

PRACTICE NOTE 2: PEER REVIEW

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ABOUT THIS PRACTICE NOTE

This Practice Note outlines good practice for engineers carrying out peer review.

It supersedes Engineering New Zealand Practice Note 02 Version 1 (ISSN 1176-0907), which was published in 2003.

Changes in this updated version include clearer definitions of types of peer review and clearer differentiation between peer reviews and other types of review. Step-by step guidance on how to conduct a peer review is also included. Guidance relating to being an expert witness, which was covered in the 2003 version, is now included in a different Engineering New Zealand practice note.

The Practice Note has been prepared in accordance with standard Engineering New Zealand Practice Note procedures, which include reporting on progress to the Engineering Practice Advisory Committee and general membership review.

WHAT IS PEER REVIEW?

A peer review is a professional opinion based on sound engineering analysis and assumptions, good practice, appropriate regulations and unbiased judgement. It's an independent assessment of engineering work, where the peer reviewer needs to have a level of engineering expertise at least equivalent to the engineer (or engineers) responsible for the work being reviewed.

Peer reviews range from a review of completed or partially completed engineering work to establish whether specific objectives have been met, to a series of reviews at pre-determined stages in large, complex projects. Peer reviews can be limited to certain key parts of the engineering work.

A peer review is intended to reveal issues rather than necessarily resolve them. But it can be a key resource for subsequent work towards resolving any issues that are identified.

In most cases, the originating engineer will know their work is being reviewed and will be part of the peer review process.

WHAT DO THE TERMS WE USE IN THIS PRACTICE NOTE MEAN?

Engineering work can mean any of these things:

- An engineering or scientific design or design process
- An assessment of an aspect of a built structure or asset
- A technical paper or report
- The planning or implementation of an engineering project.

Originating engineer: The person responsible for the original engineering work.

Peer reviewer: The person carrying out the peer review.

Client: The person or organisation commissioning the peer review. In many cases, the client will commission the peer review for submission to a regulator. The client can also be the party who commissioned the original work.

WHY CARRY OUT A PEER REVIEW?

Peer review is a powerful tool in maintaining and enhancing the quality of engineering work. It's an important check in a self-regulating profession like engineering. Peer review checks whether originating engineers used suitable processes and assumptions and made appropriate decisions. This helps strengthen the quality of work engineers do. It also gives New Zealanders confidence in the work of engineers.

A peer review means engineering work is scrutinised by other engineers. When originating engineers willingly and actively participate, it helps keep the profession's overall output at a high standard. Wider benefits, including reduced conflicts and quicker completion, can be achieved if peer review is seen as a collaboration between originating engineers and reviewers.

A peer review can identify situations where different engineering decisions could have been made. Originating engineers, and their engineering firms or organisations, have the chance to hear and understand different ways of approaching aspects of the engineering work. This makes peer review an opportunity for ongoing professional development.

WHEN ARE PEER REVIEWS CARRIED OUT?

If there are complex or unique aspects to engineering work, or where the work's impact may be significant, a peer review is recommended.

When peer reviewers are engaged early in larger and more complex projects, the peer review's value is significantly increased. Peer reviewers can have input at specified points, while the work is in progress. If peer reviewers pick up potential issues early in the project, these can be addressed and potentially save significant re-engineering later on.

Engineers in areas like building design are increasingly being engaged to carry out peer review. This is partly a result of regulators having increasingly limited technical expertise or capacity in-house. It's also driven by clients seeking verification of compliance, as part of their own quality assurance.

Some regulatory bodies may have policies that say when peer reviews are required.

WHAT TYPES OF REVIEW ARE ACTUALLY PEER REVIEW?

This Practice Note introduces these types of peer review:

- **Concept (or Strategic) Peer Review:** A preliminary-stage review, which takes place before detailed engineering work begins.
- **Specific Peer Review:** A review that can be undertaken at any point in the engineering work process to cover a specific issue. Specific peer reviews confirm the suitability of specific aspects of planned, completed or partially completed engineering work, including reports, assessments or designs.
- **Regulatory Peer Review:** A review of objectives, assumptions, options, engineering rigour, conclusions and recommendations for a complex or unique aspect of a design for compliance with a statutory code, standard or guideline.
- **Forensic Peer Review:** A review of engineering work after there has been a failure associated with that engineering work.

