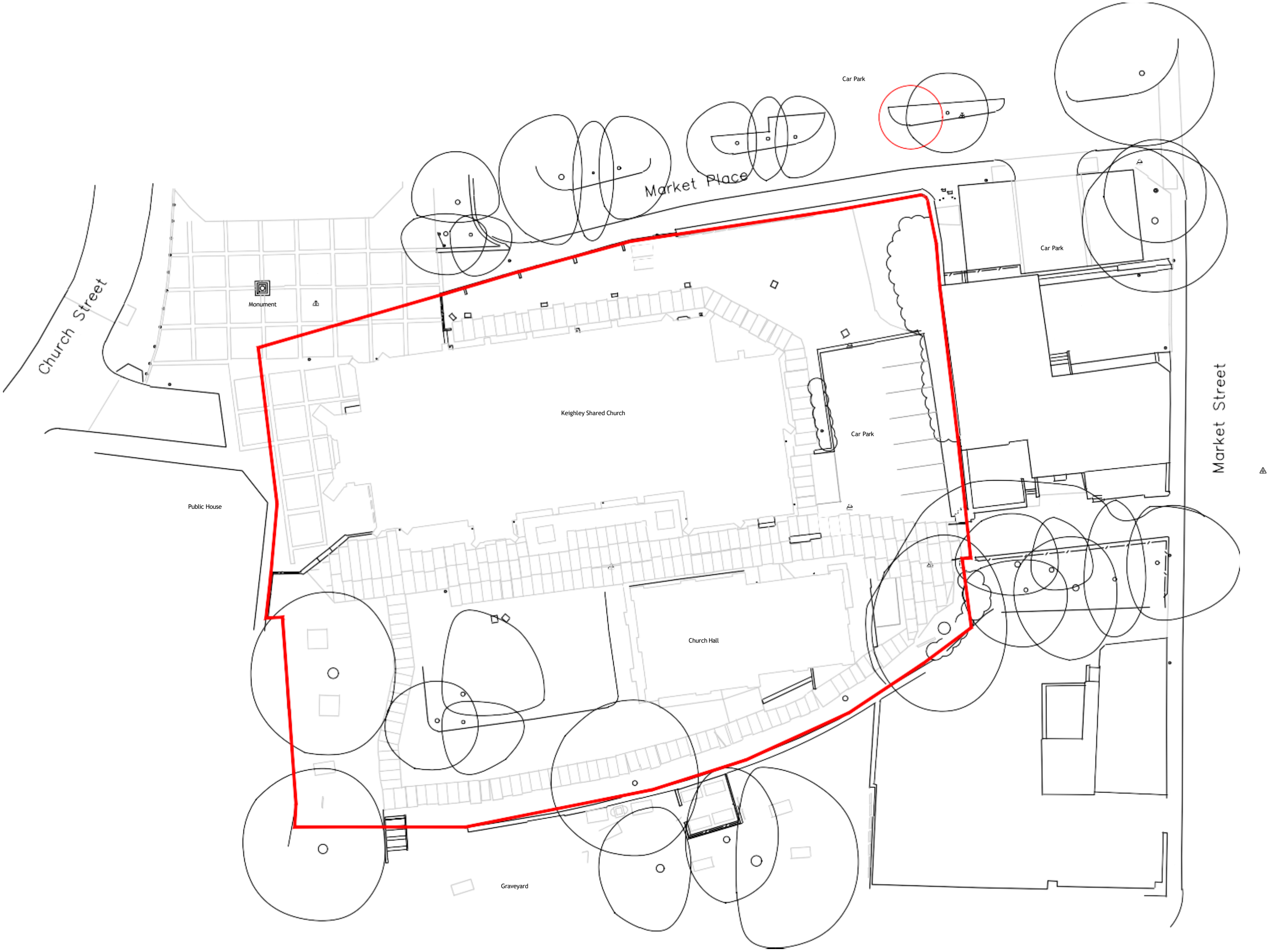
- > Ground conditions are consistent with those anticipated with an apparent ‘wedge’ of Made Ground deposits beneath the existing church hall structure a defining feature of the ground conditions on this Site.
- > Further investigation is [not recommended](#) but may be required to refine pile design parameters or subject to any design changes or requests from appointed contractors.
- > Risk mitigation is [not recommended](#) to address ground-related hazards to acceptably low levels however, general advice with respect to ground engineering risk management and design considerations is presented throughout Section 6.0 of this Report.

7.2 Recommendations

Recommended follow-on work includes:

1. [Submission of the Ground Investigation Report](#) to the project design team and the local planning authority and other stakeholders, e.g. building control.

① Photographic diary of the groundworks: It is recommended that a photographic record of the groundworks is maintained to document the physical condition and nature of the ground conditions across the Site. This will serve as a valuable record for the project as well as any future planned works on the Site.



Existing Site Plan
1:200

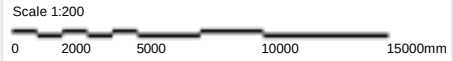
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NOTES



Drawing based on survey information provided by third party measured surveys. Any discrepancies to be reported to the architect.



11.01.2023	RJW
INITIAL ISSUE	
REVISION - DATE	DRWN CHKD

FOR INFORMATION

Keighley Shared Church
Keighley
BD21 5HT

FOR
Church on the Green
Neighbourhood Foundation

Existing Site Plan

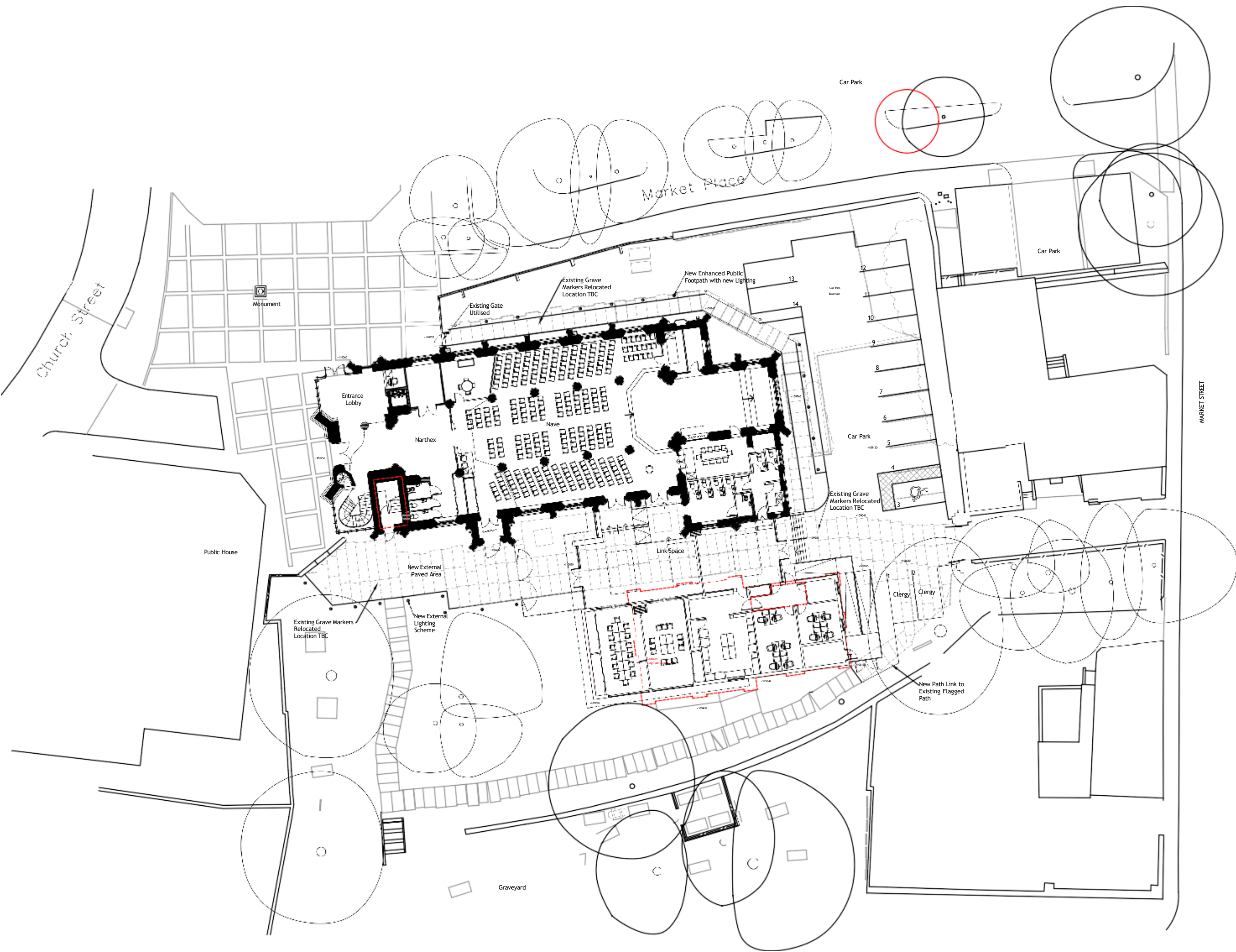
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HALLIDAY CLARK

