New Zealand guide to temporary traffic management:

Quality, assurance, and control

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Each of the six audits/reviews in the quality assurance and control model is detailed further in this guidance note.

The quality, assurance and control 'Swiss Cheese model' has been included below for context.

Each audit/review process within the system has its own unique strengths and weaknesses. By using multiple layers within the system, each risk is mitigated by a specific layer (or multiple layers) with the result being the greatest opportunity for zero harm work sites.

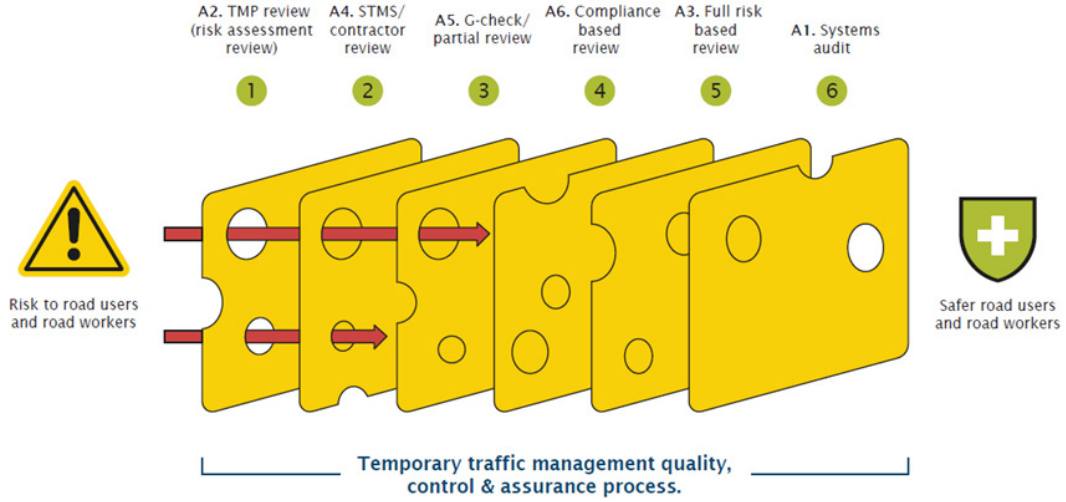

Figure 1: Quality, Assurance and Control Process - Swiss Cheese Model

Quality, assurance and control process 1 – TMP review

Version No. 1.1
Created by: Quality assurance and review working group

Process description

The TMP review process happens before site implementation or following other assurance processes. It makes sure the risks associated with impacts on normal road operating conditions have been identified, assessed, and are suitably controlled by a combination of measures to eliminate or minimise the potential for harm.

Purpose of process (the why)

The purpose of this process is to confirm that proposed controls result in the lowest total risk profile for the site as is reasonably practicable, and that all proposed controls are consistent with required industry best practise.

Scope

Process start

Finalisation of the proposed TTM controls in the form of a TMP and risk assessment.

Process end

1. Approval/authorisation of TMP
2. Handover of TMP and risk assessment for operational delivery

Overlapping reviews

A1. System audit

Parties involved

The TMP review process is multi-layered and may be triggered at any step of the of job as listed below:

1. By RCAs or other TLAs prior to TMP approval
2. By the lead contractor PCBU – for TMP approval
3. By the planner and TTM manager - before handover to STMS
4. By an appointed person – following any assurance process (partial, SCR) where root cause identification may give rise to TMP concerns
5. Post incident and/or part of a full risk-based, partial, or SCR audit.

Scope

1. Should uncover areas where risks haven't been identified or appropriately managed in a TMP
2. Would identify where the choice of controls are not in line with the Hierarchy of Controls
3. Would identify any changes on site that haven't been dealt with by the TMP
4. Is a quality check of the proposed TMP

Limitations

1. Will not assure the correct application or installation of the TMP plan

Outcomes of process

The process outcomes are:

1. Improve initial planning between the activity operational team and the design process
2. Reduce the need for reactive decision making or modifications by onsite personnel
3. Reduce variations between the activity needs and the planned TTM controls

Resource (the who)

