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CONSULTING
GEOTECHNICAL ENVIRONMENTAL

BISHOP'S ITCHINGTON PARISH COUNCIL

PROPOSED SPORTS PAVILION, CHAPEL STREET, BISHOP'S ITCHINGTON

SITE INVESTIGATION REPORT

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September 2020
Report No. CCL03359.CM18

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1. INTRODUCTION

It is proposed to develop land off Chapel Street, Bishop's Itchington, Warwickshire. The development area, subsequently referred to as "the site", forms part of land associated with a current sports ground. It is understood that the proposed development will comprise a new sports pavilion and an extended car park with managed green open space areas.

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, road pavement design 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 5 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 7 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 local authority.

The report also includes a geotechnical assessment and the salient information and recommendations are presented in Sections 9 to 14 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 at the end of Chapel Street, within Bishop's Itchington village centre and approximately 5 km to the southwest of Southam town centre, as shown on Figure 1. The National Grid Reference for the site is SP 3917 5757. The site is bounded by a residential property and its associated garden to the north. Further fields associated with the sports pavilion lie to the south of the development area. To the east, there is a children's swing park and tennis courts and to the west there is a private lane providing access to a farm.

2.2 Site Description

The following site description is based on observations made at the time of the ground investigation in November 2020.

The site is a rectangular shaped plot of land with an approximate area of 0.18 which is relatively flat and level. The general area slopes gently towards the east.

The site comprises a rectangular, single storey, sports pavilion building within the northwestern part of the site, as shown on Figure 2. The area to the north comprises an asphalt surfaced car park. The remainder of the

development area is part of a larger grassed, sports field. A wooden fence is present along the northern boundary and part of the northwestern boundary. The western site boundary comprises bushes.

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 County Series plan dated 1886-1888 shows the site as undeveloped and as part of a field. A footpath borders the north of the site and an access lane lies to the west. A Methodist Chapel lies approximately 50 m north of the site with the main part of the village to the northwest.

By 1905, several small structures, possibly sheds, had been constructed within the northwestern part of the site. During this time, the site was marked as being part of an allotment area and several other allotments are present in the adjacent areas.

The 1971 National Grid plan shows the existing pavilion in the northwestern part of the site and with a playing field making up the remainder of the development area and extending further south and east. A path is shown passing through the northern part of the site. Extensive residential development had occurred to the west of the site by this time.

Some houses had been constructed to the northwest of the site on the 1981-1986 National Grid plan. There are no changes shown on site.

By 2003, the northern part of the site had been developed into a car park. Sometime between 2003 and the current day, a playground and tennis courts had been constructed immediately to the east of the site.

3. PUBLISHED GEOLOGY

Geological map data published by the British Geological Survey (BGS) online and in print, on 1:50,000 scale Sheet No. 201 (Banbury) indicates that superficial deposits are absent at the site. The solid geology is indicated to be strata of the Charmouth Mudstone Formation, comprising mudstones.

4. DESK STUDY ENQUIRIES

Desk study information relating to the site has been obtained from the GroundSure Environmental Data Viewer, the Environment Agency and Defra regarding the site and surrounding area. Information obtained from these enquiries is presented in Appendix II and summarised below.

Hydrological information identifies that the site is not located within either a Zone 2 or a Zone 3 Floodplain area, as defined by the Environment Agency.

Hydrogeological information indicates that the solid strata below the site are classified as 'Secondary (Undifferentiated)' aquifer strata. The development area is not located within a groundwater source protection zone.
There are no historical or active landfills recorded within 250 m of the site.

There are no designated environmentally sensitive areas associated with the site or the general surrounding area.

Reference to the Building Research Establishment Document BR211 – *Radon: Guidance on Protective Measures for new buildings* (2015) indicates that the site is not within an area where radon precautions are required in new buildings.

5. GROUND CONDITIONS AND GEOLOGICAL MODEL

5.1 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.

5.2 Buried Foundations and Services

Buried foundations and services were not encountered within the investigated area of the site. However, foundations and services associated with the existing pavilion should be anticipated to be present beneath the site.

5.3 Strata Encountered

Made Ground/Topsoil
A layer of asphalt surfacing (0.1 m thick) over Made Ground was encountered across the site to depths of between 0.3 m and 0.4 m in the northern part of the site. The Made Ground generally comprises slightly clayey gravel sub-base materials.

Elsewhere, Made Ground/Topsoil is present across the site to recorded depths of between 0.3 m and 0.4 m. Traces of brick and glass materials have been observed within the surface soils. It is noted that the Made Ground essentially comprises redeposited natural soils.

Charmouth Mudstone Formation
Below the Made Ground/Topsoil materials, weathered Charmouth Mudstone Formation strata are present across the entire site and are proven to depths of at least 2.0 m (the maximum depth of the investigation). These deposits generally comprise stiff consistency, high strength, grey gravelly clay with mudstone lithorelicts.

Standard penetration tests undertaken within the Charmouth Mudstone Formation recorded 'N' values of between 4 and 50.

5.4 Groundwater

Groundwater was not encountered during the ground investigation.

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.

6. PROPOSED DEVELOPMENT

The proposed development, which is shown on Figure 3, comprises the following:

- A new sports pavilion building
- Surface Car parking area
- Managed soft landscaping areas

7. ASSESSMENT OF POTENTIAL CONTAMINATION AND GROUND GASES

7.1 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+A2:2017 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) significant pollution of controlled waters is being caused or there is significant possibility of such pollution being 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 basis of the risk assessment is the Conceptual Site Model, which is derived from the desk study and initial information and identifies potential pollutant linkages that could affect receptors relevant to the site and the wider environment. The Conceptual Site Model is presented in Table 1.

Based on the model, a ground investigation was designed to obtain relevant information to assess further the identified pollutant linkages.

7.2 Potential Sources of Contamination

With reference to the site history, the site has mostly remained undeveloped with the exception of some former outbuildings and the construction of the pavilion and car park. Made Ground materials largely consist of redeposited natural soils and there is no evidence of nearby past commercial/industrial operations likely to influence ground conditions at the site. On this basis, it is considered that there are no significant potential sources of contamination associated with the site.

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 dwellings. 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.

7.3 Pollutant Linkages – Solids and Liquids

Based on the Conceptual Site Model, consideration is given below to identified pollutant linkages and a risk evaluation is undertaken of each possible source-pathway-receptor linkage that may occur at the site. The risk evaluation considers the potential consequences and probability of occurrence in accordance with CIRIA C552 (2001). Where risks are identified as "negligible", then by implication such risks are within normally accepted levels for the proposed development, and the further reduction of such risks by remediation works is considered unnecessary. Where risks are identified that are "low" as defined in CIRIA C552 (2001), or worse, then consideration is given to the management of the identified risks, with appropriate recommended actions that may include engineering solutions / remediation works as described in the following sections.

7.3.1 Durability of Buried Structures and Services

In view of the low soluble sulphate content and near-neutral soil conditions, there are no special precautions required for the protection of good quality buried foundation concrete. Based on guidance 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-1.

The site has not been associated with past fuel and/or chemical storage and there are no such storage facilities in close proximity. Therefore, the site would not be considered to be 'brownfield' under the definition provided by UKWIR (2010) with respect to the assessment of ground for water supply pipes. Based on the guidance provided by UKWIR, conventional plastic materials can be used for potable water supply pipes without any requirements for specific testing.

It should be noted that individual water companies may have in-house requirements for the assessment of ground conditions for potable water supply pipes and these requirements may be in addition to, or may contradict, the guidance provided by UKWIR. Therefore, it is recommended that the relevant water supply company be consulted prior to finalising the potable water supply design.

7.4 Recommended Remedial Works

It is evident that the site is not associated with a valid source of potential contamination, hence there are no valid pollutant linkages and remediation works are not required for the proposed development.

7.5 Potential Liabilities

Based on the available data, it is considered that the ground conditions at the site should not represent an unacceptable risk to human health or the wider environment, such that there should be no potential environmental liabilities associated with the site ownership now, or following development.

8. ASSESSMENT OF MINING, QUARRYING AND OVERALL GROUND STABILITY

The site is not within an area of recorded underground mining or other such mineral extraction and there is no evidence of quarrying activities at, or in close proximity to, the proposed development property. Therefore, it is considered that the proposed development should not be constrained by issues of ground stability associated with mining or quarrying.

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.

9. FOUNDATION RECOMMENDATIONS

9.1 Assessment of Foundation Solutions

With reference to the recorded ground conditions and corresponding Geological Model presented in Section 5, characteristic values relating to the geotechnical properties of the strata within influencing distance of the proposed structures are outlined below. Salient elements of the geotechnical model are outlined below.

It is understood that the proposed development is to comprise a single storey building of load bearing brick construction.

Ground conditions at the site generally comprise a limited thickness of topsoil or Made Ground underlain by stiff consistency and high strength clays of the Charmouth Mudstone Formation.

On the basis of the recorded ground conditions, it is considered that strip/trench-fill foundations should be appropriate to support the proposed development as detailed below.

9.2 Recommended Foundation Design Parameters

On the basis of the foregoing assessment, it is considered that strip/trench fill footings provide the most appropriate 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 :	Stiff consistency and high strength clays (and/or mudstone) of the Charmouth Mudstone Formation
Foundation Depth :	Minimum 0.9 m deepened within influence of trees.
Foundation Width/Size:	0.6 m to 2.0 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).

Laboratory testing results indicate the clayey horizons at the site comprise medium volume change potential soils, as defined in NHBC Standards (2020). Within the influence zones of existing or proposed trees, suitable foundation precautions should be adopted, as outlined in NHBC Standards (2020).

Based on 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-1.

9.3 Floor Slab Recommendations

Due to the presence of "medium volume change" potential soils beneath the site and the presence of bushes in relatively close proximity to the proposed structure, it is recommended that allowance be made for a suspended floor slab with an underfloor void of at least 250 mm, as outlined in NHBC Standards (2020).

9.4 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.

10. TEMPORARY WORKS

Conventional plant is considered suitable for excavation works at the site. The ground is anticipated to remain stable in the short term. However, instability should be anticipated in all excavations left open for extended periods of time.

Groundwater is unlikely to be encountered in shallow excavations, although perched water may be encountered. If perched water does enter excavations, it should be controlled using conventional sump pumping.

11. ASSESSMENT OF SOAKAWAY DRAINAGE

Ground conditions beneath the site generally comprise low permeability clays underlain by mudstone. In view of this, soakaway drainage is significantly constrained at the proposed development. Two in situ permeability tests were conducted in holes WS1 and WS2, presented in Appendix III, demonstrates a very low permeability value of approximately 10^{-7} m/s.

In view of the above data, it is considered that the use of soakaway drainage is not viable for the proposed development and an alternative method of drainage for the site should be identified.

12. ROAD PAVEMENTS

Based on examination of the soils present on the site, and the guidance of IAN/73 AND TRRL Report LR1132, it is considered that an equilibrium design of CBR value of 3% is appropriate for road pavement design. It would be prudent to consider the Made Ground to be potentially frost susceptible.

13. ASSESSMENT OF MATERIALS FOR WASTE DISPOSAL

There is no requirement to remove soils from site and, therefore, development levels should set such that soils can be retained and reused on site where possible. Providing development levels are set to accommodate soil arisings (for example, from foundation excavations), such materials would not be classified as waste if retained and re-used on site. However, if materials are excess to requirements, they should be taken to an appropriately permitted waste facility.

If material is identified for removal to a waste facility, it will be necessary to provide a description of the material to the receiving facility.

The Made Ground/Topsoil across the site would be classified as 'non-hazardous' waste due to the typical organic carbon content within such soils.

The natural strata beneath the site (Charmouth Mudstone Formation) should be classified as 'inert' waste if taken off site. As these materials comprises in situ natural strata, no analytical testing should be necessary to confirm waste classification.

Waste requires pre-treatment prior to disposal at landfill and this may take the form of physical or chemical treatment to reduce hazards and/or waste volumes. The segregation and screening of waste soils into separate, and appropriately classified, waste streams would satisfy the pre-treatment criteria by ensuring that volumes of each waste category are minimised. Segregation of waste streams is also important to prevent materials being classified within a worse-case category and, therefore, incurring higher disposal costs. Mixing of different waste streams to dilute hazardous properties is not permitted.

It should be noted that the above assessment is provided in accordance with current waste disposal and environmental permitting legislation and guidance documents. However, individual landfills and other waste disposal facilities may have variances in their permit that differs from standard guidance. Waste facilities may also make decisions with respect to accepting waste on a commercial basis. Therefore, landfills or other waste facilities should be approached to confirm that they will accept waste materials prior to finalising waste disposal proposals.

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 9.4 General Construction Advice shall be considered in the implementation of the works and design of any necessary temporary works set out in Section 10.

In relation to the foundation solution and ground floor slab recommendations in Section 9, the following supervision and monitoring is recommended.

- Inspections of formation strata in excavations for shallow strip/trench fill footings

15. SUMMARY

It is proposed to develop a site off Chapel Street, Bishops Itchington. The site is currently a plot of land associated with a current sports ground. The proposed development comprises a new sports pavilion complex and an extension to car park with managed green open space areas.

