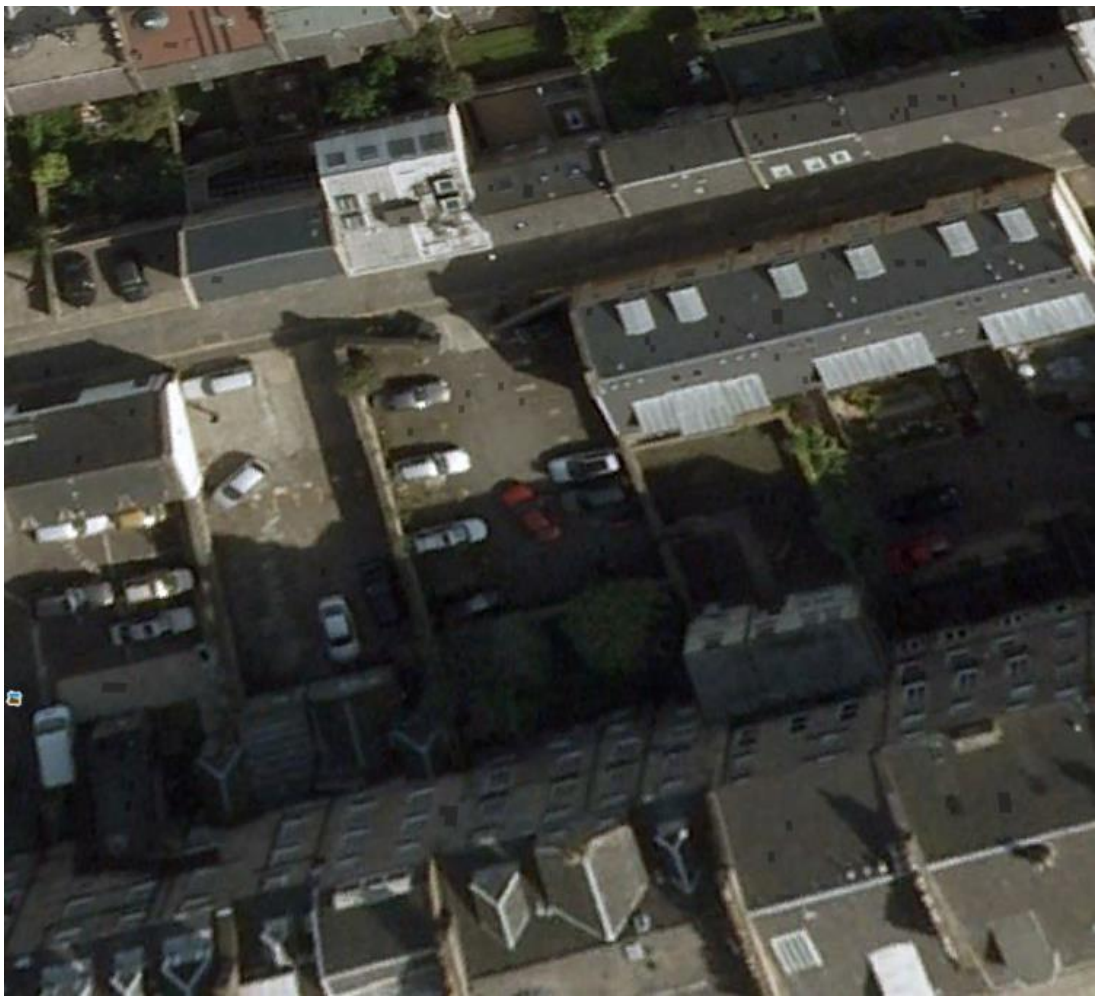
Knight Property Group

DUBLIN STREET LANE SOUTH, EDINBURGH



GROUND INVESTIGATION REPORT

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CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 General

It is the intention to develop an existing car parking area off Dublin Street Lane South into a residential end use. On behalf of Knight Property Group, Gillespie Christie Consulting Engineers have instructed Geovia to carry out a ground investigation.

A site locality plan and a site plan are included as Figures 1 and 2 respectively.

1.2 Project Details

It is understood the current proposal is for the construction of a 3 storey mews property with associated parking.

