



Degree Examination 2007

ENVIRONMENT DEPARTMENT

**BSc in Environmental Science
Part 1b**

ENVIRONMENTAL MONITORING & ASSESSMENT

Time allowed: **one and a half hours**

This examination is divided into two sections. 50% of the marks are allocated to Section A and 50% of the marks are allocated to Section B. Therefore you should divide your time approximately equally between the two sessions.

You must answer **ALL** questions in **Section A** and **EITHER** Question **B1 OR** question **B2** in **Section B**.

Pay adequate attention to spelling, punctuation and grammar, so that your answers can be readily understood

Section A

Answer **ALL** questions in this section. The five questions are each worth 10% of the total exam mark. The space provided under each question is indicative of the maximum level of detail that is required.

A1. Explain what is meant by a field (or trip) blank and why it can be an important part of a monitoring programme (10%)

A2. Identify the five components of the DPSIR framework, and write one sentence to describe what each component represents (10%)

A3. Explain the difference between environmental standards, environmental objectives and environmental indicators, and identify the role of monitoring for each of these (10%)

A4 Explain what is meant by the term 'integrated monitoring', referring to one relevant example (10%)

A5. In the context of UK policy on assessment of contaminated land, explain what is meant by the concept of a significant pollutant linkage, and identify its three key elements (10%).

End of Section A

Section B.

Answer EITHER Question B1 OR Question B2

Question B1.

York City Council has declared an Air Quality Management Area (AQMA) for the pollutant nitrogen dioxide, based on modelling studies. The AQMA indicates areas in the city where the following two national objectives for nitrogen dioxide may not be met:-

- (a) an annual mean concentration of $40 \mu\text{g m}^{-3}$
- (b) a maximum hourly mean concentration of $200 \mu\text{g m}^{-3}$

York City Council needs to carry out a monitoring campaign to assess concentrations of nitrogen dioxide in the centre of the city, including the AQMA. The following objectives have been agreed:-

1. To assess where within the centre of the city the annual mean objective of $40 \mu\text{g m}^{-3}$ is currently exceeded.
2. To establish the number of times in a year that an hourly mean concentration of $200 \mu\text{g m}^{-3}$ is exceeded at locations within the city centre where the highest concentrations are expected.
3. To ensure that all the monitoring is relevant to the exposure and health of residents of, and visitors to, York.
4. To ensure that QA/QC procedures for the monitoring exercise are appropriate
5. To ensure that the cost to the Council is not excessive.

You are asked to produce a short report recommending how the Council should plan the monitoring campaign. Your answer must include:-

- (i) a description of the measurement techniques that you would use to meet these objectives (30%)
- (ii) a description of the procedures you would adopt to ensure that appropriate QA and QC procedures are incorporated into the monitoring programme (40%)
- (iii) a description of how you would select monitoring locations, providing reasons for your choice of locations (note: it is not necessary to define specific locations) (30%).

Question B2.

Model predictions suggest that the climate of the UK is likely to change significantly over the next 25 years, as concentrations of 'greenhouse' gases increase. While the climate of the UK itself is routinely monitored, there is currently no coordinated monitoring to detect the impacts of climate change on UK ecosystems. You are asked to develop a plan for a monitoring network to operate alongside existing climate monitoring networks with the aim of detecting the long-term impacts of climate change. The following outline specification for the network is provided:-

- The network should have a national coverage
- It should contain no more than 50 sites
- Both effects on freshwaters and terrestrial ecosystems should be assessed
- Effects on physical parameters, chemical parameters, and biological parameters should be considered
- The network should be closely integrated with existing national monitoring programmes of relevance

Provide an outline proposal for this monitoring network, fully explaining the reasoning behind the different elements of your proposal, and how you would ensure that the data collected could be used to reliably assess the impacts of climate change across the country between now and 2030.