ARCHITECTS

Halliday Clark Limited
1 Lower Railway Road
Ilkley LS29 8PL

T 01943 604 123
E info@hallidayclark.co.uk
W hallidayclark.co.uk



Proposed Site Plan
1:200

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NOTES

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Drawing based on survey information provided by third party measured surveys. Any discrepancies to be reported to the architect.

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15000mm

D - 19.07.2024	JL
GA Plan updated following changes to GA Plan	
C - 11.08.2023	JL
GA Plan updated following changes to GA Plan	
B - 08.06.2023	JL
Plans now based on accurate survey information	
A - 19.04.2023	JL
Updated following updates to proposed floor plans.	
INITIAL ISSUE	JL RJW
REVISION - DATE	DRWN CHKD

FOR COMMENT

St Andrews Church
Keighley
BD21 5HT

FOR
Church on the Green
Neighbourhood Foundation

Proposed Site Plan
Option 1 - Full Scheme
Scale 1:200 @ A1

HALLIDAY CLARK

Halliday Clark Limited
1 Lower Railway Road
Ilkley LS29 8PL

T 01943 604 123
E info@hallidayclark.co.uk
W hallidayclark.co.uk

SOIL AND
STRUCTURES

Key to exploratory hole
symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample	AMAL - Amalgamated sample	B - Bulk disturbed sample
BLK - Block sample	C - Core sample	CBR - CBR test sample
D - Disturbed sample	ES - Environmental sample	EW - Environmental water sample
G - Gas sample	J - Jar sample	L - Liner sample
TW - Pushed thin wall sample	U - Undisturbed sample	UT - Undisturbed thin wall sample
W - Water sample		

IN-SITU TESTS

HV - Hand shear vane	HV(r) - Hand shear vane residual	PID - Photo ionisation detector
PP - Hand penetrometer	SPT - Standard penetration test	SPT(C) - SPT using cone

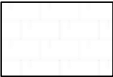
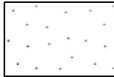
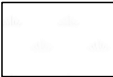
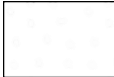
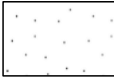
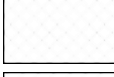
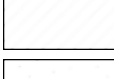
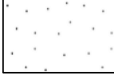
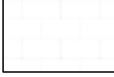
GROUNDWATER

 Groundwater strike	 Groundwater rest level
--	--

ROTARY CORE DETAILS

TCR - Total core recovery (%)	SCR - Solid core recovery (%)	RQD - Rock quality designation (%)
FI - Fracture index	NI - Non-intact core	AZCL - Assumed zone of core loss

LEGEND

 Topsoil	 Clay	 Chalk	 Sand backfill
 Peat	 Silt	 Breccia	 Gravel backfill
 Made ground	 Sand	 Conglomerate	 Arisings
 Concrete	 Gravel	 Metamorphic	 Bentonite
 Wood	 Cobbles	 Igneous	 Concrete
 Brick	 Boulders		 Grout
 Bituminous material	 Mudstone		Plain pipe
 Gypsum	 Siltstone		Slotted pipe
 Coal	 Sandstone		
 Void	 Limestone		

Sheet 1 of 1

SOIL AND STRUCTURES	Hand Pit				HP101
					PHOTO PAGE
	Hole Type HP	Easting 406098.00	Northing 440973.00	Ground Level (m) 109.00	Scale 1:10
Project Name St Andrews Church, Keighley		Project No. 20442	Start Date 2024-10-25	End Date 2024-10-25	
Client Church on the Green Neighbourhood Foundation		Contractor Soil and Structures Ltd		Consultant Soil and Structures Ltd	
Remarks PURPOSE: Investigation of existing foundations and general coverage of the Site / ground truthing. TERMINATION: Deeper excavation impractical. GROUNDWATER: none encountered. STABILITY: spalling throughout depth. LOCATION: taken off freeware software. GL: taken off satellite imagery. FOUNDATION: Top of footing = 600 mm below ground level or 1620 mm below underside of plinth cornice. Projection = 150 mm to edge of concrete; 400 mm to edge of outer breezeblock wall (suspected formwork). Base of footing = not proven but footing face was exposed/voided and 'scraped' using a pinch bar to depth of 1.85 m below ground level where 'soft' resistance was encountered. OTHER: no evidence of potentially polluting or harmful material.			Method, Plant, Stability, Dimensions 0.00 - 1.15m HP Hand tools Spalling throughout L = 1.00m W = 0.60m		Logger RB
Checked By: RB Approved By: RB Status: FINAL					

Created using Pebble Geo

SOIL AND STRUCTURES	Hand Pit				HP102
					PHOTO PAGE
	Hole Type HP	Easting 406077.00	Northing 440975.00	Ground Level (m) 109.50	Scale 1:10
	Project Name St Andrews Church, Keighley		Project No. 20442	Start Date 2024-10-25	End Date 2024-10-25
Client Church on the Green Neighbourhood Foundation		Contractor Soil and Structures Ltd		Consultant Soil and Structures Ltd	
Remarks PURPOSE: Investigation of existing foundations and general coverage of the Site / ground truthing. TERMINATION: Deeper excavation impractical. GROUNDWATER: none encountered. STABILITY: spalling throughout depth. LOCATION: taken off freeware software. GL: taken off satellite imagery. FOUNDATION: Top of footing = 700 mm below ground level or 1610 mm below underside of plinth cornice. Projection = 150 mm to edge of concrete; no evidence of outer breezeblock wall. Base of footing = not proven but footing face was porbed using a pinch bar to depth of 1.30 m below ground level where 'soft' resistance was encountered. OTHER: no evidence of potentially polluting or harmful material.			Method, Plant, Stability, Dimensions 0.00 - 1.20m HP Hand tools Collapsing in pea gravel L = 0.50m W = 0.40m		
Checked By: RB Approved By: RB Status: FINAL			Logger RB		

SOIL AND STRUCTURES	Hand Pit				HP103
					PHOTO PAGE
	Hole Type HP	Easting 406099.00	Northing 441003.00	Ground Level (m) 109.00	Scale 1:10
	Project Name St Andrews Church, Keighley		Project No. 20442	Start Date 2024-10-25	End Date 2024-10-25
Client Church on the Green Neighbourhood Foundation		Contractor Soil and Structures Ltd		Consultant Soil and Structures Ltd	
Remarks PURPOSE: Targeting proposed car park extension and ground truthing where DCP 103 was completed. TERMINATION: Refusal in sandstone fill. GROUNDWATER: none encountered. STABILITY: stable throughout. LOCATION: taken off freeware software. GL: taken off satellite imagery. OTHER: no evidence of potentially polluting or harmful material.			Method, Plant, Stability, Dimensions 0.00 - 0.75m HP Hand tools Stable L = 0.30m W = 0.30m		Logger RB
Checked By: RB Approved By: RB Status: FINAL					

SOIL AND STRUCTURES	Hand Pit				HP103
					PHOTO PAGE
	Hole Type HP	Easting 406099.00	Northing 441003.00	Ground Level (m) 109.00	Scale 1:10
	Project Name St Andrews Church, Keighley		Project No. 20442	Start Date 2024-10-25	End Date 2024-10-25
Client Church on the Green Neighbourhood Foundation		Contractor Soil and Structures Ltd		Consultant Soil and Structures Ltd	
					
