Crossfield
CONSULTING
GEOTECHNICAL ENVIRONMENTAL

THE GOVERNORS OF LA SAINTE UNION CATHOLIC SCHOOL

LA SAINTE UNION CATHOLIC SCHOOL, HIGHGATE ROAD, LONDON, NW5 1RP

SITE INVESTIGATION REPORT

The Granary
White Hall Farm
Long Itchington
Warwickshire
CV47 9PU

Tel: 01926 815678
Fax: 01926 815222
mail@crossfield-consulting.co.uk

June 2013
Report No. CCL02355.BR51

www.crossfield-consulting.co.uk

CONTENTS

1. INTRODUCTION
2. THE SITE
3. PUBLISHED GEOLOGY
4. GROUND CONDITIONS AND GEOLOGICAL MODEL
5. PROPOSED DEVELOPMENT
6. ASSESSMENT OF POTENTIAL CONTAMINATION AND GROUND GASES
7. ASSESSMENT OF MINING, QUARRYING AND OVERALL GROUND STABILITY
8. FOUNDATION RECOMMENDATIONS
9. TEMPORARY WORKS
10. ASSESSMENT OF SOAKAWAY DRAINAGE
11. ROAD PAVEMENTS
12. ASSESSMENT OF MATERIALS FOR WASTE DISPOSAL
13. RECOMMENDATIONS FOR SUPPLEMENTARY GROUND INVESTIGATIONS
14. RECOMMENDED SUPERVISION AND MONITORING
15. SUMMARY

REFERENCES

GENERAL NOTES

TABLE 1	-	Conceptual Site Model
FIGURE 1	-	Site Location Plan
FIGURE 2	-	Site Plan
FIGURE 3	-	Topographic Survey Site Plan
FIGURE 4	-	Proposed Development Plan
APPENDIX I	-	Extracts of Historical Maps
APPENDIX II	-	Desk Study Information
APPENDIX III	-	Ground Investigation
APPENDIX IV	-	Basis of Geotechnical Assessment for Foundations

1. INTRODUCTION

It is proposed to build a two-storey extension at La Sainte Union Catholic School, Highgate Road, London. School buildings occupy the site together with associated hard and soft play areas and limited car parking areas. It is proposed to extend the main school building to the northwest with a two-storey extension that may be increased to four storeys in the future.

Crossfield Consulting Limited has been commissioned to undertake an investigation of the site to identify potential constraints to redevelopment relating to the ground conditions and including a risk-based environmental assessment and recommendations for remediation works, foundations and general construction advice in the context of the above development proposals.

This report presents the information obtained from a desk study and ground investigation. Sections 2 to 4 of the report, together with the associated Figures and Appendices, provides a Ground Investigation Report (GIR), as defined in BS EN 1997-1:2004 and BS EN 1997-2:2007.

A risk-based assessment of potential contamination is included in Section 6 of the report. This assessment makes reference to the desk study, ground investigation information and a Conceptual Site Model. It is considered that the report complies with National Planning Policy Framework and is in general accordance with guidance published by the Environment Agency and the London Borough of Camden.

The report also includes information required to form a Geotechnical Design Report as defined in BS EN 1997-1:2004, and the salient information, assessments and recommendations are presented in Sections 7 to 11 of the report, together with the associated Figures and Appendices.

It is considered that the report is suitable for submission in support of a planning application and the report is appropriate to assist in an appraisal of development solutions and costs, together with the preparation of engineering designs for the development. The report also complies with the published guidance relating to the requirements of a Building Control authority.

2. THE SITE

2.1 Location

The site is located approximately 2.0 km northwest of Camden Town, to the east of Parliament Hill, as shown on Figure 1. The National Grid Reference for the site is TQ 2855 8638. The site is bounded to the north and east by adjacent residential properties and associated gardens, as shown on Figure 2. Part of the southern boundary is formed by Coftdown Road with the remaining boundary comprising more residential properties that front on to Croftdown Road. The site is bounded to the west by Highgate Road.

2.2 Site Description

The following site description is based on observations made at the time of the ground investigation in May 2013, the Site Plan (Figure 2), and a topographic survey presented as Figure 3.

The school site is an irregular-shaped plot with an approximate area of 2.7 ha. The property slopes very gently down to the southwest.

