

# Examiners Report Autumn 2025

Exam to Assess Master Level Learning



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## Background

This report is compiled by the ICE Further Learning Examinations Panel. The Examination tests whether BEng graduates (including Hong Kong graduates) have gained through further learning an academic standard of learning and critical thinking equivalent to MEng candidates.

The ICE is required by the Engineering Council to assess academic standards achieved in candidate's technical knowledge alongside management, sustainable development and other syllabus areas covered by the Case-Study Exam. Candidates are required to submit a Part A Technical Statement in advance of the Part B Case-Study Exam. Parts A and B are marked by the same two Script Markers.

The ICE thanks those chartered members who volunteered to mark submitted scripts, and members of the Further Learning Examination Panel who developed the syllabus and learning materials, set the examination, moderated the marking and considered appeals.

## Spring Examination 2025

The exam case-study was based on the National Botanic Garden of Wales Regency Restoration which won the ICE Peoples' Choice Award 2012 (<https://www.ice.org.uk/what-is-civil-engineering/infrastructure-projects/national-botanic-garden-of-wales-regency-restoration>).

150 candidates sat the exam and there were 10 Part A resubmissions. As some candidates sat only Part A or Part B, having previously passed the one Part, it is prudent to breakdown the analysis of pass rates.

Section	Candidates	Pass	Fail	Plagiarised Fail	Pass Rate
Part A	126	60	65	1	48%
Part B	150	82	67	1	55%
<b>Overall</b>	<b>150</b>	<b>*61</b>	<b>89</b>	<b>N/A</b>	<b>41%</b>
<b>Overall (Part A Resubmission)</b>	<b>10</b>	<b>7</b>	<b>3</b>	<b>N/A</b>	<b>70%</b>

\*16 passes included previously passed Part A TRS submissions combined with an October 2025 Part B Case Study Pass

The Part B pass rate increased from 41% in the Spring 2025 exam to 55% for the Autumn session. This encouraging. Study and exam preparation is key.

The pass rate for Part A is disappointingly lower than the Spring exam although the pass rate for Part A resubmissions is much higher at 70% (73% March '25).

Each paper is marked by two trained Script Markers. In cases where Markers disagree on pass/fail marks an independent Moderation Panel reviews marking before awarding a pass or fail mark.

An experienced External Examiner advises the Further Learning Examinations Panel on the standard of the exam and the questions set, and audits consistency. The standard of the Part B paper and the questions asked was verified in advance of exam day. The External Examiner reviewed marks awarded and confirmed confidence in the consistency of marking.

## Reflection

The high pass rate for Part A resubmissions would indicate that candidates may not fully understand requirements at their first attempt. Feedback from examiners may help them understand requirements earlier. Examiners feel that many candidates are either entering the exam too early and their Part A submission shows a lack of experience. They are often only applying Bachelor level knowledge to a work situation, which is what is expected during graduate training, rather than demonstrating the application of engineering principals at Masters level. This demands further academic learning and not just practical experience.

As they are exposed to the working environment, newly graduated engineers tend to advance their technical knowledge first. It is only when they have proven their technical ability that employers provide opportunity for management and leadership experience. It is logical that candidates may be able to Pass Part A of the further learning exam before being ready for Part B. The breadth of the Part B syllabus demands study to top-up experiential learning.

*Candidates will have sat many exams where questions are asked around a subject they have studied. The Part B exam is based on a Case Study for a reason. It requires candidates to place themselves in an unfamiliar work environment, and to think critically about how to apply advanced learning.*

This requires candidates to;

1. Answer each part of a sometimes complex question. This requires cross syllabus knowledge
2. Answer in the context of the practical case study, not by quoting generic text book theory
3. Demonstrate knowledge of the Masters Level syllabus on which the exam is based
4. Demonstrate critical thinking in answering within the context of the question and scenario

Examiners found that a lack of syllabus knowledge was evident in many of the Part B answers of those who fail. It is also evident that candidates are pasting in sections of text either prepared in advance or found online. These inserts are often tangential to the case study, and in many cases the case study is hardly mentioned. Markers were in a number of cases suspicious that AI generated text was included.