Ground conditions at the site comprise a thin layer of Made Ground/topsoil to a maximum identified depth of 0.4 m. Underlying the Made Ground/topsoil, stiff consistency gravelly clays of the Charmouth Mudstone Formation are present to a depth of at least 2.0 m (the maximum depth of the investigation). Groundwater was not encountered during the investigation.

No potential pollutant linkages and it is considered that remediation works are not necessary for the proposed development.

It should be feasible to support the proposed development on conventional strip and trench fill foundations placed in high strength clays of weathered Charmouth Mudstone Formation strata. Due to the volume change potential of strata beneath the site, a suspended ground floor slab with an underfloor void of at least 250 mm is recommended, as outlined in NHBC Standards (2020) and precaution will be needed for construction near to trees.

Soakaway drainage is indicated not to be viable due to the low permeability of soils recorded at the site.

REFERENCES

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

BRE (2015) *BR211 – Radon: Guidance on protective measures for new buildings* BRE Press

BSI (2020) *BS 5930:2015+A1:2020 Code of Practice for Ground Investigations* British Standards Institution

BSI (2017) *BS 10175:2011+A2:2017 Code of Practice for Investigation of Potentially Contaminated Sites* 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

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

Environment Agency (2018) Waste Classification: *Guidance on the Classification and Assessment of Waste (1st Edition v1.1) – Technical Guidance WM3* EA

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

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

UKWIR (2010) *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites Report Ref. No. 10/WM/03/21* UK Water Industry Research

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 or its assignees 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 or its assignees.

8. 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.

TABLES

TABLE 1

CONCEPTUAL SITE MODEL

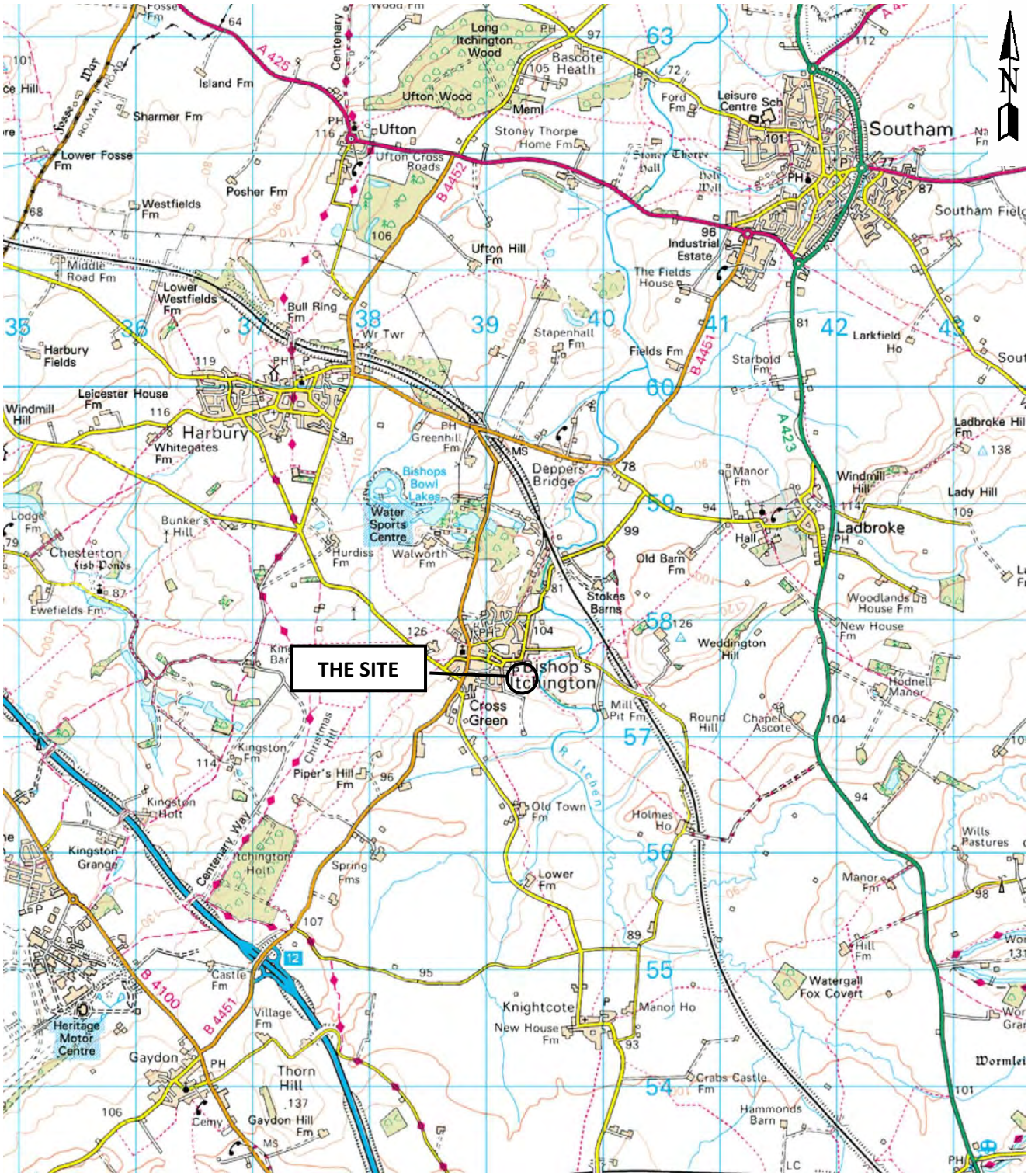
Potential Contaminant Source	Potential Pathway	Receptors and Assessed Pollutant Linkage
Solids *On-site:* No significant source identified. *Off-site:* No significant source identified.	***Movement of Solids*** Not applicable – no significant source identified.	***Human Health*** *Construction workers*: No Pollutant Linkage *Site users*: No Pollutant Linkage *Neighbours & public*: No Pollutant Linkage ***Buried Structures & Services*** *Plastic pipes for portable water:* No Pollutant Linkage *Buried concrete:* No Pollutant Linkage ***Landscape Areas*** No Pollutant Linkage
Liquids No significant source identified.	***Movement of Liquids*** Not applicable – no significant source identified.	***Controlled Waters*** *Groundwater:* Secondary Undifferentiated aquifer – No Pollutant Linkage *Surface Water*: River Itchen 298 m east of the site – No Pollutant Linkage
Ground Gases *Landfill Gases:* No potential source identified. *Radon Gas:* No significant source.	***Movement of Gases*** Not applicable – no significant source identified.	***Human Health (Ground Gases)*** No Pollutant Linkage

NOTES

1. The above conceptual model is based on CIRIA C552 (2001) and BS 10175:2011+A2:2017.
2. The Conceptual Site Model is prepared from available desk study information. Where a site walkover or ground investigation identifies information that was not known at the desk study stage, such information is used to modify the Model.
3. Where a pollutant linkage is identified, any subsequent ground investigation is designed to obtain relevant information to assess the pollutant linkage.

FIGURES

FIGURE 1

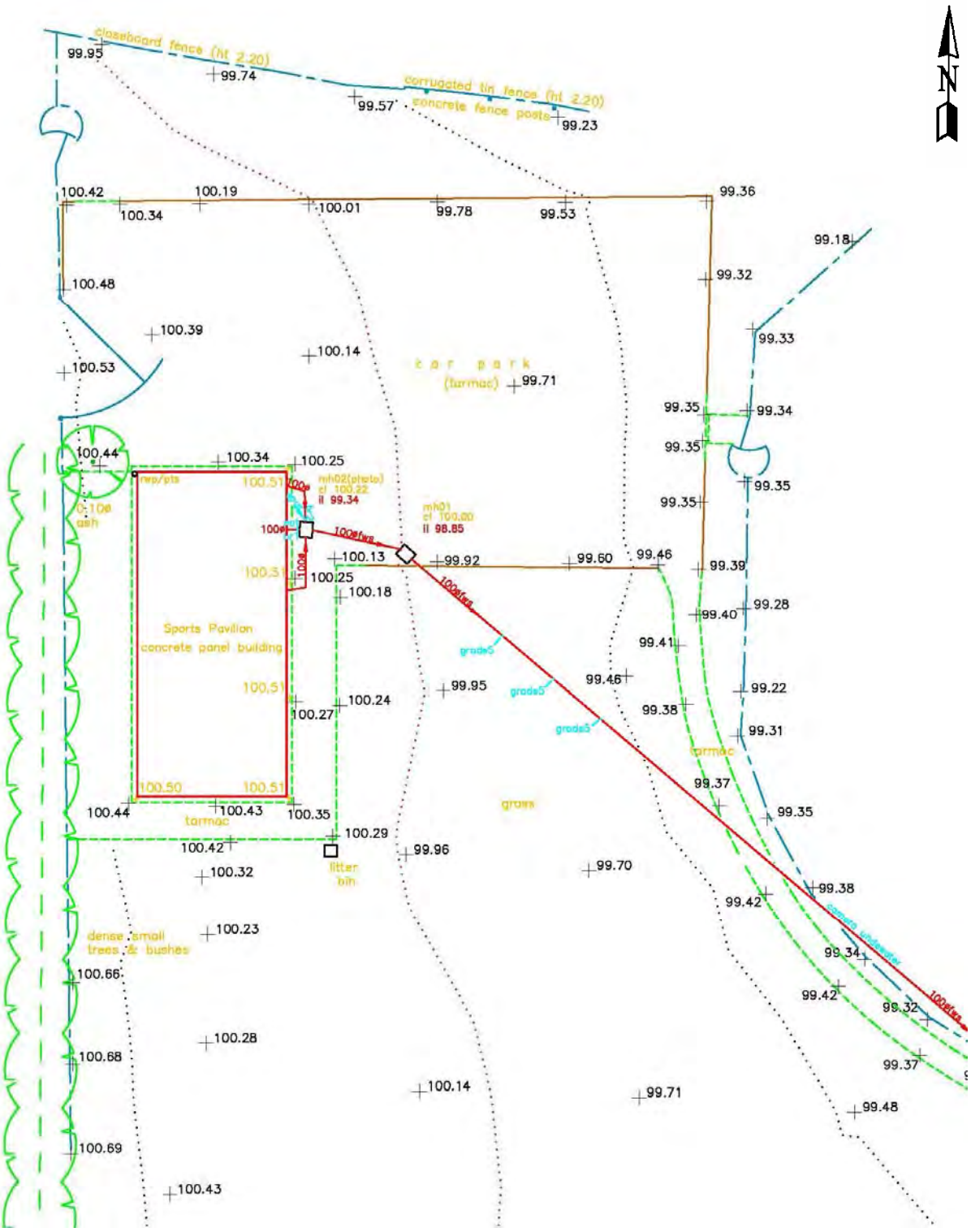


SITE LOCATION PLAN

Scale 1: 50,000

Reproduced from the 2013 1:50,000 Ordnance Survey map with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, © Crown copyright. Licence No.100014660

FIGURE 2



SITE PLAN
Scale 1: 250

Reproduced from Drawing No. 37436-1 by Midland Survey Ltd, dated November 2020

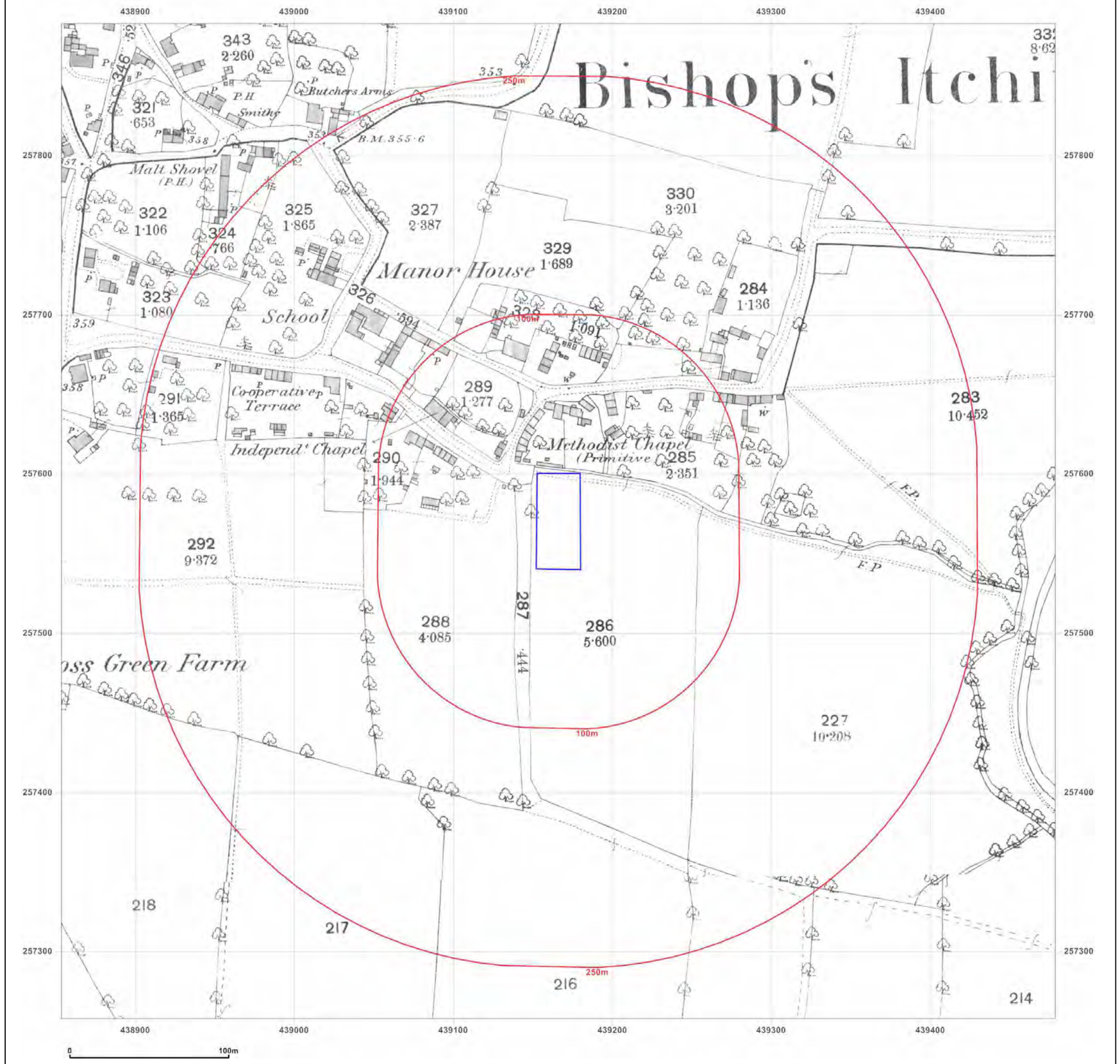
FIGURE 3

PROPOSED DEVELOPMENT PLAN

Scale 1: 250

Reproduced from Drawing No. 1485-0500- by AT Architects, dated 28/10/2020

APPENDIX I



emapsite™

Site Details:

