

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY  
FACULTY OF THE BUILT ENVIRONMENT  
DEPARTMENT OF CONSTRUCTION MANAGEMENT  
DESIGN MANAGEMENT  
BCM 5214

Main Examination Paper  
AUGUST 2024

This examination paper consists of 7 printed pages

Examiner's name : Eng. Mudhindi  
Time Allowed : 3 hours  
Total Marks : 100

**INSTRUCTIONS**

Candidates should answer: **Question 1** and select any other four **(4)** questions

**MARK ALLOCATION**

QUESTION	MARKS
1	20
2	20
3	20
4	20
5	20
6	20
<b>TOTAL</b>	<b>100</b>

## QUESTION 1

**(COMPULSORY QUESTION): READ THE STORY BELOW AND ANSWER THE QUESTION THAT FOLLOWS**

### **EMA stops Marondera dam project**

Source: The News Day: EMA stops Marondera dam project story by **Jairos Saunyama**:  
Kariba Bureau, Mar. 4, 2021.

The Environmental Management Agency (EMA) in Mashonaland East province has stopped construction of a multi-million-dollar dam in Marondera after the *project* was embarked on without an environmental impact assessment (EIA) certificate. The dam is part of a million-dollar horticultural project jointly run by Churchill, Sambok farms, and outgrower farmers in the area. Section 97 of the Environmental Management Act (20:27) demands that water sources must be constructed after going through EIA processes. EMA Mashonaland East provincial spokesperson Astas Mabwe yesterday said the dam project would resume after all the paperwork was done.

“They started the project without an EIA certificate. We ticketed and issued them with an order to stop operations until they comply,” Mabwe said. NewsDay is reliably informed that the construction of the three-million-cubic-metre dam was also being hindered by war veterans and newly resettled farmers in the area, who were reportedly demanding compensation for lost farmland.

“Some war veterans and other farmers are blocking the project as they demand compensation. One of the farmers said the dam’s overflow will affect his plans to construct chalets for his business. For the EIA to be passed, there must be consultations around the community and this is a daunting task. Farmers are referring the whole process to war veteran leaders in the

area," the source said. The contracted company, JR Goddard is reportedly in the process of securing the EIA certificate with operations set to resume in a fortnight. The dam is set to be complete by October this year. Nhimbe Fresh Exports, the company behind the project, said it was targeting to export 3 000 tonnes of garlic, 1 500 tonnes of ginger, 5 000 tonnes of sponta potato and 5 000 tonnes of red onion among other fresh produce.

A team of Asian agronomists was in Marondera last month to assess the project envisaged to supply fresh produce to markets in the United Arab Emirates.

a) From the story above, develop a stakeholder matrix (5 marks)

b) Detail how a Design Manager can assist in acquiring EIA certification for a project

(15 marks)

## QUESTION 2

### **MEDIA STATEMENT 07 May 2024 ENGINEERING COUNCIL OF SOUTH AFRICA (ECSA) RESPONDS TO THE GEORGE INCIDENT**

The Engineering Council of South Africa (ECSA) expresses its deepest concern regarding the tragic incident involving the collapse of a five-storey building in George, Western Cape, our thoughts are with all those affected by this distressing event. ECSA is actively engaged in investigating this matter, recognizing its paramount importance concerning, amongst others, public health, and safety. As the regulatory authority responsible for overseeing the engineering standards of Registered Persons and endowed with various powers pertaining to engineering-related activities, and as delineated in the Engineering Profession Act 46 of 2000, we are