Remarks PURPOSE: Targeting proposed car park extension and ground truthing where DCP 103 was completed. TERMINATION: Refusal in sandstone fill. GROUNDWATER: none encountered. STABILITY: stable throughout. LOCATION: taken off freeware software. GL: taken off satellite imagery. OTHER: no evidence of potentially polluting or harmful material.			Method, Plant, Stability, Dimensions 0.00 - 0.75m HP Hand tools Stable L = 0.30m W = 0.30m		Logger RB
Checked By: RB Approved By: RB Status: FINAL					

In-Situ Testing

Dynamic Penetration Testing

SOIL AND STRUCTURES

Project Details

Name St Andrew's Church, Keighley
Reference 20442

Test Dates

Start 25/10/2024
End 25/10/2024

Weather

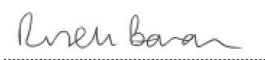
Preceding 24 hrs Wet, 10-15 deg
During testing Dry, 10-15 deg

General Notes

1. Where 'deflection' is reported this relates to the rods being moved >10° off vertical
2. All results after the 'deflection' is noted are highlighted orange - use with caution
3. Where 'deflection' is reported as the test end, this relates to the rods being moved >20° off vertical
4. Where 'ceased' is reported this relates to needing to abandon the test due to external factors, e.g. vehicle movement
5. Where 'reduced' is reported this relates to test ending due to maximum blow count being exceeded

Author Russell Bowman
BSc (Hons) MSc CEng CWEM MCIWEM

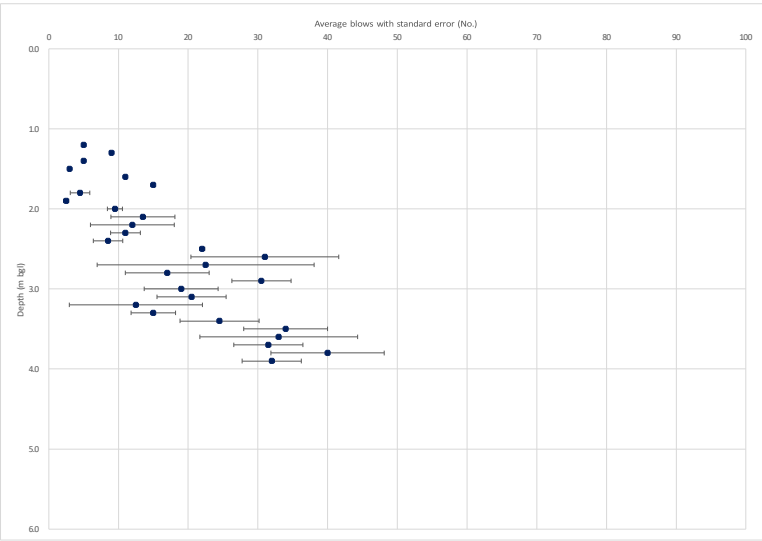
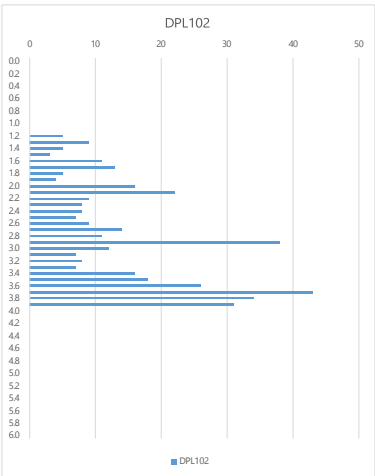
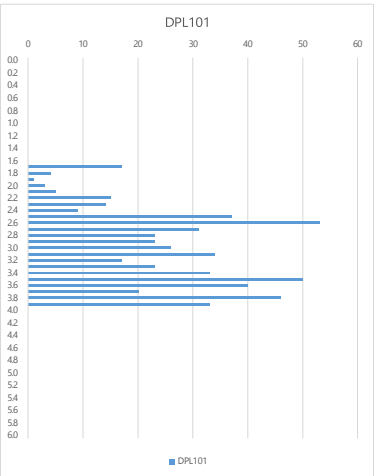
Signed


.....

Test Method

Method Dynamic Probing (Light)
Guidance BS 5930:2015 Code of practice for ground investigations (+A1:2020)

	DPL101	DPL102		Mean	St Dev	St Err
0.0						
0.1						
0.2						
0.3						
0.4						
0.5						
0.6						
0.7						
0.8						
0.9						
1.0						
1.1						
1.2		5		5		
1.3		9		9		
1.4		5		5		
1.5		3		3		
1.6		11		11		
1.7	17	13		15	3	1
1.8	4	5		5	1	0
1.9	1	4		3	2	1
2.0	3	16		10	9	5
2.1	5	22		14	12	6
2.2	15	9		12	4	2
2.3	14	8		11	4	2
2.4	9	8		9	1	0
2.5	37	7		22	21	11
2.6	53	9		31	31	16
2.7	31	14		23	12	6
2.8	23	11		17	8	4
2.9	23	38		31	11	5
3.0	26	12		19	10	5
3.1	34	7		21	19	10
3.2	17	8		13	6	3
3.3	23	7		15	11	6
3.4	33	16		25	12	6
3.5	50	18		34	23	11
3.6	40	26		33	10	5
3.7	20	43		32	16	8
3.8	46	34		40	8	4
3.9	33	31		32	1	1
4.0						
4.1						
4.2						
4.3						
4.4						
4.5						
4.6						
4.7						
4.8						
4.9						
5.0						
5.1						
5.2						
5.3						
5.4						
5.5						
5.6						
5.7						
5.8						
5.9						
6.0						



SOIL AND STRUCTURES

Test Ref.	DCP101	DCP102	DCP103								
Test depth	109.00	109.00	109.00								
Easting	406094	406102	406099								
Northing	441007	441008	441003								
Deflection	No	No	Yes, 290								
Test End	Completed	Completed	Completed								
End Depth	950	950	960								

[illegible]

SOIL AND STRUCTURES

CBR Conversion

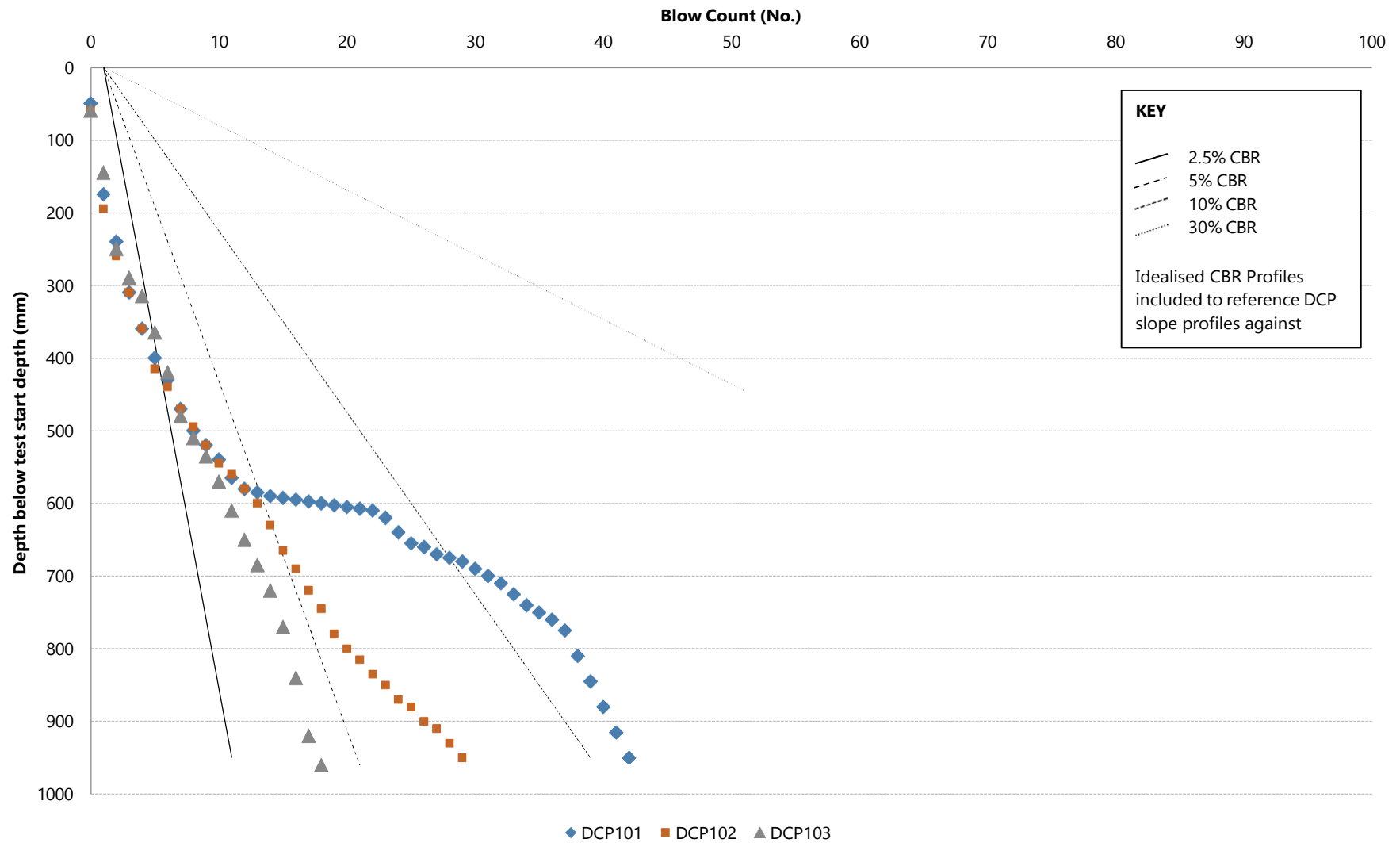
TRL correlation given in guidance above.