CCL03359 - Bishops Itchington,Chapel Street,Bishops Itchington,CV47 2RB

Client Ref: EMS_636915_846712
Report Ref: EMS-636915_846712
Grid Ref: 439166, 257570

Map Name: County Series

Map date: **1886-1888**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1888
Revised 1888
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1886
Revised 1886
Edition N/A
Copyright N/A
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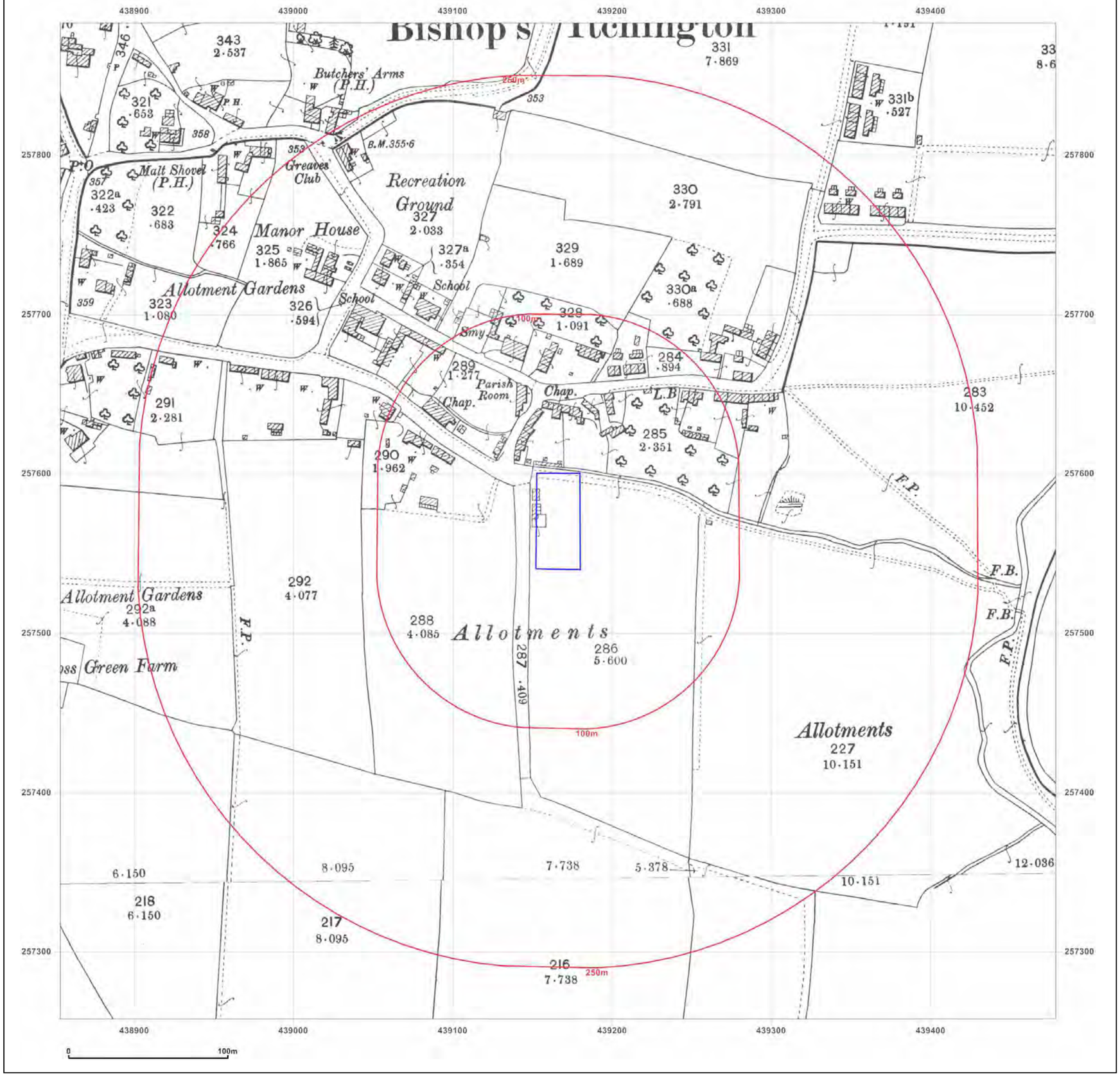
Production date: 29 September 2020

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



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Site Details:

CCL03359 - Bishops Itchington,Chapel Street,Bishops Itchington,CV47 2RB

Client Ref: EMS_636915_846712
Report Ref: EMS-636915_846712
Grid Ref: 439166, 257570

Map Name: County Series

Map date: **1905**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1905
Revised 1905
Edition N/A
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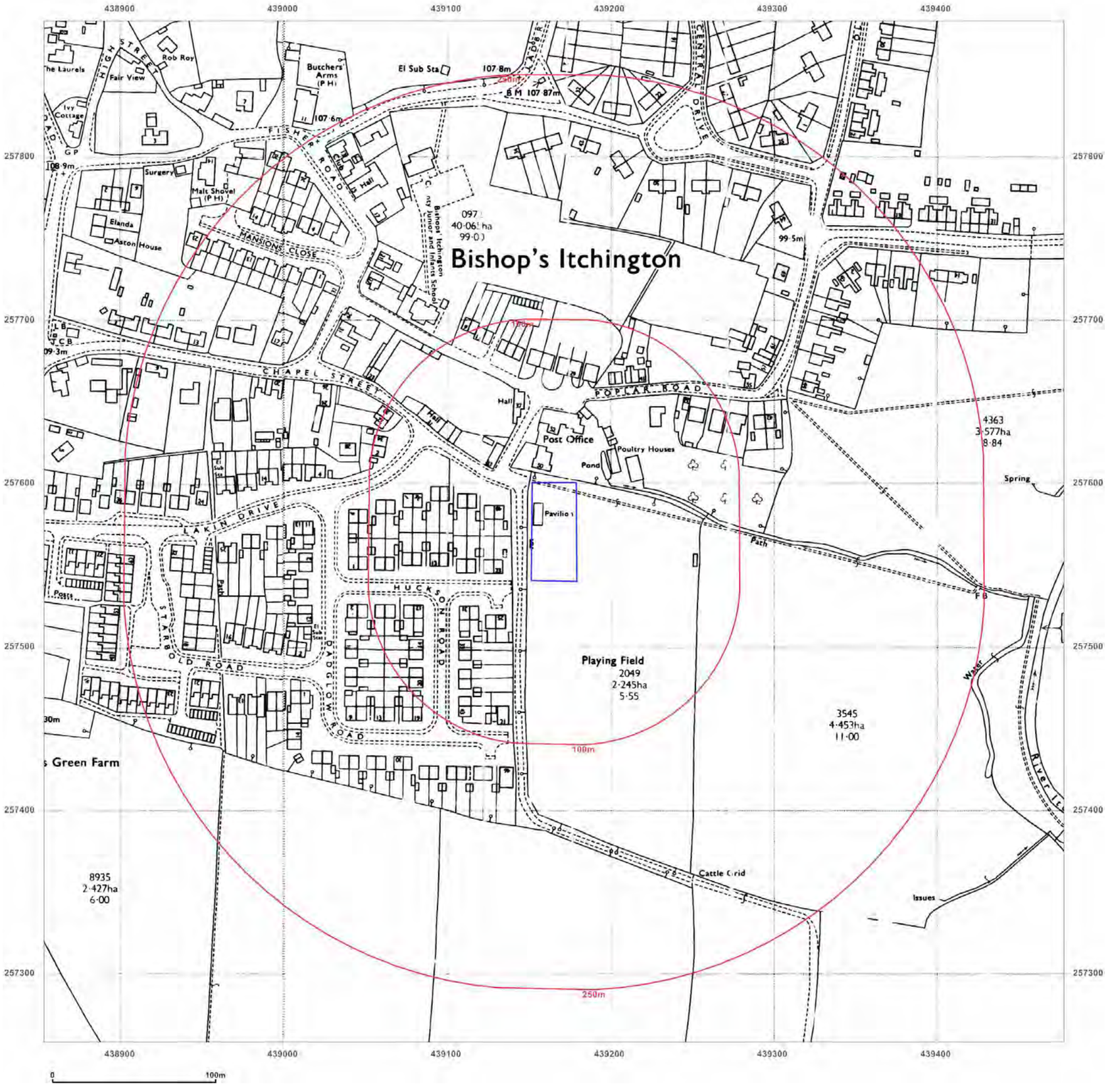

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Site Details:

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Client Ref: EMS_636915_846712
Report Ref: EMS-636915_846712
Grid Ref: 439166, 257570

Map Name: National Grid

Map date: **1971**

Scale: 1:2,500

Printed at: 1:2,500

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Revised N/A
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Surveyed N/A
Revised N/A
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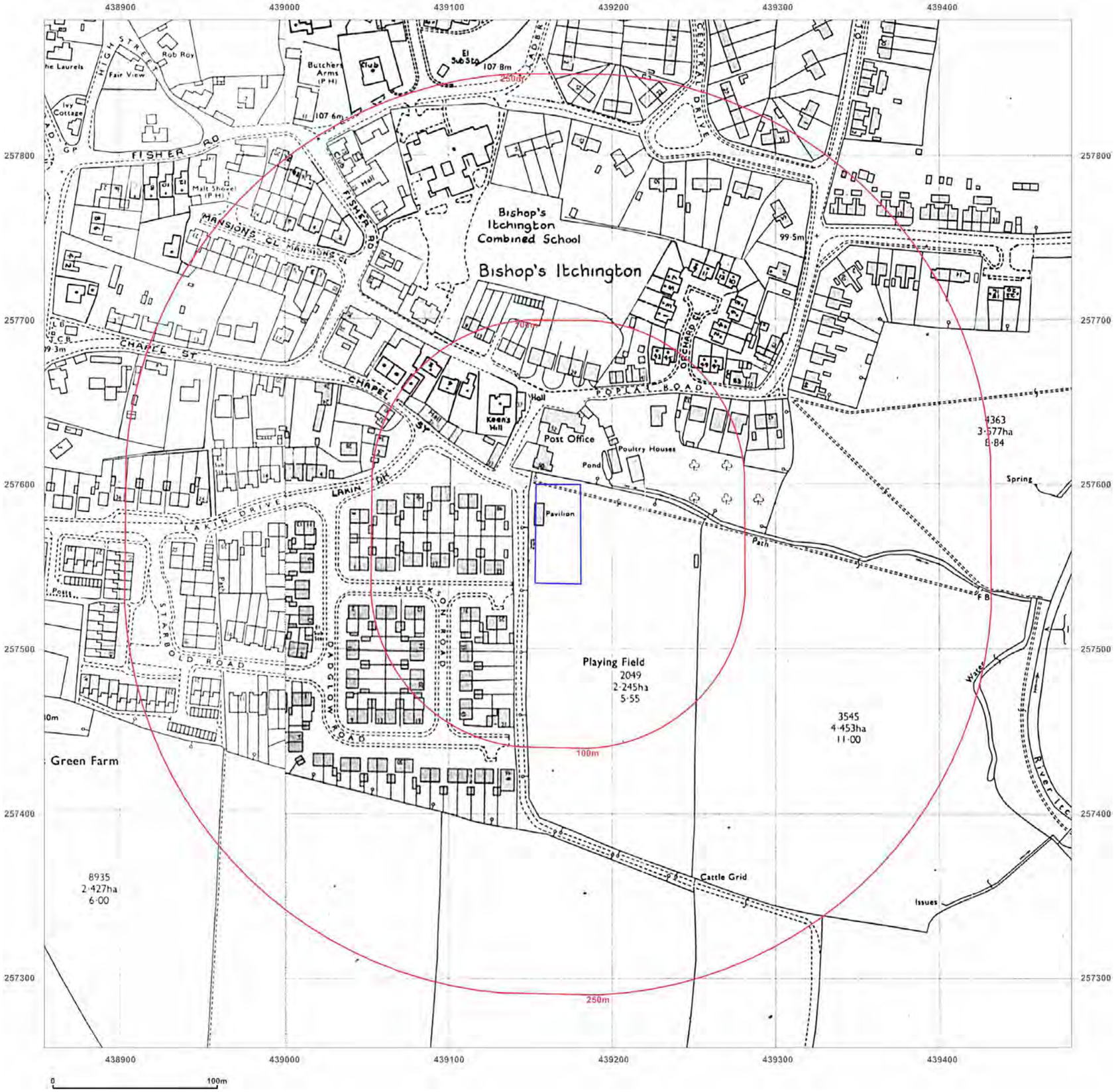

