



HATTON MAINS, EDINBURGH

PHASE I

GEO-ENVIRONMENTAL DESK STUDY REPORT

DATE

October 2018

CLIENT

Inverdunning (Hatton Mains) Ltd

Inverdunning (Hatton Mains) Ltd

Hatton Mains, Edinburgh

Phase I – Geo-Environmental Desk Study Report

Date of Issue: October 2018

Report Status: First Edition

Project Reference: P18/320

Prepared by: Andrew McGuire – Project Manager

*Reviewed and
Approved by:* Patrick Barry – Director

Mason Evans Partnership Limited
The Piazza
95 Morrison Street
GLASGOW
G5 8BE
www.masonevans.co.uk

CONTENTS

	PAGE NO
1.0 INTRODUCTION	1
1.1 Brief	1
1.2 Information Sources	1
1.3 General Methodology	5
2.0 SITE LOCATION AND DESCRIPTION	6
2.1 Site Details	6
2.2 Neighbouring Land Uses (Immediately Adjacent)	6
2.3 Watercourses	8
2.4 Flooding	8
2.5 Public Register Information	9
2.6 Invasive Plant Species	10
3.0 HISTORICAL BACKGROUND	11
3.1 General	11
3.2 Historical Background	11
4.0 DOCUMENTED GROUND CONDITIONS	13
4.1 General	13
4.2 Superficial Soils	13
4.3 Solid Geology	13
4.4 Mining and Quarrying	13
4.5 Hydrology and Hydrogeology	15
4.6 Correspondence with Edinburgh City Council	16
5.0 CONCEPTUAL SITE MODEL	17
5.1 General	17
5.2 Environmental Qualitative Risk Assessment	17
5.3 Potentially Sources of Contamination	17
5.4 Receptor and Pathway Characterisation (Pollutant Linkages)	19

6.0	CONCLUSIONS AND RECOMMENDATIONS	21
6.1	General	21
6.2	Chemical Contamination	21
6.3	Gas Emissions	21
6.4	Foundations	21
6.5	Mining and Quarrying	22
6.6	Development Considerations	22

LIST OF DRAWINGS

DRAWING NO.		PAGE NO.
PI8/320/DS/R/F/01	Site Location Plan	2
PI8/320/DS/R/F/02	Site Topography	3
PI8/320/DS/R/F/03	Proposed Site Zoning Plan	4
PI8/320/DS/R/F/04	Extract from Geological Survey of Scotland (Solid and Drift Geology)	14
PI8/320/DS/R/F/05	Preliminary Conceptual Site Model	20

APPENDICES

Appendix A	Site Walkover (September 2017)
Appendix B	Publicly Available Information
Appendix C	Envirocheck Report (with Historical Ordnance Survey Maps)
Appendix D	Information from The Coal Authority
Appendix E	Record of Historical Boreholes
Appendix F	Extract from 'Oil-Shales of the Lothians'

1.0 INTRODUCTION

1.1 Brief

1.1.1 Mason Evans Partnership were commissioned by GM Civil and Structural Consulting Engineers Ltd (the Engineer), on behalf of Inverdunning (Hatton Mains) Ltd (the Client) to undertake a Phase I Geo-Environmental Desk Study for a site titled 'Hatton Mains, Edinburgh' (Drawing No's. P17/230/DS/R/F/01 and 02).

1.1.2 It is understood that the Client proposes to construct new residential developments (with gardens), however a specific proposed development layout plan was not available at the time of writing. Notwithstanding the above, a proposed site zoning plan was made available, as indicated on Drawing No P18/320/DS/R/F/03.

1.1.3 The objectives of the study were:

- a) To clarify the historical background of the site with particular regard to any former contaminative usages or development.
- b) To provide information on nearby groundwater and surface water courses surrounding the site.
- c) To provide an indication of the geological conditions beneath the site and its environs.
- d) To recognise any nearby historical pollution incidents which may have resulted in contamination issued to the soils or water environment on site.
- e) To identify the possible presence and assess potential risks associated with chemical and gas contamination.
- f) To identify the possible presence and assess potential risks associated with historical underground mine workings and quarrying activities.