$$\text{CBR} = 10^{(2.48 - 1.057 \times \log_{10} P)}$$

Where P= penetration in mm

[illegible][illegible]

DCP101 to DCP103 - Depth v's Blow Count Plot



Some unforeseen material has been encountered in the ground. This material is suspected as being potentially harmful or polluting. What should you do?

Seek the advice of the project Engineer (*the Engineer may need to seek advice from a ground investigation consultant*).

What will the Engineer do?

The Engineer (or someone on the project team) will contact the local planning authority's contaminated land team to notify them of the encounter. The purpose of this contact is to agree a strategy for responding to and dealing with the unforeseen material. This strategy should be agreed in advance of any work on or around the unforeseen material recommencing.

What will the response strategy involve?

The responsive strategy will depend on the nature of the material encountered but may be as simple as confirming that the material will be excavated and disposed of off-site at a suitably licensed facility.

Do regulators have to be notified?

Advance notification is always recommended to avoid any response strategy being deemed inappropriate. There may or may not be a legal requirement for notification depending on the nature of the material encountered. In any case, the local planning authority's pollution control or contaminated land team should be able to assist finding the most cost-effective means of dealing with the material.

Purpose of this Guidance Note

- > Support developers working on small development sites; and,
- > Support decision making in scenarios where the likelihood of potentially harmful or polluting material being present in the ground has been assessed as low or unlikely (i.e. no remediation strategy has been put in place) but cannot be discounted.

General Commentary

A core aim of 'contaminated land'¹ planning condition(s) is to ensure that, once completed, the development can be deemed 'suitable for use'. Or, in other words, to ensure that end users (residents and visitors) will not be exposed to unacceptable levels of risk.

On any site where development works have previously taken place there is always the potential for potentially harmful or polluting material to have been introduced into the ground. Common examples of this include; fragments of asbestos containing material from old out-buildings, ash deposits from where coal ash was formerly tipped in a garden or localised fuel spillages.

Whilst ground investigation aims to remove as much uncertainty as possible from the ground, it is rarely cost-beneficial to investigate 100 % of any given development site. For this reason, unforeseen or unexpected material may be encountered during development works.

¹ 'Contaminated land' is strictly a legal definition of land that has been determined as such under Part 2A of the Environmental Protection Act. The term 'contamination' is often used as short-hand for material that may be chemically unsuitable (potentially harmful or polluting).

General Guidance on Material Suitability

Suitability (in general): A *soil* becomes a *material* once excavated. This Guidance Note advice with respect to the suitability of soils to remain on Site and the suitability of materials recovered from Site.

The materials are given preliminary classifications based on those set out within the Manual of Contract Documents for Highways Works¹.

Geotechnical suitability: If and where earthworks (cut and fill) are planned as part of the works then strength and compaction testing is typically recommended to inform the earthworks specification. Subject to the earthwork design details being finalised, it is common for additional geotechnical testing, e.g. compaction testing, to be recommended to confirm suitability.

Chemical suitability: Chemical suitability is assessed in the context of the historical and geological setting of the Site as well as against the proposed end use of the Site. This assessment forms a core part of the current planning framework as laid out within the Environment Agency's Land Contamination Risk Assessment guidance².

General Guidance on Materials Management

Materials management: In general, once material is excavated from the ground it could be deemed a 'waste' unless it has a specified use. This also applies to materials intended for re-use on Site.

For natural materials, re-use on Site is generally not regulated apart from in specific scenarios.

For non-natural deposits (Made Ground) additional protocols need to be followed (CL:AIRE Code of Practice³) to demonstrate that the material is suitable for re-use and therefore, not a waste.

¹ Manual of Contract Documents for Highways Works, Volume 1 Specification for Highway Works – Series 600 Earthworks (2016)

² [Land contamination risk management \(LCRM\) - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/344441/LCRM.pdf)

³ CL:AIRE The Definition of Waste: Development Industry Code of Practice Version 2 (2011)

APPENDIX C

DRAINAGE CCTV SURVEY



COMMITTED TO
YOUR ENVIRONMENT



**DRAINAGE
CONSULTANTS LTD**

Professional Drainage Contractors

CCTV DRAIN SURVEY CONDITION REPORT

SITE: St Andrew's Church, Keighley, BD21 5HT
CLIENT: Church on the Green Neighbourhood Foundation
DATE: 4th December, 2024

Church on the Green Neighbourhood Foundation
The Old Vicarage
Briggate
Silsden
BD20 9JS

Dear,

CCTV Drain Survey Quotation

Following our receipt of your order and as requested our engineers have attended the above mentioned site. The purpose of our visit was to carryout a CCTV survey of the drainage system as instructed to establish the pipe work condition, location and connectivity.

The following summary highlights the findings on site, and where necessary we have put forward recommendations for repairs to be carried out on the drainage system. We would strongly recommend that all repairs that have been identified are completed to prevent further defects arising. The drainage system has been designed to work in a particular way – any defects identified could be preventing the drainage system from performing as it should.

Here at Drainage Consultants Ltd. we regularly research the market to ensure that our clients are receiving extremely competitive quotations for drain repairs.

Please find below our summary of the investigation.

Findings & Recommendations

While on site we have identified the below defects on the drainage system. All other drainage lines surveyed did not exhibit any visible defects. Please see the accompanying document (CCTV Report) for further details of all drains surveyed.

Manhole-1 downstream to Discharge

The drain surveyed is a circular 100mm diameter vitrified clay pipe transporting foul waste.

The pipe work was surveyed to 5.6m where it finished inside a manhole (beyond the site boundary). A cracked section was located at 4.6m.

To repair the cracked section, we recommend the below work.

Undertake high-pressure water-jetting to thoroughly clean the pipework.

Carry out a CCTV survey to establish the precise location of the defect on the drainage system.

Supply and install 1x 100mm diameter, ambient cured epoxy resin structural patch liner over the defective section of pipework using cured-in-place pipe lining bladder system. (All materials used are approved by the Water Research Council).

The cost for this is £600.00 plus VAT.

Manhole-2 downstream to Discharge

The drain surveyed is a circular 100mm diameter vitrified clay pipe transporting surface water.

The pipe work was surveyed to 15.2m where it finished inside Manhole-3. A build up of debris was located from 7.4m to 12.4m (10%).

In an attempt to remove the debris build up, we recommend undertaking High Pressure Water Jetting (including CCTV survey).

The cost for this is £240.00 plus VAT.