1. RCA risk reviewer/corridor manager
2. Lead contractor PCBU risk reviewers
3. STMS
4. TMP designers
5. Contracting PCBU risk reviewers

Steps (the how and when)

Process steps

Steps specific to different scenarios are noted accordingly

1. Trigger of TMP review by onsite audit, or incident – specific only to these two scenarios
2. Provision of the TMP, and associated background risk assessment, by the TMP designer
3. Review conducted
4. Provision of review outcome:
   a. Endorsement with no conditions.
   b. Endorsement with conditions.
   c. Endorsement with enacted modifications – for use by onsite STMS where modifications can be made before deployment
   d. Rejection with feedback – for risk reviewer or approver
   e. Review report with conclusions – for review following onsite audit, or post-incident review
5. Incorporation of review feedback by TMP Designer – if required
6. Return to Step 2

Inputs required

1. The prepared TMP and associated authorisations – identified, requested, or approved risk assessment documentation and notes
2. Additional information regarding scope of activity, traffic data, adjacent worksites, or environmental factors that ensure comprehensive review

Flow

1. TMP prepared
   a. TMP designer prepares TMP
2. Data input
   a. TMP given to reviewer
   b. Collection of additional data or evidence as required by reviewer
3. Review conducted
   a. Review done by the reviewer
4. Feedback provided
   a. Feedback given to TMP designer – either endorsment or amendments
5. Revisions
   a. Adding of revisions or rework by TMP designer as required
6. Re-review
   a. Further review to verify changes have been added

Outputs generated

The outputs of this review come from three areas:

1. Pre-approval – Confirming appropriate control selection and application against identified risks to generate lowest total risk in line with the hierarchy of controls
2. Pre-handover to STMS – Validation that proposed controls are appropriate for the conditions present at time of deployment
3. Post installation/post event – Identification of process or control selection improvements for future activities or root cause analysis from risk management failures

Exceptions to standard process flow

Common activity plans, those that involve repetitive activities using the same controls multiple times, may get a modified risk review addressing only the variances to the original risk review, and not a full review.

Risks

	Risk	Mitigation
Process risks	Extensive rework needed, making the planning process longer	▪ More training for TMP designers ▪ Bringing TMP reviewers in at earlier stages of planning process ▪ Provide reliable review documentation for reviewers to implement
	Subjective review resulting in opinion-based conflict	▪ Proven training for TMP designers and reviewers ▪ Extra guidance and standards for TMP designers and reviewers to align thinking ▪ Practice notes ▪ Strong collaboration between planner and reviewer on the intent of the plan
	Not enough information shared across parties to explain reasoning for control selection	▪ Create internal processes to ensure full disclosure of information to TMP designer ▪ Creation of risk assessment frameworks and tools to generate more thorough information ▪ Strong collaboration between planner and reviewer on the intent of the plan
	Ineffective review TMP passes review despite being not fit for purpose.	▪ Enough time allowed for review ▪ Extra training for reviewers ▪ Good support for reviewers ▪ Enough information to reviewers to ensure review is robust
Verifications	**1.** Record and analyse review time and percentage of rejections requiring minor and major rework **2.** Record and analyse the volume of onsite or post-incident triggered reviews **3.** Engage a reviewer regularly to gather qualitative data for collective TMP designer feedback, or training system improvements	

Quality, assurance and control process 2 – STMS/contractor review

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Created by: Quality assurance and review working group

Process description

The handover from the TMP designer or TTM Manager to the STMS is often the first opportunity for the STMS to review risk mitigations and the proposed controls (the TMP).

STMS and TTM manager/supervisor to assess TTM equipment and scope of the TTM against the actual activity and environment, including a review of the residual risks.

The STMS/contractor review is similar to what a STMS would do following set up of the site and site check, however it's more comprehensive and more focussed on verifying understanding and relevance of the proposed controls within the TMP.

Purpose of process (the why)

The STMS/Contractor review makes sure the TMP is still fit for purpose pre-installation

The STMS verifies fit for purpose immediately after installation but before activation of working space.

This review normalises the best practice of pausing delivery until an assessment or plan is brought up to standard.

The overall process helps deliver fit for purpose TTM with positive outcomes for safety and productivity.