steadfast in our commitment to comprehensively assess all pertinent factors surrounding this calamity as it speaks to the Council's powers. As reported by News 24, Times live, and various other news sources, a tragic incident unfolded in Victoria Street, George, Western Cape, on Monday, 06 May 2024 when a building under construction collapsed. A CCTV footage captured the harrowing moment of the collapse at approximately 14:09, with around 75 construction workers present during the collapse, a significant rescue operation ensued. Over 80 rescue personnel, including 53 emergency responders from the City of Cape Town and Worcester Disaster Services were deployed to the scene. Assistance included heavy crane trucks, lifting equipment, and structural collapse vehicles. "So far, 25 people have been removed from the rubble, but 49 others are still unaccounted for. At least six people have lost their lives following the collapse of the apartment building" reported Mr. Gerhard Otto, Head of Disaster Management for the Garden Route District Municipality late afternoon. Local Government MEC Mr. Anton Bredell's spokesperson, Mr. Wouter Kriel, detailed the support dispatched to the site, including essential equipment and vehicles. He assured that rescue efforts would be ongoing. Municipality representatives arranged for public support donations, urging contributions of drinking water and food for the service officials on-site. Family and friends of the affected construction workers were provided a space at the main municipal building for assistance. Mr. Mario Ferreira, a representative from Gift of the Givers, reported their team's arrival two hours' post-collapse, with ongoing rescue efforts underway. The Western Cape government, led by the Premier, Mr. Alan Winde monitored the situation closely, emphasizing the priority of saving lives. Despite uncertainties surrounding the cause of the collapse, law enforcement agencies and emergency responders are actively engaged in rescue operations. Premier Winde urged the public to refrain from visiting the site, to ensure that the emergency services officials conduct operations safely and efficiently. Aligned with our third-party responsibilities enshrined in the Engineering Profession Act, we will be investigating the root- cause/s of this fatal incident to establish the extent of involvement of Registered Persons. ENDS

- Issued by The Engineering Council of South Africa

- i. Explain how you would Investigate the cause of the implosion (10 marks)
- ii. Are there relevant Ethical Issues? When, If at all, which Ethical Issue come into play? (10 marks)

### QUESTION 3

- a) List any 5 components of a design program (5 marks)
- b) Detail the key features for a design management plan (5 marks)
- c) Define design errors (1 mark)
- d) Detail the sources of design errors on construction sites (4 marks)
- e) Describe a how a Design Manager can manage and control design errors on a construction project (5 marks)

### QUESTION 4

- a) The Royal Institute of British Architects is a professional body for architects primarily in the United Kingdom, but also internationally, founded for the advancement of architecture. Discuss the applicability of their plan of work in design management (16 marks)
- b) Describe the role of the following professionals on a project
  - i. Delivery design managers (2 marks)
  - ii. Feasibility design managers (2 marks)

### QUESTION 5

- a) Engineer Willy is a professional engineer employed as an owner's representative for the design and construction of a commercial project in a small community. Engineer Willy prepares drawings, plans, and specifications for the project and submits them to a public authority for approval. The public authority routinely assigns Engineer Victor, a

civil/structural engineer in private practice at his company Techno civil consultants Firm, to review the drawings, plans, and specifications and make recommendations to the public authority. Engineer Victor also performs inspections for the public authority during the construction process to verify compliance with local codes and standards. During Engineer Victor's design review process, Engineer Victor makes a series of recommendations concerning modifications to Engineer Willy design drawings, plans, and specifications, and suggests that Engineer Willy and the owner engage Engineer Victor services to assist in the preparation of the modified documents in order to obtain approval by the public authority.

- i. Was it ethical for Engineer Victor to suggest that Engineer Willy and the owner engage Engineer Victor's services to assist in the preparation of the modified documents in order to obtain approval by the public authority (3 marks)
- ii. How can you address the problem arising from the story above using design management principles (7 marks)

b)

- i. Describe the design-build project delivery method (3 marks)
- ii. Describe the effectiveness of design-build project delivery method to a design manager (7 marks)

### **QUESTION 6**

- a) BIM is making huge news with its grip in the construction industry that was predicted to soon reach record new highs.
- i. What is a "2d Conversion" in Building Information Modeling and how is a "2d Conversion" completed (3 marks)

- ii. Those who are using BIM will almost universally tell you that the number of new benefits they continue to discover seems endless (Bloom's ,2021). Discuss the application of BIM in design management (5 marks)
- iii. What are the barriers that are likely to be encountered while Implementing BIM (2 marks)