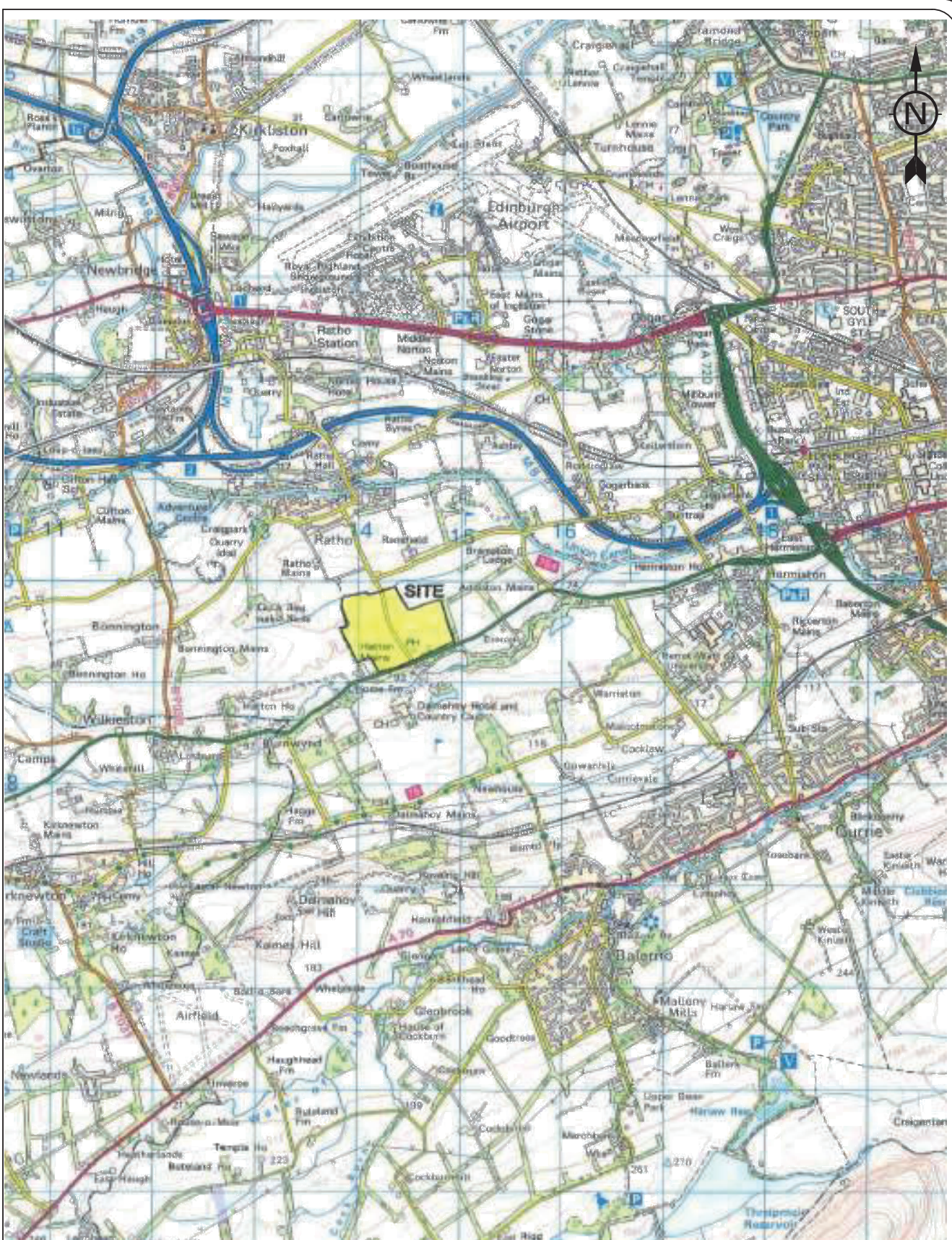
1.1.4 This report details the findings of our geo-environmental desk study researches.

1.2 Information Sources

1.2.1 The following sources of information have been utilised in the compilation of this report:

- Site Walkover Record (September 2018) (Appendix A)
- Scottish Environmental Protection Agency (SEPA) Information (Appendix B)
- Envirocheck Report (with Historical OS Maps) (Appendix C)
- Information from The Coal Authority (Appendix D)
- Record of Historical Boreholes (Appendix E)
- Memoirs of the Geological Survey Scotland 'The Oil-Shales of the Lothians' (Appendix F)

- Drawing No 1 – Site Location Plan



Geo-Environmental Consultants
t: 0141 420 2025 e: mason-evans.co.uk

The Piazza, 95 Morrison Street, Glasgow, G5 8BE

client details:

INVERDUNNING (HATTON MAINS) LIMITED

56 GEORGE STREET

EDINBURGH, EH2 2LR

project title:

HATTON MAINS
EDINBURGH

drawing title:

SITE LOCATION PLAN

project no:
P18/320

drawing no:
P18/320/DS/R/F/01

revision:

date:
01.10.18

drawn by:
AC

approved by:
PB

scale:
1:50,000

NOTES

- - - Site boundary
- + 86.17 Spot level (mAOD)

Topographic survey received from
 GW Civil and Structural Engineers Ltd (September 2018)

REV	DATE	DETAILS

INVERDUNNING (HATTON MAINS) LIMITED
 56 GEORGE STREET
 EDINBURGH
 EH2 2LR

PROJECT TITLE

HATTON MAINS
 EDINBURGH

DRAWING TITLE

TOPOGRAPHIC SURVEY

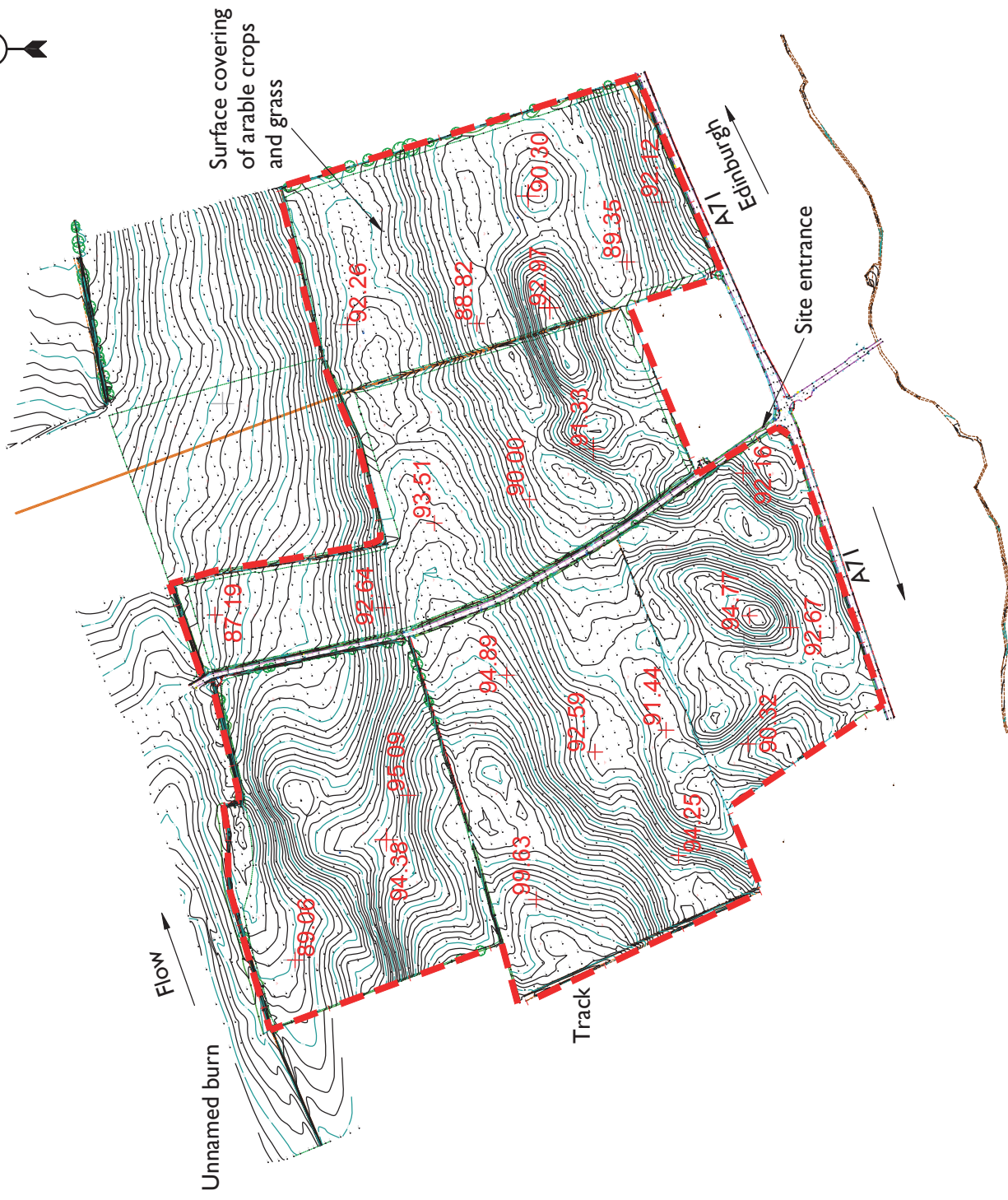
DRAWN BY AC	CHK'D BY AM	APP'D BY PB	DATE 01.10.18	SCALES 1:5000 @ A3
PROJECT No. P180220	DRAWING No. P18/320/DS/R1/02	REVISION		