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Site Details:

CCL03359 - Bishops Itchington,Chapel Street,Bishops Itchington,CV47 2RB

Client Ref: EMS_636915_846712
Report Ref: EMS-636915_846712
Grid Ref: 439166, 257570

Map Name: National Grid

Map date: **1981-1986**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Revised 1981
Edition N/A
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Levelled 1967

Surveyed 1967
Revised 1986
Edition N/A
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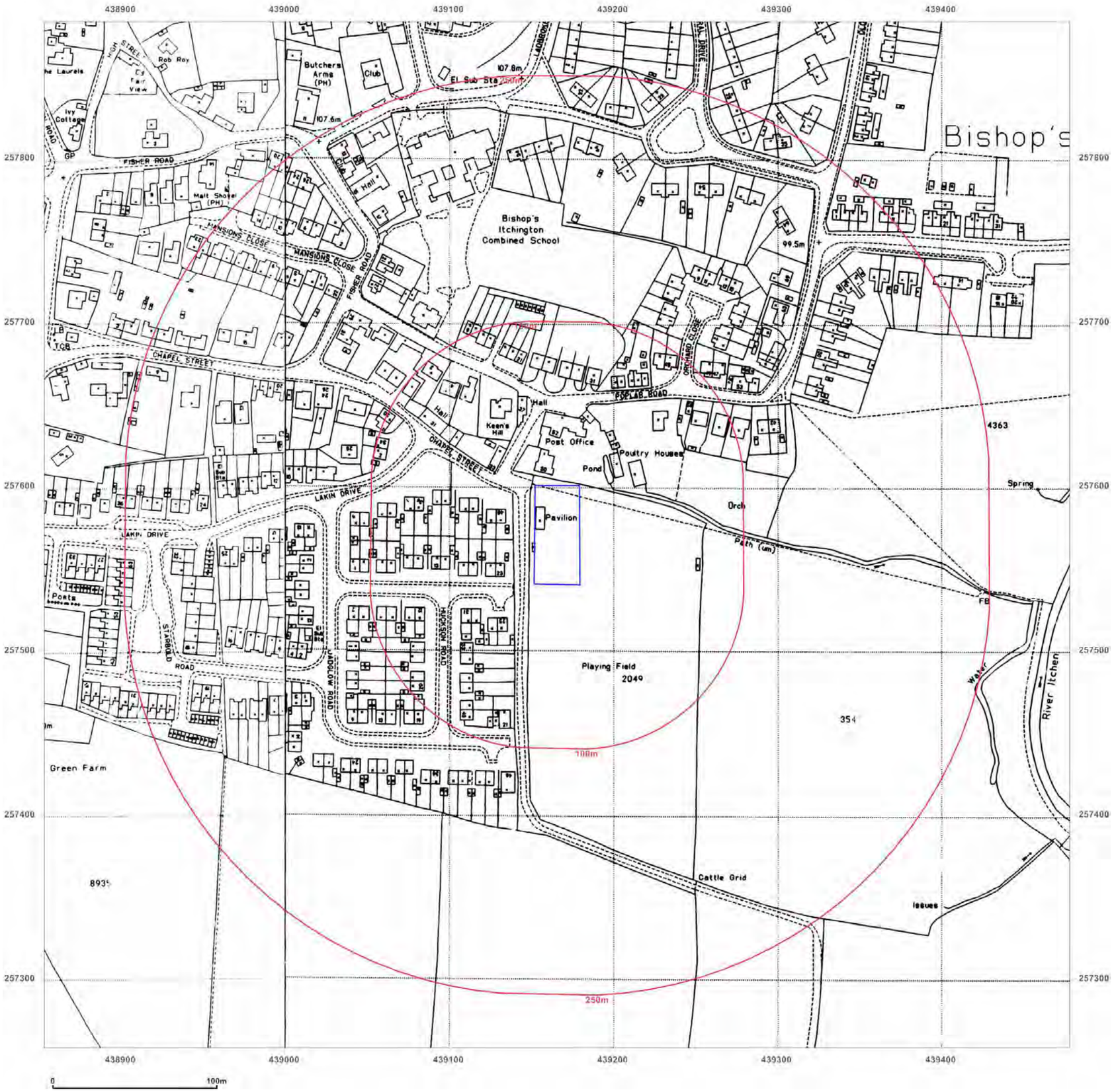

Site Details:

CCL03359 - Bishops Itchington,Chapel Street,Bishops Itchington,CV47 2RB

Client Ref: EMS_636915_846712
Report Ref: EMS-636915_846712
Grid Ref: 439166, 257570

Map Name: National Grid

Map date: **1993**

Scale: 1:2,500

Printed at: 1:2,500

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W E
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Surveyed N/A
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Site Details:

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Client Ref: EMS_636915_846712
Report Ref: EMS-636915_846712
Grid Ref: 439166, 257570

Map Name: LandLine
Map date: **2003**
Scale: 1:1,250
Printed at: 1:1,250

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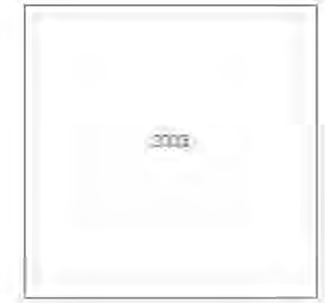

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APPENDIX II

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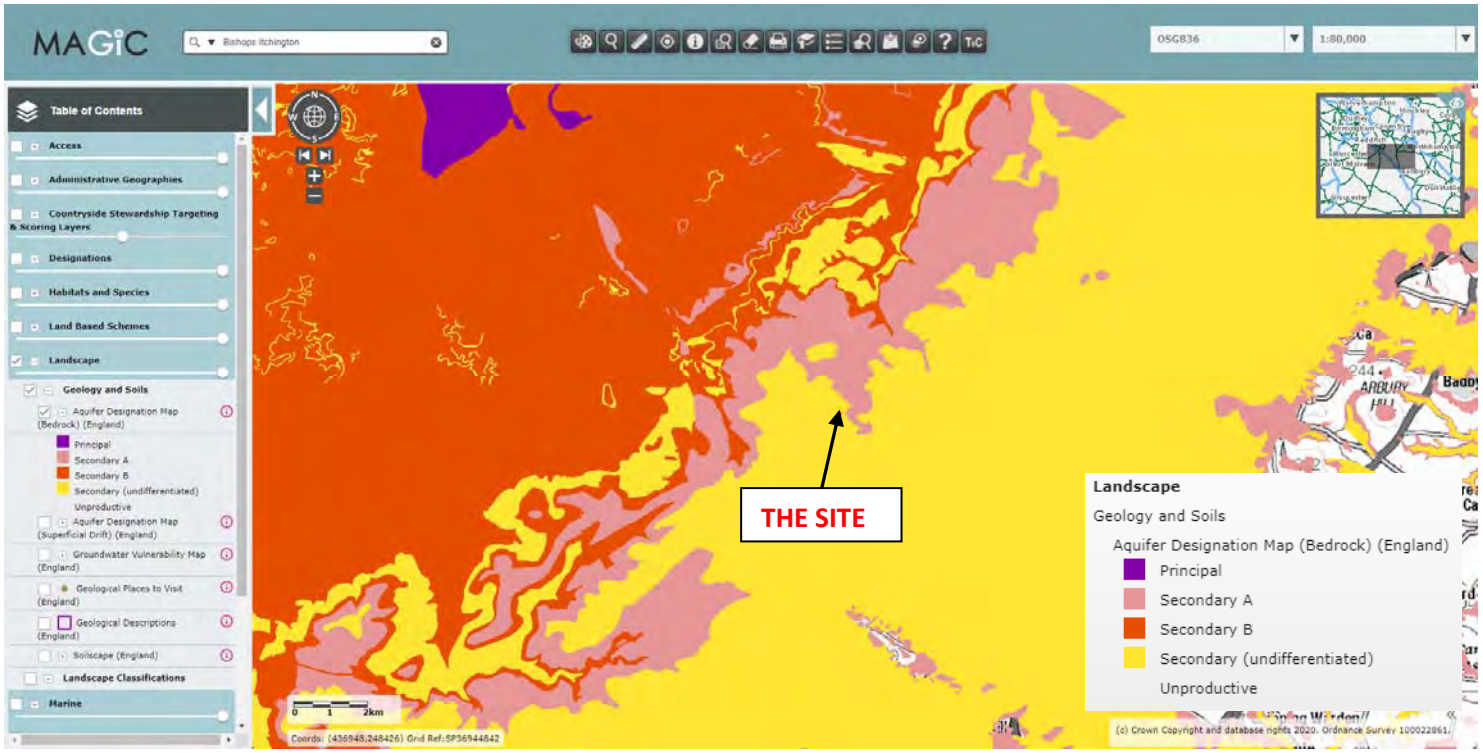

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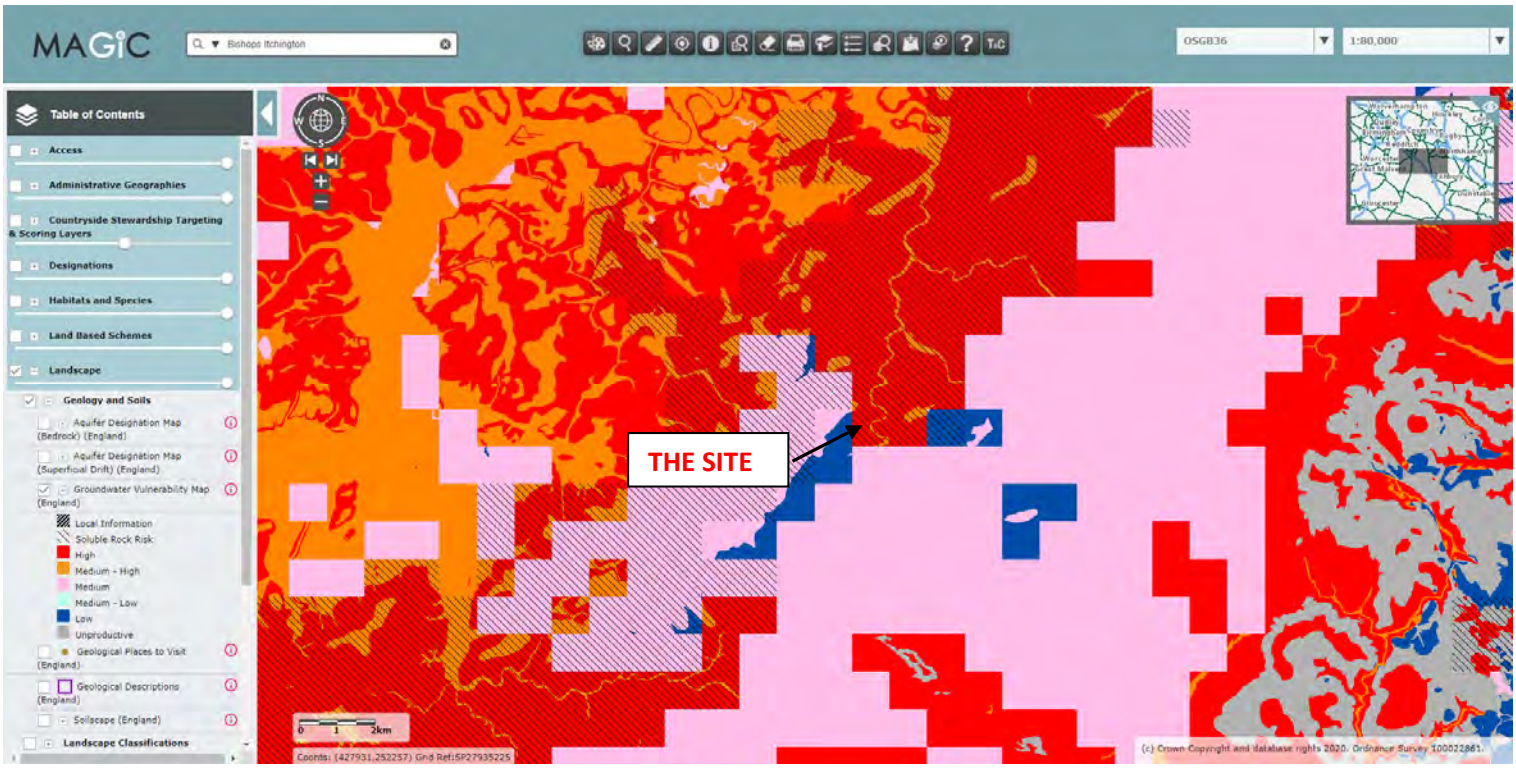