ICE members wishing to take the Chartered Professional Review, and who do not yet hold an approved Masters level academic qualification, can bridge the gap between their bachelors level qualification and the required standard by:

1. Undertaking a MEng Course (normally one year) and passing associated examinations;
2. Learning through work experience over at least five years and undertaking an Experiential Learning Assessment; or
3. Supplementing learning gained through work experience with a course of study before sitting the ICE Further Learning Examination.

*Future candidates who wish to sit the Further Learning Exam earlier than might be the case for the Experiential Learning Route, should consider studying the Online Training Modules developed*

*specifically for the exam, and/or studying the ICE Companion to Engineering Management, which has been compiled specifically to help candidates prepare for the exam.*

Candidates who fail the exam will be disappointed and may wish to re-sit at the earliest opportunity. The exam is, however, a test of whether candidates are able to demonstrate and apply an MEng level of learning gained through further study and practice. Candidates should consider whether they need to undertake further study in some syllabus areas before resitting the exam.

## Rationale behind Part A and Part B

The Engineering Council defines Learning Outcomes to be achieved through academic study. The Exam assesses whether Master level learning outcomes have been achieved.

The **Part A Further Learning Technical Report** requires candidates to demonstrate how they have continued to learn post qualification to achieve Masters level technical learning outcomes. The submission comprises: *"A 500-word Technical Statement and supporting Appendix based on one or more appropriate project(s) or activities that demonstrate Masters level technical knowledge in a civil engineering context. It should demonstrate a candidates ability to integrate prior knowledge and understanding of the discipline and engineering practice with the development of advanced level knowledge and understanding, to solve a substantial range of engineering problems, some of them complex or non-routine."*

The Further Learning Technical Statement is not simply a report describing a candidates work on recent projects. The purpose is to demonstrate academic learning gained since graduating, and to evidence how a candidate has applied knowledge in an innovative way to overcome a particular challenge. It is a test of academic learning alongside practical experience.

A good statement may describe a computational technique (calculations or modelling) that the candidate has applied or adapted to solve a particular problem. It is important to describe the candidate's personal contribution to the work of a team. Writing in the first person helps articulate personal contributions to the team. For example:

A drainage engineer might explain how a lack of flooding during an intense rainfall event had caused them to question the validity of modelling outputs. By commissioning CCTV surveys and observing overland flows during heavy rain they were able to recalibrate the model by applying further CPD learning gained on Micro-Drainage software courses, and by learning from experienced colleagues. Modelling outputs could be appended.

It important that candidates understand the purpose of the **Part B Case-Study Exam**, which is to demonstrate that Masters level learning outcomes have been achieved across the syllabus. Whilst ICE has provided online further learning modules and the ICE Companion to Engineering Management, the examination is not a test of that knowledge alone. Candidates will be expected to draw on experiential learning developed over their career, knowledge gained through CPD, and to apply that learning through critical thinking in relation to a specific scenario.

The exam syllabus aligns closely with the attributes required for the Chartered Professional Review:

- Procurement, Contracts & Project Management
- Project Appraisal & Financial Management
- Sustainable Development
- Management & Leadership
- Health, Safety, Welfare & Risk Assessment

Candidates are required to apply their learning to an unfamiliar case-study. At the start of the examination candidates should read the scenario and each of the questions carefully. The questions are often connected and together afford the candidate opportunity to demonstrate a broad knowledge. They should plan how to answer each question whilst covering the syllabus breadth and should demonstrate critical thinking when applying their knowledge. Writing three paragraphs of learned knowledge will not gain marks unless it applies directly to the question and scenario.

A seven-hour examination provides time to plan, to consider case-study implications, and to demonstrate syllabus knowledge, learning and critical thinking.

## Moderation Panel Report

It is encouraging to see that the standard of both Part A and Part B submissions is steadily improving. Several papers a good pass. At the same time, some submissions were disappointing and evidenced a failure to adequately prepare. The following strengths and weaknesses were seen:

### Part A Technical Submissions

#### **Good Features**

- Written in the first-person – I did this;
- Project worked on; challenge overcome; analysis undertaken; limitations etc;
- Details of post BEng further learning
- Advanced application of engineering principles clearly evident;
- Appendices that are easily read;
- Candidate initials on drawings & calcs.