Geo-Environmental Consultants

t: 0141 420 2025 e: mail@mason-evans.co.uk

The Piazza, 95 Morrison Street, Glasgow, G5 8BE



NOTES

Site boundary



Proposed development layout received from
GW Civil and Structural Engineers Ltd (September 2018)

REV DATE DETAILS

INVERDUNNING (HATTON MAINS) LIMITED
56 GEORGE STREET
EDINBURGH
EH2 2LR

PROJECT TITLE

HATTON MAINS
EDINBURGH

DRAWING TITLE

SITE ZONING PLAN

DRAWN BY
AC

CHK'D BY
AM

APP'D BY
PB

DATE
01.10.18

SCALES
Not to
Scale

PROJECT No.
P180220

DRAWING No.
P18/320/DS/R1/F/03

REVISION



Geo-Environmental Consultants

t: 0141 420 2025 e: mail@masevans.co.uk

The Piazza, 95 Morrison Street, Glasgow, G5 8BE



1.3 **General Methodology**

- 1.3.1 The studies involved documentary researches of available information on the historical background and the geological conditions at the site. This included examination of past and present Ordnance Survey maps, British Geological Survey records and other available information.
- 1.3.2 These researches have provided a valuable insight into the historical site development and development in the surrounding area. Consequently, an indication of potential constraints related to processes associated with its previous land use or the geological conditions has been attained.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Details

2.1.1 The summary details of the site as understood from supplied information and following a site walkover survey (refer to Appendix A) were as follows:

Site Name:	-	Hatton Mains, Edinburgh
National Grid Reference	-	278000, 609590.
Total Site Area:	-	59.3 Ha (approximately).
Local Authority	-	Edinburgh City Council.
Current Usage	-	Undeveloped agricultural land.
Access	-	Accessible via Hatton Mains Farm, off the A71, and from Dalmahoy Road
Surface Conditions	-	crops, surface grass and vegetation – agricultural fields. Dalmahoy Road (tarmac) is aligned north-south in the central site area.
Topography	-	The site was noted to be undulating, with a number of small mounds and valleys, particularly aligned through the southern and north western site area. Site levels were noted to vary between 82.00 m AoD and 98.00 m AoD. (Due to the variable topography, significant future earthworks may be required).

2.2 Neighbouring Land Uses (within the immediate area)

North	-	Agricultural land with farm dwellings, with an unnamed burn along the northern site boundary. A quarry is recorded 700 m northwest.
South	-	Generally agricultural land, with Gogar Burn recorded 136 m south of the site. Dalmahoy Golf Club located 250 m south.
East	-	Agricultural Land.
West	-	Agricultural Land.

Plate 01 - Aerial view of the site (Courtesy of Google Earth)



2.3 Watercourses

2.3.1 The nearest surface water is an unnamed burn located along the northern site boundary, flowing eastward. SEPA hold no information on this feature, but at this preliminary stage, we would consider it to be a potential sensitive receptor in terms of the captioned site.

2.3.2 Additionally, the Gogar Burn was indicated to be located 136 m south of the site. SEPA’s classification data sheet indicated that the overall status of Gogar Burn to be ‘poor’ in 2014, with a physical condition of ‘Good’ and a water quality of ‘moderate’ (refer to Appendix B).