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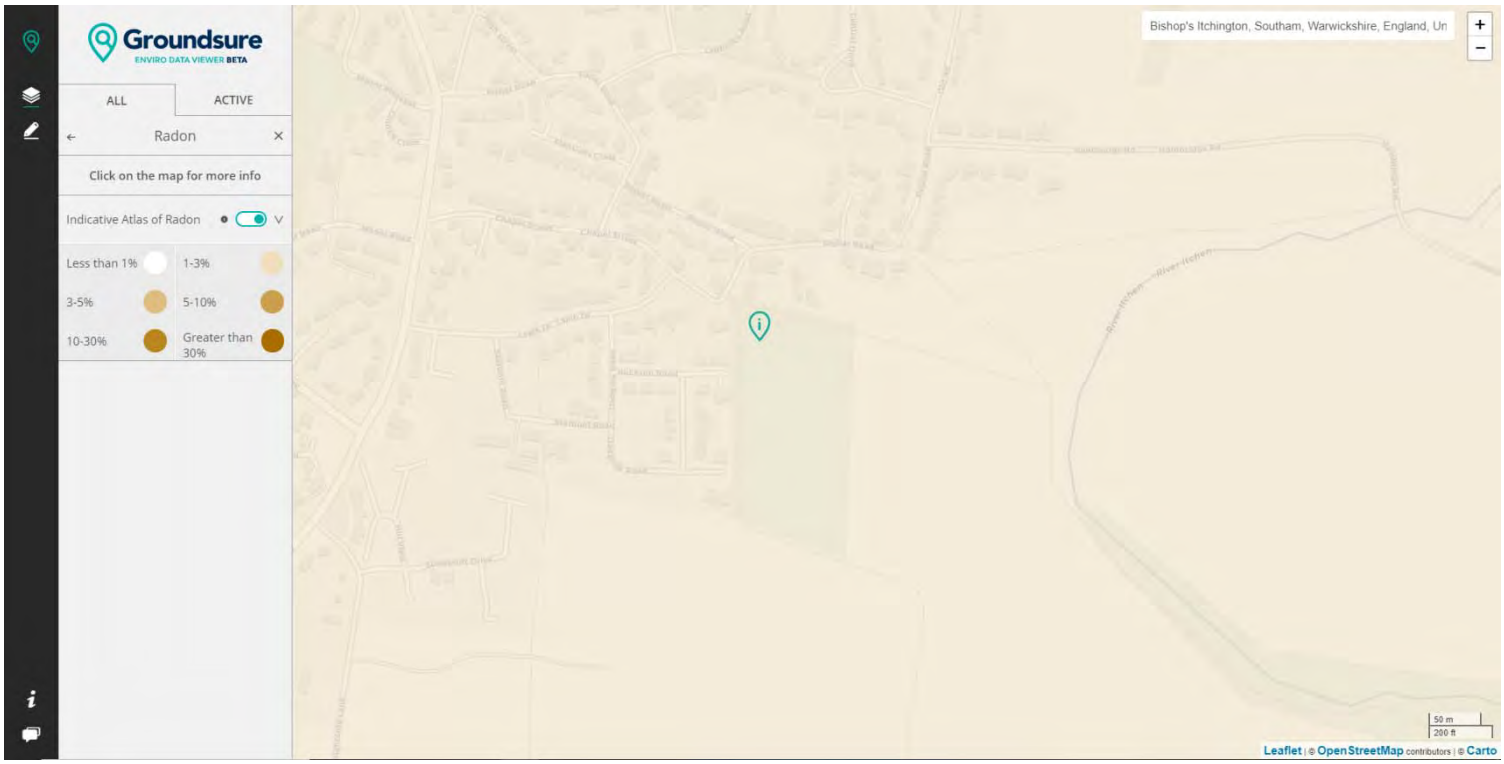

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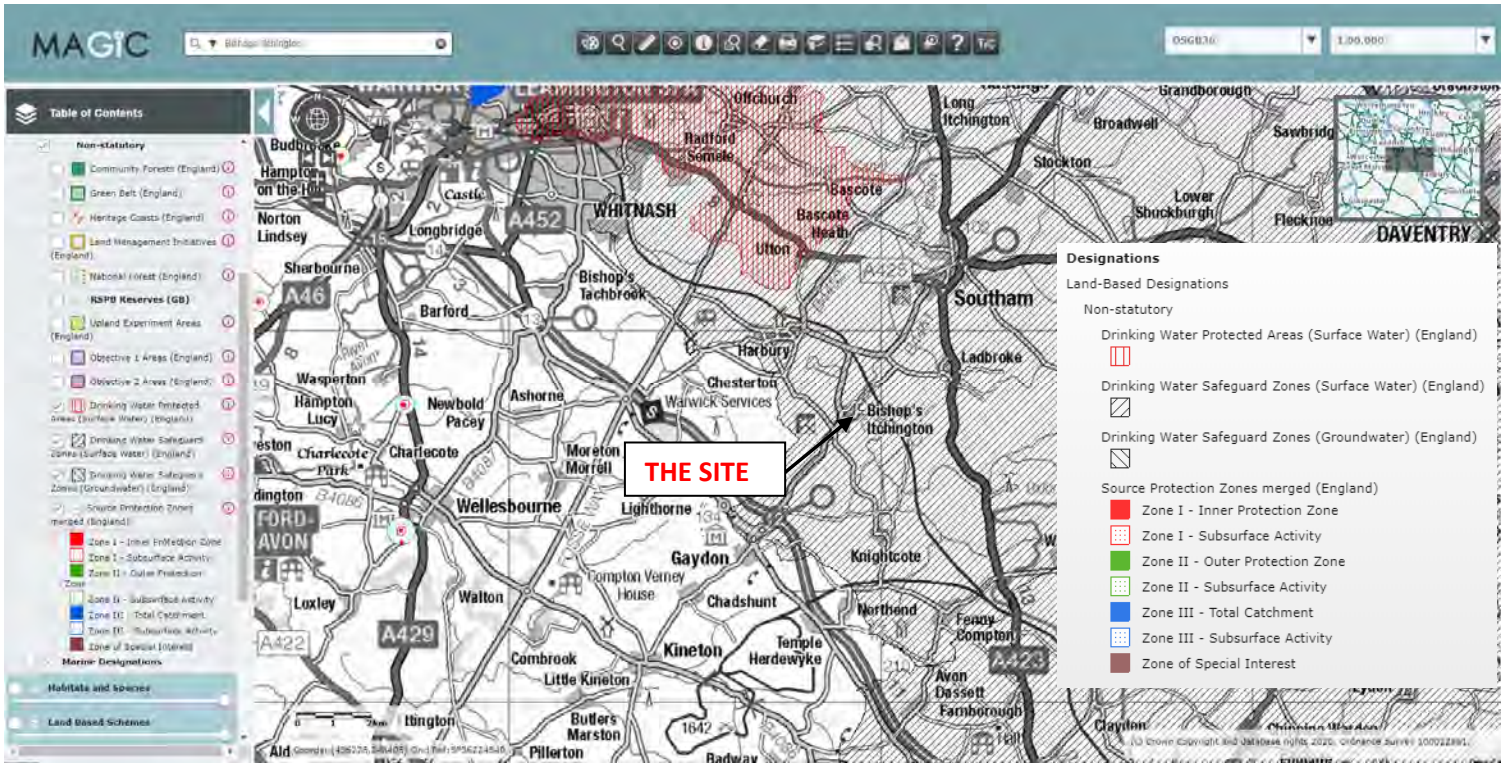

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APPENDIX III

APPENDIX III – GROUND INVESTIGATION

Introduction

This Appendix, together with Sections 2 to 5 of the report, forms the Ground Investigation Report for the development described in the report, in compliance with the requirements of BS 5930:2015+A1:2020, BS EN1997-1:2004(2007) and BS EN1997-2:2007(2007).

The site operations were carried out on 11 November 2020 under the supervision of a geotechnical engineer from Crossfield Consulting Limited. The scope and rationale for the design of the investigation is presented in Table III-1.

The ground investigation was designed and supervised by qualified and experienced geotechnical specialists from Crossfield Consulting Limited. Where appropriate, and as outlined below, specialist drilling/sampling equipment was procured together with trained and experienced operators. Unless otherwise indicated, sampling and logging remained the responsibility of trained staff from Crossfield Consulting Limited and field records were prepared on site, during or immediately following drilling/sampling or in situ measurements/tests. The results of in situ tests are presented on the relevant record sheets in this Appendix.

An exploratory hole location plan is presented as Figure III-1.

Windowless Sampling

Five windowless sampling boreholes, denoted as WS1 to WS5, were sunk by Regional Drilling Limited, o between 1.0 m and 2.0 m depth. Dynamic/driven open-tube soil sampling/boring was undertaken using a Premier Compact rig. Using a 1.0 m long thick-walled open-tube sampler (with plastic liner), Category A and B samples were recovered (sample disturbance being influenced by the specific soils encountered). Where appropriate, small disturbed sub-samples were recovered from the materials recovered in the open-tube sampler.

Standard Penetration Tests (SPT) were carried out at regular intervals to provide data on the in situ density of coarse-grained strata and an indication of strength within fine-grained strata. The SPTs were carried out in accordance with BS EN ISO 22476-3:2005(2007).

The records from the investigation are presented in this Appendix. These records include the descriptions and depths of the strata encountered, together with sample depths, in situ test results (uncorrected values), groundwater observations, details of installations/backfill within exploratory holes and other pertinent comments.

In Situ Permeability Tests

In-situ falling head permeability test were performed in WS1 and WS2. Clean water was added to the boreholes by means of a 5 litre water container. Once filled to an appropriate level, the fall in water level was measured with time. The results of the in-situ tests are presented in this Appendix.

Soil Samples

All samples for analytical testing were collected in appropriate containers, stored in cool boxes (where appropriate) and sent to the testing laboratory overnight. The sample containers, storage and handling procedures were all compatible with the relevant recommendations of the UKAS accredited testing laboratory for the specific testing proposed.

Samples designated for geotechnical testing were collected, stored and transported in accordance with the published requirements for the specific tests scheduled, such that moisture content and soil structure integrity was maintained, as necessary for the test requirements

Geotechnical Laboratory Testing

The rationale for the geotechnical laboratory testing is set out in the Table III-2.

Selected samples of the soils encountered were submitted for analysis for the following tests:

- Moisture content
- Atterberg Limits
- pH value
- Water soluble sulphate

The analyses were carried out by i2 Analytical Limited, a UKAS accredited laboratory, and the results are presented in this Appendix.

TABLE III-1

RATIONALE FOR THE DESIGN OF THE GROUND INVESTIGATION

The scope of the ground investigation was designed with reference to the published geology and ground conditions indicated in the desk study information.

In compliance with the guidance published in BS EN 1997-2:2007, the ground investigation was designed to verify the preliminary ground model, established from the desk study information and to characterise the ground conditions within influencing distance of the proposed structures. In this regard, the exploratory holes were targeted within relevant areas of the site to provide information on the strata profile down to competent materials.

In compliance with the guidance published in BS 10175:2011+A2:2017 and BS 5930:2015+A1:2020, the layout of the exploratory holes and sampling regime also considers the Conceptual Site Model and potential pollutant linkages, such that the spatial arrangement of the investigation provides the necessary information to support a risk assessment of the identified potential pollutant linkages.

Exploratory Hole and Technique	**Rationale for Hole Location**	**Depth (m)**	**Sampling/In Situ Testing and Monitoring**
WS1 – WS5	All exploratory hole locations were chosen to provide data in relevant areas of the site.	Up to 2.0 m	Soil samples were recovered at regular intervals.
WS3 – WS5	Exploratory holes were located to provide information on soil density/strength.	Up to 2.0 m	Soil samples were recovered at regular intervals.
WS1 – WS2	Exploratory holes were located to provide information water infiltration characteristics of the ground	1.0 m	Measurements of in situ permeability taken.

