

CEDD NEC Playbook (Design)



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Preface



Successful projects are conceived long before construction begins. The planning, investigation and design stages establish the foundation upon which project objectives, stakeholder expectations and delivery outcomes are built. It is therefore my pleasure to present the CEDD NEC Playbook (Design), developed to support project teams in delivering greater value through effective application of NEC principles and practices during the design stage.

The design stage plays a pivotal role in shaping project success. Decisions made during planning, investigations, stakeholder engagement, risk management and design development have a lasting influence on cost, time, quality, safety and environmental outcomes. A well-defined Scope and proactive project management enable teams to maximise the benefits of NEC through collaboration, early risk identification and informed decision-making.

This playbook brings together practical guidance, good practices and lessons learnt from NEC projects to help project teams effectively manage the design stage. It addresses common challenges associated with Scope development, consultancy administration and project governance, while promoting the NEC philosophy of mutual trust, co-operation and continuous improvement.

I sincerely hope that this CEDD NEC Playbook (Design) will serve as a valuable reference for CEDD officers as well as all NEC practitioners, helping establish strong foundations for successful project delivery and contribute to the development of sustainable, resilient and value-driven infrastructure for Hong Kong.

[Video of DCED's Messages](#)



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Introduction

Purpose and scope of this playbook

Welcome to the CEDD NEC Playbook (Design) (“this playbook”), a collection of practical know-how developed for (Civil Engineering and Development Department) CEDD officers involved in the planning, design and procurement of NEC contracts. This playbook serves as a practical reference, offering guidance, insights, and illustrative examples to enhance your understanding and application of NEC principles during the front-end development and design stages. This playbook focuses on key design-stage activities and covers relevant practical issues where consultants are engaged under NEC4 Professional Service Contract (PSC) consultancy agreements.

However, it should not be treated as a mandatory handbook nor a substitute for the Development Bureau (DEVB)’s NEC Practice Notes for Public Works Projects in Hong Kong. This playbook provides good practices to support your project development and design. Flexibility and professional judgement are essential in its application.

This playbook focuses on the administration of NEC Engineering and Construction Contract Hong Kong Edition (ECC/HK) main Options A to D and is based on:

- the ECC/HK July 2023 version; and
- DEVB’s standard amendments to NEC ECC/HK as included in the *additional conditions of contract*.

This playbook also covers the administration of NEC4 PSC and is based on:

- the PSC June 2017 version with amendments as at January 2023.



This playbook is intended to be a live document which remains current, dynamic, evolving and effective.

This playbook does not intend to provide any legal opinion/interpretation of the consultancy contract.

[Video of DH\(PEM\)'s Highlights](#)



[Video of AD\(T\)'s Highlights](#)



Structure of this playbook

This playbook is structured in five chapters, with each addressing a critical component of management of the design stage:

1) **Collaboration**

- Strategies for focusing on collaborative approaches, proactive approaches, and practical guidelines to enable clear roles, risk management, and efficient delivery.

2) **Site Investigation and Impact Assessments**

- Approaches of emphasising proactive investigation, early impact assessments, and stakeholder collaboration to inform design, reduce uncertainty, and minimise cost and programme risks.

3) **Engagement with Stakeholders**

- Best practices for emphasising proactive stakeholder engagement, early alignment, and collaborative approaches to manage requirements, resolve issues, and minimise risks to programme and cost.

4) **Design Review**

- Guidelines for structured review practices, collaborative approaches, and early risk identification to optimise design, improve buildability, and minimise cost and programme issues.

5) **Procurement and Tender**

- Strategies for fair procurement, clear documentation, and balanced risk allocation to enhance collaboration, pricing certainty, and minimise disputes and project risks.

Each chapter contains the following sections:

- Overview of the chapter's focus and how the NEC consultancy agreements could be efficiently and effectively administered by CEDD;
- Good practices and know-how: Illustration of good practices and know-how for the administration of the relevant subject matter;
- Topical issues: Discussion of common day-to-day issues faced by the project team; and
- FAQs and examples: Frequently asked questions and real-life examples to illustrate key points when applying NEC principles.

Disclaimer

All materials and information in this playbook should not be regarded as a substitute for and do not constitute part of the prevailing guidelines, practice notes and relevant contract provisions, etc. In the event of any inconsistency or conflict between the prevailing guidelines, practice notes or relevant contract provisions etc. and this playbook, the former takes precedence. This playbook is produced for internal information and educational purposes only. It does not constitute, nor is it intended to constitute, nor should it be construed or relied upon as any legal, contractual, or professional advice.

In case of any doubt, you should seek advice from the NEC Executive Support Team or Contract Advisory Unit, or other independent professional or legal advice before taking action on any matters to which the information or material provided in this playbook may be relevant.

Acronyms

Acronyms used in this playbook are as follows:

- B/D – Bureaux and departments
- CE – Compensation event
- CEDD – Civil Engineering and Development Department
- CTIA – Construction Traffic Impact Assessment
- DC – District Council
- DEVB – Development Bureau
- DRC – Design Review Committee
- D&C – Design and construction
- DSD – Drainage Services Department
- ECC/HK – Engineering and Construction Contract Hong Kong Edition
- ECI – Early *Contractor* involvement
- EIA – Environmental Impact Assessment
- EP – Environmental Permit
- EW – Early warning
- EWM – Early warning meeting
- EWR – Early Warning Register
- GBR – Geotechnical Baseline Report
- GDR – Geotechnical Data Report
- GEO – Geotechnical Engineering Office
- HD – Housing Department

Acronyms (Cont'd)

Acronyms used in this playbook are as follows:

- HKPF – Hong Kong Police Force
- IDP – Innovative Design Package
- LandsD – Lands Department
- MD – Marine Department
- MTRCL – MTR Corporation Limited
- MTR/RP – MTR Railway Protection
- O&M – Operation and maintenance
- *PM – Project Manager*
- PMI – *Project Manager's* instruction
- PN/ECC – DEVB's NEC Practice Notes for Public Works Projects in Hong Kong – Volume 1 – Engineering and Construction Contract
- PSC – NEC4 Professional Service Contract
- RAE – Resources Allocation Exercise
- *SM – Service Manager*
- SRD – Subcontract Rate Database
- TD – Transport Department
- TTA – Temporary traffic arrangement
- TTM – Temporary traffic management
- UHPC – Ultra-high performance concrete
- UTBM – U-shaped tunnel boring machine
- VE – Value engineering
- VM – Value management

1 Collaboration

1.1 Overview

PSC clause 10.1 requires that the Parties and the *Service Manager (SM)* act as stated in the contract. Compliance with contractual requirements is therefore mandatory. Meanwhile, PSC clause 10.2 requires the Parties and the *SM* to act in a spirit of mutual trust and co-operation. This obligation complements, but does not override, PSC clause 10.1. Accordingly, the Parties and the *SM* are obliged to exercise their contractual duties collaboratively and constructively.

Together, these clauses provide the foundation for collaboration, transparency and integrity throughout the design stage. Effective collaboration is a core NEC principle that promotes efficient design development and alignment with project objectives.

Collaboration should commence from the Contract Date of each consultancy agreement. Through open communication, active stakeholder engagement, and early identification and resolution of issues, project teams can improve design outcomes and reduce project risks.

1.2 Good practices and practical know-how

NEC promotes a collaborative and proactive approach throughout the project delivery cycle. Although the practical challenges of the design and construction stages differ, both rely on the same NEC principles of mutual trust, co-operation and effective project management.

Early engagement, clear roles and responsibilities, transparent communication, partnering workshops, and structured risk management are essential to successful project delivery. Similarly, early warning meetings (EWMs), effective programme management, and timely management of compensation events (CEs) require a proactive and collaborative mindset throughout both stages.

Applying these principles consistently improves efficiency, reduces risk, and strengthens working relationships across the project delivery cycle. The following sections set out good practices and practical know-how for the design stage.

1.2.1 Establishing a collaboration matrix

Under the PSC regime, CEDD officers and the *Consultant* should establish the project vision and requirements at the outset, including a clear definition of the Scope and expected collaborative behaviour. Both the *Client* and the *Consultant* should tailor the level of collaboration to the complexity and nature of the project.

To support effective coordination, it is recommended to develop a collaboration matrix defining the roles, responsibilities and areas of involvement of key stakeholders. The matrix should be reviewed and updated regularly throughout the project delivery cycle.

Collaboration Matrix by Key Stakeholders

Design Activity / Deliverable	CEDD	Consultant	Utility Undertakers	TD / MD / HKPF	HD	EPD	DSD / WSD	HyD
Site Formation & Earthworks Concept	C	A/R	C	I	C/R	I	I	I
Slope/Retaining Structure Design Inputs	I	A/R	C	I	C/R	I	I	I
Utilities Diversion Strategy	C	A/R	C/R	I	C	-	I	I
Traffic Management & TTIA/MTIA Inputs	C	A/R	-	C/R	I	I	I	C
Drainage/Sewerage / Water Supplies Proposals	C	A/R	C	I	C/R	C/R	C/R	I
Structural Design (Bridge / Footbridge)	I	A/R	C	C/I	C	I	I	C/R
Environmental Impact (EIA/EM&A)	I	A/R	-	C	C/R	C/R	C	I

R – Responsible; A – Accountable; C – Consulted; I – Informed

To further enhance collaboration, submissions and information exchanges should be undertaken digitally through the Digital Project Delivery System wherever practicable. The *Consultant* should distribute detailed analyses, calculations and supporting information only to relevant accountable, responsible and consulted parties in accordance with the collaboration matrix. The *Consultant* should develop, and the *Client* should agree on a deliverable distribution matrix included in the Inception Report.

1.2.2 Partnering workshops/meetings

Experience shows that collaboration is most effective via interactive discussions and open exchange of views. Partnering workshops and meetings help build mutual trust, strengthen working relationships and align stakeholders with project objectives. Different workshops and meetings can be held throughout the design stage (e.g. at the project commencement or upon achievement of a key milestone – see typical workshop/meeting framework below) to support project-specific needs and milestones.

Typical Framework for Project Commencement Partnering Workshop

Theme	Illustrative Focus
 Objectives	- Align project vision, objectives and success criteria. - Establish collaborative behaviours and ways of working. - Agree communication and decision-making protocols. - Promote mutual trust and co-operation.
 Participants	<i>Client's</i> representatives. <i>Consultant</i> and key subconsultants. - Major stakeholders and interfacing parties (where appropriate).
 Timing	As soon as practicable following project commencement.
 Key Topics	- Project objectives and constraints. - Roles and responsibilities. - Collaboration matrix. - Programme, milestones, Completion Dates and Key Dates. - Early warning (EW) process and initial risk identification. - Communication and reporting arrangements. - Action plan and follow-up meetings.

Typical Framework for Milestone Partnering Workshops and Review Meetings

Theme	Illustrative Focus
 Objectives	- Maintain collaborative working relationships. - Monitor progress against agreed actions and commitments. - Resolve barriers and emerging issues. - Sustain project momentum and alignment.
 Participants	<i>Client's</i> representatives. <i>Consultant</i> and key subconsultants. - Major stakeholders and interfacing parties (where appropriate).
 Timing	- At key project milestones. - Following major project developments or changes. - As agreed between the <i>Client</i> and the <i>Consultant</i>.
 Key Topics	- Progress against actions from previous workshops/meetings. - Achievement of milestones, Completion Dates and Key Dates. - Emerging risks and EW matters. - Status of stakeholder engagement and approvals. - Changes to requirements, Scope or programme. - Collaboration effectiveness and issue resolution. - Forward actions, responsibilities and target dates.

1.2.3 Value management workshops

Projects are typically initiated with a problem statement, desired outcomes and performance requirements. The project team should first establish a clear understanding of the *Client's* objectives, stakeholder requirements, programme constraints and site conditions. Based on these requirements, the multi-disciplinary team develops and evaluates design options against criteria such as functionality, constructability, sustainability, cost and compliance.

CEDD, as the *Client*, should organise and conduct value management (VM) workshops, with support from the *Consultant* and relevant stakeholders, to achieve the optimum balance between functionality, safety, buildability and value for money.

Typical Framework for VM Workshops

Theme	Illustrative Focus
 Objectives	- Agree preferred option(s) for further development. - Maximise value for money. - Improve sustainability and climate resilience. - Strengthen stakeholder buy-in. - Minimise late design changes.
 Participants	<i>Client's</i> representatives. <i>Consultant</i> and key subconsultants. - Technical specialists and reviewers. - Relevant departments and authorities. - DEVB/professional institutions (where appropriate).
 Timing	- Feasibility Study Stage (complex projects). - Early Preliminary Design Stage (less complex projects). - Additional value engineering (VE)/VM reviews where beneficial.
 Key Topics	- Value opportunities – cost and programme optimisation. - Challenge assumptions – review design basis and constraints. - Evaluate alternatives – compare options and innovative solutions. - Stakeholder alignment – confirm priorities and expectations. - Operational performance – improve efficiency and whole-life value.
 Expected Outcomes	- Agreement-in-principle on the preferred scheme. - Clear direction for site investigation and impact assessments. - Optimised basis for preliminary design development. - Stakeholder endorsement and commitment to proceed.

1.2.4 Project steering group

A project steering group may be established where close coordination is required between the *Consultant* and government departments with interrelated responsibilities, interests or operational requirements. It provides a structured platform for addressing cross-departmental issues and facilitating timely decision-making.

Typical Framework for Project Steering Group Meetings

Theme	Illustrative Focus
 Objectives	- Facilitate coordination between the <i>Consultant</i> and relevant government departments. - Resolve cross-departmental issues relating to user requirements, operational needs and specialist inputs. - Address interfacing and operational challenges at an early stage. - Establish clear accountability through agreed terms of reference.
 Participants	- CEDD directorate (D1 rank or above) as the chairperson. <i>Client's</i> representatives. <i>Consultant's</i> team members. - Relevant government departments and utility undertakers. - Representatives with authority to make decisions and commit actions.
 Timing	- Throughout the design stage where significant interfacing or stakeholder coordination is required. - Monthly or at a frequency appropriate to suit project needs. - Further meetings for critical issues requiring escalation for decisions.
 Key Topics	- Project progress – major milestones, programme status and key deliverables. - Critical issues – cross-departmental matters, interfacing issues and constraints. - Stakeholder alignment – operational, maintenance and user requirements. - Governance and decisions – terms of reference, responsibilities and accountability. - Actions & escalations – agreed actions, responsible parties and follow-up matters. - Value opportunities – cost and programme optimisation.
 Expected Outcomes	- Timely resolution of cross-departmental issues. - Clear and aligned stakeholder requirements. - Improved coordination and reduced programme risks. - Effective governance and decision-making throughout the project delivery cycle.

1.2.5 Early warning meeting

EWM is a fundamental feature of NEC's collaborative risk management approach. Its purpose is to identify and address risks that may affect programme, cost or quality before they escalate into delays, disputes or inefficiencies. EWM encourages the *Client* and the *Consultant* to work together to develop timely and effective mitigation measures.

Typical Framework for EWM

Theme	Illustrative Focus
 Objectives	- Identify and manage risks at the earliest opportunity. - Promote collaboration between the <i>Client</i> and the <i>Consultant</i>. - Assess potential impacts on programme, cost and quality. - Agree mitigation measures and minimise adverse project impacts.
 Participants	<i>Client's</i> representatives. <i>Consultant's</i> representatives. - Designers, programmers and relevant specialists (where appropriate). - Other government departments and interfacing parties.
 Timing	- As soon as practicable following notification of an EW. - Whenever a significant risk or uncertainty is identified.
 Key Topics	- Risk review – emerging risks and potential impacts. - Programme review – delays, critical activities and Key Dates. - Cost Review – cost implications and mitigation opportunities. - Collaborative solutions – options, responsibilities and agreed actions. - Action tracking – owners, target dates and follow-up arrangements.
 Expected Outcomes	- Risks assessed and mitigation measures agreed. - Responsibilities and action owners clearly assigned. - Programme and cost impacts minimised where practicable. - CEs identified and progressed where applicable. - Decisions and actions recorded for follow-up. - Timely resolution of cross-departmental issues.

