ice
Institution of Civil Engineers

Membership

ICE Further Learning Exam Case Study:

Regency Restoration Project

Landscape Restoration Project

The Landscape Restoration Project aims to restore a nationally important 18th century historic landscape, requiring lake and reservoir creation, construction of dams and water control infrastructure, installation of 6 footbridges and extensive footpaths.

Developed by the Middleton family in the early 1600s, William Paxton was later responsible for the transforming the park into an ingenious system of lakes, cascades, waterfalls, springs, bath houses and pools. Years of neglect and a shift to farming in the 20th century left this important heritage derelict and waiting to be uncovered.

Watercolours painted in 1815 (Fig 1) provide invaluable historical evidence.

Figure 1 Finely detailed watercolours clearly depict the original regency landscape and necklace of lakes

The challenge is to restore the landscape of lakes, set in 120 Ha of wooded parkland, while meeting modern dam safety and climate change requirements. Ecological studies and appraisals gained funding from the Heritage Lottery Fund (HLF) charity, which will supplement the limited core funding of the local authority client.

A masterplan has been developed to restore the landscape to its former glory. The works will focus on each of three existing lakes and their surroundings (Fig 2):

1.The Large Lake

2. Mill Lake

3. Waterfall Pool

The project will have to overcome the following:

- Dam Safety – Historic dams vulnerable to flood damage, with the village of Llanarthe downstream; impacts of climate change and Reservoir Act law.
- Access - challenging site access in valley location open to the public.
- Ecologically sensitive location – veteran trees/ several European and nationally protected species; species of wildlife/ecology that must be protected.
- Working in live watercourses – liable to flooding and extreme weather events.
- Archaeology - protection of historic features both visible and underground.