Key

WS *X* Windowless Sample Borehole

TABLE III-2

RATIONALE FOR THE GEOTECHNICAL TESTING SUITE

Exploratory Hole and Sample	**Selection Criteria**	**Geotechnical Tests**
WS1: 0.5 m WS2: 0.6 m WS3: 0.7 m WS4: 0.5 m WS5: 0.5 m	Geotechnical tests undertaken to provide data for buried concrete design.	pH Water soluble sulphate
WS1: 0.5 m WS3: 0.7 m WS4: 0.5 m	Geotechnical tests undertaken to provide soil classification and index properties for foundation design.	Moisture content Atterberg Limits

BOREHOLE & DRILLHOLE RECORDS - LEGENDS KEY SHEET

Legend - Strata Encountered in Exploratory Hole

Soil	Rock		
	Sedimentary	Igneous	Metamorphic
Made Ground	Mudstone	Fine-grained	Fine-grained
Clay	Shale	Medium-grained	Medium-grained
Silt	Siltstone	Coarse-grained	Coarse-grained
Sand	Sandstone		
Gravel	Limestone		
Peat/Topsoil	Chalk		
Organic Sand	Coal		
Organic Clay	Conglomerate		

Legend - Backfill to Borehole and Standpipe Installations

Backfill	Installations
Soil arisings	Concrete Cover Over Standpipe
Bentonite	Plain Standpipe - Bentonite Surround
Cement-based Grout	Perforated Standpipe - Geotextile and Granular Filter Surround
Gravel	Perforated Standpipe End Geotextile and Granular Filter Surround

Notes:

1. A combination of the strata symbols are indicative of mixed soil types.

2. The response zone of a standpipe refers to the section of perforated pipe within a granular surround, where substances may freely enter the standpipe from the surrounding strata.

WINDOWLESS SAMPLE RECORDS

KEY

Sampling

	J	Disturbed Jar Sample
	G	Jar Sample in Glass Container
	g	Soil Sample in Glass Vial
	W	Water Sample
	IC	Nett sample recovery ratio (ratio of length of recovered sample to length of sample run)

In Situ Measurements

FVT	c_{fv}	Undrained Shear Strength (from hand vane shear vane test)
	c_{rv}	Undrained Remoulded Shear Strength (from hand vane shear vane test)
	c_{fv} *	Hand Vane Shear Strength Test (on Category A: OS-TK/W soil sample recovered in window sampler)
	S	Standard Penetration Test (SPT: split spoon sampler)
	SPT(C)	SPT carried out with a 60° cone
	'N'	'N' Value from SPT test
	N_{10}	Dynamic Probe Test: Number of blows to drive 100 mm
DPH	N_{H10}	Dynamic Probe Test: Heavy (30 kg mass & 500 mm fall)
DPSH-A	N_{SHA10}	Dynamic Probe Test: Super-Heavy A (63.5 kg mass & 500 mm fall)
DPSH-B	N_{SHB10}	Dynamic Probe Test: Super-Heavy B (63.5 kg mass & 750 mm fall)
	$\frac{x}{y\ mm}$	x Blows per y Driving Distance (for non-standard SPT or DP driving distance)
	T	Torque (max) required to turn rods (unit: Nm, unless otherwise shown)

Notes:

1. All measurement values on record sheets are uncorrected, unless otherwise indicated.
2. For corrected test values, refer to report.
3. Identification and classification of strata is based on the guidance published in the current edition of BS5930 together with BS EN ISO 14688-1:2002, BS EN ISO 14688-2:2004 and BS EN ISO 14689-1:2003
4. Consistency (soft, firm, stiff etc) relates to a manual test/inspection on site (in compliance with BS EN ISO 14688-1:2002 Section 5.14).
5. Undrained shear strength (low, medium, high etc) relates to in situ or laboratory test data and the associated assessed strength of a stratum (in compliance with BS EN ISO 14688-2:2004 Section 5.3 and Table 5).
6. The density of coarse-grained soils is based on SPT N values (or equivalent Dynamic Probe test or CPT data) as outlined in BS5930 and BS EN ISO 14688-2:2004.
7. Rock strength (weak, strong etc) is based on field identification (and/or strength test data), as outlined in BS EN ISO 14689-1:2003 Table 5.

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Windowless Sample Record Sheet

Project:	Bishop's Itchington Sports Pavilion	**Hole Ref.**	**WS1**
Date:	11/11/2020	**Sheet**	1 of 1
		Job No.	CCL03359
Contractor	Regional Drilling Ltd	**Equipment**	Premier Compact 110
Method	0.0 m to 1.0 m windowless sampling	**Ground Level.**	99.35 m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	SR — Logged on site during drilling operations
		Checked by:	

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
					Asphalt surfacing (MADE GROUND)	0.10			99.25
					Brown slightly clayey silty fine to coarse and angular to sub-angular gravel (MADE GROUND - SUB-BASE)	0.40			98.95
0.50	J J				Stiff consistency grey mottled brown slightly gravelly CLAY. Gravel is fine to coarse and angular mudstone lithorelicts (CHARMOUTH MUDSTONE FORMATION) .....Becoming grey below 0.6 m	1.00			98.35
					End of Hole				

Core Recovery		Groundwater				Additional Tests		
Depth	Recovery	Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value
0.00-1.00	100%	1.00	-	-	None encountered			

Remarks

Ground level estimated from spot height data on topographical survey

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Windowless Sample Record Sheet

Project:	Bishop's Itchington Sports Pavilion	**Hole Ref.**	**WS2**
Date:	11/11/2020	**Sheet**	1 of 1
		Job No.	CCL03359
Contractor	Regional Drilling Ltd	**Ground Level.**	99.80 m OD
Equipment	Premier Compact 110	**Co-ordinates**	
Method	0.0 m to 1.0 m windowless sampling	**Logged by:**	SR
Boring Diameter	100 mm	**Checked by:**	

Logged on site during drilling operations

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
					Asphalt surfacing (MADE GROUND)	0.10			99.70
					Orangish brown slightly clayey fine to coarse and angular to sub-angular gravel (MADE GROUND - SUB-BASE)	0.30			99.50
0.60	JJ				Stiff consistency grey slightly gravelly CLAY. Gravel is fine to coarse and angular to sub-angular mudstone lithorelicts (CHARMOUTH MUDSTONE FORMATION) .....cobble encountered at 0.6 m	1.00			98.80
					End of Hole				

Core Recovery

Depth	Recovery
0.00-1.00	100%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
1.00	-	-	None encountered

Additional Tests

Test type	Test Depth	Test Value

Remarks

Ground level estimated from spot height data on topographical survey

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Windowless Sample Record Sheet

Project:	Bishop's Itchington Sports Pavilion	**Hole Ref.**	**WS3**
Date:	11/11/2020	**Sheet**	1 of 1
		Job No.	CCL03359
Contractor	Regional Drilling Ltd	**Equipment**	Premier Compact 110
Method	0.0 m to 2.0 m windowless sampling	**Ground Level.**	100.30 m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	SR — Logged on site during drilling operations
		Checked by:	

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
0.20	GgJ				Grass over brown slightly gravelly silty clay. Gravel is fine to medium and angular with glass and brick fragments (MADE GROUND)	0.30			100.00
0.70	JJ				Stiff consistency greyish brown slightly gravelly CLAY. Gravel is fine to coarse and angular to sub-angular mudstone lithorelicts (CHARMOUTH MUDSTONE FORMATION)				
1.00-1.45	S	-	-	N=40					
1.60	J					1.60			98.70
					Extremely weak grey MUDSTONE (CHARMOUTH MUDSTONE FORMATION)	1.80			98.50
2.00-2.19	S	-	-	N=50 40 mm	Stiff consistency grey slightly gravelly CLAY. Gravel is fine to coarse and angular to sub-angular mudstone lithorelicts (CHARMOUTH MUDSTONE FORMATION)	2.00			98.30
					End of Hole				

Core Recovery

Depth	Recovery
0.00-1.00	100%
1.00-2.00	80%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
2.00	-	-	None encountered

Additional Tests

Test type	Test Depth	Test Value

Remarks

Further progress precluded due to high strength strata

Ground level estimated from spot height data on topographical survey

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

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GEOTECHNICAL ENVIRONMENTAL

Windowless Sample Record Sheet

Project:	Bishop's Itchington Sports Pavilion	**Hole Ref.**	**WS4**
Date:	11/11/2020	**Sheet**	1 of 1
		Job No.	CCL03359
Contractor	Regional Drilling Ltd	**Equipment**	Premier Compact 110
Method	0.0 m to 1.0 m windowless sampling	**Ground Level.**	100.20 m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	SR — Logged on site during drilling operations
		Checked by:	

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
					Grass over brown slightly gravelly silty clay. Gravel is fine and angular with brick fragments (MADE GROUND)	0.40			99.80
0.50	JJ				Stiff consistency light brown slightly gravelly CLAY. Gravel is fine to coarse and angular to sub-angular mudstone lithorelicts (CHARMOUTH MUDSTONE FORMATION)				
1.00-1.29	S	-	-	N=50 135 mm		1.00			99.20
					End of Hole				

Core Recovery		Groundwater				Additional Tests		
Depth	Recovery	Hole Depth	Strike Depth	Water Depth	Observations	Test type	Test Depth	Test Value
0.00-1.00	100%	1.00	-	-	None encountered			
1.00-2.00	100%							

Remarks

Further progress precluded due to high strength strata

Ground level estimated from spot height data on topographical survey

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING
GEOTECHNICAL ENVIRONMENTAL

Windowless Sample Record Sheet

Project:	Bishop's Itchington Sports Pavilion	**Hole Ref.**	**WS5**
Date:	11/11/2020	**Sheet**	1 of 1
		Job No.	CCL03359
Contractor	Dynamic Sampling Ltd	**Equipment**	Premier Compact 110
Method	0.0 m to 1.0 m windowless sampling	**Ground Level.**	99.70 m OD
Boring Diameter	100 mm	**Co-ordinates**	
		Logged by:	SR — Logged on site during drilling operations
		Checked by:	

Sample Depth	Sample or Test	Casing Depth	Water Depth	Test Value	Description	Depth	Legend	Backfill	Level O.D.
					Grass over brown slightly gravelly silty clay (TOPSOIL)	0.40			99.30
0.50	JJ				Stiff consistency light brown slightly gravelly CLAY. Gravel is fine to coarse and angular to sub-angular mudstone lithorelicts (CHARMOUTH MUDSTONE FORMATION)	0.70			99.00
1.00-1.17	S	-	-	N=50 105 mm	Extremely weak grey MUDSTONE (CHARMOUTH MUDSTONE FORMATION)	1.00			98.70
					End of Hole				

Core Recovery

Depth	Recovery
0.00-1.00	80%

Groundwater

Hole Depth	Strike Depth	Water Depth	Observations
1.00	-	-	None encountered

Additional Tests

Test type	Test Depth	Test Value

Remarks

Further progress precluded due to high strength strata

Ground level estimated from spot height data on topographical survey

Notes

1. All logging and sampling in accordance with BS 5930:2015+A1:2020
2. The depths to strata change are approximate only
3. Symbols and abbreviations are explained on the accompanying key
4. All linear dimensions are in metres unless otherwise stated
5. Undrained shear strength test value given in kN/m^2

Crossfield CONSULTING GEOTECHNICAL ENVIRONMENTAL	In Situ Falling Head Permeability Test	Hole Ref.	WS1
	Project: Bishop's Itchington Sports Pavilion	Sheet	1 of 2
		Job No.	CCL03359
	Date: 11/11/2020	Test by:	SR
		Checked by:	

Test 1

Borehole Dia (D)	100	mm
Standpipe Dia		mm
Depth to top of test response zone	0.14	m
Depth to base of test response zone	1.00	m
Depth to groundwater prior to test		n/a
Depth to water at start of test	0.14	m
Depth to water at end of test	0.23	m
Test Duration	90	mins
Length of test section (L)	0.86	m
Length / Diameter Ratio	9	
Intial Head (H_o)	0.86	m

Head data presented on following sheet

From Hvorslev (1951)

$$\text{Permeability (k)} = \frac{A}{F(t2-t1)} \times \text{Log}_e(h_1/h_2)$$

Where:

$$F = \frac{2\pi L}{\text{Log}_e((L/D)+\sqrt{(1+(L/D)^2)})}$$

$$= \frac{5.40424}{2.848272578} = 1.897375$$

$$k = \frac{0.049}{1707.64} \times 0.048$$

In Situ Permeability = 1.4E-06 m/s

Calculation based on initial permeability response data

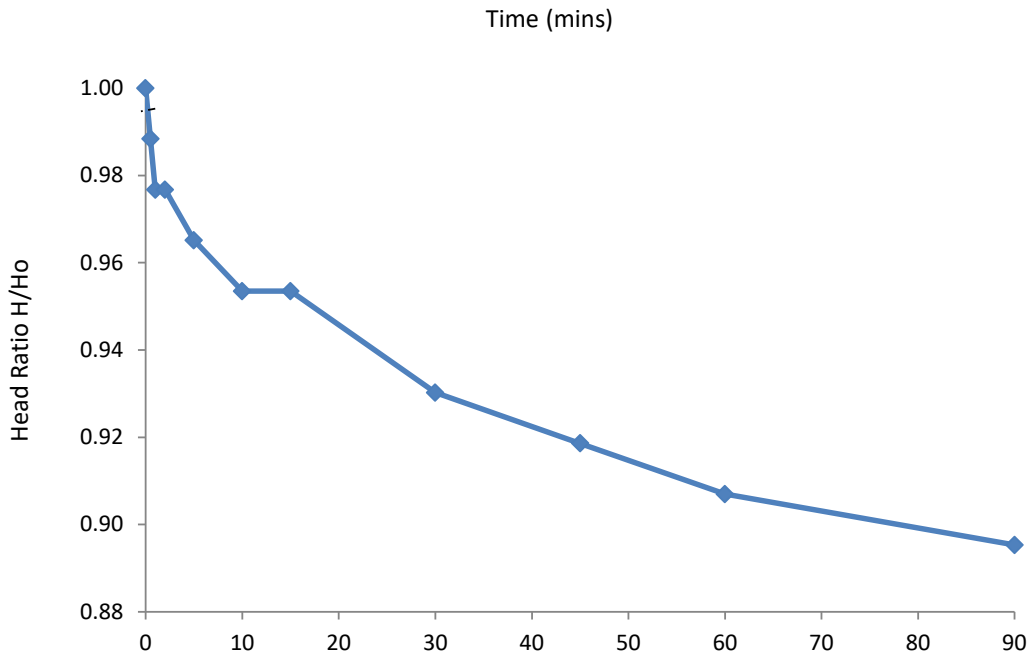
Crossfield CONSULTING GEOTECHN CAL ENVIRONMENTAL	In Situ Falling Head Permeability Test	Hole Ref.	WS1
	Project: Bishop's Itchington Sports Pavilion	Sheet	2 of 2
		Job No.	CCL03359
	Date: 11/11/2020	Test by:	SR
		Checked by:	