Funding approval is normally outside the *Consultant's* control. Any uncertainty should therefore be raised promptly as an EW and discussed through an EWM.

The Parties should identify activities affected by the funding decision and agree on which services should proceed, be deferred or be re-sequenced pending confirmation of funding. This enables the project team to minimise programme and cost impacts through collaborative planning. Where funding is not secured, the *SM* may issue instructions under PSC clause 14.3 to change the Scope or a Key Date or under PSC clause 34.1 to stop or not start work.

Although funding approval may take time, proactive management through the EW process helps minimise programme disruption, reduce unnecessary expenditure and lower the risk of disputes.



1.2.6 Programme management

NEC recognises the close relationship between time and cost. During the design stage, the programme is more than a planning tool. Indeed, it serves as a key management tool that supports collaboration by integrating the *Consultant's* activities with the *Client's* responsibilities and interface requirements for the project to be procured.

Programme management challenges – Effective programme management during the design stage can be challenging due to uncertainties, external dependencies and evolving stakeholder requirements. These challenges include site investigation works and stakeholder approvals, which may extend beyond original assumptions. Regular updates are necessary to identify emerging risks and potential delays, which is important for maintaining a realistic and regularly reviewed programme throughout the design stage.



Good practices – To improve programme certainty and support proactive project management, the following good practices are recommended:

- Establish and monitor milestone dates aligned with the overall project delivery programme;
- Define logical activity links to identify critical paths and associated risks;
- Use EWM proactively to address emerging delays and constraints;
- Apply reasonable assumptions and update them when better information becomes available;
- Include time risk allowances for site investigations, stakeholder engagement, approvals and design development activities;
- Avoid deferring significant design decisions to the construction stage; and
- Allow sufficient time for design reviews and Innovative Design Packages (IDPs) to optimise value and reduce delivery risks.

By adopting these practices, project teams can improve visibility of programme risks and maintain better control over key deliverables and project milestones.

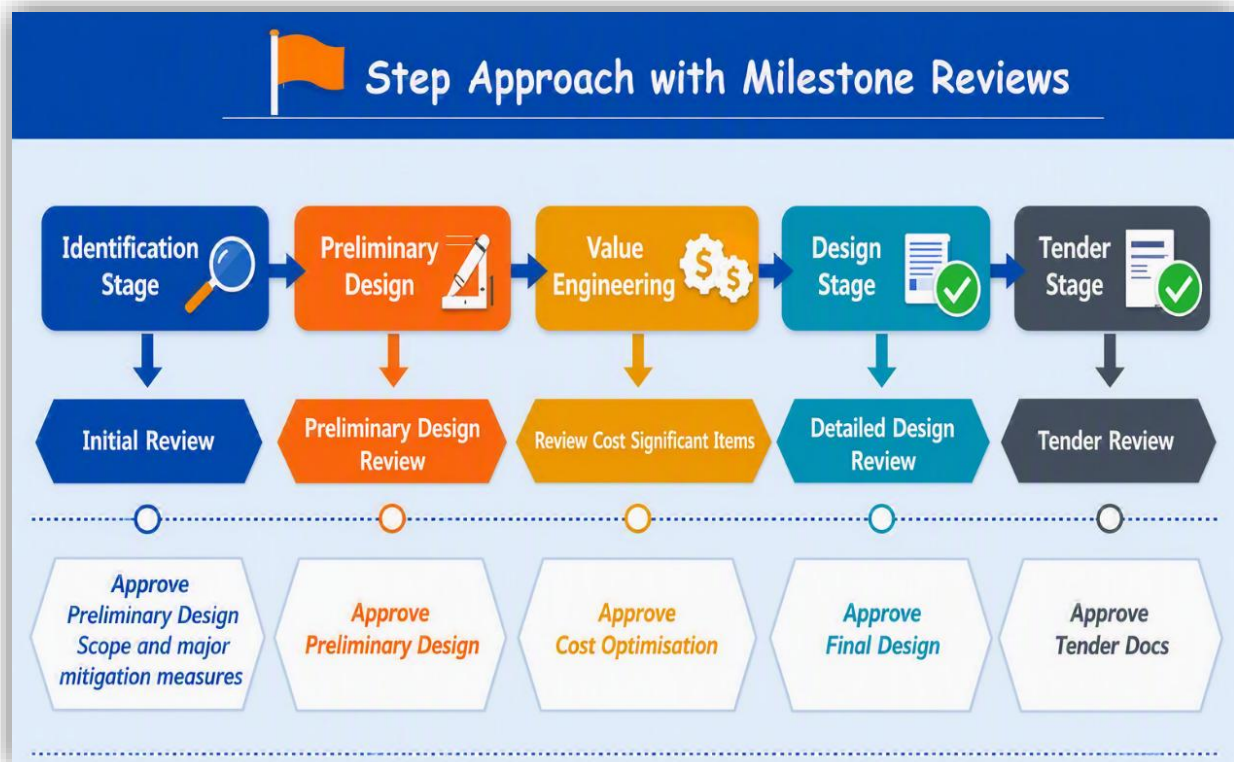
Stage-gate approach to design management – A stage-gate approach provides a structured framework for managing design development and ensuring that key requirements, risks, and decisions are addressed before progressing to the next phase. Typical considerations include:

- Divide the design process into defined stages (e.g. Identification, Preliminary Design, VE, Detailed Design and Tender);
- Establish clear objectives, deliverables and milestones for each stage; and
- Use design review meetings to confirm readiness to proceed to the next stage and to address outstanding risks and actions.

The stage-gate approach brings out the benefits from each milestone to effective programme management and the importance of with the adoption of NEC proactive and collaborative mindset to shorten programme duration, optimize resources, manage risks and deliver better value for CEDD projects.

Governance and EW – Effective governance and timely use of the EW process are essential to maintaining programme certainty and managing emerging risks before they affect project outcomes. Project teams should therefore:

- Monitor programme performance actively and raise EWs promptly when risks arise;
- Discuss and manage through the EW process delays arising from interfaces, approvals, funding or other uncertainties; and
- Take timely mitigation actions in a proactive and collaborative manner to maintain programme certainty and minimising project risks.



1.2.7 Management of compensation events

CE is a key mechanism under both ECC/HK and PSC for managing changes that affect time and cost. It provides a contractual process for adjusting the Prices and/or Completion Dates when defined events occur, including changes to the Scope and other events stated in PSC clause 60.1. Effective management of CEs supports fair risk allocation, timely decision-making and collaborative project delivery.

Where a risk or issue results in a change to the Scope with financial impact and/or delay to planned Completion, it should be assessed promptly to determine whether it constitutes a CE. Early identification and assessment enable the Parties to understand the implications and minimise adverse time and financial impacts.

Examples of CEs during the design stage include:

- Changes to the *Client's* requirements or the Scope;
- Delays in providing information, access or approvals required by the *Consultant*;
- Instructions from the *SM* that alter design deliverables;
- Unforeseen site conditions affecting design assumptions;
- Failure by the *Client* to fulfil obligations stated in the contract; and
- Additional change in requirements arising from stakeholders.

1.3 Topical issues

1.3.1 General issues

Design projects managed by consultants often face challenges arising from evolving requirements, stakeholder expectations and uncertainties during the development of the design. These challenges can affect programme, cost, quality and project outcomes if not managed proactively. Common collaboration-related issues encountered under the PSC regime include the following:

1.3.1.1 *Uncertainties in the Scope*

The *Consultant* is engaged to develop the design from project inception to detailed design to achieve the project objectives. Where the Scope is uncertain, the *Consultant* must rely on the information available and make reasonable assumptions when preparing its proposal.

Common sources of uncertainty that may affect cost, programme and quality include:

- **Undefined requirements** – Project objectives and stakeholder requirements may vary as investigations and studies progress, resulting in additional design work.
- **Incomplete information** – Early-stage designs often rely on assumptions due to limited site data, stakeholder input or technical information, which may require subsequent revisions.

To reduce uncertainty, CEDD, as the *Client*, should work proactively with the *Consultant* and relevant stakeholders to establish a common understanding of the project objectives, stakeholder requirements and key design parameters at the earliest opportunity. Early alignment helps minimise assumptions, reduce ambiguities and provide a more firm basis for design development.

As the design evolves, stakeholder requirements and project constraints may continue to develop. Frequent changes or delayed decisions can lead to abortive work, programme delay and additional costs. CEDD officers and the *Consultant* should therefore maintain close collaboration with stakeholders throughout the design stage, confirm requirements promptly and resolve outstanding issues before they affect subsequent design activities. Where necessary, CEDD officers and the *Consultant* should escalate unresolved matters to senior stakeholders to facilitate timely decisions.

This proactive approach promotes transparency, reduces uncertainty and supports informed decision-making throughout the project delivery cycle. It is also consistent with PSC clause 10.2, which requires the Parties and the *SM* to act in a spirit of mutual trust and co-operation.

1.3.1.2 ***Reluctance to adopt a partnering approach***

Where a party is reluctant to adopt a partnering approach, that reluctance may weaken collaboration under the consultancy agreement. This may arise from concerns over risk exposure, loss of control or protection of individual interests, leading to mistrust and adversarial behaviours that are inconsistent with PSC clause 10.2.

To promote partnering, CEDD, as the *Client*, and the *Consultant* should encourage open communication, transparent sharing of information and early discussion of issues on a no-blame basis. It is also important for the *Client*/approval authorities/maintenance parties to uphold a “one-government” principle and embrace an “ownership” mindset in pursuit of common goals to achieve project success. CEDD and the *Consultant* should jointly recognise achieved milestones to strengthen mutual trust. The *Consultant* may consider delivering workshops or briefings to help the *Client* understand technical matters and build consensus on design recommendations.

1.3.2 Issue no. 1 – Innovative measures

1.3.2.1 *Description*

The adoption of innovative technologies and methods in engineering consultancy projects can be challenging due to the associated risks, regulatory requirements, cost implications and resistance to change. New solutions may involve unproven designs, require extensive engagement with approving authorities, or depend on specialist resources that are not readily available.

Despite these challenges, innovation can deliver substantial benefits in safety, productivity, sustainability and cost effectiveness. Previous CEDD projects that successfully adopted innovative materials, construction methods, digital technologies and automation solutions have improved project outcomes. Project teams are encouraged to identify and promote suitable innovations where they can provide better value for money for the project.

Examples

The following examples demonstrate how innovative measures have improved safety, productivity, sustainability and cost effectiveness in CEDD projects:

- **Innovative Materials**

- Adoption of S690 and S960 structural steel to reduce bridge weight and overall construction cost; and
- Adoption of lightweight concrete and ultra-high performance concrete (UHPC) to reduce structural weight and enhance durability in marine environments.

- **Innovative Construction Methods**

- Adoption of the bridge rotation method to reduce construction time and improve site safety; and
- Adoption of U-shaped tunnel boring machine (UTBM) technology to overcome site constraints while maintaining stormwater flow during construction.

- **Digital and Automation Technologies**

- Adoption of the world's first tunnel inspection system using drones and on-board artificial intelligence to improve inspection efficiency, accuracy and safety;
- Adoption of remote-controlled rollers with real-time kinematics technology for soil compaction in site formation works; and
- Adoption of remote-controlled excavators for excavation works in confined or restricted spaces to enhance safety.

- **Innovative Site Operations**

- Adoption of small unmanned aircraft for lifting operations in hilly terrain, reducing manual handling and improving site productivity.

1.3.2.2 **FAQ**

Innovative measures may increase the initial project cost. How should their values be assessed?

Project teams are encouraged to consider innovative solutions that improve safety, quality, productivity, sustainability or whole-life performance. While some innovations may increase upfront cost, they can reduce construction duration, operational costs, programme risks and lifecycle expenditure.

The IDP mechanism supports the adoption of innovations by providing reasonable compensation for the *Consultant* to engage suitably experienced professionals and develop proposals that enhance cost effectiveness, productivity, sustainability and project outcomes.

Example

- **Ultra-high performance concrete**

UHPC was adopted in a pier improvement project to enhance durability in a marine environment while reducing structural weight. The solution improved long-term performance and demonstrated the value of considering whole-life benefits rather than initial cost alone.

1.3.3 Issue no. 2 – Enabling works

1.3.3.1 *Description*

CEDD projects often provide infrastructure to facilitate future developments by other parties. However, subsequent developments may require modification or removal of roads, utilities or slopes constructed under the original project, resulting in abortive works, increased cost and programme inefficiencies.

To maximise overall project value, CEDD should adopt a proactive and collaborative approach with relevant stakeholders during the design stage to identify opportunities for enabling works and optimise future interfaces. Early coordination can reduce abortive works, improve constructability and achieve better outcomes across multiple projects.



Examples

- **Facilitated construction of future works**

Under the Hung Shui Kiu/Ha Tsuen New Development Area project, the project team facilitated the construction of a future pedestrian subway beneath a proposed underpass and box culvert, thereby avoiding substantial future excavation and lateral support works, and associated construction costs.

- **Changed temporary fill slope to permanent works**

Under the Tsing Yi Road West site formation project, CEDD worked with the Housing Department (HD) to revise the development layout, allowing temporary fill slopes to become permanent works. This eliminated future abortive works and reduced filling, retaining wall and foundation requirements, and associated construction costs.

1.3.3.2 *FAQ*

Enabling works may increase the cost of an individual project and the benefits may accrue to other stakeholders. How should approval be sought?

Where enabling works are identified, the project team should consider the overall benefits to future developments and public resources rather than the impact on an individual project alone.

To minimise abortive works and achieve better value for money, CEDD should work proactively with relevant stakeholders to review future development plans and identify opportunities for optimisation.

Where necessary, the proposal should be escalated to project officers at D2 rank or above for strategic decision-making. Regular coordination among departments and stakeholders can facilitate information sharing and improve overall development planning.

1.3.4 Issue no. 3 – Handling of compensation events under PSC

1.3.4.1 *Description*

Additional services arising from changes to the Scope or other events instructed under PSC clause 14.3 may constitute CEs. However, implementation of a CE may be subject to approval by the Engineering and Associated Consultants Selection Board, budget availability and other internal approval requirements. Timely assessment and proactive management are therefore essential to minimise delay and disputes.

1.3.4.2 *FAQ*

PSC emphasises fair risk allocation and allows reasonable compensation for risks beyond the *Consultant's* control. How can CEDD avoid over-commitment and budget overruns?

Timely management of risks is essential. Delayed notification of EWs or CEs can obscure their impact on cost and programme, reduce opportunities for mitigation and increase the likelihood of disputes. Retrospective assessment of CEs should be avoided whenever practicable.

The best approach is genuine collaboration through the EW process. Where risks emerge, the CEDD officers and the *Consultant* should promptly discuss mitigation measures, constraints and available options to minimise time and cost impacts before significant abortive work is undertaken.

This proactive approach supports fair outcomes, reduces the risk of over-commitment by the *Client* and helps avoid unauthorised expenditure by the *Consultant*.

2 Site Investigation and Impact Assessments

2.1 Overview

Site investigation and impact assessments are amongst the earliest activities in project development. They provide critical information on site conditions, constraints and project risks that form the basis of design development and future construction planning.