The original school building is present in the western part of the site, adjacent to Highgate Road with a small landscaped area between the road and the building. Two smaller school buildings are present to the southwest of the original building, to the east and west of the main school entrance off Croftdown Road.

The proposed extension is to be added to a school building (now the main teaching building) that is within the eastern part of the site, as shown on Figure 3. The area between the school buildings in the east and west of the school site is occupied by landscaped areas, picnic areas and hard surfaced tennis courts.

The area occupied by the building where the extension is proposed is approximately 0.7 ha. The existing one-to four-storey building has an inner courtyard area. A second school site entrance off Croftdown Road is present to the southeast of the building. An access road leads to car parking areas to the south and east of the building and continues along the north of the building to an area of hard-standing/playground.

The area of the proposed extension itself is occupied by grassed areas with a variety of trees, notably two mature Ash trees, an entrance to the single-storey part of the building and the access road. The grassed area adjacent to the building is bounded by a 1 m high wire mesh fence. To the north of the area, along the site boundary, is a grassed landscaped area with more trees.

During the ground investigation, a previously repaired crack was observed, extending from ground level to the top of the existing four-storey building. Several other smaller cracks were also observed within the external wall of this part of the building.

2.3 Site History

The site history has been researched with reference to old editions of the County Series and National Grid Ordnance Survey Plans obtained from Emapsite. Extracts from a selection of these plans are presented in Appendix I. The plans indicate the following development has taken place on and around the site.

The County Series Plan, dated 1871, shows the original school building is adjacent to Highgate Road within the west of the site. Information on the school website states the building was opened as a school in 1861. The remaining site area is occupied by a gardens and paths. Residential properties are present to the southwest and north of the site.

By 1893, the school building is identified as a Convent and had been extended to the south and east. Glasshouses had been constructed to the southeast of the building. Croftdown Road had also been constructed by this time and residential development had occurred to the south and north of the site.

In 1915, a residential property had been constructed adjacent to the eastern boundary of the site. Residential development had continued to the south and east of the site, along Brookfields Park.

The 1962 Plan shows the existing buildings to the east and west of the main school entrance had been constructed, adjacent to Croftdown Road.

By 1973, the school building in the eastern part of the site had been constructed together with the second access route off Croftdown Road. No further changes have occurred at the site since this time.

2.4 Desk Study Enquiries

Enquiries were made to the Environment Agency website regarding the site and surrounding area. Information obtained from these enquiries is presented in Appendix II and summarised below.

No superficial deposits are recorded below the site and the bedrock is classified as a non-aquifer. The site does not lie within a groundwater source protection zone or a groundwater vulnerability zone.

The site does not lie within a floodplain, as defined by the Environment Agency.

There are no current or former landfill sites within a 250 m radius of the site.

There are no recorded pollution incidents within 250 m of the site.

Reference to the Building Research Establishment Document *BR211 – Radon: Guidance on Protective Measures for New Buildings* indicates that the site is not in an area where radon precautions are required for new developments.

3. PUBLISHED GEOLOGY

With reference to the 1:50,000 scale solid and drift geology maps of North London (Sheet 256), published by the British Geological Survey (BGS), no superficial deposits are recorded beneath the site. The underlying solid strata comprise London Clay strata, from the Palaeogene System.

4. GROUND CONDITIONS AND GEOLOGICAL MODEL

4.1 Ground Investigation

Details of the rationale and scope of the ground investigation and laboratory testing, together with exploratory hole logs, monitoring, in situ and laboratory test results, are given in Appendix III. The investigation has identified the presence of the following, below the site.

4.2 Buried Foundations and Services

The foundations of the existing main school building were exposed at two locations, along the northwestern side of the structure. The footing of the four-storey building comprises brick from the ground surface to 0.5 m depth. The concrete footing is present from this depth to greater than 1.1 m depth with a step out from the building of 600 mm. The single-storey building foundations are the same but the step out of the concrete footing is only 200 mm.

Buried obstructions and services were not encountered during the ground investigation. However, services and buried foundations, associated with the existing school structures, are anticipated to be present beneath the site.

4.3 Strata Encountered

Topsoil/Made Ground
Dark brown and brown, silty, slightly sandy clay with roots and rootlets are present to 0.5 m and 0.6 m depths. Locally, the topsoil material includes rare fragments of brick and glass and has been designated Made Ground. Within the hand dug pits, re-deposited natural strata (backfill around the foundations) included rare fragments of glass and brick and these deposits are present to the maximum depth of the pits, 1.1 m.