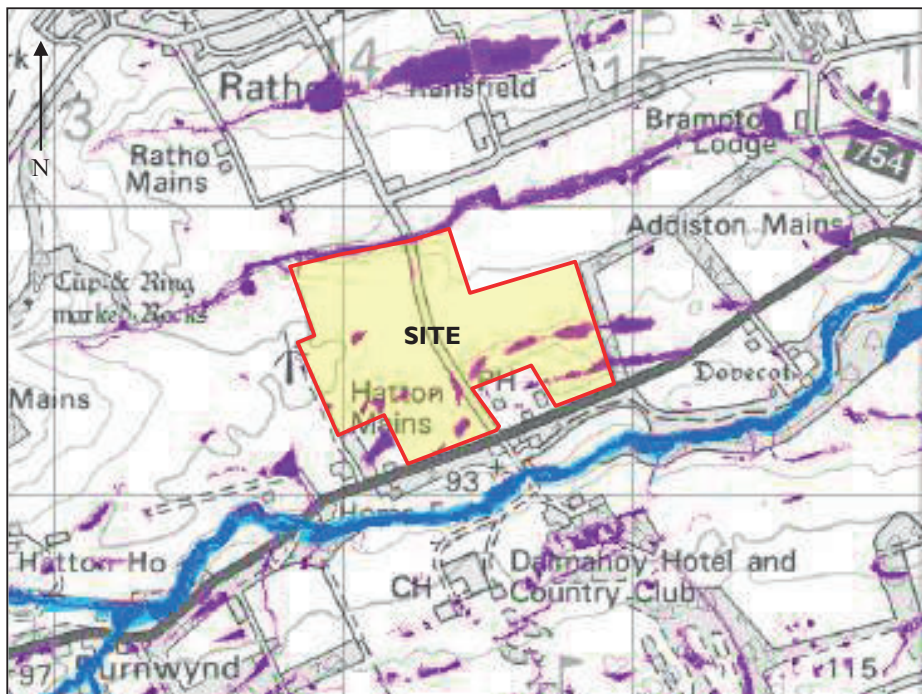
2.3.3 Given the close proximity to the site, we would consider the Gogar Burn to be a potential sensitive water receptor in relation to proposed development plans.

2.3.4 SEPA’s datasheets indicated the groundwater beneath the site to be associated with the ‘Livingston’ groundwater body. The most recent water quality information (2014) shows the water body was indicated to have an overall status of ‘poor’. The water quality of the groundwater has been classified as ‘poor’, whilst the water flows and levels had been classified as ‘Good’.

2.4 Flooding

2.4.1 The SEPA Flood Map (Appendix B) indicates that the site is generally at a low risk from flooding from surrounding water or surface water flooding. However, there are localised areas of moderate surface water flooding risk within the southern site area, and along the northern site boundary. If more detail is required, we would recommend a detailed flood risk assessment be undertaken.

Plate 02 - Arial view indicating surrounding areas of surface water flooding



*Image courtesy of Scottish Environmental Protection Agency (SEPA) with site indicated in red.

2.5 Public Register Information

2.5.1 Our desk study researches involved data acquisition and the examination of various documents on the geological and historical background of the site. The general findings were as follows: -

- *Waste Disposal Sites* - No waste disposal sites were recorded within 1000 m of the site (Appendix C).
- *Potentially Contaminative Land Uses* - There are no contemporary trade on site. One trade entry (AES Wind Generation – inactive) was recorded 39 m south. No further entries were recorded within 1000 m of the site (Appendix C).
- *Flooding* - The SEPA Flood Map (Appendix B) indicates that the site is generally at a low risk from flooding, with localised areas of surface water flooding in the southern site area, and along the northern boundary (refer to section 2.4).
- *Water Environment* - There are no historical abstraction wells recorded within 1000 m of the site (Appendix C).
- *Pollution* - There was no evidence to indicate that any notifiable pollution incidents have occurred within the site. 3 No discharge consents were recorded within the site. An additional 8 No consents were recorded within 500 m of the site (Appendix C).
- *Mining* - Part of the site (southern and central) lies within a 'Coal Mining Reporting Area' (Appendix D). Additionally, Oil-Shale seams are indicated within the surrounding area. No listed mineral sites within 250 m (Appendix C). Refer to section 4.4 for more detail.
- *Radon Potential* - Radon gas protection measures are not considered to be applicable for the site and surrounding area as less than 1% of homes are considered to be above the action level.

2.5.2 As described, the researches included consultations with public bodies and regulators, supplemented with researches of various documents and related website sources on the geological and environmental context of the site. Much of the information was summarised in the Landmark Envirocheck Report which is included in Appendix C, with the findings outlined in Table 01 overleaf.

2.5.3 In the compilation of the table, we have listed the key geo-environmental impact sources identified within the Envirocheck report. In each of these cases, we have assigned a notional risk level based on a qualitative assessment of the potential for a defined hazard to impact on the site and its users. Where the risk is estimated to be 'low', we consider that there is sufficient information available to suggest that the indicated source is unlikely to have any material effect on the site and its intended usage. Where a 'moderate' risk is shown, we consider that circumstances could reasonably arise where the site and its users could be impacted by the identified source. In the case of an assigned 'high' risk, we consider that there is sufficient information to indicate that the site will be impacted by the defined source. In this instance, we consider that the majority of the potential sources have a low risk of impacting upon the site and its users, with the exception of the potential for surface water flooding in the south-eastern corner of the site.

Table 01 - Summary of Envirocheck Records of Potential Impact Sources within 500 m of the Site

Potential Impact Source	Distance (m)	Details	Impact Risk
Mineral Sites	-	None indicated within 250 m of the site.	LOW
Discharge Consents	0	3 Within the site associated with drainage and septic tanks.	LOW
Radon	-	No radon protective measures are required as the site resides in a lower probability area where less than 1% of homes are above the action level.	LOW
Flooding (SEPA Flood Map)	0	Generally low risk with localised areas of surface water flooding in the southern site area, and along the northern boundary	GENERALLY LOW
Current Offsite Contamination Sources (Active Trade Entries)	-	None noted on site. No active entries within 1000 m of the site.	LOW
Registered Landfills	-	None noted within 250 m of the site.	LOW
Fuel Station Entry	-	None within 1000 m.	LOW

2.6 Invasive Plant Species Survey

2.6.1 No invasive plant species were recorded during our site walkover survey.

2.6.2 A detailed invasive plant species survey has been commissioned and is in the process of being undertaken. The findings from this survey will be reported under separate cover.