Their findings have significant influences on the design scheme, construction methodology, programme and cost. Changes to these findings at a later stage may result in design changes and also increase construction costs.

CEDD should therefore seek to undertake site investigation and impact assessments as early and comprehensively as practicable. This helps reduce uncertainty, improve design decisions and minimise the risk of CEs arising from unforeseen physical conditions during construction.

2.2 Good practices and practical know-how

2.2.1 Site investigation

Insufficient site investigation information can significantly affect design development, construction methodology, cost and programme. As CEDD and the *Consultant* can typically investigate only a small proportion of the ground before construction, uncertainty in ground conditions will always remain.

Where site investigation information is limited, the *Consultant* may be unable to validate certain design assumptions during the design stage fully and may therefore need to maintain such design assumptions. This may result in unresolved risks being carried into the construction stage. Typical examples include unexpected rockhead levels, which can lead to longer piles and increased construction costs.

Where site information cannot be obtained early due to land, programme or budget constraints, CEDD, as the *Client*, and the *Consultant* should collaborate to:

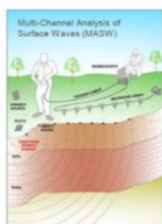


- identify critical risks arising from insufficient site investigation information;
- explore alternative methods and programmes to obtain site investigation information; and
- agree on design assumptions and record the associated risks.

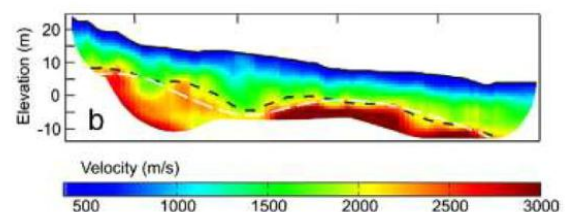
Examples

The following examples demonstrate good practices adopted in previous CEDD projects to obtain site investigation information under challenging circumstances:

- **Early engagement with the Geotechnical Engineering Office (GEO)** before the design and construction (D&C) consultancy award to define site investigation requirements, special conditions and resource availability, thus reducing lead time and budget risk. In one of the recent projects, the project team arranged to issue the site investigation works order with GEO before the consultancy award;
- **Use of alternative CEDD resources**, including term contractors from offices other than GEO and adjacent CEDD works contracts, to supplement site investigation capacity where appropriate;
- **Proactive engagement with landowners** to facilitate site access for site investigation; and
- **Adoption of innovative technologies**, such as geophysics, multichannel analysis of surface waves, portable coring equipment and other non-intrusive techniques, to obtain site investigation information where conventional methods are constrained.



Geophysical method: 2D land seismic refraction and resistivity survey



2.2.2 Impact assessments

CEDD officers and the *Consultant* should undertake various impact assessments as early as practicable to evaluate existing conditions, identify potential constraints and assess the effects of the proposed works on surrounding infrastructure systems. The findings enable mitigation measures to be developed and incorporated into the design at an early stage.

A thorough understanding of existing infrastructure systems and stakeholder requirements is essential for effective impact assessments. Timely access to relevant information allows the project team and the *Consultant* to develop practical and robust design solutions.

CEDD officers should actively participate in the impact assessment process and engage stakeholders proactively to:

- Obtain key information and requirements at an early stage;
- Establish clear and reasonable design assumptions;
- Resolve concerns before they affect design development; and
- Minimise late changes to user requirements and associated design revisions.



Examples

The following examples demonstrate good practices adopted in previous CEDD projects with facilitation by the project team in collaboration with the *Consultant*:

- **Establishing steering group meetings** to obtain timely stakeholder inputs and provide clear direction for design development;
- **Agreeing on design buffers/assumptions for future uncertain scenarios**, such as climate change-related rainfall and tidal levels, at an early stage to minimise subsequent design changes; and
- **Securing early agreement with stakeholders on key requirements**, including environmental constraints and working period restrictions under Environmental Impact Assessments (EIA).

2.3 Topical issues

2.3.1 General issues

Site investigation and impact assessments are often constrained by land availability, budget, programme and resource limitations. These constraints may affect the quality and timeliness of information available for design development.

At the same time, stakeholder requirements may evolve throughout the investigation and design stages. Achieving timely agreement on requirements, assessment methodologies and mitigation measures can be challenging and may lead to design changes if not managed proactively.

Early stakeholder engagement, proactive risk management and timely decision-making are therefore essential to minimise uncertainty and support effective design development.

2.3.2 Issue no. 1 – Land availability for site investigation

2.3.2.1 *Description*

Land availability is a common constraint to carrying out site investigation during the early stage of a project. Where access to private land or restricted areas is unavailable, site investigation may be limited, resulting in uncertainty in ground conditions and design assumptions.

To minimise this risk, the project team should proactively engage with the Lands Department (LandsD) and land owners to secure site access at the earliest opportunity. Where CEDD and the *Consultant* cannot obtain full access, they should consider alternative investigation methods and devise appropriate risk management measures.

2.3.2.2 *FAQ*

If land remains unavailable for site investigation despite CEDD's engagement with the LandsD and land owners, how should the project proceed?

Where site investigation information is limited, the project team should work collaboratively with the *Consultant* to establish reasonable assumptions for design development and assess the associated risks. Alternative investigation methods, such as geophysical surveys, should be considered where appropriate.

The *Consultant* should clearly record the adopted assumptions and the resulting assessment and agree with CEDD and relevant stakeholders. Where significant uncertainty remains, CEDD and the *Consultant* should actively manage the associated risks through the design review and EW processes.

2.3.3 Issue no. 2 – Budget availability for site investigation

2.3.3.1 *Description*

Under paragraph 1.6 of Chapter 4 of the Project Administration Handbook, budgets for site investigation funded by block allocation are typically earmarked before the appointment of the *Consultant* for the investigation and design stage. As a result, the scope and extent of site investigation may be constrained by the available budget.

Where the available site investigation information is insufficient to enable a full appreciation of the ground conditions and the associated risks, the project team should review whether additional site investigation is required as the design develops. Early planning and provision for staged site investigations can improve design reliability, reduce uncertainty and minimise the risk of design changes during later project stages.

2.3.3.2 *FAQ*

Why is site investigation information often insufficient and how should additional site investigation requirements be managed?

The site investigation requirements are often not fully defined at the outset under the Scope of the consultancy agreement. Combined with uncertainties in the design scheme during the early design stage, it can be difficult for both the project team and the *Consultant* to justify allocating a larger budget for extensive site investigation works. As a result, the initial site investigation is often planned to provide baseline information within the available budget, programme and land constraints.

As the design develops, the project team should review whether the available site investigation information is sufficient to support key design decisions and manage geotechnical risks. Where significant uncertainties remain, additional site investigation may be justified.

CEDD and the *Consultant* should therefore consider adopting a staged approach to site investigation. Following the development of the preliminary design scheme, the need for further site investigation should be assessed at the Preliminary Design Review Meeting, taking into account:

- The significance of the geotechnical risks;
- Whether the available site investigation information is sufficient for design development and construction planning; and
- Whether additional site investigation or alternative risk management measures, such as a Geotechnical Baseline Report (GBR), will provide better value to the project.

Early planning for staged site investigations can reduce uncertainty, improve risk allocation and minimise design changes during later stages of project delivery.

How should risks identified from site investigation during the design stage be managed?

Risks identified from site investigation may have significant implications on the design scheme, construction methodology, programme and cost. These risks should be recorded, assessed and discussed through the design review and EW processes as soon as practicable.

CEDD and the *Consultant* should collaborate to evaluate the significance of the risks and determine appropriate mitigation measures. Depending on the circumstances, these may include design modifications, additional site investigation, alternative construction methods or other risk reduction measures.

Where additional site investigation is required but is not included in the Scope, the *SM* should issue an instruction under PSC clause 14.3 to change the Scope. Such an instruction constitutes a CE under PSC clause 60.1(1), entitling the *Consultant* to compensation for the resulting impact on Completion and Prices, if any.

2.3.4 Issue no. 3 – Tight programme for site investigation

2.3.4.1 *Description*

Procurement and execution of site investigation works often require a considerable lead time. Current practice typically involves submission of a desktop study report, followed by at least 4 months for procurement and commencement of site investigation works, and a further 2 to 3 months for laboratory testing and reporting. As a result, obtaining site investigation results may take 8 to 9 months from commencement of the process.

Given these programme constraints, preliminary design development and statutory processes often proceed before complete site investigation results are available. Where unexpected ground conditions are subsequently identified, significant design changes, abortive work and additional costs may arise.

To minimise these risks, the project team should plan site investigation activities at the earliest opportunity and proactively explore measures to expedite the availability of critical site investigation information.

2.3.4.2 **FAQ**

How to obtain site investigation and laboratory test results promptly to avoid abortive design works?

The programme is often compressed, with site investigation works and laboratory testing undertaken in parallel with design development. In some projects, CEDD officers and the *Consultant* may substantially advance the design before complete site investigation results become available. If the site investigation results lead to significant changes to the design assumptions adopted, substantial design changes could arise, leading to abortive work and additional time/costs.

To reduce this risk, the project team should work collaboratively with the *Consultant* to plan and commence site investigation activities as early as practicable. Early agreement on the site investigation scope, priorities and testing requirements is essential to support key design decisions.

To expedite site investigation procurement and testing, the project team should proactively explore alternative delivery arrangements, including:

- Early engagement with GEO and other relevant parties to confirm site investigation requirements, special conditions and resource availability;
- Utilising alternative CEDD resources, such as term contractors from other offices, where appropriate;
- Coordinating with nearby CEDD projects to undertake site investigation works under ongoing contracts where practicable;
- Prioritising site investigation works and laboratory testing for critical design areas and high-risk locations; and
- Considering alternative investigation techniques, such as geophysical surveys, where conventional site investigation is constrained by programme or site access limitations.

Where complete site investigation information is not available, the project team and the *Consultant* should agree on reasonable design assumptions, assess the associated risks, and monitor them through the design review and EW processes.

2.3.5 Issue no. 4 – Resource availability for site investigation

2.3.5.1 *Description*

Availability of site investigation resources can affect the amount and quality of site investigation information obtained during the design stage. Where GEO term contractors or other site investigation resources are unavailable while critical ground conditions remain insufficiently investigated, an increased uncertainty in the design and construction stages will inevitably arise. To minimise this risk, the project team should assess alternative means of obtaining the necessary site investigation information and review appropriate mitigation measures as early as practicable.

2.3.5.2 *FAQ*

What can the project team do if GEO term contractors are unable to carry out the required site investigation works?

Where GEO term contractors are unavailable, the project team and the *Consultant* should jointly review the risks associated with insufficient site investigation and agree on an appropriate way forward. Alternative approaches may include engaging additional site investigation contractors, using term contractors from other CEDD offices, undertaking site investigation under nearby ongoing contracts, or adopting alternative investigation techniques such as geophysical surveys.

The project team should assess the cost, programme and risk implications of each option and determine whether additional site investigation is necessary to support the design. Where further site investigation is not pursued, the residual risks, design assumptions and any required contingencies should be clearly documented and reviewed through the design review process.

Where changes to the agreed site investigation strategy affect the *Consultant's* Scope, the project team should assess whether the changes constitute a CE and manage the matter proactively under the PSC regime.

2.3.6 Issue no. 5 – Discussion with green groups and relevant authorities on Environmental Impact Assessment

2.3.6.1 *Description*

Environmental issues can significantly influence project delivery. Obtaining Environmental Permits (EPs), addressing stakeholder concerns and reaching agreement with relevant authorities and green groups often require extensive consultation and negotiation. Delays in these processes may affect programme certainty and increase project costs.

Early engagement with relevant authorities, green groups, and other stakeholders enables the project team to understand concerns better, identify potential constraints, and develop practical mitigation measures before they affect the design or the programme.

Examples

The following examples demonstrate the benefits of early stakeholder engagement and collaborative problem solving:

- **Revision of EP Requirements**

In a previous CEDD project, the EP prohibited construction works during the dry season. To address this constraint, the project team proactively carried out environmental monitoring and data collection during the early stage of the construction works. The findings enabled constructive discussions with the relevant authority and ultimately supported a revision of the EP conditions, allowing construction activities within 15 m from the ground during the dry season. CEDD subsequently adopted the same approach in stage 2 of the project and achieved a similar outcome. This example demonstrates the importance of early engagement, evidence-based discussions and proactive management of environmental constraints.

- **Early engagement with green groups and stakeholders**

Experience from another CEDD project showed the value of engaging green groups, District Councils (DCs) and other stakeholders at an early stage. CEDD and the *Consultant* met with the relevant parties to explain the project objectives, constraints and environmental considerations, while actively seeking to understand their concerns. Through collaborative discussions, mitigation measures were refined and agreed with all stakeholders. This proactive approach facilitated earlier acceptance of the EIA and subsequent EP approval, minimising potential programme delays.

2.3.7 Issue no. 6 – Site Information for impact assessments

2.3.7.1 Description

Impact assessments rely heavily on information from existing infrastructure systems operated and maintained by relevant departments. These departments are often best placed to provide data on system conditions, capacities, constraints and operational requirements. However, such information may not always be available to the project team or the *Consultant* in a timely or comprehensive manner.

Insufficient information can affect the accuracy of impact assessments and may lead to design revisions as additional information becomes available. Early engagement with relevant stakeholders is therefore essential to obtain the necessary information and reduce uncertainty during design development.

2.3.7.2 FAQ

What should the project team do if stakeholders do not provide the boundary conditions of existing infrastructure systems?

Boundary conditions, such as the capacity, operational constraints and performance requirements of existing traffic, drainage, sewerage and water supply systems, are often essential inputs to impact assessments. Where such information is unavailable, the *Consultant* may need to proceed based on reasonable assumptions derived from available information and professional judgement.

The project team should proactively engage the relevant stakeholders to confirm their requirements, constraints and concerns at the earliest opportunity. The assumptions adopted for the impact assessments should be clearly documented and used as the basis for discussion and subsequent refinement.

Where CEDD and the relevant stakeholders cannot reach agreement on the boundary conditions, CEDD should identify the implications to the design and impact assessments, assess the associated risks, and escalate the matter to senior management of the relevant departments for timely resolution.

2.3.8 Issue no. 7 – Level of details and tolerances in the impact assessments

2.3.8.1 *Description*

Impact assessments are prepared during the design stage using information, assumptions and design proposals available at the time. However, stakeholders may sometimes request additional assessments, higher levels of details or wider study boundaries beyond those anticipated for the project stage. Such requirements can sometimes significantly increase assessment effort, extend programme durations and influence the development of the design. Where expectations on the scope, level of details or acceptance criteria are not aligned at an early stage, repeated revisions and delays may occur.

To minimise these risks, the project team should engage stakeholders early to establish a common understanding of the assessment scope, assumptions, acceptance criteria and level of details required for the project stage.

2.3.8.2 *FAQ*

What should the project team do if stakeholders extend the scope of the impact assessments?

Stakeholders may occasionally request additional assessment areas, more detailed analysis or wider study boundaries beyond those originally anticipated. Such requests can sometimes significantly affect programme, cost and design development.

The project team should proactively engage stakeholders to understand the underlying concerns and agree on the scope of assessment that is proportionate to the project objectives and risks. Where the proposed requirements may have significant implications, the project team should assess the impact on programme, cost and project deliverables before proceeding.

If CEDD and the relevant stakeholders cannot reach agreement at the working level, CEDD officers should escalate the issue to senior management for timely resolution. Where the expanded requirements result in a change to the Scope under the consultancy, CEDD officers and the *Consultant* should assess the latter's entitlement to additional time and cost in accordance with the CE procedures under the PSC regime.

