

[ENG17]

**UNIVERSITY OF BOLTON**

**SCHOOL OF ENGINEERING**

**BEng (HONS) CIVIL ENGINEERING**

**SEMESTER TWO EXAMINATION 2023/2024**

**SUSTAINABLE CONSTRUCTION AND MATERIALS 1**

**MODULE NO: CIE4019**

Date: Thursday 16<sup>th</sup> May 2024

Time: 14:00 – 15:30

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**INSTRUCTIONS TO CANDIDATES:** There are SIX questions on this paper.

Answer ANY FOUR questions.

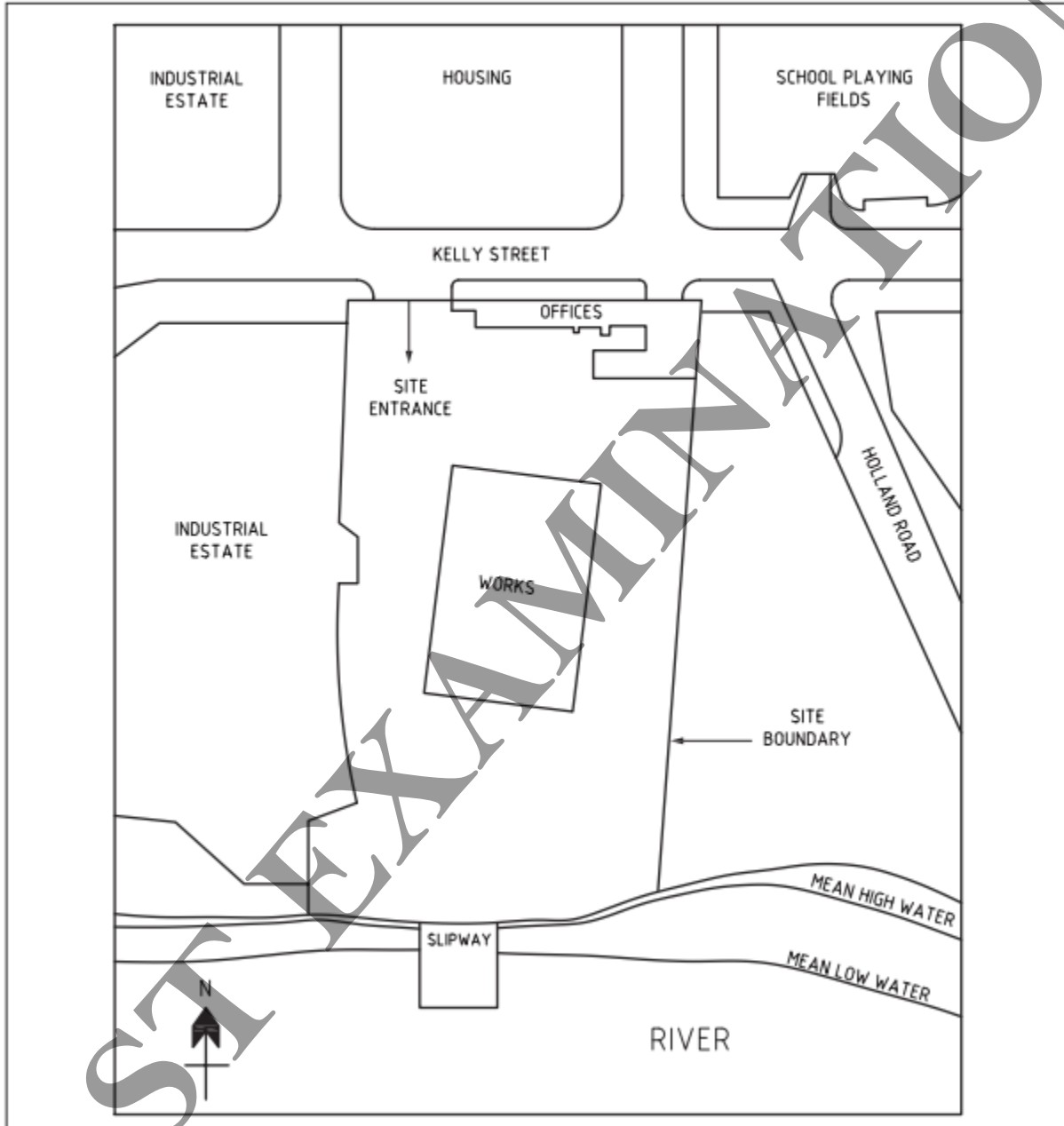
**QUESTION ONE IS COMPULSORY**

Marks for parts of questions are shown in the brackets.

This examination paper carries a total of 100 marks.

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**Figure 1.** Proposed site and surrounding for a housing estate of semi-detached identical storey buildings.

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**Q1 – COMPULSORY QUESTION**

The site in **Figure 1** is proposed for a modern housing estate of several units of semi-detached identical storey buildings (3 floors) with integrated garage, at Bolton. In respect of the following items, respond to the associated task.

- a) Discuss the main concerns in the event of carrying out a site investigation for the proposed project. **(10 marks)**
- b) In detailed terms, enumerate sources of specific information that can be gathered in the desktop study. **(10 marks)**
- c) With the aid of a diagram or sketches explain what type(s) of foundation you would recommend for the structure and why. **(5 marks)**

**Total 25 marks**

**Q2**

- a) What are construction plants. Explain why construction plants may be considered import in achieving desired project outcome. **(7 marks)**
- b) What factor are engineers expected to consider in the selection of construction plants for project in **Figure 1**. Give four examples of plants or equipment that will be required for landscaping site. **(9 marks)**
- c) Explain the importance of groundwater control and why it may be required for the modern housing project. **(9 marks)**

**Total 25 marks**

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**Q3**

- a) With the aid of a diagram discuss the function of a wall. **(5 marks)**
- b) Explain the benefits of damp-proof courses and their application in buildings. **(8 marks)**
- c) Identify existing options for the construction of external wall insulation systems, compare and contrast their merits and demerits using a table. **(12 marks)**

**Total 25 marks**

**Q4**

- a) In what situation is soil stabilisation required on a project and why. **(5 marks)**
- b) Describe a systematic approach you will adopt in considering available solutions to proffer in dealing with unsuitable ground conditions for foundation works. **(8 marks)**
- c) Based on the mode of construction and with the aid of a table, enumerate the advantages and disadvantages of pile types for foundation. **(12 marks)**

**Total 25 marks**

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**Q5**

- a) Explain what a 'floor' is, including the enumeration of its functions. **(6 marks)**
- b) Provide a professional advice on the functional requirements that should be considered in the design and construction of upper floor slab. **(12 marks)**
- c) Rationalise why an architect/engineer may choose to specify a suspended timber ground floor over a ground bearing floor slab in a building design. **(7 marks)**

**Total 25 marks**

**Q6**

- a) Explain the structural principles of a truss rafter. Draw a section through a truss rafter roof including the eaves detail annotating all component parts. **(15 marks)**
- b) List the advantages and disadvantages of using a traditional cut roof compared to a truss rafter roof in the construction of the three storey houses on the development. **(10 marks)**

**Total 25 marks**

**END OF PAPER**