Manhole-3 Branch-1 upstream to Head of Line

The drain surveyed is a circular 100mm diameter PVCu pipe transporting surface water.

The pipe work was surveyed to 9.0m where it was abandoned (camera unable to pass bend). Large displaced joints were located at 4.5m and 6.0m. A build up of debris was located from 0.0m to 1.6m (25%).

In an attempt to remove the debris build up, we recommend undertaking High Pressure Water Jetting (including CCTV survey).

The cost for this is £240.00 plus VAT.

To repair the large displaced joints, we recommend the below work.

Undertake high-pressure water-jetting to thoroughly clean the pipework.

Carry out a CCTV survey to establish the precise location of the defect on the drainage system.

Supply and install 2x 100mm diameter, ambient cured epoxy resin structural patch liners over the defective sections of pipework using cured-in-place pipe lining bladder system. (All materials used are approved by the Water Research Council).

The cost per patch liner is £600.00 plus VAT (total cost is £1,200.00 plus VAT).

Manhole-3 downstream to Discharge

The drain surveyed is a circular 100mm diameter PVCu pipe transporting surface water.

The pipe work was surveyed to 12.2m where it was abandoned (camera unable to progress). An increased water level (40%) was located from 4.4m onwards, resulting in the camera lens submerging underwater (loss of picture).

In an attempt to clear the drain through, we recommend undertaking High Pressure Water Jetting (including CCTV survey).

The cost for this is £240.00 plus VAT.

Manhole-4 downstream to Discharge

The drain surveyed is a circular 100mm diameter vitrified clay pipe transporting surface water.

The pipe work was surveyed to 5.3m where it finished inside Manhole-5. A displaced joint (medium) was located at 4.8m.

To repair the displaced joint, we recommend the below work.

Undertake high-pressure water-jetting to thoroughly clean the pipework.

Carry out a CCTV survey to establish the precise location of the defect on the drainage system.

Supply and install 1x 100mm diameter, ambient cured epoxy resin structural patch liner over the defective section of pipework using cured-in-place pipe lining bladder system. (All materials used are approved by the Water Research Council).

The cost for this is £600.00 plus VAT.

Manhole-5 downstream to Discharge

The drain surveyed is a circular 150mm diameter vitrified clay pipe transporting combined waste.

The pipe work was surveyed to 20.6m where it was abandoned (camera unable to progress). Defective sections were located at 1.8m (broken, including obstruction through pipe wall, 10%), 8.7-9.0m, 14.0m (cracked sections), 14.3m (hole in the pipe wall) and 20.6m (fractured incoming connection).

Due to the obstruction intruding through the pipe wall, to remove and repair the drain an excavation will be required. We recommend the drain is traced as the stone grave markers in the excavation area may need to be lifted.

The cost to trace the drain is £120.00 plus VAT.

To repair the cracked sections at 8.7-9.0m and 14.0-14.3m, we recommend the below work.

Undertake high-pressure water-jetting to thoroughly clean the pipework.

Carry out a CCTV survey to establish the precise location of the defect on the drainage system.

Supply and install 2x 150mm diameter, ambient cured epoxy resin structural patch liners over the defective sections of pipework using cured-in-place pipe lining bladder system. (All materials used are approved by the Water Research Council).

The cost per patch liner is £640.00 plus VAT (total cost is £1,280.00 plus VAT).

To determine if the fractured connection at 20.6m is located on / off the site boundary, the drain will need to be traced.

The cost for this is £120.00 plus VAT.

Manhole-5 Branch-3 upstream to Head of Line

The drain surveyed is a circular 150mm diameter vitrified clay pipe transporting surface water.

The pipe work was surveyed to 11.2m where it was abandoned (camera unable to pass debris build up, 40%).

Defective sections were located at 1.0m (cracked) 1.8m (displaced joint – medium) and 10.3m (large displaced joint).

In an attempt to remove the debris build up, we recommend undertaking High Pressure Water Jetting (including CCTV survey).

The cost for this is £240.00 plus VAT.

To repair the defective sections at 1.0-1.8m and 10.3m, we recommend the below work.

Undertake high-pressure water-jetting to thoroughly clean the pipework.

Carry out a CCTV survey to establish the precise location of the defect on the drainage system.

Supply and install 2x 150mm diameter, ambient cured epoxy resin structural patch liners over the defective sections of pipework using cured-in-place pipe lining bladder system. (All materials used are approved by the Water Research Council).

The cost per patch liner is £640.00 plus VAT (total cost is £1,280.00 plus VAT).



Manhole-6 downstream to Discharge

The drain surveyed is a circular 100mm diameter PVCu pipe transporting surface water.

The pipe work was surveyed to 21.3m where it finished at the discharge point (connection onto a drain). A small deformed section (5%) was located at 8.3m.

We do not recommend any further work at this time, however if any issues arise from this area an excavation will be required to replace the section.

Manhole-6 Branch-1 upstream to Head of Line

The drain surveyed is a circular 100mm diameter vitrified clay pipe transporting surface water.

The pipe work was surveyed to 0.6m where it was abandoned (camera unable to pass debris build up, 50%).

In an attempt to remove the debris build up, we recommend undertaking High Pressure Water Jetting (including CCTV survey).

The cost for this is £240.00 plus VAT.

While on site our engineer has noted the below.

Manhole-5A (unable to find).

The cost to trace the drain and locate Manhole-5A at ground level is £120.00 plus VAT. A further cost to access Manhole-5A and continue the CCTV survey will be provided once made accessible.

Manhole-4 (Silt Trap).

Manhole-6 (cover and frame in poor condition, 620x470mm light duty, grassed surface).

The cost to replace the cover and frame with new is £785.00 plus VAT.





Project

Project Name: CCTV Report - St Andrews Church_ Keighley_ BD21 5HT
Project Number: GR/14764
Inspection Standard: MSCC5 Sewers & Drainage GB (SRM5 Scoring)



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CCTV Report - St Andrews Church_ Keighley_ BD21 5HT	GR/14764	

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Project Information

Project Name	Project Number	Project Date
CCTV Report - St Andrews Church_ Keighley_ BD21 5HT	GR/14764	

Client

Company: Church on the Green Neighbourhood Foundation
Street: The Old Vicarage, Briggate
Town or City: Silsden
Post Code: BD20 9JS

Site

Description: St Andrew's Church
Street: Church Street
Town or City: Keighley
Post Code: BD21 5HT

Contractor

Company: Drainage Consultants Ltd
Street: Clearwater House, Newby Road Ind Est
Town or City: Hazel Grove
County: Stockport
Post Code: SK7 5DA
Phone: 0161 483 2298





Section Inspection - 13/11/2024 - MH1X



Item No. 1	Insp. No. 1	Date 13/11/24	Time 6:58	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR MH1X
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:		Inspection Direction: Downstream		Upstream Node: MH1	
Road:		Inspected Length: 5.60 m		Upstream Pipe Depth: 0.820 m	
Location:		Total Length: 5.60 m		Downstream Node: DISCHARGE	
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use: Foul		Pipe Shape:		Circular	
Type of Pipe:		Dia/Height:		100 mm	
Flow Control:		Pipe Material:		Vitrified clay	
Year Constructed: Not Specified		Lining Type:		No Lining	
Inspection Purpose:		Lining Material:		No Lining	

Comments:
Recommendations:

Scale: 1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 0.82 m MH1						
	0.00	MH	Start node, manhole, reference: MH1	00:00:00		
	0.00	WL	Water level, 0% of the vertical dimension	00:00:06		
	3.80	S01 LD	Line deviates down, start: 45°	00:00:26		
	4.60	CC	Crack, circumferential from 12 o'clock to 12 o'clock	00:00:31		2 / 2
	5.60	MHF	Finish node, manhole, reference: Discharge: Manhole (beyond site boundary)	00:00:35		
Discharge Depth: m						

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
1	10.0	1.8	10.0	2.0	1	1.0	0.2	1.0	2.0