What should the project team do if there is significant delay in obtaining stakeholders' acceptance of the *Consultant's* deliverables?

Delays in accepting the *Consultant's* deliverables may cause abortive work, prolong the acceptance process and delay the overall project programme. In accordance with the SDEV's memo ref. () in DEVBWB WP4S-022-002-002, dated 29 May 2026, providing guidelines on vetting consultants' submissions, the project team should actively monitor the vetting process, facilitate timely resolution of comments and avoid unnecessary rounds of correspondence.

Bureaux and departments (B/Ds) should uphold the "one-government" principle and adopt an "ownership" mindset. Comments should be clear, necessary, relevant to the intended purpose and stage of work, and essential and practical from a value-for-money perspective. For relatively straightforward deliverables, the project team should aim to finalise the submission in one round of vetting as far as practicable. For more complicated deliverables, comments should generally be addressed within two rounds of vetting, depending on the complexity of the deliverable and the number of parties consulted.

Where unresolved issues may affect timely acceptance or give rise to time or cost implications, they should be recorded in the (Early Warning Register) EWR and monitored through monthly progress reports and regular progress meetings. The project team should establish an internal escalation mechanism to resolve the issues.

If the issues remain unresolved at departmental level, or in special or urgent cases, CEDD should bring the matter to the relevant bureaux for attention and steer. CEDD and the *Consultant* should also review any programme implications through the design review and the EW processes.

3 Engagement with Stakeholders

3.1 Overview

CEDD projects generally involve a wide range of stakeholders whose requirements, decisions and actions can significantly influence project outcomes. These stakeholders may include project proponents, approving authorities, consultants, utility undertakers, landowners, end users, DCs, green groups and the general public.

Early engagement with stakeholders is essential to identify requirements, constraints and concerns before they affect the design, programme or cost of a project. Effective engagement enables better-informed decision-making, reduces uncertainty and helps achieve timely agreement on key project issues. Consistent with the NEC principles of mutual trust and co-operation, stakeholder engagement should be proactive, transparent and continuous throughout the design stage.

3.2 Good practices and practical know-how

The project team should take a proactive role in stakeholder engagement throughout the design stage. Early and continuous involvement helps facilitate discussions, build trust and consensus, and obtain timely agreement on key project matters.

The project team can facilitate stakeholder engagement through the following good practices:

- **Stakeholder identification**

Identify all relevant stakeholders at, or before, project commencement, including government authorities, DCs, local villages, green groups and other affected parties. Allow sufficient time in the programme for stakeholder engagement.

- **Scope and methodology definition**

Define the Scope, methodology and acceptance criteria in consultation with stakeholders at an early stage to establish a common understanding of project requirements.

- **Early alignment**

Conduct stakeholder workshops and meetings to align expectations, confirm requirements and facilitate timely agreement on key project issues.

EARLY COLLABORATION WITH STAKEHOLDER ENGAGEMENT



STAKEHOLDER IDENTIFICATION

- Clearly identify stakeholders



SCOPE AND METHODOLOGY DEFINITION

- Conduct workshops early



EARLY ALIGNMENT

- Conduct workshops early



TRANSPARENT COMMUNICATION

- Promote open communication



TASK FORCE FORMATION FOR COMPLEX PROJECTS

- Form task force groups

▪ **Transparent communication**

Promote open and constructive communication to understand stakeholder concerns, constraints, priorities and operational needs, while clearly communicating project objectives and programme constraints.

▪ **Task Force formation for complex projects**

For projects involving extensive site investigation works, multiple stakeholder interfaces or complex user requirements, consider establishing a task force group to facilitate coordination, streamline review processes and expedite approvals.



3.3 Topical issues

3.3.1 General issues

During the design stage, the *Consultant* is required to collect information, identify constraints through site investigation and impact assessments, and develop design solutions that satisfy stakeholder requirements. Effective stakeholder engagement is therefore critical to successful project delivery. However, project teams often encounter challenges in obtaining timely stakeholder inputs, reaching agreement on requirements, and addressing interfacing constraints. Common issues include:

- Obtaining information on existing infrastructure systems and their boundary conditions;
- Securing approvals, permits and site access for investigations and works;
- Identifying operation and maintenance (O&M) parties for completed works;
- Agreeing methodologies, assumptions and acceptance criteria for technical assessments;
- Reaching agreement on mitigation measures for project impacts; and
- Addressing operational and maintenance requirements of end users.

The following sections discuss these common issues and provide practical guidance, lessons learnt and examples to support proactive stakeholder management.

3.3.2 Issue no. 1 – Temporary traffic management

3.3.2.1 Description

Temporary Traffic Management (TTM) is often one of the most challenging aspects of project delivery. Many CEDD projects generally involve temporary traffic arrangements (TTAs), road diversions and utility works that require extensive coordination with stakeholders, including the Transport Department (TD), Hong Kong Police Force (HKPF), DCs, transport operators and road users.

TTM requirements are also closely linked to construction methodology and may be influenced by interfacing projects, public events and changing traffic conditions. As a result, the development and approval of TTM proposals can significantly affect programme, cost and construction methodology.

Early stakeholder engagement during the design stage is therefore essential to identify critical traffic constraints, develop practical TTM proposals and minimise construction-stage risks.

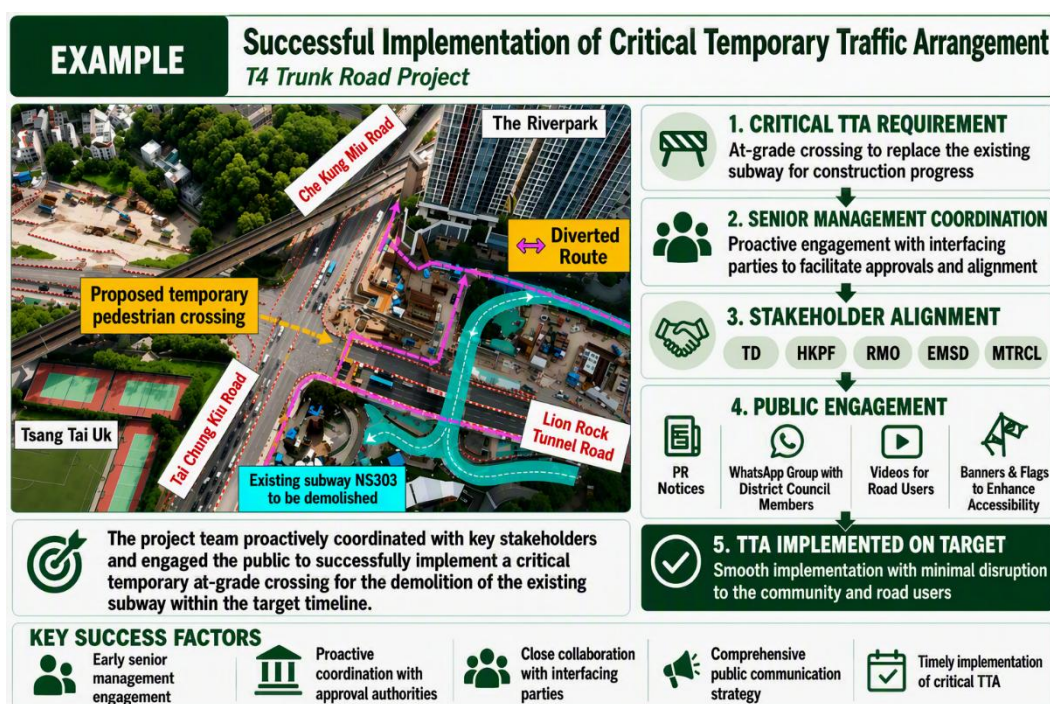
Experience from previous projects suggests that the following measures can significantly improve the development and approval of TTM proposals:

- Identify critical traffic locations, such as busy junctions, trunk roads and major access points, at an early stage;
- Engage TD and HKPF early to understand key traffic concerns and potential constraints;
- Consider alternative traffic arrangements, including temporary diversions or partial road closures, where these can reduce construction time and complexity;
- Plan haul roads and construction access arrangements early to minimise interface issues between contracts; and
- Involve experienced project staff in reviewing the practicality of proposed TTM schemes.

Examples

▪ T4 Trunk Road – Proactive Planning of Critical TTM

- In this project, a temporary at-grade crossing was to replace an existing subway. The proposed arrangement involved multiple interfacing parties, including TD, the Road Management Office, the Electrical and Mechanical Services Department and the MTR Corporation Limited (MTRCL). To facilitate timely implementation, the project team proactively held senior management meetings with the relevant stakeholders to coordinate reviews and approvals.
- The project team also implemented a comprehensive stakeholder engagement strategy, including public notices, liaison with DC members through community groups, production of information videos for road users, and themed banners and signage to maintain accessibility to the Hong Kong Heritage Museum. Through early coordination and proactive engagement, the TTM was successfully implemented within the target programme.
- This example demonstrates the importance of early engagement with key stakeholders and proactive communication with affected road users when developing TTM proposals.



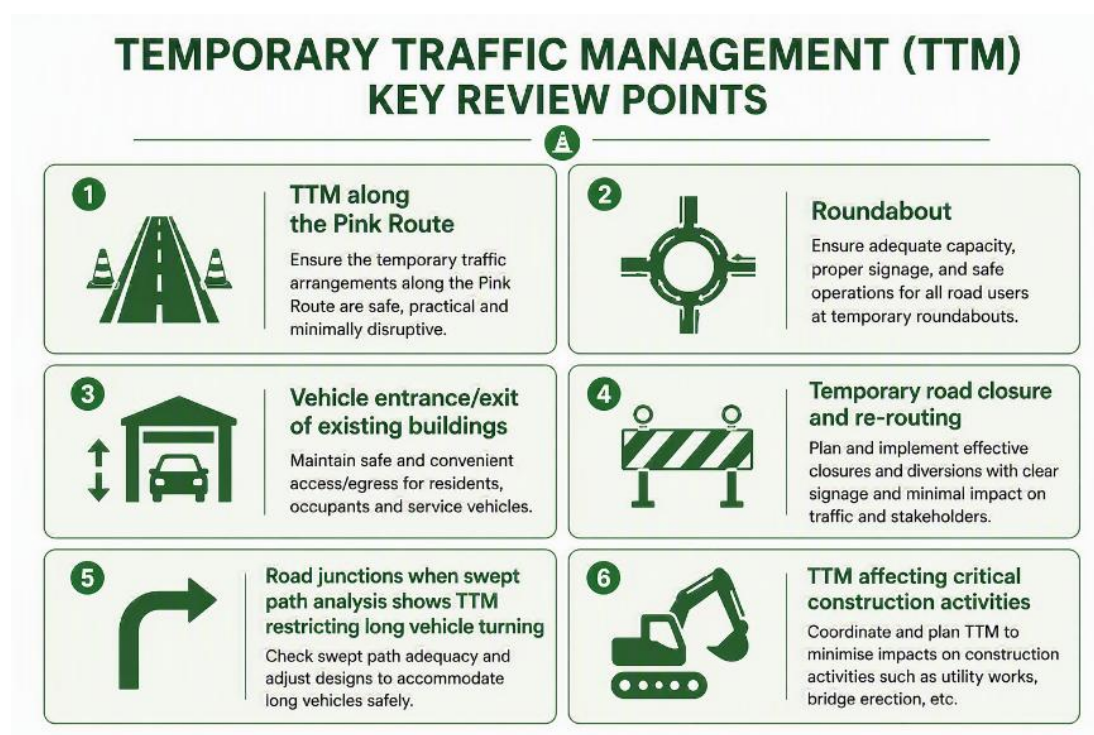
▪ New Territories Drainage Works – Traffic Management Optimisation

- In a drainage pipe laying project, the conventional approach would have required multiple TTM stages over an extended period whilst maintaining the existing traffic arrangement. Following discussions with TD and HKPF, the project team adopted a temporary one-direction road closure on a single carriageway, allowing the works to be completed in a single operation.
- The revised arrangement reduced construction complexity, shortened the programme and minimised the need for repeated traffic diversions. This example illustrates how early engagement with TD and HKPF can lead to more efficient and cost-effective TTM solutions.

3.3.2.2 FAQ

What level of detail should be provided for TTM plans and Construction Traffic Impact Assessments (CTIAs) during the design stage to avoid traffic issues and risks being deferred to construction?

Early engagement with TD and HKPF is essential to understand their key concerns and to identify traffic constraints that may significantly influence construction methodology, programme and cost. Their operational experience and local knowledge can help the project team focus on the most critical traffic issues at an early stage. It is generally neither practical nor necessary to develop every TTA in full detail during the design stage. Instead, the project team should focus on critical locations and high-risk activities where TTM is likely to have a significant impact on construction delivery, including examples as listed below:



Where TTM and CTIA assumptions are fundamental to the proposed construction methodology, CEDD and the *Consultant* should discuss these assumptions with TD and HKPF during the design stage and incorporate them into the Scope. This provides tenderers with a clearer understanding of the anticipated traffic constraints and supports fairer assessment of programme and financial implications during construction.

3.3.3 Issue no. 2 – Construction drainage impact

3.3.3.1 Description

Temporary construction drainage is a significant consideration in many CEDD projects, particularly site formation and infrastructure works. Drainage diversion, temporary flow management and stormwater mitigation measures can have substantial implications for construction methodology, programme and cost.

Where drainage requirements and stakeholder expectations are not clearly identified during the design stage, significant temporary works and associated costs may arise during construction. This is particularly relevant to projects involving stream diversions, box culverts and temporary stormwater retention measures.

As temporary drainage arrangements are often closely linked to construction methodology, early engagement with Drainage Services Department (DSD) and other relevant stakeholders is essential. The agreed Drainage Impact Assessment and/or Construction Drainage Impact Assessment, together with key assumptions should be included in the Scope to facilitate realistic pricing, programme planning and risk allocation.

3.3.4 Issue no. 3 – Land matters

3.3.4.1 Description

Land matters are a key source of uncertainty in many CEDD projects. Delays in land possession, resumption or clearance can directly affect the construction programme and may lead to additional costs and delayed project delivery.

CEDD projects often require land to be acquired through land resumption, Temporary Government Land Allocations, Simplified Temporary Land Allocations and/or Short-Term Tenancies. These processes involve multiple stakeholders and can require considerable time to complete.

As CEDD generally does not maintain possession of land before construction commences, timely coordination with the LandsD and other stakeholders is essential to secure site access, minimise programme risk and facilitate early commencement of works.

3.3.4.2 FAQ

How can the project team reduce the risk of delay in land possession?

Early planning and proactive engagement with the LandsD are essential to minimise programme risks associated with land matters. The project team should identify critical land requirements early, establish realistic land acquisition programmes and maintain close coordination with LandsD throughout the design stage.



Examples

- **Early Land Possession through the *PM's* Instructions (PMIs)**

In one CEDD project, the project team issued a PMI under an adjacent NEC contract to commence liaison with LandsD on engineering conditions before the award of the new contract. This enabled the land possession process to commence earlier and significantly reduced the lead time that would otherwise have delayed the start of construction.

- **Phased Site Possession through Close Collaboration**

In another project involving a large development site, CEDD and the *Consultant* worked closely with LandsD to review the land acquisition strategy. Recognising that compensation and legal procedures could be progressed in stages, the project team actively collaborated with LandsD and established a clear understanding of the project's objectives and key programme milestones. Through a phased site possession arrangement, CEDD obtained full possession of the site approximately three months ahead of the original programme.