Test 1

Water Level Measurements

Time (Minutes)	Depth to Water (m)	Head H (m)	Head Ratio H/Ho
0	0.14	0.86	1.00
0.5	0.15	0.85	0.99
1	0.16	0.84	0.98
2.0	0.16	0.84	0.98
5.0	0.17	0.83	0.97
10	0.18	0.82	0.95
15	0.18	0.82	0.95
30	0.20	0.80	0.93
45	0.21	0.79	0.92
60	0.22	0.78	0.91
90	0.23	0.77	0.90

Time t_1	0.0	mins	Head Ratio	1.00	Head H_1	0.86
Time t_2	15	mins	Head Ratio	0.95	Head H_2	0.82



Crossfield CONSULTING GEOTECHNICAL ENVIRONMENTAL	In Situ Falling Head Permeability Test	Hole Ref.	WS2
	Project: Bishop's Itchington Sports Pavilion	Sheet	1 of 2
		Job No.	CCL03359
	Date: 11/11/2020	Test by:	SR
		Checked by:	

Test 1

Borehole Dia (D)	100	mm
Standpipe Dia		mm
Depth to top of test response zone	0.08	m
Depth to base of test response zone	1.00	m
Depth to groundwater prior to test		n/a
Depth to water at start of test	0.08	m
Depth to water at end of test	0.12	m
Test Duration	60	mins
Length of test section (L)	0.92	m
Length / Diameter Ratio	9	
Intial Head (H_o)	0.92	m

Head data presented on following sheet

From Hvorslev (1951)

$$\text{Permeability (k)} = \frac{A}{F(t2-t1)} \times \text{Log}_e(h_1/h_2)$$

Where:

$$F = \frac{2\pi L}{\text{Log}_e((L/D)+\sqrt{(1+(L/D)^2)})}$$

$$= \frac{5.78128}{2.91529135} = 1.983088$$

$$k = \frac{0.018}{1189.85} \times 0.03$$

In Situ Permeability = 4.9E-07 m/s

Calculation based on initial permeability response data

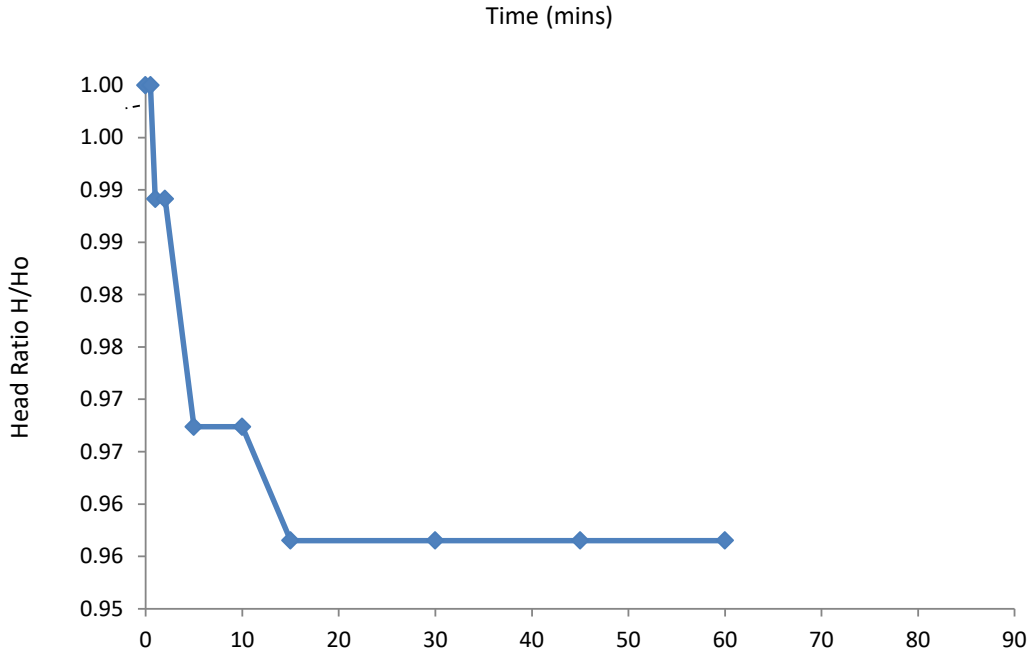
Crossfield CONSULTING GEOTECHN CAL ENVIRONMENTAL	In Situ Falling Head Permeability Test	Hole Ref.	WS2
	Project: Bishop's Itchington Sports Pavilion	Sheet	2 of 2
		Job No.	CCL03359
	Date: 11/11/2020	Test by:	SR
		Checked by:	

Test 1

Water Level Measurements

Time (Minutes)	Depth to Water (m)	Head H (m)	Head Ratio H/Ho
0	0.08	0.92	1.00
0.5	0.08	0.92	1.00
1.0	0.09	0.91	0.99
2.0	0.09	0.91	0.99
5	0.11	0.89	0.97
10	0.11	0.89	0.97
15	0.12	0.88	0.96
30	0.12	0.88	0.96
45	0.12	0.88	0.96
60	0.12	0.88	0.96

Time t_1	0.0	mins	Head Ratio	1.00	Head H_1	0.92
Time t_2	10	mins	Head Ratio	0.97	Head H_2	0.89



Samantha Rudling
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Analytical Report Number : 20-40936

Project / Site name:	Bishops Itchington Sports Pavilion	**Samples received on:**	11/11/2020
Your job number:	CCL03359	**Samples instructed on/ Analysis started on:**	11/11/2020
Your order number:	PO11684	**Analysis completed by:**	19/11/2020
Report Issue Number:	1	**Report issued on:**	19/11/2020
Samples Analysed:	5 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 20-40936
Project / Site name: Bishops Itchington Sports Pavilion
Your Order No: PO11684

Lab Sample Number				1681105	1681106	1681107	1681108
Sample Reference				WS1	WS2	WS3	WS4
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.60	0.70	0.50
Date Sampled				11/11/2020	11/11/2020	11/11/2020	11/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	17	16	15
Total mass of sample received	kg	0.001	NONE	0.7	0.7	0.7	0.7

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	8.5	8.5	8.3
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.029	0.025	0.017	0.013

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 20-40936
Project / Site name: Bishops Itchington Sports Pavilion
Your Order No: PO11684

Lab Sample Number				1681109
Sample Reference				WS5
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				11/11/2020
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	16
Total mass of sample received	kg	0.001	NONE	0.7
General Inorganics				
pH - Automated	pH Units	N/A	MCERTS	8.4
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.016

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 20-40936
Project / Site name: Bishops Itchington Sports Pavilion

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1681105	WS1	None Supplied	0.5	Brown clay with gravel.
1681106	WS2	None Supplied	0.6	Brown clay with gravel.
1681107	WS3	None Supplied	0.7	Brown clay.
1681108	WS4	None Supplied	0.5	Brown clay.
1681109	WS5	None Supplied	0.5	Brown clay.

Analytical Report Number : 20-40936
Project / Site name: Bishops Itchington Sports Pavilion

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

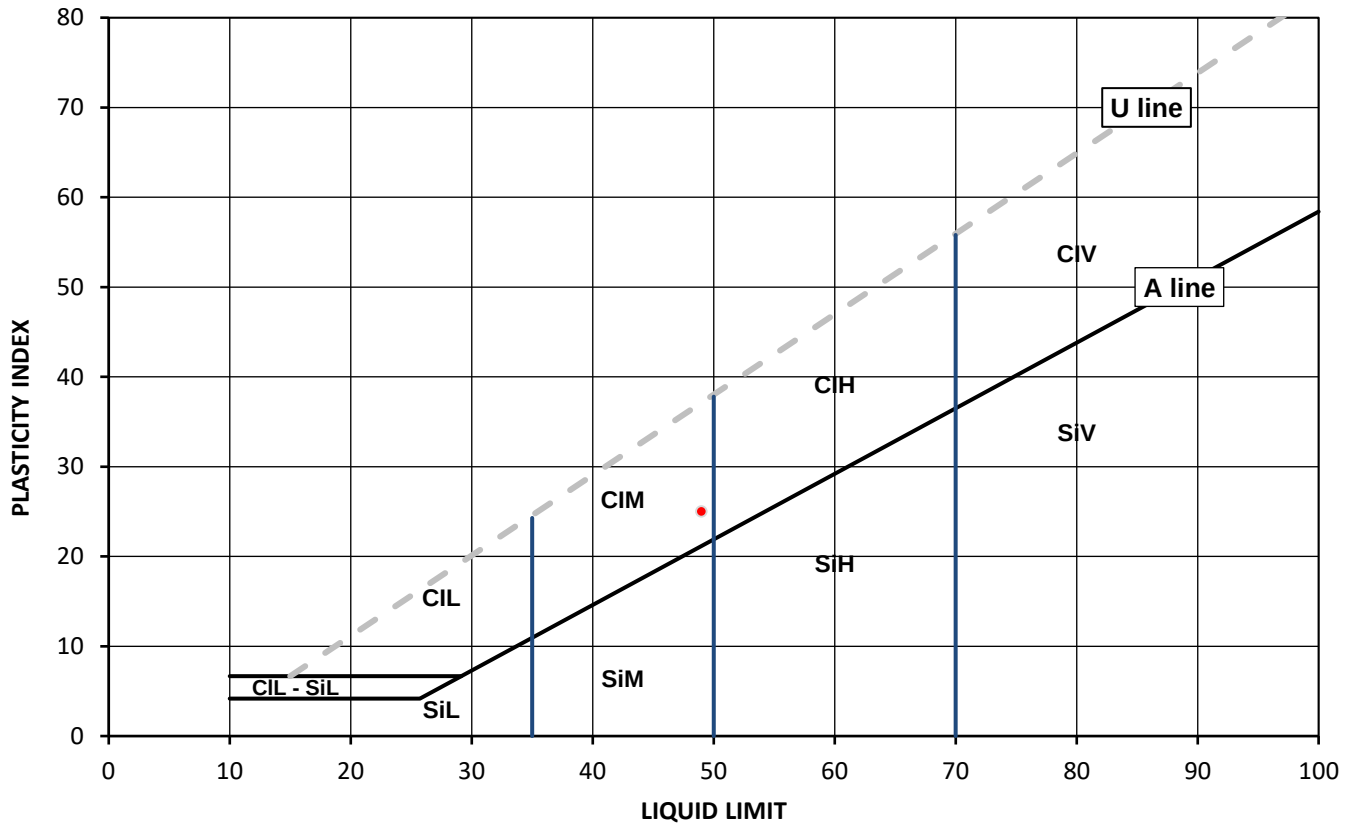
Client:	Crossfield Consulting Ltd	Client Reference:	CCL03359
Client Address:	The Granary, White Hall Farm, Leamington Road, Long Itchington, Warwickshire, CV47 9PU	Job Number:	20-40716
		Date Sampled:	11/11/2020
		Date Received:	11/11/2020
Contact:	Samantha Rudling	Date Tested:	19/11/2020
Site Address:	Bishops Itchington Sports Pavilion	Sampled By:	Client- SR

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1680072	Depth Top [m]:	0.50
Hole No.:	WS1	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Greyish brown slightly gravelly slightly sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
24	49	24	25	93