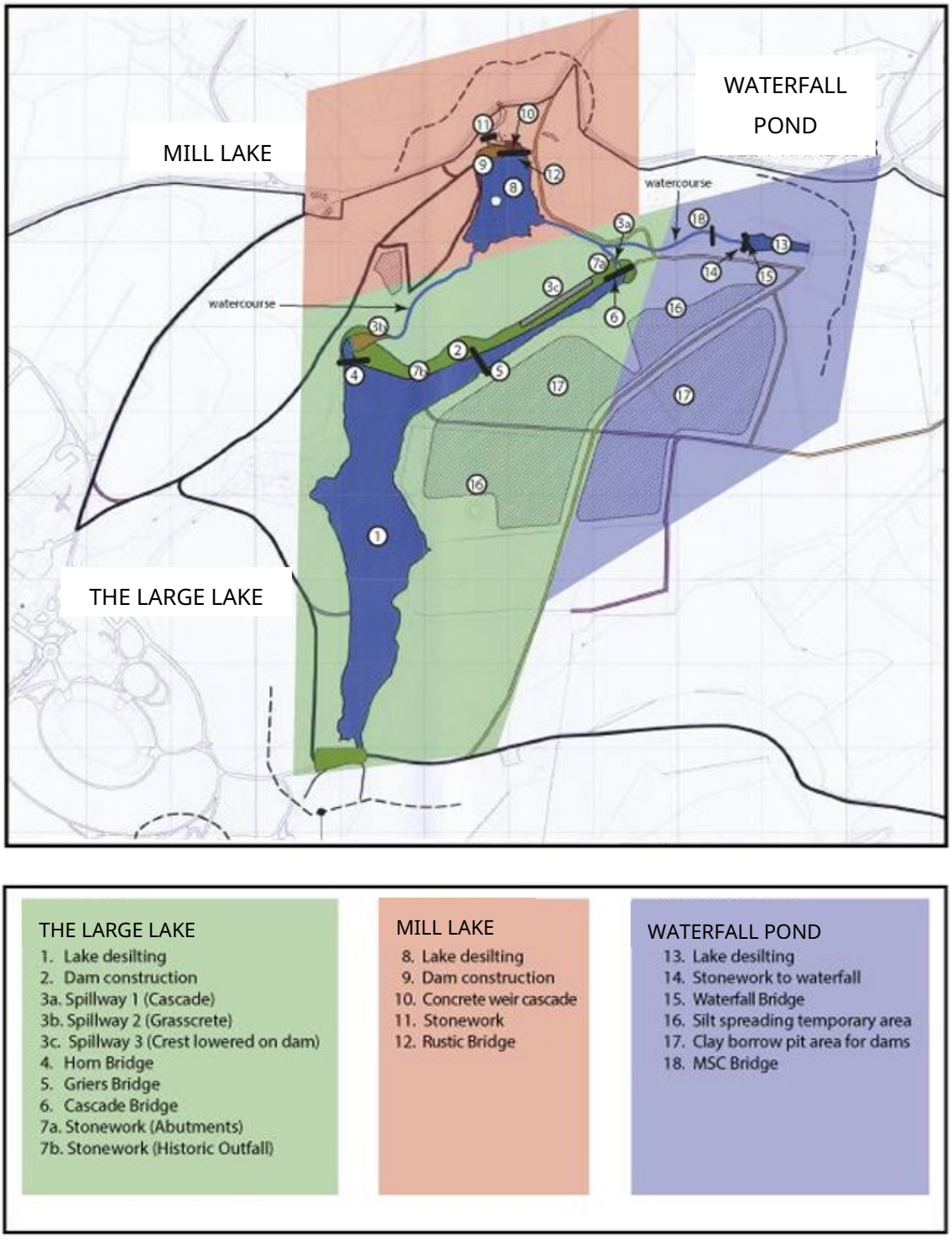

Figure 2 Diagram illustrating scope of works – all lakes fed by live watercourses with restricted access

The Large Lake is a raised reservoir classed as high risk, where a breach would endanger lives in a community. The design should retain the fabric of the existing heritage whilst constructing to modern standards. A larger spillway capacity is required to meet peak flows of up to 50 m3/sec (See Figure 4).

The landscape is open to the public, despite its current condition (Fig 3).

Restoration works are planned over five years with the main activity being limited between April and October to avoid winter ground conditions. This means work being carried out when the park is most heavily used. Figure 4 illustrates the scale of civil engineering works. The budget is £7 million.

Figure 3 Surveys have revealed structural condition, archaeological remains and environmental assets.

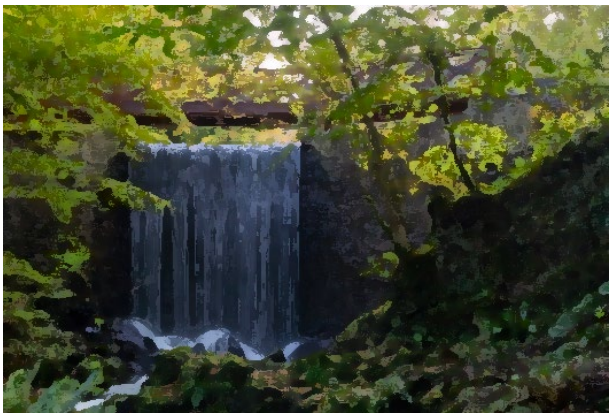

Figure 4 Illustrations of reservoir spillways give an indication of the scale of civil engineering works involved.

Questions

The scenario is based on a real project. No marks will be awarded for project information found online. Plagiarism may result in disqualification. Examiners will be looking at how you apply syllabus related further learning to the following:

1 As Client Project Manager, how will you procure the works and maintain oversight to achieve outcomes with minimal reputational harm?

2 As Design Manager, how will you identify and involve the various external stakeholders in finding solutions that satisfy their sometimes competing needs?

3 Volunteers will be involved in construction and subsequent operation. How should the health, safety and welfare of everyone be assured?

4 The client has limited resources; Costs can escalate when excavating and constructing to modern standards in a sensitive setting. How will you assure client and funder that allocated funds are spent effectively?

5 Given the environmental and historical sensitivity of the landscape, how will you ensure construction impacts are minimised and sustainability outcomes achieved?

Our vision

Civil engineers at the heart of society, delivering sustainable development through knowledge, skills and professional expertise.

Core purpose

- **To develop and qualify professionals engaged in civil engineering**
- **To exchange knowledge and best practice for the creation of a sustainable and built environment**
- **To promote our contribution to society worldwide**

Diversity statement

As a membership organisation and an employer, we value diversity and inclusion - a foundation for great engineering achievement

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