Experience from previous projects suggests that the following measures can significantly reduce the risk of delay in land possession:

- Engage LandsD at the earliest opportunity to understand land constraints and approval requirements;
- Identify opportunities for phased possession where full site handover is not immediately achievable;
- Clearly communicate project objectives, Key Dates and programme priorities to relevant stakeholders;
- Consider innovative and collaborative approaches, including the use of existing contracts where appropriate, to advance land-related activities; and
- Monitor land matters proactively and escalate critical issues early to minimise programme impacts.

3.3.5 Issue no. 4 – Public/stakeholders engagement

3.3.5.1 Description

Public works projects often attract significant interest from the general public and other stakeholders. Concerns may arise over construction impacts, disruption to daily activities, environmental effects and local community interests. If these concerns are not addressed early, they may affect project acceptance, programme and cost.

Stakeholders do not always have full visibility of the project's objectives, constraints and long-term benefits. As a result, project teams should engage proactively during the design stage to understand stakeholder concerns, manage expectations and identify opportunities to address potential issues before construction commences.

Example

- **Early stakeholder engagement in Fanling Bypass (Eastern Section) project**
 - In this project, early collaboration with MTRCL enabled the project team to build trust and establish a common understanding of the project's objectives and constraints. Through proactive engagement, the project team secured support for a novel construction method above the existing railway line and facilitated timely stakeholder approval.



- This example demonstrates the value of engaging key stakeholders during the design stage to address concerns, build confidence and obtain in-principle agreement before construction commences.

3.3.5.2 FAQ

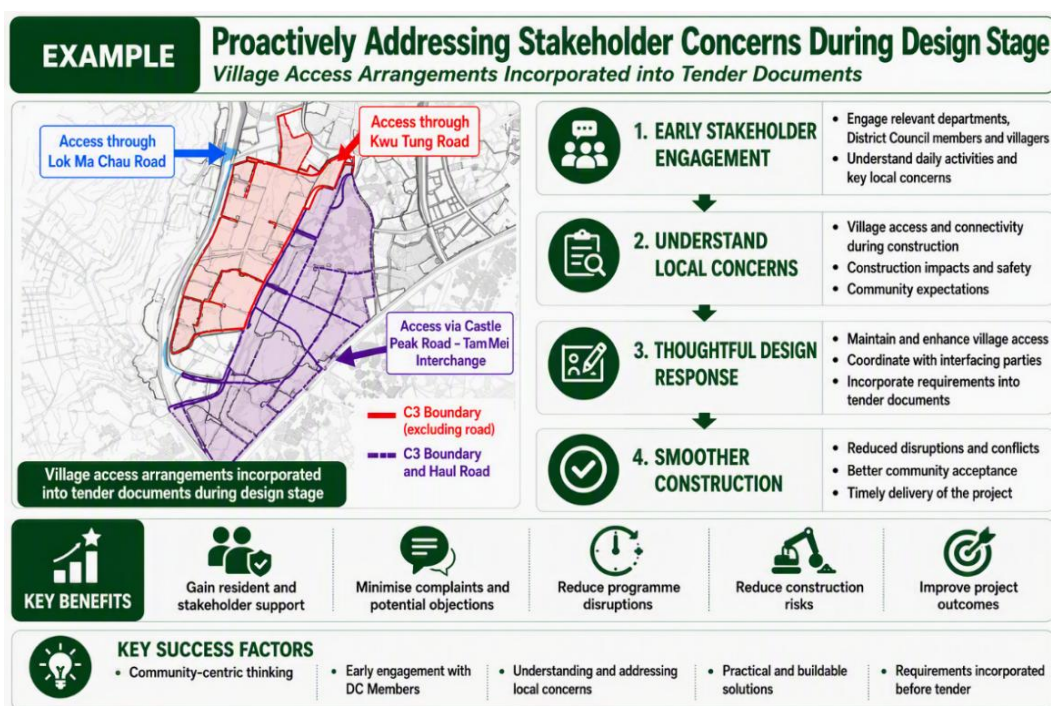
How can the project team identify and address public and stakeholder concerns during the design stage?

The project team should engage relevant stakeholders and the public as early as practicable to understand concerns that may affect the design, construction methodology, programme or project acceptance. Early engagement enables potential issues to be identified and addressed before they escalate during construction.

CEDD should give particular attention to stakeholders who may be directly affected by the works, including local communities, DCs, user groups and O&M parties. Their feedback can provide valuable local knowledge and help the project team develop more practical and acceptable solutions.

Example

- **Proactively addressing stakeholder concerns during the design stage**
 - A CEDD project identified village access as a key stakeholder concern during construction. The project team therefore engaged relevant departments, DC members, and villagers at an early stage to understand local access needs, operational constraints and community concerns, and to obtain their feedback.
 - Practical village access arrangements were later developed with the agreed requirements included in the contract, thereby enabling stakeholder concerns addressed before construction and facilitating a smoother project delivery.
 - By proactively addressing stakeholder concerns, the project achieved:
 - 1) Improved stakeholder and community support;
 - 2) Reduced complaints, objections and potential conflicts;
 - 3) Reduced programme disruption and construction risks; and
 - 4) Improved project outcomes through early stakeholder alignment.



 Experience from previous projects suggests that the following measures can significantly enhance the smoothness of the project delivery:

- Early engagement with DC members and local stakeholders;
- Understanding local access requirements and community concerns;
- Developing practical and buildable design solutions; and
- Incorporating the agreed arrangements into the tender documents before tendering.

3.3.6 Issue no. 5 – O&M requirements

3.3.6.1 *Description*

O&M requirements are a key input to the design. However, additional requirements may emerge during the later stages of design or even during construction, resulting in design changes, additional cost and programme impacts. To minimise these risks, the project team should engage O&M parties early to understand their requirements and incorporate them into the design and tender documents wherever practicable.

3.3.6.2 *FAQ*

Should the project team accommodate changes requested by O&M parties?

O&M requirements should be considered carefully, as they may affect the long-term performance and O&M of the completed works. Where practicable, these requirements should be identified and incorporated during the design stage to minimise abortive work and construction-stage changes.

To reduce the risk of late changes, the project team should proactively engage O&M parties, understand their latest requirements and, where appropriate, obtain examples of O&M manuals or standard requirements for incorporation into the tender documents.

Example

- Proactive co-ordination to anticipate updated requirements
 - In a CEDD project, the project team recognised that updated climate change requirements for drainage systems were under development by DSD. CEDD incorporated additional capacity into the proposed drainage system during the design stage in anticipation of potential changes.
 - When the revised Stormwater Drainage Manual was subsequently issued, the project team reviewed the updated requirements and confirmed that the original design remained adequate. As a result, significant redesign, programme delay and additional cost were avoided.
 - This foresight and early anticipation of the updating of requirements by DSD as a maintenance department, through proactive coordination, enabled the following benefits to be achieved:
 - 1) Reduced risk of design changes during later project stages;
 - 2) Reduced programme and cost risks associated with changing stakeholder requirements;
 - 3) Smoothened the construction of the relevant works;
 - 4) Enhanced co-ordination with the O&M department; and
 - 5) Improved long-term operability and maintainability of the completed works with enhanced resilience to climate change.



 Experience from previous projects suggests that the following measures can significantly enhance the smoothness of the project delivery:

- Early engagement with O&M parties;
- Understanding future policy and technical requirements; and
- Incorporating O&M requirements into the design at an early stage.

3.3.7 Issue no. 6 – Changing user requirements from stakeholders

3.3.7.1 **Description**

User requirement is a key input to design development and often involve multiple stakeholders. However, requirements may evolve during the investigation, design and construction stages as stakeholders gain a better understanding of the project or changing operational needs emerge.

Late changes to user requirements can result in design revisions, abortive work, programme delay and additional cost. Early engagement and timely agreement on user requirements are therefore essential to minimise project risks and support efficient project delivery.

3.3.7.2 **FAQ**

What should the project team do if user requirements change during the design or construction stage?

CEDD and the *Consultant* should promptly assess changes to user requirements to determine their impact on the design, programme, cost and project objectives. Early assessment enables informed decision-making and reduces the risk of abortive work.

To manage changing requirements effectively, the project team should:

- Clearly document agreed requirements, assumptions and stakeholder decisions;
- Assess the technical, programme and cost implications of the proposed change at the earliest opportunity;
- Determine whether the change affects the *Consultant's* Scope and requires consideration under the CE provisions;
- Allow appropriate time risk allowances and contingencies for evolving stakeholder requirements;
- Manage stakeholder expectations and explain the implications of late changes; and
- Escalate unresolved issues promptly where CEDD and the relevant stakeholders cannot reach agreement at the working level.

Successful management of changing user requirements relies on early engagement, transparent communication and timely decision-making to achieve the best outcome for the project.

3.3.8 Issue no. 7 – Stringent requirements from other stakeholders

3.3.8.1 *Description*

Stakeholders may impose stringent requirements on CEDD projects, particularly where the works interface with critical infrastructure such as operating railways. These requirements may include extensive monitoring, protective measures, restricted working hours, limited access windows and stringent approval procedures. Such requirements, while not unreasonable, can significantly affect construction methodology, programme and cost.

If these requirements are not identified and addressed during the design stage, substantial time and cost implications may arise during construction. Early engagement with stakeholders is therefore essential to understand their concerns, establish realistic requirements and identify practical solutions.

3.3.8.2 *FAQ*

Should stringent stakeholder requirements be left for contractors to manage during construction?

No. CEDD should proactively engage stakeholders during the design stage to understand the underlying concerns and identify practical measures that CEDD and the *Consultant* can incorporate into the design and tender documents. Addressing these issues early is often more effective than relying solely on construction-stage solutions. The project team should:

- Understand the stakeholders' operational, safety and maintenance concerns;
- Explore alternative solutions collaboratively on a best-for-project basis;
- Manage stakeholder expectations where implementing all requested requirements would result in disproportionate cost or programme impacts;
- Consider appropriate mitigation measures, such as monitoring systems, instrumentation or protective works, where these can facilitate stakeholder agreement; and
- Record and communicate agreed requirements clearly in the tender documents.

Where stakeholder requirements remain unresolved, the project team should continue engagement and escalate key issues where necessary before construction commences. Resolving these matters during the design stage significantly reduces the risk of costly changes and programme delays during construction.

For projects within railway protection areas, the following good practices are recommended:

- Keep MTR Railway Protection (MTR/RP) teams informed of significant design developments and changes;
- Allow sufficient time in the programme for MTR/RP review and approval processes, including review of the contractor's methodology during construction; and
- Clearly specify railway-interface requirements, approval procedures and stakeholder coordination obligations in the tender documents.

Successful management of stringent stakeholder requirements relies on early engagement, expectation management, practical mitigation measures and clear documentation, rather than transferring the issue to the *Contractor* during construction.

4 Design Review

4.1 Overview

Design review is an important governance process under CEDD's project delivery framework. It provides a structured platform to challenge assumptions, identify risks, optimise design solutions and confirm readiness to proceed to the next stage of project development.

In accordance with Environment, Transport and Works Bureau TC(W) No. 19/2003, DEVB TC(W) No. 6/2020, CEDD TC No. 1/2023 and CEDD TC No. 5/2023, CEDD should undertake design reviews before proceeding to detailed design and before tender invitation. Buildability Evaluation System for Public Engineering requirements should also be considered as part of the design review process.

Design review should not be regarded as a one-off compliance exercise. Consistent with NEC principles, project teams should adopt an ongoing and collaborative design review process throughout the design stage. An effective design review should seek to:

- confirm that the design satisfies project objectives, functional requirements, approved design policies and relevant Government requirements;
- evaluate design options, alternative solutions and innovative proposals to achieve better value and project outcomes;
- improve buildability, O&M performance and whole-life value, and achieve design-for-safety;
- identify and address stakeholder requirements, interface issues, land matters and environmental mitigation measures;
- review changes in project conditions, assumptions and constraints that may affect the design;
- optimise the design to achieve cost effectiveness and maintain affordability within the project budget; and
- reduce the risk of design changes, construction issues and programme delays during later project stages.



Front-end planning, efficient execution

Design issues, risks and constraints should be identified, discussed and resolved as early as practicable through a comprehensive design development process, before significant commitments are made to detailed design and tendering. By bringing issues to light early and making informed decisions at the appropriate stage, project teams can invest sufficient effort in front-end planning and design development to achieve more efficient execution, reducing abortive work and improving project outcomes.

4.2 Good practices and practical know-how

4.2.1 Why design review matters?

During the design stage, considerable effort is invested in developing design deliverables. However, the *Consultant* may not always fully reflect constructability, safety, cost effectiveness, and stakeholder constraints in the initial design due to limited site investigation information, project-specific challenges, or the absence of construction-stage perspectives. A structured and collaborative design review process helps identify and address these issues before they affect tendering or construction.

Design reviews provide an opportunity to challenge assumptions, assess risks and explore alternative solutions before major commitments are made. By involving key stakeholders and experienced project personnel, project teams can:

- Identify constraints and risks early;
- Improve buildability and safety;
- Optimise cost and programme outcomes;
- Reduce abortive work and late design changes; and
- Improve overall project delivery performance.

Front-end planning, efficient execution – Design issues, risks and constraints should be identified and resolved as early as practicable. Investing sufficient effort in front-end planning and design optimisation enables project teams to refine the scheme before detailed design, improve buildability and achieve more efficient project delivery.

Focus on major cost and risk drivers – Design reviews should focus on elements that have significant implications for construction cost, programme or risk, including:



Practical examples of design optimisation

Early design reviews can improve value by challenging conventional solutions and assessing alternatives from technical, construction, programme and cost perspectives. Examples from previous projects include:

Design element	Optimisation	Why successful?
Noise Barrier Foundations	Foundation of the proposed noise barriers amended from pre-bored socketed H-piles to some mini-piles and some pad footing after considering different loading conditions and geographical conditions along different sections of proposed noise barriers.	Early collaborative design reviews encourage the exploration of alternative solutions and enable stakeholders to collectively identify the most efficient, buildable and cost-effective design options.
Depressed Roads/Underpasses	Foundation of the proposed depressed road and underpass revised from socketed H-piles to founding directly on soil by considering more reasonable soil parameters with the comprehensive ground investigation.	
Noise barriers and underpass	Pad foundation of the noise barriers has been removed by integrating the noise barrier into the proposed underpass.	
Slopes	Shallow angle of slope adopted but with greater volume of earthworks against steeper angle of slope with more soil nails or retaining structures to balance technical, cost, programme as well as environmental considerations like trees removal.	Balancing earthworks, retaining structures, programme, costs and environmental impacts to identify the optimum slope solution.
Utilities	Shallowest utilities adopted to reduce significant temporary works and excavation against deep excavation to balance technical, cost, programme as well as future maintenance feasibility.	Early design review enables utility alignments to be optimised by balancing construction complexity, Temporary Works requirements, cost and future maintenance considerations.

4.2.2 Collaboration

Successful design review relies on collaboration amongst CEDD, the *Consultant* and relevant stakeholders. Consistent with NEC principles, CEDD should use design reviews to identify risks, challenge assumptions and optimise solutions on a best-for-project basis rather than as a fault-finding exercise.

Whilst technical circulars require formal Design Review Committee (DRC) reviews before detailed design and tender invitation, project teams should adopt an ongoing design review process throughout design development. Early and regular reviews enable risks, constraints and stakeholder requirements to be addressed before significant design effort is committed.

Project teams should therefore:

- Collaborate closely with the *Consultant* throughout design development;
- Engage stakeholders early to facilitate timely discussion of requirements, constraints and design options;
- Use the EW process to identify and mitigate emerging design risks;
- Review critical risks, including geotechnical, stakeholder and programme risks, at key project milestones; and
- Escalate significant issues promptly to support timely decision-making.

A collaborative and structured review process improves design quality, reduces abortive work and supports more efficient project delivery.