3.0 **HISTORICAL BACKGROUND**

3.1 **General**

3.1.1 An examination of the history of a site can often provide valuable information relating to potential constraints to its development. To facilitate these investigations, copies of historical Ordnance Survey maps contained within the Envirocheck report (Appendix C) and other historical data were examined, with particular attention being focused on former site uses and the presence of any industrial processes in the vicinity of the study area. It should be noted that considerable periods of time have elapsed between successive Ordnance Survey map editions and the possibility that further land uses occurred in the intervening years, which were not recorded on the maps, cannot be discounted.

3.2 **Historical Background**

TABLE 02 - Summary of History (Ordnance Survey Map Records)

Ordnance Survey Map Edition	The Site	The Surrounding Area
1853-55 (1:10,560)	<ul style="list-style-type: none"> The site consisted of unoccupied agricultural land. 	<ul style="list-style-type: none"> St. Mary's School is recorded to the immediate south of the site. The surrounding 1 km radius is generally unoccupied agricultural land with occasional roads and cottages. 'Quarry' recorded 1 km to the north-west and 800m south-east of the site. 'Ratho Quarry' recorded 1.25 km to the north-west.
1894-95 (1:2,500) 1895 (1:10,560)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> 'Parsonage', 'Entry head' and 'Gateside' are recorded to the immediate south of the site. 'Old Quarry' is recorded 500 m to the south of the site. 'Old Sand Pit' is recorded 66 m to the south of the site. 'Deer Park' is recorded 500 m to the south of the site area. 'Reservoir' 1 km to the north-west. 'Fish Pond' recorded 300 m to the south of the site.
1907 (1:2,500) 1909 (1:10,560)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> 'Craigpark Quarry' is recorded 1.2 km to the north-west. Sewage tanks are recorded 600 m north-east and 750 m north of the site area. 'Smithy' and 'Gas Works' are recorded 1 km to the north of the site. 'Cistern' is recorded 950 m to the north west of the site area. 'Boathouse' and 'Kennels' are recorded 350 m to the south of the site.
1913 (1:2,500) 1915 (1:10,560)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> No significant changes were recorded.
1938 (1:10,560)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> No significant changes were recorded.
1957 – 1958 (1:10,000)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> Golf courses recorded 500 m to the south and 600 m to the north east of the site. No other significant changes were recorded.
1963-69 (1:2,500) 1966 (1:10,000)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> Significant residential development around Ratho. No other significant changes were recorded.

TABLE 02 - Summary of History (Ordnance Survey Map Records)

1978 (1:2,500) 1973-77 (1:10,000)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> 'Ransfield' and 'Ratho Mains' cottages recorded 200m to the north of the site area. 'Knowhead' and 'Bridge End' cottages recorded 350 m to the south-west of the site area. No other significant changes were recorded.
1980-84 (1:10,000)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> Significant residential development around Ratho. No other significant changes were recorded.
1991-95 (1:10,000)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> No other significant changes were recorded.
1993 (1:2,500) 1999 (1:10,000)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> Further residential development around Ratho. No other significant changes were recorded.
2018 (1:10,000)	<ul style="list-style-type: none"> No significant changes were recorded. 	<ul style="list-style-type: none"> No significant changes were recorded.

3.2.1 A review of the site history indicates the site has been unoccupied agricultural land since 1853. Several quarries were recorded within 1.5 km of the site boundaries.

3.2.2

3.2.3 The surrounding area is indicated to have been occupied by predominantly agricultural land, recreational areas and residential properties. Development to the village of 'Ratho' to the north has undergone significant residential expansion since the 1960's.

3.2.3 **Following these researches, we conclude that this site is 'greenfield' in nature.**

4.0 DOCUMENTED GROUND CONDITIONS

4.1 General

4.1.1 The conjectured ground conditions at the site have been assessed utilising documentary information sources such as British Geological Survey Maps.

4.2 Superficial Soils

4.2.1 Our site walkover survey (Appendix A) recorded the site to be in use as agricultural land, consisting crops and surface grass. As such, we would consider that the majority of the site will be underlain by topsoil.

4.2.2 The British Geological Survey geological map (Drawing No. P18/320/DS/R/F/04) indicates the natural superficial deposits below the site to generally comprise glacial till (generally recorded as a sandy, gravelly CLAY), with localised mounded SAND and GRAVEL within the south western site area. Due to the 'greenfield' nature of the site, we do not expect significant made ground deposits to underlie the site.

4.2.3 Historical boreholes from the surrounding area (i.e >200 m) support the geological survey map. Rockhead is recorded to be generally shallow within the surrounding area, recorded at depths between <1.00 m and 4.00 m bgl.

4.2.4 Historical borehole records are included in Appendix E and on Drawing No P18/320/DS/R/F/04.

4.3 Solid Geology

4.3.1 The British Geological Survey solid geology map (Drawing No. P17/320/DS/R/F/04) indicates the solid strata to consist sedimentary bedrock, belonging to the Carboniferous aged Lower Oil Shale Group, described as sandstones, interbedded with siltstones and mudstones, seams of oil-shale and coal, dipping in an unknown direction.

4.3.2 The survey map conjectures the 'Dalmahoy Shale' to outcrop approximately 75 m to the south-east of the site, dipping to the north (forming part of a syncline). The 'Dalmahoy Shale' is understood to outcrop below the 'Pupherston Shale' Group (recorded to be 115 m thick, consisting three oil shales varying between 4 foot and 6 foot thick), and is indicated to be approximately 8 foot thick. This is the only known locality of the 'Dalmahoy Shale'

4.3.3 The BGS map indicates a geological fault in the central western site area, downthrown to the north.

4.4 Mining and Quarrying

4.4.1 The northern, eastern, southern and central site area is recorded to be located within a 'Coal Mining Reporting Area' (Appendix B), and as such we consulted with The Coal Authority to gain more information on historical coal mining activities below the site.