This Practice Note does not cover:

- In-house review processes, where detailed checks of calculations and drawings take place as part of an engineering firm's quality assurance processes.
- Compliance reviews undertaken by a regulatory body to check for compliance with consent requirements, codes or other regulations where engineering expertise equivalent to the originating engineer is not required.
- Second opinions, where an alternative design is required without another engineer's work being reviewed.
- Competence reviews, where an engineer's competence to undertake certain work is assessed.
- Expert reviews required as part of a legal or disciplinary process.

WHO CAN CARRY OUT PEER REVIEWS?

Peer reviewers need expertise and experience

This means being recognised as at least equal in experience and technical capability to the originating engineer. This recognition will usually come from fellow members of a professional body like Engineering New Zealand.

Often the peer reviewer will have more experience in similar work than the originating engineer. Before agreeing to undertake a peer review, an engineer may need to confirm their competence to their prospective client. This confirmation can include a CV, references, professional memberships and registrations, or a portfolio of relevant experience.

For Regulatory Peer Reviews, it is important that the peer reviewer is considered acceptable by the relevant regulator. For building consents, the client should make sure the peer reviewer is acceptable to the relevant Building Consent Authority before engaging them.

Peer reviewers should be independent

Ideally, there should be no form of dependent relationship between the peer reviewer and the originating engineer. The peer reviewer should declare they are independent of the originating engineer and the originating engineer's organisation. They should have no financial or other interest in the outcome of the peer review.

In some practice fields or disciplines, there are few engineers but a large demand for peer reviews. This can make independence difficult. Originating engineers may end up being the peer reviewer for other engineers who sometimes peer review their work. The same situation can occur when local knowledge is required or preferred but the pool of suitable engineers is small.

In these cases, the peer reviewer should clearly identify any potential conflicts of interest before they are engaged. The peer reviewer should consider their ethical obligations to maintain honesty, objectivity and integrity.

If the necessary expertise is not available in New Zealand, the client may need to engage an overseas peer reviewer.

TYPES OF PEER REVIEW

Peer review is often used as part of the design process but isn't restricted to design work. It can be used for other types of engineering work, including engineering reports and assessments. Peer review can also be relevant at different stages of a project.

The client and peer reviewer need to have a common understanding of the output, the process and the end use of the review. This should be clearly recorded in writing in a contract between the peer reviewer and the client.

CONCEPT OR STRATEGIC PEER REVIEWS

This type of review is about confirming the direction of the project. It usually occurs relatively early in the engineering process, and could be requested by the client or by another engineer. It's more likely to be used for complex engineering problems. This review can take a long time if significant social, cultural or environmental impacts need to be analysed.

The purpose of a Concept or Strategic Peer Review is to check the overall concept is well conceived. It provides an opinion on option identification and evaluation, risks recognised and conclusions drawn. The review can include comments on the proposed work methods and on compliance with any relevant regulations.

The review could cover:

- Client objectives
- Social, cultural and environmental impacts
- Relevant regulatory frameworks and standards
- Design inputs and assumptions
- Proposed analytical methods
- Proposed quality assurance processes
- The risk register
- Health and safety considerations
- Value analysis
- Aspects of the work that need further review.

SPECIFIC PEER REVIEWS

A Specific Peer Review is a technical review that can be undertaken at any point in the engineering work process. The need for these reviews may occur during the engineering process as matters arise, as well as being a planned review that would generally happen as part of an engineering process. A peer review of engineering work that does not belong in any of the other three categories will be a Specific Peer Review. A peer review in this category can include

- a review of the suitability of one or more aspects of a completed or partly complete design
- a review of an assessment of one or more aspects of an already as-built structure or engineered asset
- a review of an engineering report.

Within the design process, a Specific Peer Review is usually requested by the client when they are concerned about the design, or a new factor affecting the design has emerged after the original design was undertaken. This new factor could include

- a change in legislation
- changes in recommended designs or materials or construction methods
- a physical (geological) event.