#### **Poor Features**

- English difficult to understand;
- Use of “we” casts doubt on whether this is the candidates own work;
- No advanced application of engineering principles evident;
- Appendices cramped and difficult to read;
- Candidate initials missing from drawings or calculation sheets cast doubt on authenticity.

### Part B Case Study Exam

#### **Good Features**

- Case study understood and addressed;
- Each part of the question answered;
- Use of sub-headings aligned with question;
- Written in the first person – “This is how I would manage this project”;
- Knowledge from across the syllabus that is specifically relevant (question & scenario)
- Referencing that is relevant;
- Critical thinking and advanced knowledge;
- Confident, knowledgeable and articulate;
- Good planning and time management.

#### **Poor Features**

- Case study not understood & often ignored;
- Parts of question not answered;
- Long, complex, meandering paragraphs;
- Written in the third person and often with long sections of unattributed pasted in text;
- Pasted text (eg NEC or UNSDGs) which is peripheral and fails to answer the question;
- Weak understanding of syllabus elements;
- Lack of referencing;
- Lack of critical thinking & shallow knowledge;
- Poor time management.

The question posed by the Part B exam are not complicated and can be answered by a BEng candidate. Without further learning, the answers are generally superficial and lack critical thinking. Such candidates fail to demonstrate further learning across the syllabus. It is usually clear which candidates have failed to study the syllabus. Candidates seem intent on demonstrating UNSDG knowledge even though the sustainability requires broader learning. Aspects such as an Environmental Impact Assessments, carbon accounting, waste management and triple bottom line reporting are important elements of the syllabus and are part of a good answer.

The application of further learning and critical thinking in applying it to the challenge set out in the scenario was demonstrated by a number of candidates that achieved good pass marks:

In response to **Q1**, many candidates failed to demonstrate sufficient knowledge of procurement. If candidates have not gained experience of procurement, they need to study

Module 1 of the syllabus. One candidate set out a clear scenario specific approach and then used clear sub-headings to describe a logical approach i.e. Procurement Form & Gate Strategy; Commercial Controls & Programme Discipline; Oversight & Evidence and Risk Handling before summarising. The response was scenario specific, demonstrated critical thinking and evidenced breadth of syllabus knowledge:

*“Firstly, I will adopt two-stage Design & Build with Early Contractor Involvement (ECI) under NEC4 ECC Option C (target cost) because the uncertainty around archaeology, ecology and hydrology is structural. A fixed price would either inflate premiums or trigger claims, whereas Option C’s open-book target cost with pain / gain aligns both parties to reduce risk and share savings. It directly lowers stoppages and reputational harm. Because planning must be preceded for committing, Stage-1 develops method statements for dams, spillways, bridges and heritage fabric and a logic-linked programme around seasonal ecological windows and visitor-peak access constraints, so that the target cost is evidence-based and delivery is compatible with park use.*

*Governance will use a benefits map and Key Performance Indicator (KPI) tree that track safety, days of path closure, first-time acceptance, defined-to-target cost variance, carbon variance, ecology non-compliances and complaint trends. The KPIs selected will appear in pain / gain so that incentives pay for outcomes, not activity. Independent assurance will sample RAMS, Inspection & Test Plan (ITP) / Construction Quality Assurance (CQA) and stress-test assumptions. The monthly pack able to reconcile defined cost to target, showing the risk burn and earned-value indices and documents transparent decisions that explain trade-offs via Multi-Criteria Assessment (MCA) / Whole-Life Cost (WLC) sensitivity results. Therefore funders and the public can see outcomes per pound..*

*Where risks crystallise, I will use early warnings and compensation events to re-baseline openly. If hydrology uplifts, we rerun MCA / WLC and seek for Panel Engineer agreement. If archaeology is found, the watching-brief protocol pause works. If carbon drifts, circular-economy alternatives and low-carbon plant protect the carbon budget. Because we work in a live public park, I will require RAMS and Permit to Work, Lock Out Tag Out (LOTO). Temporary Works design should be included inspection by competent person with the temporary work certificate and emergency drills (rescue plan) would be executed to make safety performance is engineered and verified. I will also close with a post-project review and lessons learned linked to benefits realization for the knowledge compounds”.*

In response to **Q2**, another candidate used a RACI approach in discussing the roles and needs of key external stakeholders. They went on to outline an engagement strategy, the importance of continuous communication, providing insurance and using SMART targets in both design and stakeholder engagement.