- 4.4.2 A report provided by The Coal Authority (refer to Appendix D), states that the property is 'not within a surface area that could be affected by known past underground mining'. Importantly, The Coal Authority does not make mention of the likelihood for unrecorded shallow mine workings.
- 4.4.3 The Coal Authority report does not record any known coal mine entries within, or within 20 m of, site boundary. In terms of mine gas emissions, The Coal Authority report notes it has 'no record of mine gas emissions requiring action'. This further supports the conclusion that there is no record of coal mining activities within the site, or surrounding site area.
- 4.4.4 A review of the Memoirs of the Geological Survey Scotland '*The Oil-Shales of the Lothians*' (Appendix F) book provided further information on the Dalmahoy Shale. The memoirs indicate that the seam is not wide spread, and has only been recorded in the indicated locality, and won't be wide spread throughout the area.
- 4.4.5 The memoirs indicate that the seam had been historically investigated for extraction potential, however no subsequent operations were undertaken, and the seam was not wrought (worked).
- 4.4.6 A review of the stratigraphic column (Drawing No P18/320/DS/R/F/04), indicates the 'Dalmahoy Shale' to underlie the 'Pumpherston Shale' Group. Though the precise vertical separation is not known, it is indicated from the memoirs that there is a 'considerable' distance between the Dalmahoy and the Pumpherston Group.
- 4.4.7 Furthermore, a review of the geological survey map did not indicate the presence of the Pumpherston Shale group to outcrop within the site. Additionally, the memoirs for the Dalmahoy area (which encompasses the site) do not indicate the presence of historical workings at the level of the 'Pumpherston Shale' Group.
- 4.4.8 A review of the available historical Ordnance Survey maps indicated that there were no quarrying activities within the site or immediate surrounding area (i.e 250 m).
- 4.4.9 As such, and with cognisance to the above, we do not consider the site to be at any potential risk from mineral instability as a result of past shallow mine workings (i.e oil-shale or coal) or quarrying activities.

4.5 Hydrology and Hydrogeology

- 4.5.1 Interpretation of the site hydrogeology required consideration of the general geological conditions. In this instance the available information indicates the ground conditions to be potentially comprised of four geological units: TOPSOIL, Glacial Till, SAND and GRAVEL deposits and sedimentary bedrock. The typical permeabilities of each of these strata are recorded in Table 02.

TABLE 02 - Typical Material Permeability

Material	Permeability
TOPSOIL	$10^{-4} - 10^{-3}$
Glacial Till	$10^{-4} - 10^{-9}$
SAND and GRAVEL	$10^{-4} - 10^{-3}$
Sedimentary Bedrock	$10^{-4} - 10^{-8}$

- 4.5.2 At present, surface run-off below the site would be relatively low over the site given that the site was surfaced predominantly in arable crops and grass. Infiltration of surface water would therefore be expected to be high.
- 4.5.3 It was considered that a shallow groundwater body would not exist within the glacial till deposits on site, due to the low permeability range of cohesive deposits. Groundwater may still be encountered within the glacial till soil underlying the site, though this is likely to be localised and perched, likely the result of surface water infiltration.
- 4.5.4 Given the moderate infiltration and moderate permeability of the localised SAND and GRAVEL deposits within the south western site area, it was considered possible that shallow groundwater body could exist.
- 4.5.5 Notwithstanding the above, given the limited range of these deposits (i.e southwestern site area only), we would not consider any groundwater encountered to be representative of a groundwater body, instead this would be localised and perched, likely the result of surface water infiltration.
- 4.5.6 The potential for a deeper groundwater table below rockhead is moderate given the permeability range of the sedimentary strata. The presence of any potential deep groundwater table would be dependent on secondary porosity, such as fracturing; this would also control any potential movement between shallow and deep lying groundwater bodies. SEPA indicated the bedrock groundwater body to be the 'Livingston'.
- 4.5.7 The nearest surface water is an unnamed burn located along the northern site boundary. SEPA hold not information on this feature, but we would consider it to be a potential sensitive receptor in terms of the captioned site.
- 4.5.8 In consideration of the available information regarding groundwater, the following general comments could be made.

TABLE 03 - Surface Water and Groundwater Pathways

Surface water run-off	Surface water run-off below the site would be relatively low over much of the site given that it was surfaced entirely in arable crops and grass. Consequently, the infiltration of surface water would therefore expected to be relatively high.
Groundwater migration through superficial materials	The site was anticipated to be predominantly underlain by natural cohesive glacial till deposits which would not likely facilitate shallow sub-surface migration of water. As such, it is considered unlikely that a shallow groundwater body would underlie the site.

4.6 Correspondence with Edinburgh City Council

- 4.6.1 As part of our desk study researches we contacted Edinburgh City Council (September 2018) to obtain any available historical site information. We are currently awaiting a response from this freedom of information request.

5.0 CONCEPTUAL SITE MODEL

5.1 General

5.1.1 In order to fully evaluate the potential presence and impact of contamination at the site, the area must be considered in an environmental context taking account of its geology, topography, past and present land-use. From this review, the current guidance requires the development of a 'Conceptual Site Model' as defined in the R & D Publication CLR10 published by the Department for the Environment and Rural Affairs (DEFRA). The model then forms an integral part of the contamination assessment for the proposed development site, looking at conventional source-pathway-receptor linkages.

5.1.2 The key parameters of the model are the conjectured ground conditions at the site, the potential sources of contamination, migration pathways and possible receptors in the vicinity. During the initial stages of the investigation, a preliminary conceptual model can be developed using information obtained during the desk study phase, prior to site investigations being carried out. This should then be revised during a subsequent phase of investigation.

5.2 Environmental Qualitative Risk Assessment

5.2.1 Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) has created a new regime for the identification and remediation of contaminated land. A revised Statutory Guidance Edition 2 (Paper SE/2006/44) to the Act was published by the Scottish Executive in May 2006.