A Specific Peer Review is one option for a client when engineers have had differences in opinion on a particular aspect of a design or assessment.

As with all peer reviews, the scope of the review may be limited to certain elements or aspects of the design. In complex projects, clients may ask the peer reviewer to review an aspect of the design against alternatives.

What can a Specific Peer Review cover?

A Specific Peer Review may be requested to address:

- economic viability
- buildability
- environmental impact
- risk
- seismic capacity (or damage).

REGULATORY PEER REVIEWS

A Regulatory Peer Review determines whether aspects of a design comply with relevant regulations, codes, standards or guidelines. As a peer review, it needs to be carried out by an engineer with at least equivalent expertise to the originating engineer.

A Regulatory Peer Review provides an assessment of the originating engineer's assumptions, conclusions and recommendations, and also whether the output meets the required code, standard or guidelines. For building consents, this will usually mean checking the proposed design against relevant Building Code clauses.

A client can initiate a Regulatory Peer Review to verify compliance as part of their own quality assurance procedures, especially when applying for consent for complex or higher risk projects.

When is a Regulatory Peer Review used and what does it include?

A regulator might request or trigger a Regulatory Peer Review if:

- The project is:
 - Complex
 - Unique
 - Has an unusual form
 - Uses new technology or materials
 - Poses unusual risks (including compliance via an alternative solution that is not well understood).

- There are doubts about the design engineer meeting the regulatory body's required level of knowledge or skills in the relevant area of design.
- There are concerns about aspects of the design or design methodology.

The client and the peer reviewer must clearly describe and agree the part of the design being reviewed.

A Regulatory Peer Review should not include:

- Proposals by the reviewer of different or 'better' solutions or methodologies or wording.
- Verification of the details of every calculation or drawing. (This should be carried out as part of the design firm's QA processes.)
- Verification that design documents, such as Producer Statements, satisfy contractual obligations.

A Regulatory Peer Review is different from a compliance review

A compliance review does not include a peer review of the design and does not require an engineer with equivalent expertise to the originating engineer.

A compliance review is a comprehensive compliance check performed by or on behalf of a regulatory body, such as a Building Consent Authority. It looks at pertinent regulations, consent requirements and laws or guidelines.

We recommend that regulatory bodies make it clear what type of review is required when engaging engineers.

If an engineer is engaged by a regulatory body to carry out both a Regulatory Peer Review and a compliance review, then these reviews should be worked on and reported on separately.

Regulatory Peer Reviews related to building consents

Peer reviews carried out as part of the building consent process are called design reviews. The peer reviewer needs to complete a Producer Statement 2 Design Review (PS2). This is submitted to the Building Consent Authority with the design review report, which should include a log of communication between the peer reviewer and the originating engineer.

The PS2 is a statement of opinion, based on stated reasonable grounds, that the aspects of the proposed building work covered in the scope of engagement will comply with the Building Code.

Further information on Producer Statements can be found in Engineering New Zealand's Practice Note *Guidelines on Producer Statements*.

Regulatory Peer Reviews for other regulatory bodies

Some regulatory bodies, such as the New Zealand Transport Agency, have their own clearly-defined design and design review requirements and processes. The guidance contained in this Practice Note may not align with those design review policies.

Engineers should check if the regulatory body commissioning or accepting their review has defined design and design review policies.

FORENSIC PEER REVIEWS

A Forensic Peer Review may be part of an investigation of a completed or as-built project. It is typically requested following an engineering failure. The focus of this type of peer review is more on the performance and compliance of the completed work, rather than on design analysis and calculation.

A Forensic Peer Review could be requested by a client, a third party, a regulatory body or a professional body. It can be carried out by either a single engineering “expert” or a panel of experts.

It can consider a repeated design that occurs in several existing structures or built assets.

A Forensic Peer Review will not determine culpability for the failure. However, the review may be used as evidence in litigation or disciplinary action.

GUIDANCE FOR PEER REVIEWERS

As well as technical expertise, peer review relies on parties agreeing the work's scope and objectives, acting ethically and being aware of their liabilities.

WHAT ARE THE SCOPE AND OBJECTIVES?