Section Inspection - 13/11/2024 - HOLX



Item No. 2	Insp. No. 1	Date 13/11/24	Time 6:58	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR HOLX
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:	Inspection Direction: Upstream	Upstream Node: HOL
Road:	Inspected Length: 5.30 m	Upstream Pipe Depth:
Location:	Total Length: 5.30 m	Downstream Node: MH1 B1
Surface Type:	Joint Length:	Downstream Pipe Depth: 0.790 m
Use: Foul	Pipe Shape: Circular	
Type of Pipe:	Dia/Height: 100 mm	
Flow Control:	Pipe Material: Vitrified clay	
Year Constructed: Not Specified	Lining Type: No Lining	
Inspection Purpose:	Lining Material: No Lining	

Comments:

Recommendations:

[illegible]

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Inspection - 13/11/2024 - MH2X



Item No. 3	Insp. No. 1	Date 13/11/24	Time 6:59	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR MH2X
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:	Inspection Direction:	Downstream	Upstream Node:	MH2
Road:	Inspected Length:	15.20 m	Upstream Pipe Depth:	0.490 m
Location:	Total Length:	15.20 m	Downstream Node:	DISCHARGE
Surface Type:	Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular	
Type of Pipe:		Dia/Height:	100 mm	
Flow Control:		Pipe Material:	Vitrified clay	
Year Constructed:	Not Specified	Lining Type:	No Lining	
Inspection Purpose:		Lining Material:	No Lining	

Comments:

Recommendations:

Scale:	1:132	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 0.49 m MH2							
		0.00	MH	Start node, manhole, reference: MH2	00:00:00		
		0.00	WL	Water level, 0% of the vertical dimension	00:00:02		
		0.30	MCPVC	Pipe material changes to polyvinyl chloride at this point	00:00:06		
		7.40	S01	DER Settled deposits, coarse, 10% cross-sectional area loss, start	00:00:27	HOLX_9d1 2f336-8dd 5-4552-a5	
		12.40	F01	DER Settled deposits, coarse, 10% cross-sectional area loss, finish	00:00:41		3
		13.80	S02	LD Line deviates down, start: 45°	00:00:46		
		14.80	F02	LD Line deviates down, finish: 45°	00:00:48		
Discharge Depth: m		15.20	MHF	Finish node, manhole, reference: HOL: Manhole-3	00:00:52	HOLX_35a 4a035-aa7 3-40cb-91	

Construction Features

Miscellaneous Features

Structural Defects

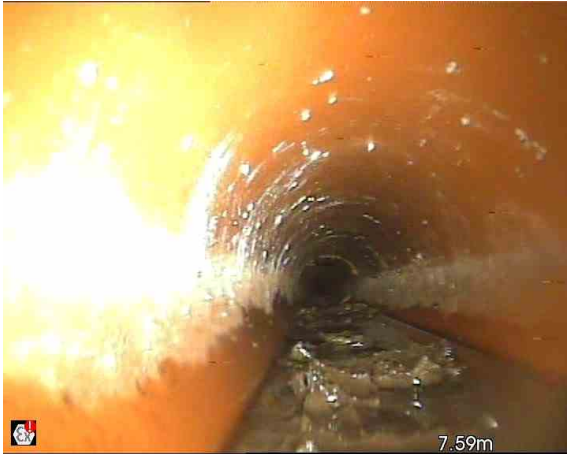
Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	2.0	0.7	10.0	3.0



Section Pictures - 13/11/2024 - MH2X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
3	Downstream	MH2X		



HOLX_9d12f336-8dd5-4552-a565-83569e797c79_20241204_093454_644.jpg, 00:00:27, 7.40 m
Settled deposits, coarse, 10% cross-sectional area loss, start



HOLX_35a4a035-aa73-40cb-916c-0bc3d1fdb085_20241204_093653_793.jpg, 00:00:52, 15.20 m
Finish node, manhole, reference: HOL, Manhole-3



Section Inspection - 13/11/2024 - HOLX



Item No. 4	Insp. No. 1	Date 13/11/24	Time 6:59	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR HOLX
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:		Inspection Direction: Upstream		Upstream Node: HOL	
Road:		Inspected Length: 9.00 m		Upstream Pipe Depth:	
Location:		Total Length: 9.00 m		Downstream Node: MH3 B1	
Surface Type:		Joint Length:		Downstream Pipe Depth: 0.650 m	
Use: Surface water			Pipe Shape: Circular		
Type of Pipe:			Dia/Height: 100 mm		
Flow Control:			Pipe Material: Polyvinyl chloride		
Year Constructed: Not Specified			Lining Type: No Lining		
Inspection Purpose:			Lining Material: No Lining		

Comments:

Recommendations:

Scale:	1:78	Position [m]	Code	Observation	MPEG	Photo	Grade	
Depth: 0.65 m MH3 B1								
			0.00	MH	Start node, manhole, reference: MH3 B1	00:00:00		
			0.00	WL	Water level, 0% of the vertical dimension	00:00:03		
			0.00	S01	DES	Settled deposits, fine, 25% cross-sectional area loss, start	00:00:03	HOLX_f5b 15a02-15c 6-49ca-ad
			1.60	F01	DES	Settled deposits, fine, 25% cross-sectional area loss, finish	00:00:11	4
			2.00	CN	Connection other than junction at 10 o'clock, 100mm dia	00:00:13		
			4.50	JDL	Joint displaced, large	00:00:22	HOLX_8fe 7d4a0-a44 7-4f32-865	1 / 4
			6.00	JDL	Joint displaced, large	00:00:25	HOLX_de0 a0591-9f4 0-4000-95	1 / 4
			7.90	CN	Connection other than junction at 12 o'clock, 100mm dia	00:00:32		
			8.30	LL	Line deviates left: 45°	00:00:33		
			8.70	LL	Line deviates left: 45°	00:00:35		
			9.00	SA	Survey abandoned: unable to pass bend	00:00:35		

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
2	2.0	0.4	4.0	1.0	3	5.0	2.2	20.0	4.0



Section Pictures - 13/11/2024 - HOLX

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
4	Upstream	HOLX		



HOLX_f5b15a02-15c6-49ca-ad68-5e1ce1ecfc98_20241204_093814_295.jpg, 00:00:03, 0.00 m
Settled deposits, fine, 25% cross-sectional area loss, start



HOLX_8fe7d4a0-a447-4f32-8652-4e34f0c8edb9_20241204_094802_729.jpg, 00:00:22, 4.50 m
Joint displaced, large



HOLX_de0a0591-9f40-4000-95a9-1d120054087b_20241204_094912_845.jpg, 00:00:25, 6.00 m
Joint displaced, large



Section Inspection - 13/11/2024 - MH3X



Item No. 5	Insp. No. 1	Date 13/11/24	Time 6:59	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR MH3X
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:	Inspection Direction:	Downstream	Upstream Node:	MH3
Road:	Inspected Length:	12.20 m	Upstream Pipe Depth:	0.700 m
Location:	Total Length:	12.20 m	Downstream Node:	DISCHARGE
Surface Type:	Joint Length:		Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular	
Type of Pipe:		Dia/Height:	100 mm	
Flow Control:		Pipe Material:	Polyvinyl chloride	
Year Constructed:	Not Specified	Lining Type:	No Lining	
Inspection Purpose:		Lining Material:	No Lining	

Comments:
Recommendations:

Scale:	1:106	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 0.70 m MH3							
		0.00	MH	Start node, manhole, reference: MH3	00:00:00		
		0.00	WL	Water level, 0% of the vertical dimension	00:00:03		
		4.40	WL	Water level, 40% of the vertical dimension	00:00:19	MH3X_03 bf998c-1b 52-4fa0-91	
		4.50	S01	CUW	Loss of vision, camera under water, start	00:00:19	
		12.20	SA	Survey abandoned: unable to progress	00:00:52		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Pictures - 13/11/2024 - MH3X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
5	Downstream	MH3X		



4.29m

MH3X_03bf998c-1b52-4fa0-91a1-7b8871073471_20241204_095750_087.jpg, 00:00:19, 4.40 m
Water level, 40% of the vertical dimension



Section Inspection - 13/11/2024 - MH4X



Item No. 6	Insp. No. 1	Date 13/11/24	Time 6:59	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR MH4X
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:		Inspection Direction: Downstream		Upstream Node: MH4	
Road:		Inspected Length: 5.30 m		Upstream Pipe Depth: 0.760 m	
Location:		Total Length: 5.30 m		Downstream Node: DISCHARGE	
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use: Surface water		Pipe Shape:		Circular	
Type of Pipe:		Dia/Height:		100 mm	
Flow Control:		Pipe Material:		Vitrified clay	
Year Constructed: Not Specified		Lining Type:		No Lining	
Inspection Purpose:		Lining Material:		No Lining	