5.2.2 Both Part IIA and the planning regulations it impacts on, embrace the "suitable for use" approach, with remedial actions only required where there are unacceptable risks to health or the environment, taking into account the current and proposed land uses and its environmental setting.

5.2.3 It is based on the principles of risk assessment, including the concept of a **pollutant linkage** between a **source** contaminant and a **receptor**, by means of a **pathway**. We would highlight that the approach, while perhaps rendering the site suitable for its current use, may prove inappropriate to a change in site designation or specific land use, arising from existing site conditions.

5.2.4 The presence of all three elements identifies a plausible pollutant linkage. An assessment of the potential sources, pathways and receptors constitutes a conceptual model for the site.

5.3 Potential Sources of Contamination

5.3.1 Based on our desk top researches we do not perceive there to be any significant sources of contaminations which would have an affect the shallow soils or water environment, and therefore the potential for contamination to underly the site is perceived to be low.

5.3.2 Notwithstanding the above, given that the site has been open to public access, and given the built-up nature of the surrounding area, we would consider any potential contamination risk (though considered unlikely) to be the result of localised made ground deposits within the site, or contaminant migration from surrounding development works and subsequent usage.

5.3.3 Furthermore, herbicide and pesticide chemicals may have been used during the sites on-going use for agriculture. As such, future site investigations should include for appropriate testing suites.

5.3.4 Potential contaminants of concern are outlined in Table 06 below.

TABLE 04: Contaminants of Concern

THE SITE	Industrial Activity/ Site Use	Potential Pathways	Associated Potential Contaminants
CURRENT/ PREVIOUS	<ul style="list-style-type: none"> • Potential localised Made ground. • Herbicide/Pesticide use from agriculture. 	<ul style="list-style-type: none"> • Deposition of waste arising • Leaching of contaminants to water environment through infiltration and direct discharge • Generation of ground gases. 	As, Mg, Cd, Cr, Ni, Zn, Cu, Hg, Pb, Fuel oils, PAH, Phenol, Asbestos, CO ₂ , CH ₄ , PCBs Herbicides/pesticides
IMMEDIATE SURROUNDING AREA	Industrial Activity/ Site Use	Potential Pathways	Associated Potential Contaminants
CURRENT/ PREVIOUS	<ul style="list-style-type: none"> • Made ground associated with construction and usage of neighbouring farm steadings 	<ul style="list-style-type: none"> • Deposition of waste arising • Leaching of contaminants to water environment • Ground gas generation and migration • Spillage/leakage of solvents and fuels/oils used in the construction process 	Fe, Al, As, Mg, Cd, Cr, Ni, Zn, Cu, Hg, Pb, Fuel oils, PAH, Phenols, PCBs, Tar, Asbestos, sulphates, phosphates

5.4 Receptors and Pathway Characterisation (Pollutant Linkages)

5.4.1 Pathways for the migration of contaminants may be both airborne dispersions (gases and dust) and through the soils, largely in groundwater movements. The movements through the soils can be facilitated by groundwater flows, which should be determined and the connection between different groundwater systems should be assessed. In addition, service trenches, drainage runs, underground storage tanks, former foundations, and other physical features could influence the migration of contamination. As such, these aspects will require to be considered further.

5.4.2 The most sensitive receptors and the pathways by which they may be exposed to potential sources of contamination are as follows:

1. Human and Ecological Receptors (site end users, visitors and construction operatives)
 - Dermal (skin) contact with contaminated soil, fugitive dust and the absorption of any contaminants through the skin into the body.
 - Inhalation of fugitive soil dust or vapour.
 - Ingestion of soil by hand to mouth activity
 - Inhalation of any ground gas migrating into the buildings.
2. Groundwater Receptors (groundwater systems)
 - Leaching of contaminants from the soil to groundwater.
 - Direct leakage/spillage of contaminants dissolved in the groundwater.
 - Discharge of fluids or soluble wastes direct to soakaways or drains.
3. Buildings (Existing and proposed buildings and associated infrastructure)
 - Contact of building materials with aggressive chemicals or acidic soils.
4. Public Utilities (domestic water supply, pipes and cables)
 - Direct contact with contaminated soil or groundwater.
 - Leaching of contaminants through the soil.
 - Service trenches acting as preferential migration pathways for contamination.
 - Permeation of plastic water supply pipes.
5. Vegetation (plants in landscaping)
 - Uptake of contaminants from the soil or groundwater into the plant.

5.4.3 Based on the above, a qualitative risk assessment is presented in Table 08 below and the potential source-pathway-receptor relationships, based on the preliminary qualitative risk assessment, are summarised in our Preliminary Conceptual Site Model (refer to Drawing No. PI 8/320/DS/R/F/05).