Before the peer reviewer starts, the objectives and scope of the peer review need to be agreed by both the client and the peer reviewer. A contract should be in place between the peer reviewer and the client, supported by a brief that sets out what is and isn't covered.

To avoid unnecessary work, where possible, the scope should focus on complex and unusual aspects of the work.

The peer reviewer can choose to add relevant comments over and above their brief. But it's not appropriate for peer reviewers to comment on the general competence of the originating engineer nor to promote their own views. All comments (and responses to them) should be professional and respectful, and promote a sense of collaboration.

Peer reviews should not usually include detailed checking of calculations, drawings, formatting and grammar. Detailed checking should be covered by the originating engineer's firm's quality assurance procedures. The extent to which detailed checking of calculations and drawings will be undertaken in a peer review needs to be discussed with the client and made clear in the scope.

WHAT ARE PEER REVIEWERS' ETHICAL OBLIGATIONS?

Every rule in the Chartered Professional Engineers' and Engineering New Zealand's Codes of Ethical Conduct is relevant to all stages of peer review, including when peer review work is being accepted.

Both the peer reviewer and the originating engineer should be mindful of their obligations under Rule 5 of the Code of Ethical Conduct, which focuses on appropriate behaviour. This rule sets out engineers' obligations to act with honesty, objectivity and integrity, and to treat people with respect and courtesy. It is relevant to all written and verbal discussions during any part of the peer review.

The Engineering New Zealand Practice Note *Engineers and Ethical Obligations* provides guidance on how to interpret the relevant Code of Ethical Conduct. If you are a peer reviewer and you are concerned about your ethical obligations (including concerns about health and safety, or competence), you can contact Engineering New Zealand.

WHAT ABOUT LIABILITY AND INSURANCE?

If a court upholds a claim against design work or other aspects of the design process, any peer reviewer of that design may also be liable for damages.

If you are engaged as a peer reviewer, you should consider limiting your level of liability in contract with your client. Engineers should limit their liabilities in accordance with industry guidelines. You should discuss appropriate levels of liability for high-cost projects with your insurer.

Remember there is no limit to liability under the Consumer Guarantees Act. This will be relevant if the client for the peer review is a consumer and is not 'in trade'. If the client is 'in trade', it is possible to contract out of the Consumer Guarantees Act.

When carrying out regulatory peer reviews to verify Building Code compliance, peer reviewers complete a Producer Statement (PS2 Design Review). The Engineering New Zealand/CENZ/NZIA PS2 form states a maximum amount of damages payable to the Building Consent Authority by the peer review firm. You should only alter this amount for high-cost projects.

WHAT ABOUT CONFIDENTIALITY?

A peer reviewer must agree to maintain confidentiality of the work being reviewed. This includes any information relating to the work that emerges during the review process.

If you are thinking about disclosing information you obtained during a peer review, consider your obligation to maintain confidentiality under the Chartered Professional Engineers' and Engineering New Zealand Codes of Ethical Conduct, as well as any clauses on confidentiality in the contract.

TELLING ANOTHER ENGINEER THEIR WORK IS BEING REVIEWED

We recommend peer reviewers inform the originating engineer they are reviewing their work. (An exception to this is Forensic Peer Reviews, where there may be legal constraints.) Informing the originating engineer is a professional courtesy. It creates an opportunity to start working collaboratively on the work under review.

While informing the originating engineer is no longer an ethical obligation under the 2016 Chartered Professional Engineers' and Engineering New Zealand Codes of Ethical Conduct, peer reviewers should make every reasonable effort to contact and work with the originating engineer.

ENGINEERING JUDGEMENT

All engineering work includes engineering judgement. This is a unique, personal perspective on what is appropriate or acceptable. It's derived from personal and professional experiences and skills. In the same way that personal and professional experiences vary, judgements vary from engineer to engineer.

If you are reviewing work where an engineer had to significantly exercise their judgement, maintain a fair and reasonable approach.