London Clay
Below the topsoil/Made Ground, orangish brown, mottled bluish grey, slightly sandy, silty clay was encountered and proven to 7 m, the maximum depth of the investigation. Occasional selenite crystals are present below 2.5 m. Rootlets are present within the clay to approximately 2.5 m depth.

Hand vanes tests undertaken at 1 m and 2 m depth recorded shear strengths of between 58 kN/m^2 and 92 kN/m^2 within the London Clay. These test values indicate that the strata are medium to high strength becoming high strength below 2.5 m.

Standard Penetration Tests undertaken within this strata recorded uncorrected 'N' values of between 4 and 9 at 1 m depth, increasing to between 14 and 19 at 3 m depth and 21 to 38 below 4 m depth.

4.4 Groundwater

Perched water was encountered, at 2.2 m depth, within one windowless sample location where a slight seepage was recorded. The hole was dry on completion. Within the hand-dug pits, perched water was also recorded as a slight seepage at the base of the pits.

The groundwater conditions are based on observations made at the time of the fieldwork. It should be noted that groundwater levels may vary due to seasonal and other effects.

5. PROPOSED DEVELOPMENT

The proposed development includes a two-storey extension to the northwest of the school building, in the eastern area of the school site, with the potential to be increased to four-storeys in the future. A proposed development plan is presented as Figure 4.

6. ASSESSMENT OF POTENTIAL CONTAMINATION AND GROUND GASES

6.1 Assessment Criteria

Assessment of potential contamination and ground gases has been undertaken using a risk assessment based approach, as recommended within the Environmental Protection Act (1990), CLR11 (2004) CLEA Model (2004-2009), BS 10175 (2011) and CIRIA C552 (2001). This approach considers the likely source of contamination, given the history and location of the site, and the possible migration pathways by which these potentially hazardous substances may reach likely receptors, such as end users of the site, controlled waters or the wider environment, in the context of the proposed development.

Part IIA of the Environmental Protection Act (1990) states that

"Contaminated Land is any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that –

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or
(b) pollution of controlled waters is being, or is likely to be caused;"

All risk assessments carried out as part of this investigation have been carried out with respect to the definition of "contaminated land" within Part IIA of the Environmental Protection Act (1990) and have considered the site both before and on completion of the development.

The conceptual site model used in this assessment is presented in Table 1.

6.2 Potential Sources of Contamination

With reference to the site history, the existing school has occupied the site since the 1860s and has been the only development on the site. Given the nature of the development, a secondary school, it is considered that there are no sources of potential contaminants associated with this land use.

Ground conditions at the site comprise a limited thickness of topsoil/Made Ground over London Clay strata.

The localised Made Ground encountered during the investigation comprises man-made materials such as brick and glass fragments with reworked natural strata. The potential risks from such man-made inclusions are considered to be negligible. No visual or olfactory evidence of any potentially contaminated soils was noted within the Made Ground or the natural strata at the site.

With respect to off-site sources of potential contamination, the majority of the land in the area is associated with residential usage and, therefore, is considered not to be a potential source of mobile contaminants.

Based on desk study information and observations of the ground, there are no potential sources of contamination identified at the site and the ground conditions are considered not to represent a potential risk to human health or the wider environment.

No putrescible material has been identified at the site and there are no recorded landfills within influencing distance. The site is not within an area where precautions against the ingress of radon gas are required in new buildings. Therefore, it is considered that there are no sources of hazardous ground gases at the site and ground gas protection is not required for the proposed development.

6.3 Recommended Remedial Works

It is considered that no soil or groundwater remedial works will be required at this site to permit development.

6.4 Potential Liabilities

On the basis of the above, it is considered that the site does not present a significant risk of harm to end users or a risk of pollution to the wider environment and, therefore, retention of the materials currently at the site should not be associated with any liability following completion of the development.

7. ASSESSMENT OF MINING, QUARRYING AND OVERALL GROUND STABILITY

The site is not located within an area of recorded past mining or quarrying and no evidence of mining or quarrying has been identified during the ground investigation. Therefore, associated issues of ground stability are not applicable to the development.

With reference to published information provided by the British Geological Survey, and in the context of the low sensitivity of the proposed structure to very minor background seismic events recorded in the UK, it is considered that the foundation solution should not be constrained by potential ground vibrations from natural sources and that more detailed assessment is not necessary.