4.2.3 Composition of the Design Review Committee

The effectiveness of a design review depends on involving individuals with the appropriate technical knowledge, project experience and stakeholder perspectives. In addition to the core DRC members, project teams should consider inviting specialists and stakeholders relevant to the project's key risks and interfaces.

Suggested participants may include:

- Senior representatives of key stakeholders and end users;
- Specialists in permanent and Temporary Works design;
- Geotechnical professionals;
- Construction and site logistics specialists;
- Project teams from similar or adjacent projects;
- O&M representatives; and
- Personnel with relevant lessons learnt from nearby or comparable projects.

For major or complex projects, consideration may be given to appointing selected members on a longer-term basis to participate in multiple design reviews throughout the project delivery cycle. Maintaining continuity of membership helps preserve project knowledge, promote consistency in decision-making and facilitate the transfer of lessons learnt between projects.

4.3 Topical issues

4.3.1 General issues

Design reviews are intended to challenge assumptions, identify risks and optimise project outcomes. However, they are sometimes treated as a compliance exercise carried out late in the design stage, when significant design effort has already been committed, and opportunities for optimisation are limited.

Where design issues, stakeholder requirements and project risks are not identified and addressed early, substantial design changes, abortive work, programme delays and additional costs may arise during later project stages.

The following sections discuss common challenges encountered during design reviews and provide practical guidance on improving design quality, managing risks and achieving better project outcomes through proactive and collaborative review processes.

4.3.2 Issue no. 1 – Tight programme

4.3.2.1 *Description*

Design reviews often identify opportunities for design enhancement, optimisation and risk mitigation. However, where insufficient time is allowed between design reviews and tender invitation, implementing these improvements may be challenging.

A compressed programme may discourage meaningful review and result in unresolved risks, design constraints or stakeholder concerns being carried into the construction stage. This can reduce the effectiveness of the design review process and increase the likelihood of design changes, programme delays and additional costs during construction.

To maximise the benefits of design reviews, project teams should plan review activities early and allow sufficient programme float for design development, stakeholder engagement and implementation of agreed improvements.

4.3.2.2 FAQ

Should design reviews proceed if deliverables have not yet been accepted or approval for tendering, and the Resources Allocation Exercise (RAE) funding decision is still pending?

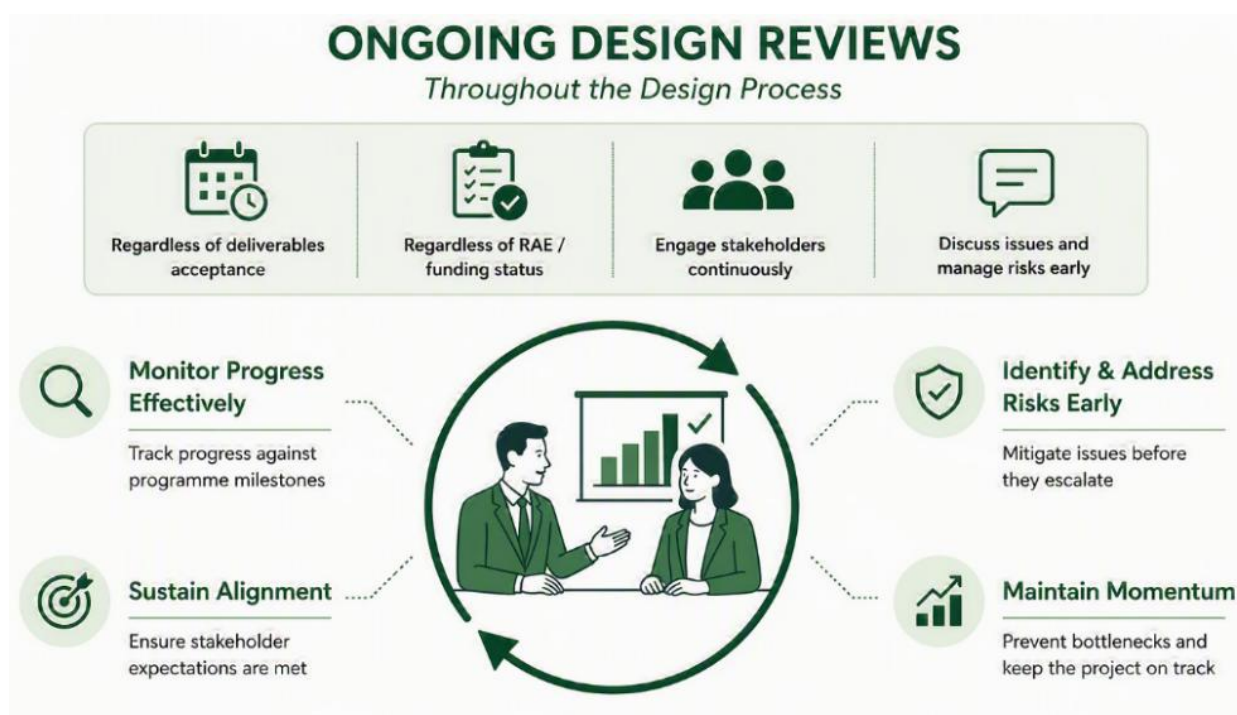
Yes. CEDD should undertake design reviews throughout the design stage and should not make them dependent on the completion of approvals, acceptance of deliverables or RAE funding decisions. Their primary purpose is to identify risks, challenge assumptions and facilitate timely decision-making before issues affect programme, cost or project outcomes.

Consistent with NEC principles, design reviews provide an opportunity to discuss emerging risks and develop mitigation measures at the earliest practicable stage. CEDD should therefore integrate design reviews into the project programme as a proactive management tool rather than a final compliance exercise.

Good practices include:

- Establishing design review milestones throughout the design stage;
- Using reviews to assess critical risks, key assumptions and stakeholder requirements;
- Identifying actions and responsibilities for risk mitigation and issue resolution;
- Reviewing programme implications and initiating the EW process where appropriate; and
- Escalating unresolved strategic issues promptly where management intervention is required.

By carrying out regular and structured design reviews, project teams can improve decision-making, maintain project momentum and reduce the risk of significant changes during later project stages.



4.3.3 Issue no. 2 – Design change

4.3.3.1 **Description**

Design changes are often perceived negatively because they may result in additional work, programme impacts and increased costs. However, changes may be necessary as stakeholder requirements evolve, additional site investigation information becomes available, or design reviews identify opportunities for optimisation.

Avoiding design changes at all costs may result in unresolved risks, over-design or missed opportunities to improve project outcomes. Project teams should therefore assess proposed changes on a best-for-project basis, taking account of their impact on cost, programme, buildability, safety and long-term value.

Consistent with NEC principles, design changes should be identified, discussed and assessed as early as practicable to minimise abortive work and maximise the benefits of design optimisation. A no-blame culture should be promoted, with the project team and the *Consultant* working collaboratively to resolve issues, reduce risks and optimise the design. Early agreement on the design approach, together with timely escalation of unresolved matters, enables informed decision-making and supports better project outcomes.

4.3.3.2 **FAQ**

Will design changes identified during design reviews constitute a CE?

Whether a CE arises depends on the circumstances and the reason for the design change. Examples that may constitute a CE include:

- A change to the Scope instructed under PSC clause 14.3, resulting in a CE under PSC clause 60.1(1); and
- A change to a decision previously made by the *SM*, resulting in a CE under PSC clause 60.1(7).

The project team should assess the implications of proposed changes promptly and determine whether they affect the *Consultant's* Scope, programme or cost. Early assessment enables mitigation measures to be considered before significant abortive work occurs.

Consistent with NEC principles, timely communication, early decision-making and proactive management of CEs help minimise programme and cost impacts while supporting fair outcomes for the *Client* and the *Consultant*.

4.3.4 Issue no. 3 – Design optimisation

4.3.4.1 Description

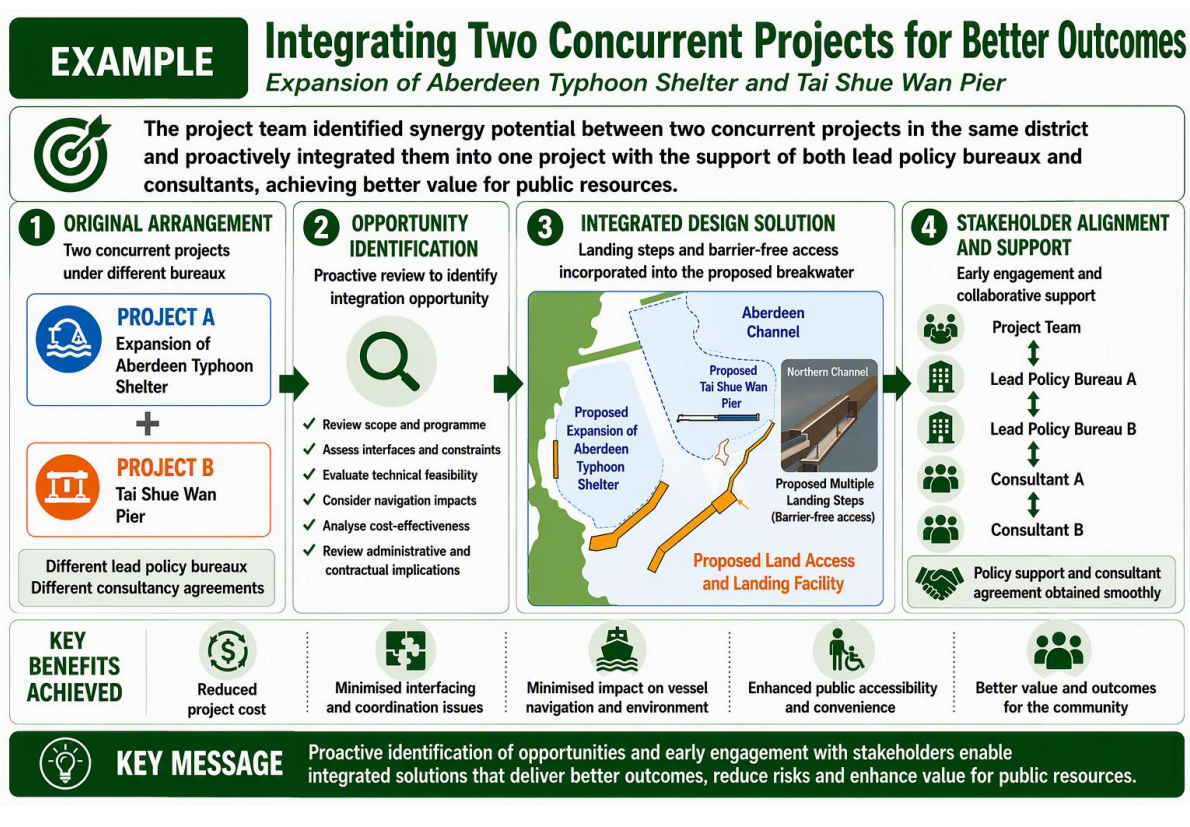
Design optimisation is one of the primary objectives of the design review process. If CEDD does not critically review and challenge designs, CEDD may miss opportunities to improve buildability, reduce costs, shorten construction programmes and enhance project outcomes.

There is rarely a single optimal solution to a design problem. Different options may offer varying benefits in terms of cost, programme, safety, constructability, O&M requirements, and stakeholder acceptance. Design reviews therefore provide an important opportunity to evaluate alternative solutions and identify options that deliver better value on a best-for-project basis.

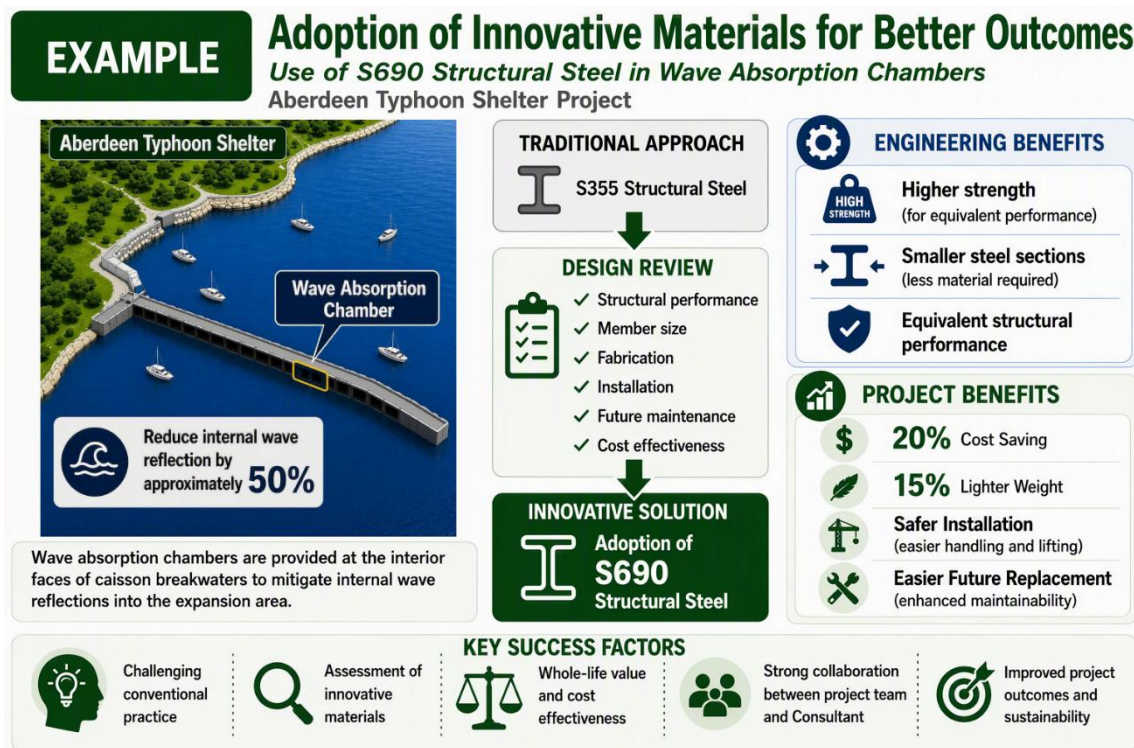
Consistent with NEC principles, design optimisation should be undertaken collaboratively rather than as a fault-finding exercise. In addition to DRC reviews involving D2 officers, project teams should consider involving experienced project personnel, technical specialists and relevant stakeholders to provide independent perspectives and lessons learnt from similar projects.