CONDUCTING A PEER REVIEW: KEY STEPS

1. The client identifies the **need** for a peer review. They then define the **broad scope** of the review, and identify a **competent peer reviewer**. (If it's a Regulatory Peer Review, this includes making sure the peer reviewer is acceptable to the regulator.)
2. The peer reviewer tells the client about any potential **conflicts of interest**.
3. The client and peer reviewer **agree on a brief**. A clear brief is critical. The brief sets out:
 - the purpose of the peer review
 - the original objectives for the work (these are the objectives that were given to the design or assessing engineer)
 - the scope of the peer review, giving a clear and detailed description of what is and is not covered.
 - cost and expected timeframes for the peer review
 - how and when the peer reviewer and the client will communicate with each other
 - the reporting schedule (this is relevant if interim reviews are expected)
 - any barriers that may prevent aspects of the peer review being carried out. These could include known limitations to obtaining necessary documentation
 - the limit of the peer reviewer's liability
 - who will receive the review.
4. The client and peer reviewer enter into a **contractual agreement** that includes the agreed brief. The Short Form Engineering New Zealand/ACENZ contract should be suitable, unless the peer review is complex. For larger, more complex projects, you could use other agreements such as the Conditions of Contract for Consultancy Services (CCCS) or the American Society of Civil Engineers' E-581 Agreement between owner, design engineer and peer reviewers for peer review of design.
5. The peer reviewer starts the peer review. Depending on the type of peer review, the peer reviewer will **contact the originating engineer**. During a Concept or Strategic Peer Review, Regulatory Peer Review or a Specific Peer Review, there is usually a lot of communication between the peer reviewer and the originating engineer. During a Forensic Peer Review, there may be little or no communication (due to specific directives, such as legal constraints).
6. The peer reviewer should keep a **log of any documentation** provided by the client or originating engineer.
7. The peer reviewer should keep a **log of queries and responses** between themselves and the originating engineer. Each matter raised should be resolved and recorded in the log. Maintaining a query/correspondence log may also be a requirement of some regulatory bodies.
8. If the peer review is taking a long time, the peer reviewer should **keep the client updated** on progress.
9. The peer reviewer informs the client **if resolution on key issues can't be reached** with the originating engineer. The peer reviewer will need to give the client a summary of the dispute, including relevant correspondence.
10. When the peer review is finished, the peer reviewer **reports to the client**. If the client consents, the peer reviewer should send a courtesy copy to the originating engineer. (Providing a courtesy copy to the originating engineer may not be possible for a Forensic Peer Review, due to legal constraints.)

The peer review report should:

- specify who is entitled to rely on the report, and under what circumstances
- state the scope and purpose of the report
- describe what has and hasn't been reviewed
- provide key findings
- include disclaimers and qualifying statements for
 - work not undertaken
 - matters requiring more investigation
 - reliance on information provided by others
 - assumptions made.

11. For a Regulatory Peer Review, a **Producer Statement** (PS2 Design Review) should also be completed. When completing the PS2, carefully and clearly define the scope of the design review.

REFERENCES

The following resources were used in preparation of this Practice Note, or referred to in it:

American Society of Civil Engineers (2011). *E-581 Agreement between Owner, Design engineer, and Peer reviewers for Peer Review of Design*. Available at www.asce.org/templates/contract-document-product-detail.aspx?id=6672

Engineering New Zealand (formerly Institution of Professional Engineers New Zealand) (2016). *Code of Ethical Conduct: What you need to know*. Available at: www.engineeringnz.org/resources/code-ethical-conduct/

Engineering New Zealand (formerly Institution of Professional Engineers New Zealand) (2014) and Association of Consulting Engineers New Zealand. *Practice Note 1: Guidelines on Producer Statements*. Available at: www.engineeringnz.org/resources/practice-notes-and-guidelines/

Engineering New Zealand (formerly Institution of Professional Engineers New Zealand) and Association of Consulting Engineers New Zealand (2016). *Short Form Agreement for Consultant Engagement*. Available at: www.engineeringnz.org/resources/contracts/

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Wellington City Council (n.d.). *Building control and peer review Wellington City Council Guidance Document*. Wellington: Wellington City Council.

LEGAL INFORMATION

Practice Notes offer guidance to practising engineers by exploring issues of importance to the profession and setting out good-practice methodologies. They are written by practitioners and subject to review by Engineering New Zealand members.

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