8. FOUNDATION RECOMMENDATIONS

8.1 Design Approach

In compliance with the requirements of the National Annex of BS EN 1997-1:2004 the geotechnical design assessment is based on Design Approach 1 (as defined in BS EN 1997-1:2004). As the structural loads for the proposed building are well defined, uncertainty and risks of potential unfavourable conditions (or deviations from characteristic values) are primarily associated with the ground conditions.

Consideration is given to the assessment of ultimate limit state (ULS) conditions, where full collapse or failure conditions are considered, and relevant design information is presented in Appendix IV in this regard. In addition, the assessment considers serviceability limit states (SLS), to ensure that the recommended design parameters are compatible with an acceptably low risk of serviceability criteria being exceeded during the standard design life of the structure. It is noted that the SLS has a greater influence on the design parameters in comparison to ULS conditions and this is considered in the following assessment.

8.2 Proposed Structural Loadings and Serviceability Criteria

Details of imposed foundation loads (i.e. actions imposed by the building structure) and serviceability limit values are not presently available for the proposed structures. The geotechnical assessment presented in the report has considered generic values for the proposed development type, which is considered appropriate for the appraisal of engineering solutions and preliminary design, and these are listed below:

Preliminary Values, for appraisal purposes:

Maximum Imposed Load on Foundations: Up to 200 kN/m run

Serviceability Limit Values (associated with above action)

Maximum Total Settlement: 25 mm

Maximum Deflection: 1/1000

8.3 Geotechnical Category of Proposed Structures

In view of the nature of the proposed structure, comprising a two-storey extension, and with reference to the indicated ground conditions, as outlined in Section 4, it is considered that the development is compatible with Geotechnical Category 2, as defined in BS EN 1997-1:2004, and the necessary information relating to the Ground Investigation and Geotechnical Design Reports has been obtained and assessed on this basis.

8.4 Assessment of Foundation Solutions

With reference to the recorded ground conditions and corresponding Geological Model presented in Section 4, characteristic values relating to the geotechnical properties of the strata within influencing distance of the proposed structures are presented in Appendix IV. Salient elements of the geotechnical model are outlined below.

Ground conditions at the site comprise a limited thickness of topsoil/Made Ground over medium to high strength clays of the London Clay strata.

On the basis of the recorded ground conditions, it is considered that traditional shallow spread foundations may be appropriate to support the proposed development. However, several trees, including a mature ash tree, are present in close proximity to the proposed development or are to be removed to permit the development.

Due to the recorded medium volume change potential of the London Clay strata at the site and the proximity of the trees to be removed, deepened trench-fill foundations with heave precautions are likely to be required.

If foundation excavations are likely to exceed 2.5 m depth, or are deemed uneconomical or impractical to construct, consideration should be given to the use of a piled foundation solution for the proposed development. If a piled foundation solution is preferred, further foundation design parameters may be required through supplementary investigation works, such as described in Section 13.

8.5 Recommended Foundation Design Parameters

On the basis of the foregoing assessment and the details presented in Appendix IV, it is considered that a shallow strip/trench fill foundation provides a possible foundation solution for the proposed structure. On the basis of the ground conditions and structures described in the report, the recommended parameters for the foundation design are as follows:

Foundation Strata :	Medium to high strength clays (London Clay)
Foundation Depth :	Minimum 0.9 m, deepened within influence of trees
Foundation Width:	Up to 1.5 m max
Nett Allowable Bearing Pressure:	150 kN/m^2

It is considered that total settlement of foundations designed on the above basis should be less than the normal serviceability limit state for this development (i.e. total settlements of 25 mm) as outlined in the assessment presented in Appendix IV.

Laboratory testing results indicate the clayey horizons at the site comprise “medium volume change” potential soils, as defined in NHBC Standards (2013) (and referenced by the Building Regulations (2006)). Within the influence zones of existing or proposed trees, foundations should be deepened and precautions to prevent to prevent excess movement due to heave should be incorporated.

The cracks noted in the existing school building, which may be related to heave, should be inspected by a structural engineer so that implications for the new extension can be considered before construction begins.

Based on the soil pH and sulphate conditions recorded at the site and with reference to the guidance published within BRE Special Digest 1 (2005), the specified DC Class of concrete for buried structures and foundations should be suitable for an ACEC site classification of AC-2.