Comments:

Recommendations:

Scale: 1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 0.76 m MH4						
0.00	MH	Start node, manhole, reference: MH4	00:00:00			
0.00	WL	Water level, 0% of the vertical dimension	00:00:03			
0.20	S01	LD Line deviates down, start: 45°	00:00:09			
0.50	F01	LD Line deviates down, finish: 45°	00:00:11			
3.20	CN	Connection other than junction at 3 o'clock, 100mm dia	00:00:18			
4.80	JDM	Joint displaced, medium	00:00:25	MH4X_25 a2e17d-f7 0c-44fa-95	1 / 3	
4.90	LL	Line deviates left: slight	00:00:26			
5.30	MHF	Finish node, manhole, reference: Discharge: Manhole-5	00:00:29	MH4X_d3 7e2720-9a f4-4fd0-a4		
Discharge Depth: m						

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
1	1.0	0.2	1.0	1.0	1	2.0	0.4	2.0	3.0



Section Pictures - 13/11/2024 - MH4X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
6	Downstream	MH4X		



MH4X_25a2e17d-f70c-44fa-9597-381f4a33c61e_20241204_1
00732_816.jpg, 00:00:25, 4.80 m
Joint displaced, medium



MH4X_d37e2720-9af4-4fd0-a4cf-d79205e8e24a_20241204_1
00757_651.jpg, 00:00:29, 5.30 m
Finish node, manhole, reference: Discharge, Manhole-5



Section Inspection - 13/11/2024 - MH5X



Item No. 7	Insp. No. 1	Date 13/11/24	Time 6:59	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR MH5X
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:		Inspection Direction: Downstream		Upstream Node: MH5	
Road:		Inspected Length: 20.60 m		Upstream Pipe Depth: 1.090 m	
Location:		Total Length: 20.60 m		Downstream Node: DISCHARGE	
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use: Combined		Pipe Shape:		Circular	
Type of Pipe:		Dia/Height:		150 mm	
Flow Control:		Pipe Material:		Vitrified clay	
Year Constructed: Not Specified		Lining Type:		No Lining	
Inspection Purpose:		Lining Material:		No Lining	

Comments:

Recommendations:

Scale: 1:179	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 1.09 m						
MH5						
0.00						
MH						
Start node, manhole, reference: MH5						
00:00:00						
0.00						
WL						
Water level, 0% of the vertical dimension						
00:00:03						
1.80						
B						
Broken pipe from 10 o'clock to 12 o'clock						
00:00:07						
MH5X_9fc						
6e4c7-2a4						
3-4a5b-87						
4						
1.80						
OBZ						
Other obstacles from 7 o'clock to 11 o'clock, 10% cross-sectional area loss: through pipe wall						
00:00:08						
MH5X_c0c						
3a63c-6cd						
c-4a35-a5						
5						
8.70						
S01						
CL						
Crack, longitudinal at 8 o'clock, start						
00:00:52						
MH5X_18						
5be66f-17						
c8-4d9e-b						
2 / 2						
9.00						
F01						
CL						
Crack, longitudinal at 8 o'clock, finish						
00:00:55						
12.50						
CN						
Connection other than junction at 10 o'clock, 100mm dia						
00:01:08						
14.00						
CC						
Crack, circumferential from 7 o'clock to 3 o'clock						
00:01:17						
MH5X_d4						
08e408-6f						
02-4475-9						
2 / 2						
14.30						
H						
Hole in drain or sewer at 11 o'clock						
00:01:18						
MH5X_17						
5cf094-4b						
0a-4ec2-a						
4						
16.80						
CN						
Connection other than junction at 12 o'clock, 150mm dia						
00:01:24						
17.00						
S02						
LD						
Line deviates down, start: vertically						
00:01:27						
19.30						
F02						
LD						
Line deviates down, finish: vertically						
00:01:36						
20.60						
FC						
Fracture, circumferential from 10 o'clock to 2 o'clock: inside connection						
00:01:44						
MH5X_ab						
e27e89-56						
a8-431a-9						
3 / 2						
20.60						
CN						
Connection other than junction at 12 o'clock, 150mm dia						
00:01:45						
20.60						
SA						
Survey abandoned: unable to progress						
00:01:47						

Construction Features

Miscellaneous Features

Structural Defects

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
5	80.0	10.7	220.0	4.0	4	10.0	0.6	13.0	5.0



Section Pictures - 13/11/2024 - MH5X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
7	Downstream	MH5X		



MH5X_9fc6e4c7-2a43-4a5b-87c7-f4a1d26bb878_20241204_101328_412.jpg, 00:00:07, 1.80 m
Broken pipe from 10 o'clock to 12 o'clock



MH5X_c0c3a63c-6cdc-4a35-a548-ab103acfaab9_20241204_101307_004.jpg, 00:00:08, 1.80 m
Other obstacles from 7 o'clock to 11 o'clock, 10% cross-sectional area loss, through pipe wall



MH5X_185be66f-17c8-4d9e-bd18-b977a3fbfb20_20241204_101449_021.jpg, 00:00:52, 8.70 m
Crack, longitudinal at 8 o'clock, start



MH5X_6a26c413-ea11-457a-957f-f760f4e0470e_20241204_101453_766.jpg, 00:00:52, 8.70 m
Crack, longitudinal at 8 o'clock, start



Section Pictures - 13/11/2024 - MH5X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
7	Downstream	MH5X		



MH5X_d408e408-6f02-4475-9b5c-a995a6e660a8_20241204_111046_661.jpg, 00:01:17, 14.00 m
Crack, circumferential from 7 o'clock to 3 o'clock



MH5X_175cf094-4b0a-4ec2-a684-b70b6543e0f9_20241204_111100_422.jpg, 00:01:18, 14.30 m
Hole in drain or sewer at 11 o'clock



MH5X_abe27e89-56a8-431a-99ec-3d3ba66a8485_20241204_111530_717.jpg, 00:01:44, 20.60 m
Fracture, circumferential from 10 o'clock to 2 o'clock, inside connection



Section Inspection - 13/11/2024 - HOLX



Item No. 8	Insp. No. 1	Date 13/11/24	Time 6:59	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR HOLX
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:		Inspection Direction: Upstream		Upstream Node: HOL	
Road:		Inspected Length: 11.20 m		Upstream Pipe Depth:	
Location:		Total Length: 11.20 m		Downstream Node: MH5 B3	
Surface Type:		Joint Length:		Downstream Pipe Depth: 1.060 m	
Use: Surface water			Pipe Shape: Circular		
Type of Pipe:			Dia/Height: 150 mm		
Flow Control:			Pipe Material: Vitrified clay		
Year Constructed: Not Specified			Lining Type: No Lining		
Inspection Purpose:			Lining Material: No Lining		
Comments:					
Recommendations:					

Scale: 1:97	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 1.06 m MH5 B3						
0.00	MH	Start node, manhole, reference: MH5 B3	00:00:00			
0.00	WL	Water level, 0% of the vertical dimension	00:00:03			
1.00	CC	Crack, circumferential from 12 o'clock to 12 o'clock	00:00:11	HOLX_b85 21a0e-a45 a-4bdd-8b	2 / 2	
1.80	JDM	Joint displaced, medium	00:00:12	HOLX_840 3c2cd-957 2-4d5d-a5	1 / 3	
10.30	JDL	Joint displaced, large	00:00:33	HOLX_b33 2ada4-07d 8-4aa5-a9	1 / 4	
10.90	S01	DER Settled deposits, coarse, 40% cross-sectional area loss, start	00:00:35	HOLX_6fb 0ee1b-c05 1-431e-b6	4	
11.20	SA	Survey abandoned: unable to pass debris	00:00:43			

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
3	10.0	1.2	13.0	2.0	4	5.0	1.2	13.0	4.0