Scope

Process start

After approval of the TMP – physical action to start the process is the handover to the STMS.

Process end

Opening of active workspace – after 1st (setup) site check.

Overlapping reviews

Once TTM is active, partial review (A5) or compliance-based review (A6) (including the mobile installation) procedure can be done.

Parties involved

1. TMP designer
2. STMS
3. TTM manager/supervisor – or similar organisational roles that oversee TTM operations

Scope

Approval/acceptance of TMP and confirmation for operational delivery of the plan (job scheduled and TTM team rostered) triggers:

- Determining plant and equipment requirements.
- Verifying job location and work area, including that the environment still fits with plan.
- Checking authorisations to be established, that is, no parking, bus stop and bus routes, traffic signal authorisations etc.
- Verifying the physics of the TMP – do exclusion zones fit the environment etc. Do a reality check of the plan.
- Checking the risk assessment and resolution of the risks including gaining an understanding of the residual risks of the plan.

The STMS/contractor review also prepares the STMS for the initial site check post installation.

Gives STMS opportunity to push pause on the work if the plan is not fit for purpose, including rostered people, plant and other equipment

This review may be done more frequently as part of a risk verification process, or in confirming competence or training of staff.

Limitations

1. Will not assure the correct application or installation of the TMP plan.
2. Will not assure, in isolation, future TTM design or risk assessments are fit-for-purpose without a good system for feedback.

Outcomes of process

The process outcomes are:

1. A deliberate decision to proceed (or not) with on-road TTM activity
2. Verifying the appropriateness of selected controls with up to date environmental and activity information
3. An inventory of plant and equipment needed to implement the controls as designed
4. Staff development and verification of staff competency
5. Confirmation of set out times, authorisations, and approvals

Resource (the who)

Essential parties:

1. Contractor – the TMP designer, TTM manager and/or the scheduler of the job
2. STMS

Optional parties: (depending on site context)

1. Others within the TTM Team
2. Risk reviewer/s
3. Corridor manager
4. Contracting PCBU representative and/or engineer's representative
5. Others within the contracting chain

Steps (the how and when)

Process steps

Steps specific to different scenarios are noted accordingly

1. Handover from TMP designer/TTM manager of the TMP.
2. TTM manager and/or STMS collaboration on the physical delivery – risk assessment confirmation (This step may involve other parties in certain circumstances).
3. STMS (and possibly TTM team) do an operational review for physical delivery (equipment, time, methodology).
4. Physical installation of TTM – STMS establishes TTM, followed by final drive over to ensure alignment with the TMP and risk assessment.
5. Activation and first occupation of the working space.
6. Ongoing STMS/contractor review is done to verify continued effectiveness of controls and operation within the TMP parameters.
7. STMS compiles quality assurance documents, such as an on-site record, to satisfy the PCBUs in the system that controls are being reviewed and are remaining appropriate.

Inputs required

1. The approved and authorised TMP, including:
   a. Scope of work
   b. Scope of the TTM including traffic impacts and potential for delay
   c. Location details and information
   d. Appropriate approvals (network and regulatory) and contractor assurance approval of the proposed controls
2. Competent people with required qualifications to do the onsite roles such as STMS
3. Time, after approval before installation, to ensure deliberate execution of this review
4. Appropriate recording documentation, including an on-site record, hazard ID recording system etc.

Flow

1. Handover
   a. Handover to STMS is done
2. Risk review
   a. Collaborative review on how the risk is proposed to be managed and if the controls are applicable (multiple parties may be involved)
3. Operational review
   a. Collaborative review of operational aspects of the plan such as plant, equipment, time and space
4. TTM installation
   a. Installation of onsite TTM including post-installation review
5. Ongoing review
   a. Ongoing STMS reviews throughout onsite operation to ensure applied controls remain effective
6. Recording
   a. Compilation of documentation or generation of evidence that controls remain applicable and are being reviewed

Outputs generated

Through the application of this process, a STMS-led partial review (A5) is done to cover all General (G) checks:

1. **Risk assessment and plan matches the reality onsite (and vice-versa) (G8)**
2. **Summary of plan specific objectives, including regulatory measures (site pre-conditioning – for example, installation of no parking signs before day of works, timing of installation of TTM measures on large works etc.)**
3. **Ensures a qualified person is responsible for the works (G1)**
4. **Opportunity to halt the operation prior to implementation if the plan is inappropriate (G7)**
5. **Ensures regulatory approvals and measures are present and applicable (G2, G5)**
6. **Establishes a system for recording review of controls and their continued effectiveness (G3, G4)**
7. **Gathering of trend data for reoccurring issues**

This review also provides an opportunity to provide feedback to TMP designers to build a more robust planning processes.