Examples

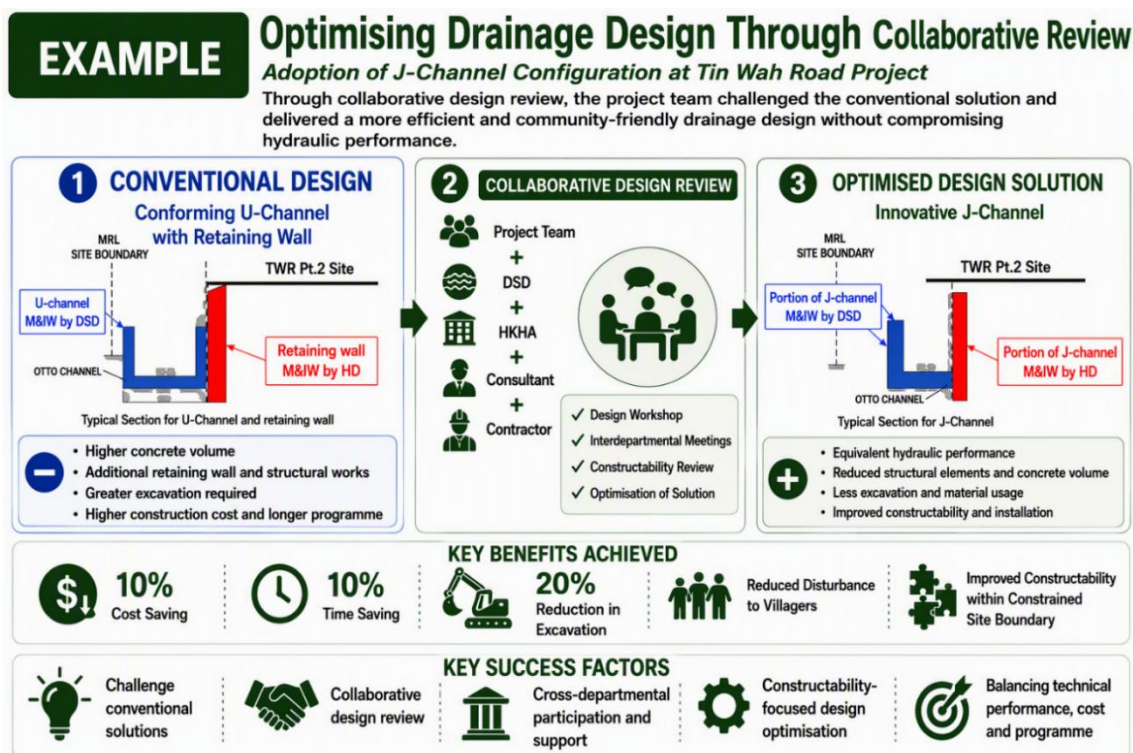
- **Expansion of Aberdeen Typhoon Shelter and Tai Shue Wan Pier** – Two separate projects were integrated into a single scheme through proactive coordination with relevant policy bureaux, improving overall project efficiency and delivery.



- **Aberdeen Typhoon Shelter Project** – Adoption of S690 structural steel reduced structural weight by approximately 10% and achieved around 20% cost savings compared with conventional solutions.



- **Tin Wah Road Site Formation and Infrastructure Works** – CEDD and the Consultant reviewed the original open drainage and retaining wall arrangement through the design optimisation process. An innovative J-channel solution was subsequently adopted, reducing construction cost while maintaining functionality.



- **Tsing Yi Road West Site Formation Project** – The original site formation required substantial retaining structures to form the required platform for public housing development, and the fill slopes formed by CEDD would be removed and became abortive by the HD for piling works to support an overhanging platform. Close collaboration with HD resulted in revisions to the proposed development layout, allowing fill slopes constructed by CEDD to become permanent works. This eliminated future abortive slope works, reduced retaining structures and optimised costs for both the CEDD and future housing developments.

4.3.5 Issue no. 4 – Review on buildability and safety

4.3.5.1 *Description*

Buildability and safety are critical considerations during design development. If construction constraints, site conditions and construction methodologies are not adequately considered during the design stage, significant programme delays, additional costs and safety risks may arise during construction.

Design reviews should therefore evaluate not only compliance with technical requirements, but also the practicality, safety and efficiency of constructing, operating and maintaining the proposed works. Particular attention should be given to Temporary Works, construction sequencing, access arrangements, utility interfaces, traffic management and maintenance requirements, as these factors often have a significant influence on construction risk and project outcomes.

Consistent with the principles of Design for Safety, project teams should seek to eliminate hazards through design where practicable and reduce residual risks before construction commences. Safety considerations should extend beyond construction activities to include future operation, inspection, maintenance and replacement works.

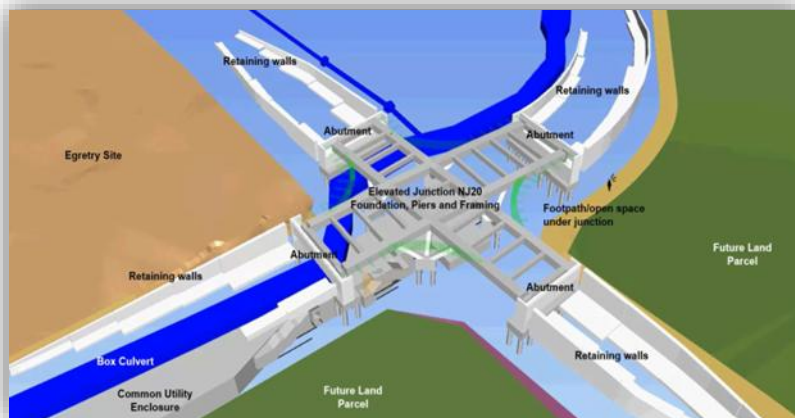
Typical examples that warrant detailed review include:

- **TTM** – assessing whether proposed TTM arrangements are practical and achievable, particularly for busy junctions, trunk roads and critical construction activities;
- **Utility diversions and trenchless works** – reviewing utility constraints, diversion proposals and the feasibility of jacking pits, receiving pits and associated Temporary Works;
- **Construction sequencing for earthworks and slopes** – reviewing temporary slope cutting, filling requirements and staging arrangements to improve constructability and safety;
- **Drainage, sewerage and waterworks** – assessing whether online upgrading works are practical, or whether offline arrangements and phased commissioning can provide safer, faster and more cost-effective solutions; and
- **Access and maintenance considerations** – reviewing access routes, working space and maintenance requirements to facilitate safe construction and future O&M activities.

Early collaboration amongst CEDD as the *Client*, the *Consultant*, O&M parties, contractors and other stakeholders can help identify these issues before they affect construction. This enables practical solutions to be incorporated into the design, reducing abortive work, improving safety and facilitating more efficient project delivery.

Examples

- **San Tin/Lok Ma Chau Development Node** – Full Building Information Modelling adoption enabled comprehensive spatial coordination between foundations, utilities and road infrastructure, improving constructability and reducing design clashes.



- **Pik Wan Road Goose-shaped wall solution** – An alternative wall configuration was adopted in place of conventional soldier piles and socketed H-piles. The solution improved constructability, reduced earth pressures, shortened construction time and lowered carbon emissions and construction costs.
- Other successful innovations include pre-cast column installation, bridge rotation, UTBM, Modular Integrated Construction and Design for Manufacture and Assembly, all of which improved constructability, safety or programme performance.

4.3.6 Issue no. 5 – Innovative Design Package

4.3.6.1 Description

IDP was introduced to encourage the identification of innovative and cost-effective solutions in ongoing D&C and Investigation, design and construction consultancies. Whilst cost optimisation should be considered throughout the design process, opportunities for innovation may emerge at any stage of project development as circumstances, constraints and stakeholder requirements evolve.

The objective of an IDP is not limited to achieving cost savings. It also provides an opportunity to improve buildability, programme performance, sustainability, safety and overall project outcomes. CEDD and the *Consultant* should therefore proactively assess alternative solutions identified through design reviews, VM exercises, stakeholder engagement or changing project conditions on a best-for-project basis.

The IDP mechanism encourages the *Client* and the *Consultant* to challenge conventional approaches and explore innovative alternatives. It provides reasonable compensation to the *Consultant* for undertaking additional design effort, enabling innovation to be pursued in a structured and collaborative manner.

Project teams should therefore allow sufficient programme flexibility for the development and assessment of potential IDPs, particularly for projects involving high cost, programme or construction risks.

Example

Expansion of Aberdeen Typhoon Shelter – Through a collaborative design review and optioneering exercise, the project team challenged the traditional seawall arrangement and identified an innovative floating breakwater solution as a viable alternative with significant cost savings and reduced construction duration achieved whilst maintaining the required wave protection performance.



The success of the proposal was supported by:

- Collaborative design reviews and interdisciplinary discussions;
- Early assessment of construction, environmental and operational considerations;
- Engagement with relevant stakeholders and approving authorities; and
- Whole-life value assessment rather than capital cost comparison alone.

4.3.6.2 **FAQ**

The *Consultant* should have identified cost-saving opportunities during the preliminary and detailed design stages. Why is IDP still needed and does this imply that the *Consultant* did not perform the original design adequately?

No. The IDP is not a fault-finding or blame exercise, nor does it imply any inadequacy in the original design. Design development is often constrained by available information, programme requirements, stakeholder expectations and prevailing project conditions at the time decisions are made.

As projects progress, new information, changing constraints and alternative technologies may create opportunities that were not apparent during the original design stage. In some cases, external circumstances may change such that an alternative solution becomes more cost-effective or delivers better overall value to the project.

The IDP process therefore provides an opportunity for independent review and fresh thinking. Benefits may include:

- Identification of innovative construction methods or materials;
- Reduction in construction cost and programme duration;
- Improved buildability and risk management;
- Enhanced sustainability and whole-life value; and
- Better project outcomes through collaborative design optimisation.

The project team should therefore view IDP as a strategic design optimisation tool that complements, rather than replaces, the original design process. Consistent with NEC principles, its purpose is to encourage innovation, challenge conventional approaches and achieve better value on a best-for-project basis.

4.3.7 Issue no. 6 – Project cost vetting

4.3.7.1 **Description**

Detailed project cost vetting by B/D is typically undertaken during the later stages of design development, often after substantial design effort has been committed. Recommendations arising from the cost vetting process may result in design optimisation, changes to project requirements or reviews of cost-significant elements. These changes can affect programme, resources and design development.

To minimise the risk of late significant design changes, project teams should continuously review major cost drivers, challenge assumptions and identify optimisation opportunities throughout the design stage. Early engagement with stakeholders and O&M parties can also help resolve requirements and constraints that may otherwise lead to unnecessary project costs.

Consistent with NEC principles, proactive design optimisation and early decision-making improve cost certainty, reduce abortive work and enhance the likelihood of achieving agreement during the cost vetting process.

4.3.7.2 **FAQ**

How can project teams reduce the risk of significant design changes arising from project cost vetting during later stages?

The most effective approach is to identify and review major cost drivers as early as practicable during design development. CEDD and the *Consultant* should proactively use design reviews, VM exercises, and stakeholder engagement to challenge assumptions, optimise designs, and explore alternative solutions before making major design commitments.

CEDD and the *Consultant* should pay particular attention to:

- Cost-significant structures, Temporary Works and specialist construction methods;
- Stakeholder requirements that may drive substantial construction costs;
- O&M requirements that may affect whole-life value;
- Opportunities for innovation, standardisation and design optimisation; and
- Risks and assumptions that may influence tender pricing and project affordability.

In line with the NEC principle of mutual trust and co-operation, B/D's requirements and project affordability objectives should be clearly communicated to the *Consultant* through the Project Inception Appraisal and ongoing design discussions. This helps establish a common understanding of the project's cost objectives and reduces the likelihood of significant design changes at a later stage.

Project teams should also identify major cost items early and undertake joint reviews with the *Consultant* to explore opportunities for cost reduction, design optimisation and risk mitigation. Where stakeholders propose significant changes to their requirements, CEDD should engage D2-level officers and/or B/D early to facilitate timely agreement before the *Consultant* commits substantial design effort.

Although changes arising from cost vetting may constitute a CE if they result in a change to the Scope instructed under PSC clause 14.3, early identification and resolution of cost issues can significantly reduce abortive work, additional consultancy effort and programme impact.

Example

A CEDD project identified rock excavation as a major cost and programme risk. Through an optimisation review, the project team evaluated alternative excavation methods and identified open-cast blasting as a more efficient solution than conventional mechanical breaking for the prevailing site conditions. Approvals from GEO and EPD for the adoption of open-cast blasting were sought and obtained.

The review demonstrated that, subject to environmental and stakeholder considerations, the alternative method could significantly improve productivity and reduce programme risk. The exercise also highlighted the importance of reviewing major cost items and construction methodologies early so that CEDD and the *Consultant* can assess potential optimisation opportunities before construction commences.

Key lessons learnt include:

- Identify major cost drivers early and review them regularly;
- Challenge design assumptions and conventional construction approaches;
- Engage stakeholders early to facilitate agreement on optimisation opportunities;
- Consider innovation and alternative construction methods where appropriate; and
- Use design reviews and IDPs proactively to improve value and reduce programme risks.

Method	Pros	Cons	Productivity Rate	Method allowed in current EIA?
Mechanical Breaking 	▪ More competent contractors ▪ Equipment (Hydraulic breakers and excavators) availability	▪ Lower productivity compared to blasting ▪ High equipment maintenance cost ▪ Relatively labor intensive	▪ 50 cum / day per breaker for Grade III rock ▪ 300 cum / day per breaker for soil	▪ Yes
Chemical Breaking 				
Open-cast Blasting 	▪ Fast and efficient for large volume ▪ Cost effective	▪ Sensitive receivers ▪ Protective measures ▪ Permit process	▪ 500 to 1000 cum per blast front	▪ No ▪ Revisiting EIA required

5 Procurement and Tender

5.1 Overview

A well-structured procurement and tender process is fundamental to successful project delivery. Procurement decisions made during the design stage have a significant influence on collaboration, risk allocation, pricing certainty, programme performance and, ultimately, overall project outcomes.

Key considerations include:

- Selection of an appropriate procurement strategy;
- Fair and balanced risk allocation;
- Clarity and adequacy of the Scope, the Site Information and the tender documents; and
- Early identification and management of project-specific risks and constraints.

Poorly defined requirements, unclear risk allocation or inadequate tender information may lead to inconsistent pricing, misaligned expectations, CEs and even disputes during construction.

Consistent with NEC principles, procurement strategies and tender documents should promote fairness, transparency and collaboration. By clearly defining requirements, allocating risks to the parties best able to manage them and providing appropriate Site Information, project teams can improve pricing certainty, reduce disputes and achieve better project outcomes.

5.2 Good practices and practical know-how

5.2.1 Appropriate risk allocation

Appropriate risk allocation is fundamental to successful project delivery. CEDD should allocate risks to the party best able to understand, manage and control them. Excessive transfer of risks to the *Contractor* often leads to higher tender prices, increased contingency allowances and a greater likelihood of disputes during construction.

Tenderers typically have only a limited period to review tender documents, inspect the Site and assess project risks. They may therefore be unable to evaluate all constraints affecting the *works* fully. If CEDD transfers significant risks to the *Contractor* without providing adequate information for pricing, tenderers may include substantial risk premiums in their tender prices.

Fair risk allocation is supported through the CE mechanism under the NEC regime. Where a *Client's* liability materialises, the *Contractor* may be entitled to additional time and/or financial compensation in accordance with the contract. This allows project teams to avoid paying excessive risk premiums upfront while maintaining a balanced and transparent approach to risk management.

The project team should therefore avoid imposing requirements that are excessively stringent, uncertain or impractical for Providing the Works. Examples include:

- Providing access to the Site within an extended and uncertain access period rather than a clearly defined access arrangement;
- Requiring significant earthworks or underground works to be priced on a lump-sum basis under ECC/HK main Options B or D despite substantial uncertainty in ground conditions; and
- Imposing constraints in the Scope that are difficult to achieve in practice and may unnecessarily increase construction risks and tender prices.

Fair and balanced risk allocation promotes collaboration, improves pricing certainty, reduces disputes and supports better project outcomes. Consistent with NEC principles, risk management should focus on identifying, understanding and proactively managing risks, rather than transferring risks to parties who are not best placed to control them.