*“I will organize collaborative workshops and site visits allows stakeholders such as the Heritage Lottery Fund, environmental agencies, and archaeology experts to express their priorities—heritage preservation, ecological protection, and dam safety. These sessions should be linked to the RACI framework, where stakeholders in the “Consulted” role actively contribute to shaping design solutions without bearing accountability, ensuring their voices influence decisions.*

*I will actively engage in regular progress updates through newsletters, dashboards, and milestone review meetings where stakeholders can see how their input has been incorporated. For example, environmental agencies consulted on spillway design should receive clear evidence that ecological buffers are integrated. Using RACI roles clarifies expectations: those “Responsible” (design team) act on feedback, while those “Informed” (community groups) receive transparent updates on access and safety measures during seasonal works.*

*I would follow a traceability matrix mapping stakeholder requirements to design outputs demonstrates accountability and responsiveness. When competing needs arise (balancing heritage aesthetics with dam safety) visual decision boards and documented trade-offs help stakeholders*

understand constraints and compromises. By embedding within the RACI structure, the Design Manager ensures that all parties feel heard, their needs are accommodated where feasible, and conflicts are resolved collaboratively, safeguarding both compliance and project integrity.

*I would clearly define outcomes such as “increase spillway capacity to 50 m<sup>3</sup>/sec while preserving historic dam fabric.” This ensures heritage and safety objectives are explicit (Specific). I will achieve measurable progress through design milestones—e.g., completion of ecological surveys, approval of dam safety calculations—tracked in dashboards and Earned Value metrics, allowing transparent reporting to stakeholders like the Heritage Lottery Fund and regulators. I will actively hold/engaged in collaborative workshops where stakeholders can compromise agreed targets validate priorities, documented through RACI roles (e.g., environmental agencies consulted on habitat protection, local authority accountable for compliance). I then proceed to set realistic goals consider seasonal constraints, ensuring tasks like footbridge installation are scheduled within April–October windows using in the design. I finally then embed time-dependent targets into the master schedule with clear deadlines for design approvals, procurement, and construction phases;*

**Q3** saw candidates concentrating too much on volunteers rather than “How should the health, safety and welfare of everyone be assured? Good responses considered volunteer roles critically:

*“Volunteers can play a meaningful role in non-specialist, low-risk activities such as: Environmental Work (Planting native species / Removing invasive plants / habitat restoration). Heritage Support (Helping re interpretation panels; educational materials; guided tours etc) Participating in citizen science (wildlife spotting, water sampling).”*

One candidate thought critically about the role of new technology *“I will publish QR-coded Safe System of Work (SSoW) packs at the workplace which could be scanned to view the latest Job Safety Analysis (JSA), Control of Substances Hazardous to Health (COSHH) and photos; a red banner shows if a document is superseded. 4D BIM will be applied clips to brief exclusion zones and pedestrian/plant choreography before weekend events; volunteers grasp the sequence faster when they see it move. A Common Data Environment (CDE) aligned to ISO 19650 will hold the single source of truth for method photos, permits, and lessons... Instead of generic audits, I will use Statistical Process Control (SPC) charts on two lead indicators: (1) Job Safety Analysis (JSA) quality score and (2) close-out time for near-miss actions. When the chart trends adverse, I will trigger a focused coaching cycle one-to-one refreshers and live-task demos since coaching, not paperwork, changes behaviour.”*

The same candidate demonstrated understanding of risk analysis with a simple table:

Hazard	Who might be harmed	Initial risk (L×C)	Controls (hierarchy + RAMS)	Residual (L×C)	Owner	Review
Fall into open water/embankment	All	4×4=16	Edge protection; exclusion; rescue	2×3=6	PC	Weekly
Plant–people interface	All on site	4×4=16	Segregated routes	2×3=6	PC	Daily
Lifting operations (bridge parts)	Workers	3×4=12	Appointed-person plan; certified gear	2×3=6	PC	Per lift
Adverse weather/flood rise	All	3×4=12	Triggers; stop-work	2×2=4	PC	Daily