8.6 Floor Slab Recommendations

Due to the recorded “medium volume change” potential of the near surface soils, a suspended ground floor slab is recommended for the proposed development. It would be prudent to make allowance for a 300 mm under floor void due to potential heave issues.

8.7 General Construction Advice

All formations should be cleaned, and subsequently inspected by a suitably qualified engineer prior to placing concrete. Should any soft, compressible or otherwise unsuitable materials be encountered they should be removed and replaced by blinding concrete.

Foundation concrete, or alternatively, a blinding layer of concrete, should be placed immediately after excavation and inspection in order to protect the formation against softening and disturbance.

Generally, all formations should be placed wholly within the same material type, unless specific geotechnical inspection and assessment have been undertaken.

Care should be taken to ensure that any field drains encountered are carefully and satisfactorily blocked to prevent water seeping through the drains and into any excavations.

9. TEMPORARY WORKS

Conventional plant is considered appropriate for excavation works at the site, although allowance should be made for hydraulic breakers to break out hardstanding, foundations and any other buried structures that may be encountered.

Shallow excavations may remain stable in the short term. However, instability may occur in excavations left open for extended periods of time. Support should be provided, or the sides battered back, in any excavations requiring man entry.

No groundwater was encountered during the site investigation. If any perched water is encountered, it is considered seepages may be controlled by pumping from sumps.

10. ASSESSMENT OF SOAKAWAY DRAINAGE

Due to the low permeability of the London Clay strata below the site, soakaway drainage is likely to be precluded for the proposed development.

11. ROAD PAVEMENTS

Based on an examination of the soils present at the site and the guidance of TRRL Report LR1132 and the Highways Agency Interim Advice Note 73/06 (Rev 1), it is considered that an equilibrium design CBR value of 3% may be used for road pavement design. It is considered that the materials at shallow depth should be regarded as frost susceptible due to the likely silt content of the near-surface soils.

12. ASSESSMENT OF MATERIALS FOR WASTE DISPOSAL

There should be no environmental requirement to remove materials from site to permit development. Therefore, excavated materials should be retained and reused on site where possible.

The topsoil beneath the site, including the localised Made Ground comprising topsoil materials with fragments of brick and glass, is likely to be classified as “non-hazardous” waste if taken off site due to the likely total organic carbon concentrations. Alternatively, these materials can be taken to a recycling facility. Any tarmac, from the access road, should be taken to a recycling facility.

The natural strata (London Clay strata) should be classified as “inert” waste if taken off site. As these materials comprise in situ natural strata, no analytical testing should be required on these materials to confirm waste classification.

It is important that, during excavations on site, the arisings are segregated into different waste streams. Failure to separate the different materials could result in all the waste being classified as “non-hazardous” waste resulting in higher waste disposal costs.

Landfill tax would be payable on any materials removed from site and taken to landfill. However, inert waste may also be taken to a facility that is exempt under the Environmental Permitting regulations, subject to specific exemption requirements.

13. RECOMMENDATIONS FOR SUPPLEMENTARY GROUND INVESTIGATIONS

As foundation depths are likely to be below 2 m depth within the zone of influence of trees, a piled foundation solution may be preferred. It is considered that the deep windowless sample hole completed at the site (WS1), contains appropriate data for preliminary pile costing and design purposes. However, if piling contractors require additional data for detailed pile design, a supplementary investigation may be required. Due to the small size of the proposed development, it is considered one borehole may be sufficient.

14. RECOMMENDED SUPERVISION AND MONITORING

In compliance with the requirements in BS EN 1997-1:2004 and BE EN 1997-2:2007, construction and workmanship of the engineering solutions recommended in this report shall be supervised. In particular, issues listed in Section 8.7 General Construction Advice shall be considered in the implementation of the works and design of any necessary temporary works set out in Section 9.

In relation to the foundation solution(s) and ground floor slab recommendations in Section 8, the following supervision and monitoring is recommended.

- Inspections of formation strata in excavations for shallow strip/trench fill footings (if used)
- Verification testing required following pile installation (if used)

15. SUMMARY

It is proposed to build a two-storey extension at La Sainte Union Catholic School, Highgate Road, London. School buildings occupy the site together with associated hard and soft play areas and limited car parking areas. It is proposed to extend the school building, in the east of the school site, to the northwest with a two-storey extension that may be increased to four storeys in the future.