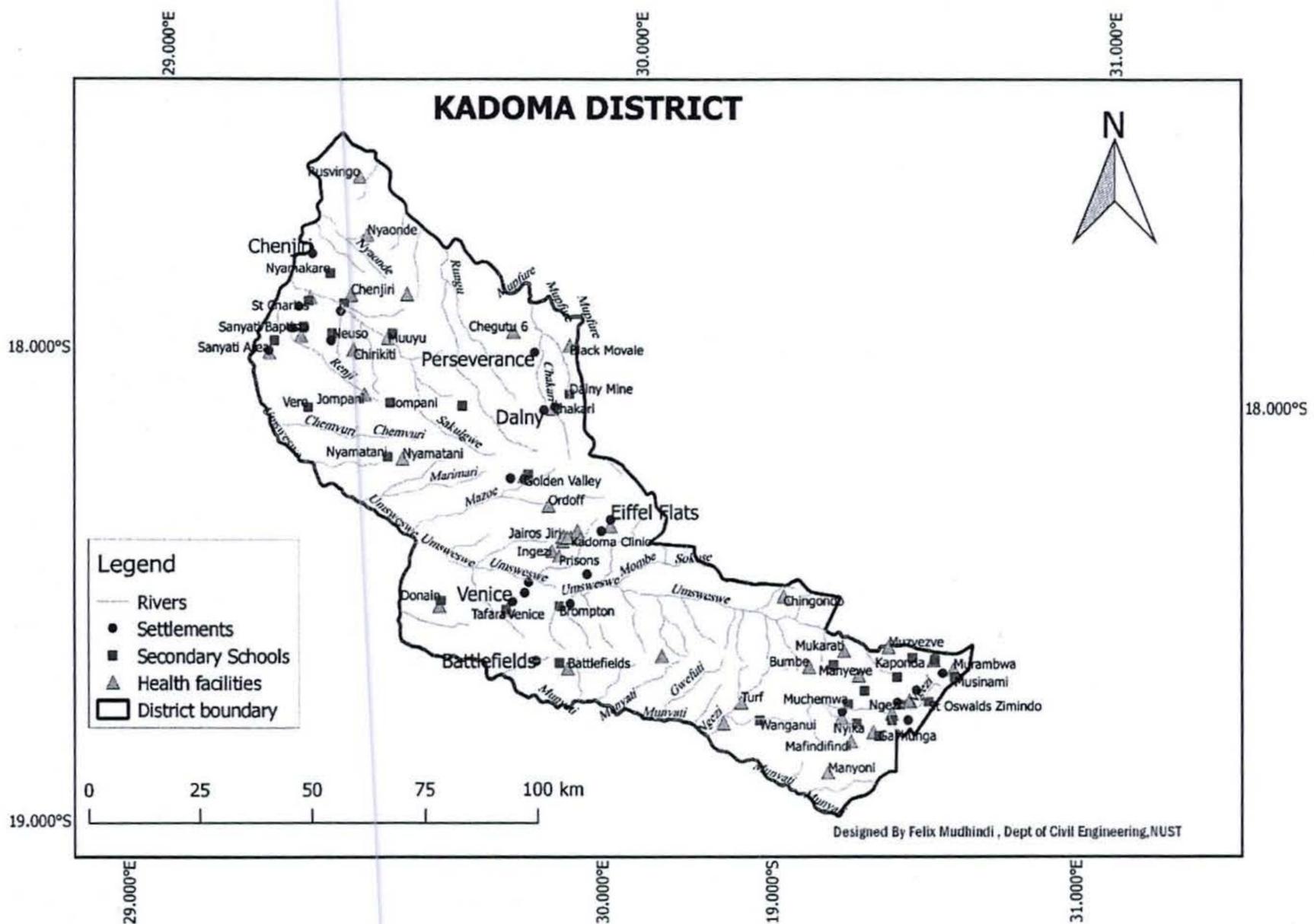


figure 1 :Kadoma District

- b) With reference to Figure 1 above, describe how the map was designed (5 marks)