1.3 Purpose, Aims and Scope of Investigation

This investigation has been carried out to provide information on the ground conditions to inform the structural design of the development and support building warrant procedures. The works have included boreholes, trial pit and in-situ/ laboratory testing, together with factual and interpretive reporting.

1.4 Previous reporting & published information

No previous reporting has been made available for the site. Published geological mapping indicates that the site is underlain by Glacial Till that lies on sedimentary bedrock of the Gullane Formation (mainly sandstone).

Published borehole data in the surrounds indicates a surface layer of made ground overlying stiff Glacial Till (sandy gravelly clay) onto bedrock that lies at relatively shallow depth (3-5m). A surface layer of made ground would be expected at the site associated with existing and previous development.

2.0 GROUND INVESTIGATION FIELDWORK

2.1 General

The physical ground investigation works were completed on Monday 12th March 2018. The scope of works was scoped by the Structural Engineer and included:

- 2 No. window sample boreholes to refusal including in-situ standard penetration testing.
- 3 No. hand dug pits to expose the base of the boundary wall.
- 1 No. in-situ California Bearing Ratio (CBR) test.
- Sample recovery and laboratory based geotechnical testing of soils.

Exploratory hole locations were set out by Geovia, which were in general accordance with the Structural Engineers schedule but moved to suit access and services.

A plan showing the location of exploratory holes is included as Figure 3.

2.2 Window sample boreholes

Each window sample borehole (BH01 & BH02) was taken to refusal which was 1.60m and 1.77m below existing ground level (m beGL). On completion, the boreholes were back-filled with arisings and the surfaces made good. Borehole engineering logs are included as Appendix B.

2.3 Hand dug trial pits

Three hand dug trial pits (FP-01 to FP-03) were carried out along the line of the boundary wall at the western boundary. The pits were extended to the base of the wall and the foundation arrangement logged and photographed before being backfilled and the surface made good. Engineering logs and photographs are included in appendix B.

2.4 In-situ Tests

In-situ Standard Penetration tests (SPTs) were carried out within the window sample boreholes. SPT 'N' values relate to the number of blows required to drive a cone or split spoon 300mm, after an initial seating drive of 150mm. These results are uncorrected for hammer efficiency ratios and overburden pressure. SPT results are included on the exploratory logs in Appendix B.

An in-situ CBR tests was carried out at CBR-01 from a depth of 0.58m 5m beGL. These are results are presented in Appendix C.

2.5 Geotechnical Testing

Two soil samples were recovered from the boreholes and despatched for the geotechnical testing including water soluble sulphate (2:1 extract) and pH. Geotechnical results are included in Appendix D.

3.0 GROUND CONDITIONS

3.1 General

Ground conditions were generally in line with the published ground conditions.

3.2 Surfacing

Surfaces of the site comprise rough and dilapidated tarmac and in places gravel and sandstone slabs. Where encountered, the tarmac was found to be 0.05m - 0.07m thick.

3.2 Made ground

Made ground was found at every location up to a depth of 0.80m beGL. It comprised sand and gravel with fragments of brick, sandstone, mortar and glass. No obvious olfactory of visual signs of contamination were noted.

3.3 Glacial Till

The made ground lies on layer of yellow and dark brown locally clayey gravelly sand to depths of 1.2m and 1.3m beGL. This in-turn rests of light brown and dark brown sandy gravelly clay with cobbles. Tactile examination suggests the cohesive horizon is stiff. The SPT testing returned N values of between 37 and 50 indicating the material as very stiff.

Borehole BH01 terminated at 1.6m and BH02 at 1.77m beGL. Termination was either on bedrock or a boulder obstructions.

No obvious olfactory of visual signs of contamination were noted.

3.4 Groundwater

Groundwater was not encountered at any exploratory boreholes.

3.5 Wall foundations

The base of the wall was exposed at all three locations. At two locations no obvious foundation protrusion was observed. At FP-03, the base of the wall sits on a sandstone block. Foundation sections are included on the logs in Appendix B.

4.0 GEOTECHNICAL ASSESSMENT

4.1 General

It is understood the intention is to develop the site into a residential end use comprising a 3-storey mews property.