**Q4** required understanding of project appraisal and financial management. One candidate began by demonstrating an understanding of his role and scenario specific cost risks:

*“Assume I am a project/design manager, knowing that the client has limited resources (£7m budget), I should first identify why costs can escalate in a sensitive setting. There are several reasons: Historic features - Damage to heritage assets can lead to costly delays and conservation work. Restoration using authentic materials/craftsmen - more expensive and time-consuming. Upgrading old infrastructure to modern specs requires complex design and construction. Seasonal Constraints - Delays due to weather or ecological events can push costs higher.”*

The candidate goes on to apply syllabus learning to the risks identified:

*“Value engineering can be applied to the £7 million budget is used efficiently while preserving the site’s historical and ecological integrity. It involves analyzing each component of the project to identify opportunities for cost savings without compromising function, safety, or heritage value. For example, instead of constructing three separate spillways for the Large Lake, engineers could explore combining functions into fewer structures that still meet the required 50 m<sup>3</sup>/sec flow capacity. Similarly, reclaimed stone from the site or nearby sources could be used for bridge abutments and outfalls, maintaining historical authenticity while avoiding the high cost of newly quarried stone.”*

*And “A risk management plan helps assure the client and funders that the allocated are being spent effectively by identifying potential risks early and preparing strategies to handle them without causing budget overruns. For example, risks like unexpected archaeological discoveries, ecological restrictions, or weather delays are assessed in advance. The plan includes mitigation measures, such as contingency funds, flexible scheduling, and alternative construction methods, that reduce the financial impact if these risks occur. By actively managing risks, the project team can avoid costly surprises, keep the work on track, and demonstrate responsible use of funding.”*

In answering **Q5** were keen to demonstrate knowledge of UNSDGs rather than considering other syllabus elements. Good answers considered both. One candidate began by considering potential environmental and historical/archaeological impacts before detailing a systematic approach:

*“Environmental Impacts: Disturbance to Protected Species - Watercourse Disruption - Soil Erosion and Sediment Runoff - Vegetation Loss*

*Historical / Archaeological Impacts: Damage to Historic Features - Alteration of Heritage Structures*

*As the project client, I understand that restoring a nationally significant 18th-century landscape and constructing new infrastructure, will encounter environmental, historical, social & logistical challenges. The development/implementation of a Sustainable Development Management Plan (SDMP) will ensure that impacts are minimized and sustainability outcomes achieved... before the SDMP is developed it is essential to understand the concerns/expectations of all involved parties... The SDMP should clearly communicate its objectives to the entire project team. In response to the challenges raised by stakeholders, including ecological sensitivity, heritage preservation, public access, and climate resilience, the strategic direction must be articulated in the Plan’s vision and purpose statement. It will commit to 1 Reducing carbon emissions throughout the construction process by using low-impact methods and materials. 2 Delivering economically sustainable infrastructure that meets modern safety standards while preserving historic features.... One effective approach is to translate the Plan’s sustainability goals into specific contractual requirements for consultants and contractors. For example, require the use of low-carbon fuels, green construction technologies, and locally sourced materials such as clay and reclaimed stone to reduce the project’s carbon footprint.”*

The candidate goes on to discuss KPIs to monitor adoption of green technologies and monitoring emissions before considering UNSDG implications:

*“No Poverty (SDG 1)*

*Provide employment and training opportunities for local residents / Include community benefit clauses in contracts to ensure economic inclusion.*

*Clean Water & Sanitation (SDG 6)*

*Improve water quality through lake desilting / Protect watercourses from construction pollution.*

*Industry, Innovation & Infrastructure (SDG 9)*

*Upgrade historic dams / spillways to modern safety & climate resilience standards / Use innovative low-carbon materials and techniques (e.g., grasscrete spillways).*

*Responsible Consumption & Production (SDG 12)*

*Reuse materials (e.g., stonework) and source clay locally / Minimize waste & implement sustainable procurement practices.*

*Climate Action (SDG 13)*

*Monitor and reduce carbon footprint through KPIs and green technologies.*

**Appendix A** contains example Answer Plans provided to Script Markers to illustrate how each question might be answered. These are example frameworks of how a question might be answered by drawing on further learning from across the syllabus. They have been developed by the same experienced Chartered Civil Engineer that set the questions. Future candidates may find it useful to see how a good answer could be developed but are not expected to have the same depth of knowledge. They are not in essay form so lack critical discussion.

