

[ENG12]

UNIVERSITY OF BOLTON

SCHOOL OF ENGINEERING

BEng (HONS) CIVIL ENGINEERING

SEMESTER TWO EXAMINATION 2021/2022

SUSTAINABLE CONSTRUCTION AND MATERIALS 1

MODULE NO: CIE4019

Date: Monday 16th May 2022

Time: 14:00 – 15:30

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

Answer **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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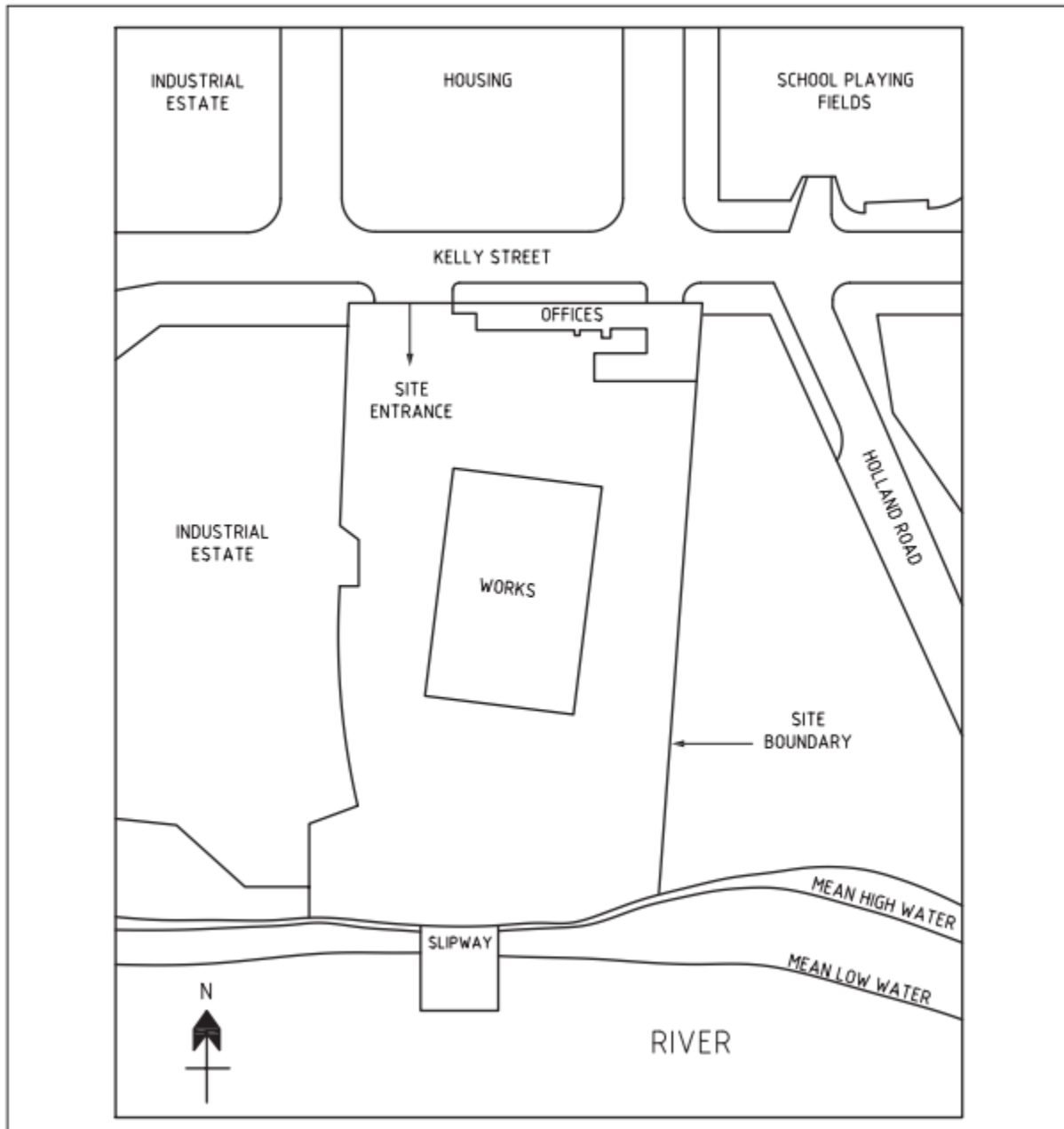


Figure 1. Proposed site and surrounding for a housing estate of semi-detached identical storey buildings (adapted from BSI, 2017).

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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. **(3 marks)**
- b) Describe a systematic approach you will adopt in considering available solutions to proffer in dealing with unsuitable ground conditions for foundation works. **(10 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