NOTES

REV	DATE	DETAILS

INVERDUNNING (HATTON MAINS) LIMITED
56 GEORGE STREET
EDINBURGH
EH2 2LR

PROJECT TITLE

HATTON MAINS
EDINBURGH

DRAWING TITLE

PRELIMINARY CONCEPTUAL
SITE MODEL

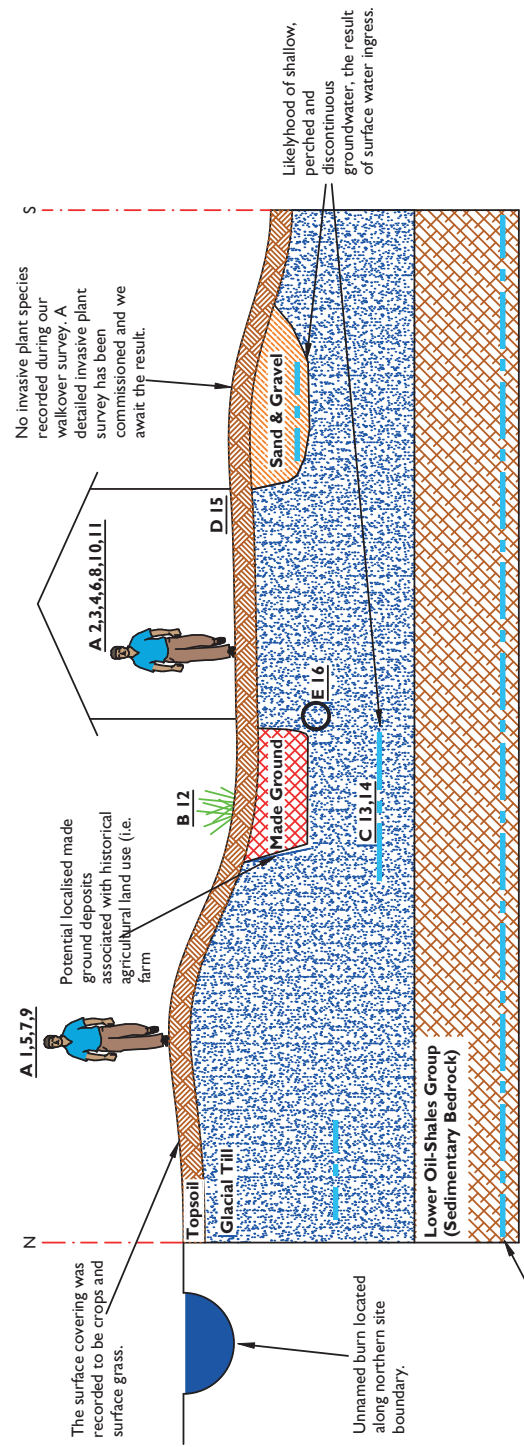
DRAWN BY AC	CHKD BY AM	APPD BY PB	DATE 02.10.18	SCALE Not to Scale
PROJECT No. P18/320	DRAWING No. P18/320/DS/R/F/05		REVISION	



Geo-Environmental Consultants

t: 01 41 420 2025 e: mail@mason-evans.co.uk

The Piazza, 95 Morrison Street, Glasgow, G5 8BE



Potential Receptors

- A. Site users / construction personnel.
- B. Vegetation / fauna.
- C. Groundwater.
- D. Buried concrete (Service and foundations)
- E. Plastic water supply pipes.

Potential Exposure Pathways

1. Outdoor ingestion of dust.
2. Indoor ingestion of dust.
3. Consumption of homegrown vegetables.
4. Ingestion of soil attached to vegetables.
5. Skin contact with outdoor soil.
6. Skin contact with indoor dust.
7. Outdoor inhalation of dust.
8. Indoor inhalation of dust.
9. Outdoor inhalation of soil vapour.
10. Indoor inhalation of soil vapour.
11. Inhalation of ground gases.
12. Contaminant uptake by vegetation.
13. Leaching of contaminants to the groundwater.
14. Contaminant migration in the groundwater.
15. Detrimental effects on buried concrete.
16. Permeation of plastic water supply pipes.

Potential Source

- Potentially contaminated localised made ground.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 Phase I desk study researches have indicated that there is a low risk that the site is potentially impacted by contamination relating to historical activities both on-site and in the surrounding area. Notwithstanding this, further evaluation through Phase II investigations, including the testing of soil/water samples, and examining the characterisation of the soils and groundwater bodies beneath the site, would be required. In addition, potential gas emissions, sourced from any biodegradable soils, require to be assessed through monitoring. Foundation options for any new development will be influenced by the thickness and condition of the superficial deposits.

6.2 Chemical Contamination

6.2.1 In order to address the any potential risk to the various receptors highlighted, we advise that a programme of investigations should be instigated, as described, to examine the soils and groundwater conditions. This should examine potential contamination impacts and the pathways by which receptors may be at significant risk.

6.2.2 Given that no significant contamination sources are anticipated, the investigations should be initially non-targeted, consisting trial pits and soil boreholes to recover samples of the soils and groundwater (were available). If possible, samples of the nearby surface water body along the northern site boundary should be retrieved during Phase II investigations.

6.2.3 Given the on-going site usage for agriculture, testing should also be undertaken for pesticides and herbicides.

6.3 Gas Emissions

6.3.1 The historical researches suggest the potential for localised made ground to exist (i.e associated with the farm steading development). As such, a detailed ground gas risk assessment, including a programme of gas monitoring from standpipes installed in boreholes, will be required.

6.3.2 We do not consider the site to be at risk from radon gas.

6.4 Foundations

6.4.1 The natural soils appear suited to sustaining medium loaded structures (refer to section 4.2) but may also be capable of tolerating significantly greater loadings. As such, intrusive ground investigations will be required to confirm the load bearing characteristics of the underlying natural soils.

6.4.2 Based on existing site layouts, we would expect standard spread foundations (for standard two storey developments) to be appropriate. However, in the future, due to potential significant earthworks, foundation solutions may differ.

6.5 Mining and Quarrying

- 6.5.1 Based on our detailed researches, we do not consider the site to be at any potential risk from mineral instability as a result of past shallow mine workings or quarrying activities.

6.6 Development Considerations

- 6.6.1 A number of development geo-environmental considerations could arise from the recommended Phase II investigations. These include:

- *Possible remediation of localised contaminated land (though considered unlikely).*
- *Gas Preclusion measures may be required (though considered unlikely).*
- *Possibility of significant earthworks*
- *Foundations designs will be determined by the condition of the underlying natural soils, plus the requirement (if any) of earthworks.*

We highlight that these considerations are speculative without the more detailed information that would arise following Phase II investigations, following which the impact of each should be re-assessed. The advised scope of these investigations would include:

- Trial pits to assess the shallow soils and ground conditions
- Soil boreholes with installations for gas and groundwater monitoring.
- Geo-environmental testing (including soil re-usability) of soil and water samples.
- Monitoring of ground gas and groundwater.
- Phase II Geo-environmental interpretive report.

We trust that this will meet your current requirements. However, should you require any further information, please do not hesitate to contact us.

Andrew McGuire
Project Manager

Patrick Barry
Director