Marks are not deducted if an answer varies from this guidance, indeed some candidates provide better answers. The coloured squares relate to syllabus modules:

- M1** Procurement, Contracts and Project Management;
- M2** Management and Leadership;
- M3** Project Appraisal and Financial Management;
- M4** Health, Safety, Welfare and Risk Assessment; and
- M5** Sustainable Development.

## Appendix A

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

### EXAMPLE ANSWER PLAN

#### Defining scope and outcomes

- Develop clear scope and outcome expectations **M1**
- Provide leadership/direction throughout the project **M2**

#### Procuring the works

- Assess competence within the client team and commission support in areas of weakness **M1**
- Procure expert consultant support for developing environmental impact assessments, archaeological and heritage advice, Dam Register Engineers etc **M1**
- Pre-Qualification questionnaires to select competent designers & contractors for tendering **M1**
- Pre-tender focus on ISO9001; ISO14001; ISO45001 etc. accreditation
- Procure lead Design consultant & ECI contractor **M1**
- Main contractor tender process using tender documents prepared by Design Consultant **M1**
- Contractor appointment and pre-contract meeting **M1**

#### Governance

- PRINCE2 seven principles that guide project management: **M3**
  - Ensure continued business justification by checking performance against outcomes
  - Learn from experience (through feasibility/design/construction)
  - Define roles, responsibilities and relationships
  - Manage by exception to focus on areas of weak performance
  - Manage by stages with risk threshold & performance gateways at stage boundaries
  - Focus on the products (work output)
  - Tailor process to the project
- Chair regular Project Board meetings to monitor performance, spend and emerging risk
- Ensure key stakeholders (environmental groups, park users, local village) represented on Project Board **M2M3**
- Given the importance of ecology, adopt Triple Bottom Line accounting so that environment & stakeholder impact is are considered equally to cost performance **M5**

#### Contract Management

- Consider NEC or JCT contracts best suited to scheme complexity & desired outcomes. **M1**
- Allocate risk within the contract and accept responsibility for client actions **M1**
- Incorporate KPI targets aligned with defined outcomes **M1M3**
- Establish performance monitoring processes. **M3**
- Establish regular Contract Management meetings (management by exception ethos) **M1**
- Establish regular HLF meetings to provide performance updates (Triple Bottom Line) **M1M5**

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

**EXAMPLE ANSWER PLAN**

**Internal and External Stakeholders**

Internal Stakeholders	External Stakeholders
<ul style="list-style-type: none"> <li>• Client</li> <li>• Site owner</li> <li>• HLF</li> <li>• Designer</li> <li>• Main Contractor</li> <li>• Sub Contractors</li> <li>• Key Suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• Local Council</li> <li>• Llanarthe Parish Council</li> <li>• Local residents and businesses</li> <li>• Park users</li> <li>• Environmental Agencies</li> <li>• Local nature groups</li> <li>• Regulatory bodies (eg dams)</li> <li>• Public utilities</li> </ul>

**Involving External Stakeholders**

- Ethos of welcoming stakeholder insight to shape a successful project **M1**
- Engage at formative stage (feasibility) where feedback can have maximum impact **M1M2**
- Individual meetings with key stakeholder representatives - outline initial proposals & seek feedback on concerns/expectations. Listen and learn. **M2**
- Establish database to record all interactions, feedback & resulting actions. **M2**
- Adapt project objectives, design & project planning to reflect early feedback received **M1M2**
- Public meetings at key project stages to inform wider community & record concerns etc **M2**
- Use stakeholder feedback to shape evolving design e.g. protecting flora & fauna **M5**
- Continue engagement through design and construction & adapt to feedback eg increase sweeping of local roads in response to complaints re mud tracking from site **M1M2**
- Provide timely feedback to everyone who raised an issue on actions taken and reasons **M2**