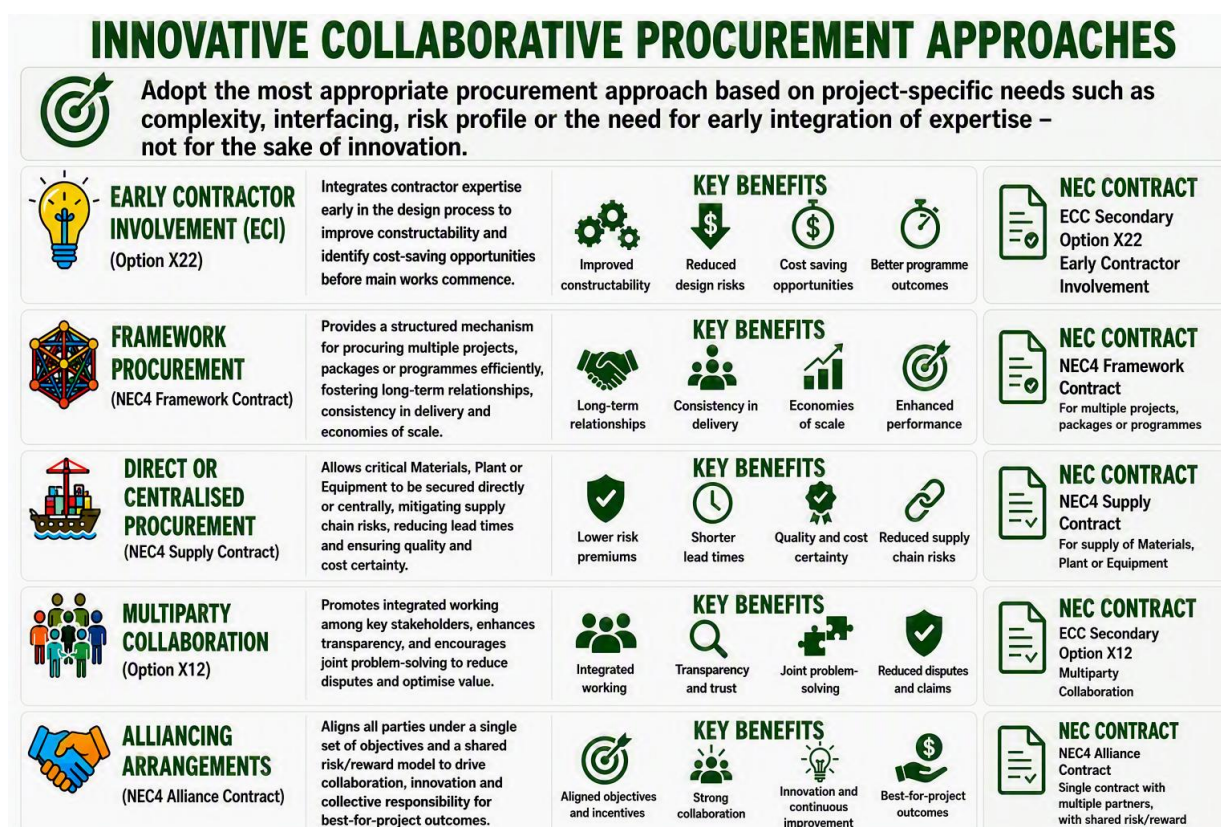
5.2.2 Site Information

Site Information is defined under ECC/HK clause 11.2(21) as the information describing the Site and its surroundings identified in the Contract Data. The adequacy and clarity of Site Information have a significant influence on tender pricing, risk allocation and the assessment of CEs related to unforeseen physical conditions.

Under ECC/HK clauses 60.1(12) and 60.2, the assessment of unforeseen physical conditions is based on the Site Information, together with publicly available information referred to in the Site Information, information obtainable from a visual inspection of the Site, and other information which an experienced contractor could reasonably be expected to have or obtain before the tender closing date. To support fair risk allocation and realistic tender pricing, the project team should therefore include as much relevant information as practicable in the Site Information. In particular, for projects involving significant subsurface risks, the inclusion of the Geotechnical Data Reports (GDRs) and the GBRs is encouraged, with relevant guidelines provided in the DEVB's NEC Practice Notes for Public Works Projects in Hong Kong – Volume 1 – Engineering and Construction Contract (PN/ECC) paragraphs 2.1.1.8 to 2.1.1.13. In summary, clear and comprehensive Site Information reduces ambiguity, facilitates a common understanding of site conditions and minimises the risk of disputes arising from differing interpretations of physical conditions.

5.2.3 Innovative collaborative procurement approaches

Whilst the use of ECC/HK remains the commonest procurement approach adopted for public works, project teams should consider alternative collaborative procurement strategies where they could demonstrably improve project outcomes. Such approaches should be adopted only where justified against project complexity, interfaces, risk profile or the need for early integration of expertise. The following summary includes examples of innovative collaborative procurement approaches:



When applied appropriately, these procurement approaches can strengthen collaboration, improve risk management and enhance value throughout the project delivery. The selection of the procurement strategy should always reflect the specific objectives, risks and requirements of the project.

5.2.4 Pre-contract cost estimation using subcontract rate database

A realistic and well-substantiated cost estimate is essential to support design development, risk management, procurement planning, budgeting and tender assessment. Although NEC does not prescribe specific requirements for cost estimation, CEDD and the *Consultant* should reflect NEC principles such as mutual trust, co-operation, proactive risk management and the "sort it now" approach throughout the estimating process.

Traditionally, pre-contract cost estimates are developed using rates from completed or ongoing contracts, adjusted to reflect project-specific conditions. However, for projects involving substantial specialist or trade-driven works, reliance solely on historic contract rates may not adequately reflect prevailing market conditions. In such circumstances, project teams should consider using the departmental Subcontract Rate Database (SRD) to enhance the reliability of cost estimates.

The use of SRD can:

- Improve the accuracy of estimates for specialist works;
- Better reflect prevailing market conditions;
- Enhance transparency for internal review and cost vetting;
- Identify cost-sensitive elements requiring further design review; and
- Provide a more reliable benchmark for tender assessment and VM.

Cost estimates developed using appropriate market data support more informed decision-making, improve budget certainty and contribute to better procurement outcomes.

5.3 Topical issues

5.3.1 General issues

Procurement and tender activities play a critical role in establishing the contractual framework for successful project delivery. Decisions made during the design stage, particularly in the preparation of the Scope, the Site Information and the procurement strategy, can significantly influence risk allocation, tender pricing and the administration of the works contract.

Common procurement and tender challenges often arise from unclear requirements, incomplete Site Information, evolving project constraints and differing interpretations of contractual obligations. If not properly addressed, these issues may result in misaligned expectations, CEs, disputes and increased project costs.

The following sections discuss common procurement and tender issues and provide practical guidance on improving clarity, achieving fair risk allocation and promoting collaborative project delivery under NEC contracts.

5.3.2 Issue no. 1 – Clarity in requirements

5.3.2.1 *Description*

Clarity in the Scope and the Site Information is fundamental to successful contract delivery. These documents form the basis of tender pricing, risk allocation and contract administration. Ambiguities, inconsistencies or incomplete requirements may lead to differing interpretations, CEs and disputes during construction.

Project teams should therefore prepare the Scope and the Site Information with sufficient details, consistency and transparency. Ambiguous expressions such as “for information only”, “in the opinion of the *Project Manager (PM)*” or “to the acceptance of the *PM*” should be avoided wherever practicable, as they may create uncertainty and increase contractual risks.

Early identification and resolution of ambiguities during the design and tender stages improve pricing certainty, facilitate fair risk allocation and support collaborative project delivery.

5.3.2.2 *FAQ*

How should ambiguities or inconsistencies in contract documents be managed under ECC/HK?

Under ECC/HK clause 17.1, the *PM* or the *Contractor* notifies the other party as soon as an ambiguity or inconsistency is identified. The *PM* then states how the ambiguity or inconsistency is to be resolved.

Where the resolution of the ambiguity or inconsistency requires a change to the Scope, the instruction constitutes a CE under ECC/HK clause 60.1(1). In accordance with ECC/HK clause 63.10, the assessment is based on the interpretation most favourable to the party that did not provide the relevant Scope information.

How can project teams improve clarity and minimise disputes when preparing tender documents?

The project team should provide clear, coordinated and practical requirements within the Scope. The project team should pay particular attention to Temporary Works, existing utilities, construction constraints and site-specific risks that may significantly affect tender pricing and construction methodology.

Examples include:

- **Major Temporary Works** – clearly define temporary roads, access arrangements, traffic diversions, drainage diversions, retaining structures and construction staging where these are critical to the *works*;
- **Existing Utilities** – clearly set out the requirements for the *Contractor* to provide the works and services in relation to the existing utilities as shown in the Site Information. Relevant guidelines are contained in the PN/ECC paragraphs 2.1.1.8 to 2.1.1.13 above;

- **Approval and Stakeholder Constraints** – allow realistic programme durations for approvals, consultations and stakeholder engagement processes, including Traffic Management Liaison Group approvals where required; and
- **Site-specific Constraints** – clearly identify restrictions that may materially affect construction, such as limited working space, restricted headroom, critical utilities (e.g. important power cables, trunk water mains, box culverts) or requirements to maintain access to villages and existing facilities.

Clear tender documentation reduces ambiguity, supports fair risk allocation and enables tenderers to price the *works* on a more consistent and reliable basis.

5.3.3 Issue no. 2 – Interpretation of Site Information

5.3.3.1 *Description*

CEs arising from unforeseen physical conditions under ECC/HK clause 60.1(12) are a common source of disagreement in construction contracts. The adequacy, clarity and interpretation of the Site Information therefore have a significant influence on risk allocation, tender pricing and the assessment of entitlement to CEs.

To achieve fair risk allocation and minimise disputes, the project team should prepare comprehensive and reliable Site Information, including relevant site records and investigation results. The project team should pay particular attention to how they present the information, as ambiguities or inconsistencies may lead to differing interpretations of the physical conditions anticipated at the tender closing date.

A clear and common understanding of the Site Information helps improve pricing certainty, facilitates consistent assessment of CEs and supports collaborative contract administration under NEC.

5.3.3.2 *FAQ*

A CE will only arise under ECC/HK clause 60.1(12) if the physical conditions encountered are such that an experienced contractor would have judged at the tender closing date to have such a small chance of occurring that it would have been unreasonable to have allowed for them. How should this test be applied?

The assessment should be objective and based on the information available at the tender closing date. Particular consideration should be given to:

- The Site Information, including GDRs, GBRs and other information identified in the Contract Data;
- Information obtainable from a visual inspection of the Site and publicly available information referred to in the Site Information; and
- The assumptions and allowances that an experienced contractor would reasonably have made when preparing its tender having regard to, amongst others, the industry standards and practices as well as independent expert advice, if any.

The test is not whether the *Contractor* actually foresaw the condition, but whether an experienced contractor, acting reasonably and based on the information available at the tender closing date, would have allowed for the condition. Open dialogue amongst the *Client*, the *PM* and the *Contractor* is encouraged to establish a shared understanding of what was reasonably foreseeable, using the contract documents as the primary reference.

What happens if there is ambiguity or inconsistency within the Site Information?

Under ECC/HK clause 60.3, where there is ambiguity or inconsistency within the Site Information (including information referred to in it), the *Contractor* is assumed to have taken into account the physical conditions that are more favourable to carrying out the works. This provision reinforces the importance of providing clear, complete and consistent Site Information.

How can project teams minimise disputes and promote fair risk allocation when preparing the Site Information?

The project team should include as much relevant and reliable information as practicable in the Site Information. Particular consideration should be given to incorporating available GDRs, GBRs, impact assessment findings, utility information and other relevant site data that may affect construction planning and risk allocation.

Clear and comprehensive Site Information provides a common basis for tender pricing and for assessing entitlement under ECC/HK clause 60.1(12), thereby reducing ambiguity and minimising the risk exposure to disputes.

5.3.4 Issue no. 3 – Early Contractor Involvement

5.3.4.1 Description

Early *Contractor* Involvement (ECI) enables the *Contractor* to contribute its expertise in buildability, construction methodology, innovation and risk management before major design and construction decisions are finalised. By engaging the *Contractor* during design development, project teams can identify and mitigate risks earlier, improve buildability and optimise project outcomes.

ECI is particularly beneficial for projects involving significant interfaces, complex construction methodologies, challenging site conditions or substantial programme risks. Early collaboration amongst the *Client*, the *Consultant* and the *Contractor* helps establish a common understanding of project constraints and facilitates more informed decision-making.

Successful ECI requires sufficient time, clearly defined objectives and active participation from all parties. The extent of ECI should be tailored to the project's complexity, risks and procurement strategy.

5.3.4.2 FAQ

What advantages do ECI offer compared with a conventional Design-and-Build approach?

Albeit both approaches involve the *Contractor's* input into design and construction, ECI provides a structured mechanism for collaboration before major project decisions are committed. Key advantages include:

- **Earlier buildability input** – Construction expertise can influence design development before the design becomes fixed.
- **Better risk management** – Risks can be identified and mitigated collaboratively before construction commences.
- **Greater flexibility** – Design solutions can be refined and optimised before substantial commitments are made.
- **Improved collaboration** – The *Client*, the *Consultant* and the *Contractor* can establish a common understanding of project risks, constraints and opportunities.

ECI should therefore be viewed not simply as an alternative procurement arrangement, but as a collaborative risk management and design optimisation tool that supports better project outcomes.

How can project teams maximise the benefits of ECI under ECC/HK secondary Option X22?

To maximise the value of ECI, the project team should engage the *Contractor* sufficiently early to influence key design decisions, construction methodologies and risk management strategies. Meaningful engagement before major design decisions are finalised allows buildability and construction expertise to be incorporated more effectively.

The following good practices are recommended:

- **Engage early** – Commence ECI activities at the earliest practicable stage of project development;
- **Allow adequate time** – Provide sufficient programme allowance for meaningful collaboration and option development;
- **Target high-risk areas** – Focus ECI on selected works involving significant interfaces, geotechnical uncertainty, Temporary Works, traffic management or specialist construction methods instead of the whole of the *works*; and
- **Promote collaborative problem-solving** – Encourage joint review of risks, construction methods, programme constraints and innovative opportunities on a best-for-project basis.

By applying ECI strategically, project teams can improve buildability, reduce project risks and achieve more cost-effective and value-driven outcomes.

5.3.5 Issue no. 4 – Application of subcontract rate database

5.3.5.1 *Description*

Reliable cost estimates are essential to design development, procurement planning, budgeting and tender assessment. For projects involving significant specialist or trade-driven works, reliance solely on historic contract rates may not adequately reflect prevailing market conditions.

The departmental SRD provides a valuable source of market information for developing more realistic cost estimates, particularly where a substantial proportion of the works is expected to be undertaken by specialist subcontractors. Examples include piling and ground treatment, excavation and lateral support, trenchless works, utility diversions, marine works and specialist electrical and mechanical installations.

The use of SRD can improve estimate accuracy, enhance transparency of cost build-ups and facilitate more informed decision-making during design development, VM and tender preparation.

5.3.5.2 *FAQ*

What are good practices for applying the SRD in cost estimation?

The SRD should be used as a reference tool to support professional judgement rather than as a direct substitute for project-specific estimating. Cost estimates should always take account of the project's characteristics, risks and market conditions.

The following good practices are recommended:

- **Disaggregate Major Cost Components** – Price significant subcontract-driven elements separately rather than embedding them within composite rates;
- **Use Relevant Market Data** – Select rates from recent projects of comparable scale, complexity and procurement approach, and adjust them where appropriate to reflect current market conditions;
- **Reflect Project-specific Conditions** – Consider factors such as site access, programme constraints, construction sequencing, stakeholder requirements and other project risks that may influence pricing;
- **Document the Estimating Basis** – Clearly record assumptions, data sources, exclusions and adjustments to facilitate internal review, cost vetting and future reference; and
- **Apply NEC Principles** – Adopt a proactive and transparent approach to cost estimation, including early identification of cost risks and timely review of significant cost items during design development.

The objective of using SRD is not simply to produce a more accurate estimate, but also to improve cost visibility, support value-for-money decisions and enhance confidence in the procurement and budgeting process.



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