Section Pictures - 13/11/2024 - HOLX

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
8	Upstream	HOLX		



HOLX_b8521a0e-a45a-4bdd-8b27-920ac559ada8_20241204_115742_254.jpg, 00:00:11, 1.00 m
Crack, circumferential from 12 o'clock to 12 o'clock



HOLX_8403c2cd-9572-4d5d-a5bb-ef0710bb80ff_20241204_115838_850.jpg, 00:00:12, 1.80 m
Joint displaced, medium



HOLX_b332ada4-07d8-4aa5-a926-19bf2996e49c_20241204_115919_896.jpg, 00:00:33, 10.30 m
Joint displaced, large



HOLX_6fb0ee1b-c051-431e-b61d-a9be6db5d8c1_20241204_115941_937.jpg, 00:00:35, 10.90 m
Settled deposits, coarse, 40% cross-sectional area loss, start



Section Inspection - 13/11/2024 - HOLX



Item No. 9	Insp. No. 1	Date 13/11/24	Time 6:59	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR HOLX
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:		Inspection Direction: Upstream		Upstream Node: HOL	
Road:		Inspected Length: 9.00 m		Upstream Pipe Depth:	
Location:		Total Length: 9.00 m		Downstream Node: MH5 B4	
Surface Type:		Joint Length:		Downstream Pipe Depth: 1.080 m	
Use: Surface water			Pipe Shape: Circular		
Type of Pipe:			Dia/Height: 150 mm		
Flow Control:			Pipe Material: Vitrified clay		
Year Constructed: Not Specified			Lining Type: No Lining		
Inspection Purpose:			Lining Material: No Lining		

Comments:
Recommendations:

Scale: 1:78	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 1.08 m MH5 B4						
	0.00	MH	Start node, manhole, reference: MH5 B4	00:00:00		
	0.00	WL	Water level, 0% of the vertical dimension	00:00:04		
	0.50	CN	Connection other than junction at 9 o'clock, 150mm dia	00:00:11		
	2.40	CN	Connection other than junction at 10 o'clock, 100mm dia	00:00:22		
	3.90	CN	Connection other than junction at 9 o'clock, 100mm dia	00:00:27		
	9.00	GYF	Finish node, gully, reference: HOL	00:00:45	HOLX_2a2 8ca55-e4d 0-4381-8d	
HOL Depth: m						

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



Section Pictures - 13/11/2024 - HOLX

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
9	Upstream	HOLX		



HOLX_2a28ca55-e4d0-4381-8dd3-884fbc891533_20241204_
120341_377.jpg, 00:00:45, 9.00 m
Finish node, gully, reference: HOL



Section Pictures - 13/11/2024 - HOLX

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
10	Upstream	HOLX		



HOLX_8c0b2557-16c8-4c16-8d29-e8733d427b37_20241204_120528_669.jpg, 00:00:13, 2.30 m
Finish node, manhole, reference: HOL, Manhole-5A (unable to find)



Section Inspection - 13/11/2024 - MH6X



Item No. 11	Insp. No. 1	Date 13/11/24	Time 6:59	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR MH6X
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:		Inspection Direction: Downstream		Upstream Node:	MH6
Road:		Inspected Length: 21.30 m		Upstream Pipe Depth:	0.670 m
Location:		Total Length: 21.30 m		Downstream Node:	DISCHARGE
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Surface water			Pipe Shape:	Circular
Type of Pipe:				Dia/Height:	100 mm
Flow Control:				Pipe Material:	Polyvinyl chloride
Year Constructed:	Not Specified			Lining Type:	No Lining
Inspection Purpose:				Lining Material:	No Lining

Comments:

Recommendations:

Scale: 1:185	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 0.67 m MH6						
	0.00	MH	Start node, manhole, reference: MH6	00:00:00		
	0.00	WL	Water level, 0% of the vertical dimension	00:00:03		
	8.30	D	Deformed sewer or drain, 5%: 06 to 07 o'clock	00:00:20	HOLX_3cf 57756-9ad f-4abe-92d	1 / 2
	15.60	LR	Line deviates right: slight	00:00:38		
	16.50	CN	Connection other than junction at 9 o'clock, 100mm dia	00:00:40		
	20.60	CN	Connection other than junction at 9 o'clock, 100mm dia	00:00:50		
	21.30	BRF	Finish node, major connection without manhole, reference: HOL: connection onto drain	00:00:52		
Discharge Depth: m						

Construction Features

Miscellaneous Features

Structural Defects

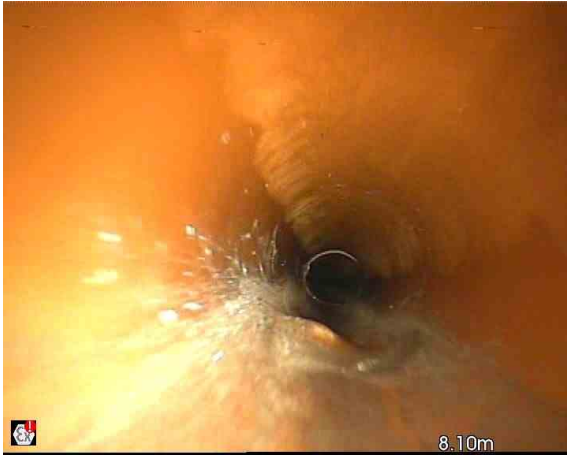
Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
1	0.0	0.0	0.0	1.0	1	1.0	0.0	1.0	2.0



Section Pictures - 13/11/2024 - MH6X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
11	Downstream	MH6X		



HOLX_3cf57756-9adf-4abe-92db-7a30f6c4a8a6_20241204_1
20731_002.jpg, 00:00:20, 8.30 m
Deformed sewer or drain, 5%, 06 to 07 o'clock



Section Inspection - 13/11/2024 - HOLX



Item No. 12	Insp. No. 1	Date 13/11/24	Time 7:00	Client's Job Ref Not Specified	Weather Not Specified	Pre Cleaned Not Specified	PLR HOLX
Operator Not Specified		Vehicle Not Specified		Camera Push	Preset Length Not Specified	Legal Status Not Specified	Alternative ID Not Specified

Town or Village:		Inspection Direction: Upstream		Upstream Node: HOL	
Road:		Inspected Length: 0.60 m		Upstream Pipe Depth:	
Location:		Total Length: 0.60 m		Downstream Node: MH6 B1	
Surface Type:		Joint Length:		Downstream Pipe Depth: 0.670 m	
Use: Surface water			Pipe Shape: Circular		
Type of Pipe:			Dia/Height: 100 mm		
Flow Control:			Pipe Material: Vitrified clay		
Year Constructed: Not Specified			Lining Type: No Lining		
Inspection Purpose:			Lining Material: No Lining		

Comments:
Recommendations:

Scale:	1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
		0.00	MH	Start node, manhole, reference: MH6 B1	00:00:00		
		0.00	WL	Water level, 0% of the vertical dimension	00:00:04		
		0.30	S01 DER	Settled deposits, coarse, 50% cross-sectional area loss, start	00:00:06	HOLX_cb3 90839-b95 b-4231-8f0	4
		0.60	SA	Survey abandoned: unable to pass debris	00:00:19		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	0.0	13.3	8.0	5.0



Section Pictures - 13/11/2024 - HOLX

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
12	Upstream	HOLX		



HOLX_cb390839-b95b-4231-8f0f-a8d9737cf4ed_20241204_1
23249_462.jpg, 00:00:06, 0.30 m
Settled deposits, coarse, 50% cross-sectional area loss, start





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Key:

Surface Water Drains

Foul Waste Drains

Combined Waste Drains

Unknown Usage Drain

Surface Water Manhole

Foul Waste Manhole

Combined Waste Manhole

Gully

Interceptor

Channel Drain

Rainwater Pipe

Soil Vent Pipe

Pump Station

Silt Trap / Catch Pit

Grease Trap

UTL

Unable To Lift

UTA

Unable To Access

UTF

Unable To Find

UTS

Unable To Survey

Rodding Access

Indicative Only - Not To Scale
Job ref: GR/14764

APPENDIX D

TRIAL HOLE PHOTOS



Photo 1 – General view on trial hole showing excavation and outstand of stone footing and lime mortar mix concrete.



Photo 2 – Detailed view of excavated material.