**Stakeholder Management.**

- Appoint Stakeholder Manager as principle point of contact for all stakeholders **M2**
- Focus throughout on project objectives for communications & stakeholder interaction **M1M2**
- Develop/populate Stakeholder Matrix to identify level of influence each stakeholder has on the project and what impact the project has on them. **M2**
- Use Matrix to understand complexity and map how to engage with each group **M2**
- What/Why/Who strategy to manage key messaging as project develops **M2**
- Establish programme of regular meetings with key stakeholder reps **M2**
- Website/social media/bulletins/media releases to update local community & park uses **M2**
- Regularly review performance re engagement to continually improve processes **M2 M3**

**Resolving competing needs & expectations.**

- Consider equally all feedback received **M2**
- Make design/construction decisions based primarily on project objectives whilst accommodating feedback received **M1M2**
- Explain reasons for decisions e.g. explain to park users that a path is temporarily closed due to advice from environmental agencies re protection of flora/fauna **M2 M5**

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

**EXAMPLE ANSWER PLAN**

**Scenario specific risk**

- Areas of open water
- Working in live watercourses
- Buried underground hazards
- Open access by the public

**Management & Leadership M2M4**

- Leadership commitment to HS&W as key project objective e.g. Zero Harm
- Business commitment to HS&W resources (facilities, PPE, medical support)
- Encourage reporting of HS&W concerns and permit 'refuse to continue'
- Measuring H&S performance M3
  - Leading KPIs that predict future outcomes allowing preventative actions (e.g. inspections / management site visits / toolbox talks / training / medical checks)
  - Lagging KPIs that show what has already happened e.g. accident rates / injuries (Alert team to failures / Assign probability of recurrence / Evaluate control effectiveness)
- Contractual – incorporate KPIs as contractual targets M1

**HS&W Responsibilities M4**

- Client responsible for ensuring suitable management arrangements in place, and providing pre-construction information (H&S file) to designers and contractors.
- Designers responsible for planning, managing, monitoring & coordinating H&S safety in the pre-construction phase. They should consider relevant information, such as H&S file
- Contractors responsible for planning, managing & monitoring all work carried out by themselves and their workers. Consider risks to anyone who might be affected by the work, and the measures needed to protect them

**H&S Systems & Processes M4**

- Health and Safety Management System e.g. ISO45001 (Plan-Do-Check-Act methodology to systematically manage health and safety risks) including audits & continuous improvement
- Development & maintenance of H&S Plan throughout design/construction phases, and to notify maintenance contractors of residual risk
- Risk workshops for collective identification of risk
- Qualitative/Quantitative risk & safety assessment techniques e.g. ALARP, HAZOP
- Precautionary principal (ERIC): eliminate risk if possible, reduce, inform/isolate or control
- Issue of Method Statement for site operations and communicate verbally (toolbox talks)
- 'Permit to enter' for hazardous workspaces

**People impacted & protected M4**

- Designers – workplace stress; workstation assessments; welfare provision
- Site workers (including volunteers) – induction/training/toolbox talks/ site risk assessment/PPE
- Site visitors – induction / PPE
- General Public – fencing/guardrails to isolate hazardous areas ; information & signing
- Future park users – Life saving equipment and signing provided around open water
- Future Maintenance operatives – H&S File & as built drawings highlighting residual risk; operation manuals; design for safe operation
- Future decommissioning - H&S File & as built drawings highlighting residual risk

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?

#### EXAMPLE ANSWER PLAN

##### Governance

- Confirm budget with client at each stage including annual allocations **M1M3**
- Confirm with client & HLF outcome expectations including sustainability goals etc. **M1**
- PRINCE2 Project management: **M3**
  - Ensure continued business justification by continually checking performance v outcomes
  - Learn from experience (through feasibility/design/construction)
  - Define roles, responsibilities and relationships
  - Manage by exception to focus on areas of weak performance including cost variance
  - Manage by stages with risk threshold & gateways to check cost before proceeding
  - Focus on the products (work output)
  - Tailor process to the project
- Schedule liaison meetings to update HLF on progress throughout **M1**

##### Cost Benefit and Cost Optimisation.

- Develop budget projections for each phase aligned with allocated funding **M3**
- Use Earned Value Analysis to measure progress, cost & schedule – Calculate & report: **M3**
  - Percentage task completion
  - Planned value of scheduled tasks (PV)
  - Actual cost of completed tasks (AC)
  - Earned value of work completed (EV)
  - Cost Variance (EV-AC)
  - Schedule Variance (EV-PV)
- Adopt Tripple Bottom Line (TBL) reporting to present environment impact KPIs & social impact KPIs (park users & local community) alongside cost for balanced consideration **M5**