Ground conditions at the site comprise a limited thickness of topsoil/Made Ground over medium and high strength clays of the London Clay strata.

It is considered that the proposed development should not be constrained by issues relating to contaminated land or ground gases.

Due to the removal of a number of trees, most notably a mature Ash, in close proximity to the proposed foundations and the medium volume change potential of the clayey strata, it is considered likely that deepened trench-fill foundations, with heave precautions, will be required for the proposed development. If foundation excavations are likely to exceed 2.5 m depth, a piled foundation solution may be preferred.

Due to the potential for near-surface deposits to heave, suspended ground floor slabs are recommended for the proposed development.

Due to the low permeability of the London Clay strata soakaway drainage is precluded for the proposed development.

If a piled foundation solution is preferred, a supplementary ground investigation may be necessary to obtain pile foundation design parameters.

REFERENCES

BRE (2005) *Special Digest 1 – Concrete in aggressive ground,* CRC Ltd

BSI (2010) *BS 5930:1999+A2:2010 Code of Practice for Site Investigations* British Standards Institution

BSI (2004) *BS EN1997-1:2004 Eurocode 7: Geotechnical Design – Part 1: General Rules* British Standards Institution

BSI (2007) *BS EN1997-2:2007 Eurocode 7: Geotechnical Design – Part 2: Ground Investigation and Testing* British Standards Institution

BSI (2011) *BS 10175:2011 Code of Practice for Investigation of Potentially Contaminated Sites* British Standards Institution

CIRIA (2001) *CIRIA C552 – Contaminated Land Risk Assessment: A Guide to Good Practice* Construction Industry Research Association

CIRIA (2000) *CIRIA C515 – Groundwater Control – design and practice* Construction Industry Research Association

DoE (1990) *The Environmental Protection Act* Department of The Environment HMSO

Department for Communities and Local Government (2012) *National Planning Policy Framework*

Environment Agency (2005) *Environment Agency Guidance on Requirements for Land Contamination Reports* EA

Highways Agency (2009) *Interim Advice Note 73/06 Revision 1 – Design Guidance for Road Pavements (Draft HD25)* HA

NHBC (2013) *Standards* National House Building Council

Office of the Deputy Prime Minister (2006) *The Building Regulations 2000 Approved Document C: Site Preparation & Resistance to Contaminants and Moisture 2004 edition* HMSO

TRRL (1989) *LR1132 – The Design of Bituminous Road Pavements* Transport and Road Research Laboratory

GENERAL NOTES

1. This report is provided in the context of the stated development proposals and should not be used in a different context.

2. The accuracy of map extracts cannot be guaranteed and it should be recognised that different conditions on site may have existed between and subsequent to the various map surveys.

3. Any borehole data from the British Geological Survey sources are included on the following basis: "The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation.

4. Where any data supplied by the Client or by other external sources, including previous site investigation data, have been used it has been assumed that the information is correct unless otherwise stated. No responsibility can be accepted by Crossfield Consulting Limited for inaccuracies within the data supplied by others.

5. Exploratory hole locations provided in the report are generally established by tape measurement from existing features or boundaries. Hole locations are not accurately surveyed and ground levels at these locations are not obtained unless specifically requested.

6. Any assessments made in this report are based on the ground conditions indicated by the trial pits and/or boreholes, together with the results of any field or laboratory testing undertaken and, where appropriate, other relevant site data which may have been obtained for the site. Variations in ground conditions may occur between exploratory hole locations and there may be special conditions appertaining to the site which have not been revealed by the investigation and which have not been taken into account in the report. The assessment may be subject to amendment in the light of additional information becoming available.

7. The report is provided for the sole use by the Client and is confidential to the Client's professional advisers. No responsibility whatsoever for the contents of this report will be accepted to any person other than the Client.

8. The copyright of this report and other plans and documents prepared by Crossfield Consulting Limited is owned by them and no such report, plan, or document may be reproduced, published or adapted without their written consent. Complete copies of this report may, however, be made and distributed by the Client as an expedient in dealing with matters relating to its commission.

9. New information, improved practices and legislation may necessitate an alteration to the report in whole, or in part, after its submission. Therefore with any change in circumstances or after the expiry of one year from the date of the report, the report should be referred to Crossfield Consulting Limited for re-assessment and, if necessary, re-appraisal.