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 25/11/2020

GF 236.10

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

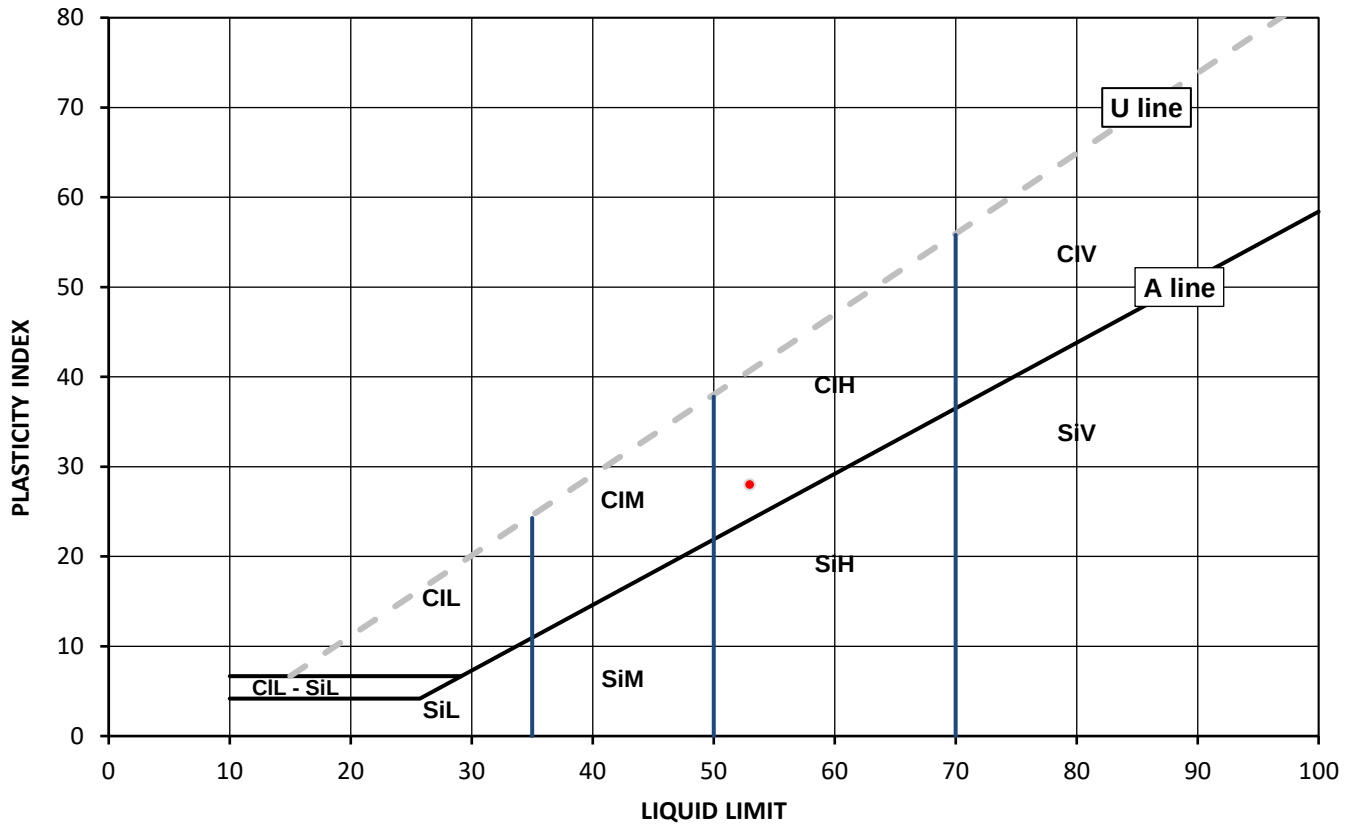
Client:	Crossfield Consulting Ltd	Client Reference:	CCL03359
Client Address:	The Granary, White Hall Farm, Leamington Road, Long Itchington, Warwickshire, CV47 9PU	Job Number:	20-40716
		Date Sampled:	11/11/2020
		Date Received:	11/11/2020
Contact:	Samantha Rudling	Date Tested:	19/11/2020
Site Address:	Bishops Itchington Sports Pavilion	Sampled By:	Client- SR

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1680073	Depth Top [m]:	0.70
Hole No.:	WS3	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Yellowish brown to grey slightly gravelly slightly sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
24	53	25	28	99



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Date Reported: 25/11/2020

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Brackmills Industrial Estate
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UKAS TESTING 4041

Environmental Science

Tested in Accordance with: BS 1377-2: 1990: Clause 4.3 and 5

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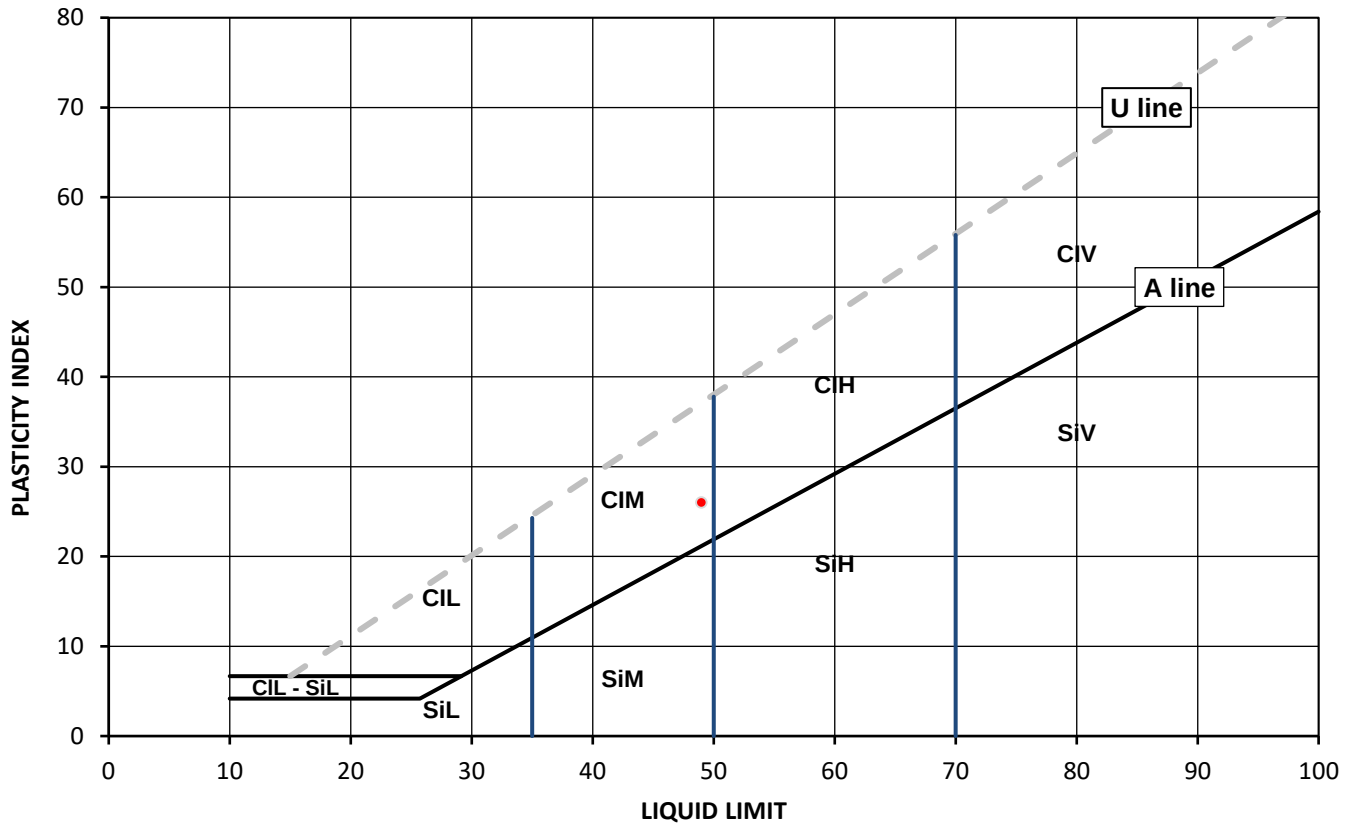
Client Address:	The Granary, White Hall Farm, Leamington Road, Long Itchington, Warwickshire, CV47 9PU	Job Number:	20-40716
		Date Sampled:	11/11/2020
		Date Received:	11/11/2020
Contact:	Samantha Rudling	Date Tested:	19/11/2020
Site Address:	Bishops Itchington Sports Pavilion	Sampled By:	Client- SR

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1680074	Depth Top [m]:	0.50
Hole No.:	WS4	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Soil Description:	Yellowish brown slightly sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	49	23	26	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 25/11/2020

GF 236.10

SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client: Crossfield Consulting Ltd

Client Address: The Granary, White Hall Farm, Leamington Road, Long Itchington, Warwickshire, CV47 9PU

Contact: Samantha Rudling

Site Address: Bishops Itchington Sports Pavilion

Client Reference: CCL03359
Job Number: 20-40716
Date Sampled: 11/11/2020
Date Received: 11/11/2020
Date Tested: 19/11/2020
Sampled By: Client- SR

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top m	Depth Base m	Type			%	%	% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3	%		
1680072	WS1	Not Given	0.50	Not Given	D	Greyish brown slightly gravelly slightly sandy CLAY	Atterberg 4 Point	24		93	49	24	25						
1680073	WS3	Not Given	0.70	Not Given	D	Yellowish brown to grey slightly gravelly slightly sandy CLAY	Atterberg 4 Point	24		99	53	25	28						
1680074	WS4	Not Given	0.50	Not Given	D	Yellowish brown slightly sandy CLAY	Atterberg 4 Point	25		100	49	23	26						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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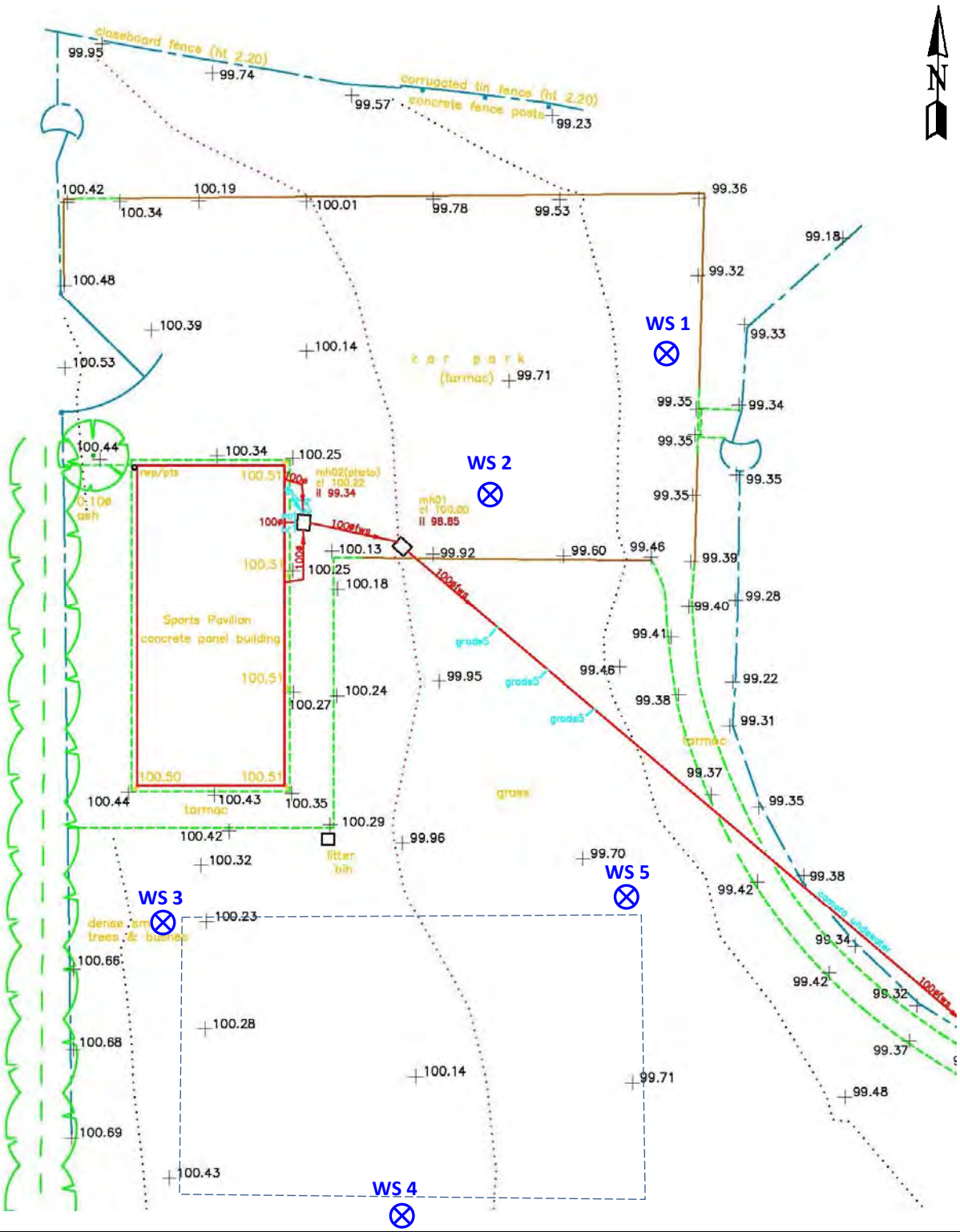
Date Reported: 25/11/2020

GF 238.12

FIGURE III-1



EXPLORATORY HOLE LOCATION PLAN

Scale 1: 250

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