##### Economy, Efficiency & Effectiveness

**Economy:** Apply TBL to purchasing, balancing lowest cost with env. & social benefit (e.g. compare local products using local labour with CO2 footprint of imported goods) **M3 M5**

**Efficiency:** Apply lean thinking principles to focus on what is valuable to project outcomes, develop continuous workflows to eliminate waste and continuously improve processes **M1**

**Effectiveness:** Focus continually on outcomes so the client gets what the client wants **M1**

##### Performance Measurement & Reporting.

- Measure only what is important to ensuring effective project outcomes **M3**
- Use SMART KPIs (specific, measurable, attainable, relevant and time-bound) **M3**
- Collect KPIs digitally and in real-time where practical to avoid generating non-productive work
- Maintain KPI dashboard presenting data to managers monthly, weekly and daily **M3**
- Bind key performance indicators as target in the contract. **M1**
- Report summary KPIs at progress meetings with ability to provide detail as required **M1M3**

##### Value & Risk Management.

- Begin value engineering & risk workshops at early stage with input from internal stakeholders & seek external input that may add value. Continue through design & construction. **M3**
- Value engineering should challenge initial outputs to find more cost effective or more sustainable solutions. All decisions should be valued, verified and recorded **M3**
- Risk workshops should scan the horizon for emerging political, economic, social, technical, legal & environmental (PESTLE) risks. Likelihood & impact should be assessed & scored **M3**
- Maintain a Risk Register throughout to track measures to eliminate, reduces, inform or control all risks identified **M3**

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

**EXAMPLE ANSWER PLAN**

**Environmental and Historical Sensitivity**

- Appoint Environmental Manager to review feasibility stage studies & appraisals **M2M5**
- Engage environmental stakeholders to agree outcome objectives **M2M5**
- Seek stakeholder input to the development of an Environmental Sensitivity database **M2M5**
- Develop database of historic assets & features including preconstruction photographs
- Consider Nature Based Solutions as part of design and construction **M5**

**Environmental Management Plan (EMP) 5**

- Environmental Management System to ISO14001 including site specific Environmental Policy, assessing risks & impacts of all activities and conducting regular audits **M1M5**
- Environmental Manager to develop EMP at design stage, with stakeholder input, to include:
  - Environmental objectives & targets:** Specific goals to reduce environmental impacts **M5**
  - Risk assessment:** Identify and assess potential risks to the environment. **M1 M3**
  - Mitigation measures:** Cost-effective impact reduction e.g. avoid tree root disturbance & relocate wildlife in advance of lake excavation **M5**
  - Compensatory measures:** If mitigation measures aren't feasible, cost-effective, or sufficient e.g. new planting to compensate for those removed for lake excavation **M5**
  - Enhancement activities:** e.g. plant additional trees or create recreational facilities **M5**
- Develop and report SMART EMP KPIs **M3M5**

**Minimising Construction Impacts M3**

- Contractor to develop Construction Environmental Management Plan (CEMP) to include: **M5**
  - Working Hours
  - Noise & vibrations
  - Contamination of land/ecology/groundwater
  - Carbon footprint measurement
  - Communication with stakeholders
  - Vehicular Access
  - Dust & air quality
  - Site Waste Management Plan
  - Communication with the public
  - Monitoring the CEMP
- Develop SMART CEMP targets for the above and report performance to client monthly **M3M5**

**Achieving wider sustainability goals**

- **Economic sustainability:**
  - use local sub-contractors and local suppliers (UNSDG8) **M5**
  - provide jobs and training for local workers (UNSDG8) **M5**
- **Social sustainability:**
  - pursue gender equality in employment and report monthly KPI (UNSDG 5) **M5**
  - use the project as an educational resource re environmental restoration (UNSDG4) **M5**
  - Actively seek and report feedback from park users & local residents. **M2**
- Report EMP & CEMP performance alongside cost as part of Triple Bottom Line reporting **M5**

## 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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