4.2 Ground Model

A layer of tarmac and made ground overlies the site which was found up to depths of 0.8m. This rests on natural superficial soils of gravelly sand and then Glacial Till in the form of stiff/ very stiff sandy gravelly clay. Groundwater was not encountered.

4.3 Buried Structures

Given the site history and the built up nature of the site/ surrounds, the presence of buried foundations below the site cannot be discounted. In-ground structures such as remnant foundations identified below new footprints should be grubbed up and removed.

4.4 Foundations

Detailed structural loadings are not currently known, therefore the engineering review given below should be re-evaluated once detailed layouts and loadings are finalised. For the basis of this reporting, it is assumed that for typical low-rise housing, line loads of 50kN/m^2 to 75kN/m^2 will be likely.

As a general comment, any made ground should be negated as a foundation horizon due to its inherent variability and unknown mode of compaction. The gravelly sand below the made ground would be expected to provide a suitable load bearing characteristic/ foundation horizon for the anticipated structural loads. SPT results were not taken within this horizon because of the hand dug starter pits, but SPT results at 1.2m within the underlying Glacial Till soils suggest a bearing capacity of 100kN/m2 to 150kN/m2. Settlement is likely to be within tolerable limits and settlement within the granular layer should take place a short time after loading.

Given the relative shallow depth of suitable foundation strata, it is considered a conventional shallow spread strip and pad foundation would be suitable for the building. These should be designed in accordance with NHBC guidelines, and foundation depths will require consideration of minimum depths in respect to the potential for the shrink/ swell effects of clay, frost susceptibility as well as recognising the guidelines for building near to trees (if applicable).

Before the pouring of concrete, all formations should be inspected, and if zones of looser materials or soft spots are identified then these should be removed and the excavation taken down to more competent strata.

The allowable bearing capacity is a function of the proposed loading, foundation configuration, depth and the ability of the structure to tolerate such movements and the foundation design/ solution should therefore be validated during detailed design, particularly if any larger loaded structures are proposed.

4.5 Other Engineering Issues

Concrete Slabs
It should be possible to cast ground bearing floor slabs off the natural soils. The in-situ CBR results suggest a CBR value within the upper horizons of the natural ground of 14%. Any slabs cast onto the made ground may require to be suspended to prevent risks of differential settlement between the slab and the structure.

The formation should be proofed rolled to ensure adequate compaction of the near surface soils, with any soft or hard spots removed. Slabs should be placed on a suitably compacted layer of granular sub-base material.

Excavations and De-watering
Shallow excavations through the near surface soils at the site are anticipated to be stable, however instability could occur below 1.0m or so and is significantly more likely where there is groundwater ingress. Temporary shoring will be required to support deeper excavations and the presence/ protection of the adjacent structures will require special consideration (e.g. boundary walls/ buildings). Excavations requiring man entry will also require shoring to ensure the safety of site construction personnel.

Any requirement for dewatering should be achieved by traditional sump pumping, however care should be taken not to remove fines from adjacent areas and risks to adjacent structures should be accounted for.

Shallow bedrock might be a feature of the site and may require consideration where deeper excavations are required.

Chemical Attack on Buried Concrete
Results of chemical testing on the shallow soils indicate sulphate levels of 10-34mg/l. pH conditions ranged between 8.0 and 8.2, which indicate slightly alkaline conditions.

With reference to Table C2 of BRE Special Digest 1: 2005 – Concrete in Aggressive Ground (taking into consideration a static groundwater environment and a brownfield location), the design for sulphate class (DS) for the site is considered to be DS-1. The Aggressive Chemical Environment for Concrete Class (ACEC) for the site is considered AC-1s.

FIGURES

FIGURE 1

SITE LOCATION PLAN

FIGURE 2

SITE LAYOUT PLAN

FIGURE 3

EXPLORATORY HOLE LOCATION PLAN

APPENDICES

APPENDIX A

NOTES ON LIMITATIONS

APPENDIX B

ENGINEERING LOGS

APPENDIX C

CBR TEST RESULTS

APPENDIX D

GEOTECHNICAL LABORATORY RESULTS