Exceptions to standard process flow

Highly motivated and competent STMS may follow process but not document these actions until completion.

While the exception is expected from time to time, operational behaviours should be focussed on ensuring recording of the review of controls at the time of the review. A range of recording measures such as video and audio are encouraged to limit operational constraint on onsite staff.

Milestones of control

Where risks could happen in the process and add control points which will help monitor the process.

Verifications

Outline measurements to determine the process is still effective and where it can improve.

Risks

	Risk	Mitigation
Process risks	TTM provider operations are disconnected from the process, limiting the STMS from doing the process prior to implementation	▪ TMP should have appropriate staging and occupation times ▪ Establishment of organisational processes to ensure this review is operationally consistent and embedded ▪ Training for operational staff to express the importance of this review and its value
	Review not completed by STMS	▪ Provision of training to STMS on the importance and value of this review, and how to do it ▪ Establishment of operational checks by PCBUs to verify this review is done
	Lack of competence of those doing the review (STMS and TTM operational staff/ managers)	▪ Additional mentoring and/or peer review for involved staff. Supervisory system. ▪ Potential escalation of the process to partial review of compliance-based review
	Misunderstanding or miscommunication between parties	▪ Ensure direct handover to STMS so there's an opportunity for dialogue ▪ Ensure an opportunity for communication, questions or feedback is present in the process ▪ Allocation of appropriate review time as part of operational planning
	Information about work activity not known at time of review.	▪ Lead/sub-contractor PCBU staff should be engaged as part of the review as needed to ensure all parties are able to coordinate. ▪ Planning processes should arrive at appropriately precise (and unambiguous) work activity risks and controls.
Verifications	**1.** If this review is completed correctly, a partial review (A5) has also been completed but organically (by the STMS). Later A5 reviews should result in full compliance. **2.** Significant improvement in outcomes through a reduction in compliance-based review scores and dangerous worksites (for more information, refer to Auckland Transport's 'recipe for success'	

Quality, assurance and control process 3 – partial site condition review (G checks only)

Version No. 1.1
Created by: Quality assurance and review working group

Process description

Partial review of the controls on a TTM worksite by looking at only a narrow-focussed aspect or aspects of the worksite controls (in this case the Other Checks G1 – G8 from the compliance-based review form).

Purpose of process (the why)

To identify performance and issues in key control areas or areas where there are poor performance trend areas.

The completion of a partial review means that a larger sample size can be completed which allows more certain data analysis and more robust decision making for corrective actions if necessary. Doing a partial TTM SCR means that targeted briefing and monitoring can more easily maintain a consistent monitoring regime.

The successful implementation of each of the Other Check controls has a statistically significant impact on the successful implementation of the physical controls (traffic control devices and mitigations) at worksites.

Scope

Review G1, G2, G3, G4, G5, G6, G7 and G8 as per the full compliance-based review and associated guidelines.

Forms part of the full compliance-based review (A6). Refer to A6 for the more extensive process.

Outcomes of process

The process outcomes are:

1. Time efficient screening of worksites.
2. Where significant issues are observed on site, a full compliance-based review (A6) must be completed instead.
3. Identification of trends with performance in each of the other checks (key controls) and where corrective actions can be targeted.

Resource (the who)

TTM reviewer (qualified)

A PCBU may instruct a suitably competent person to do an informal partial review

Inputs required

- Clear scope of the review (in this case, G Checks only)
- Observation of an actual worksite, especially in vicinity of workspace or hazard area
- Approved TMP (if not emergency work)
- OSR (last OSR if unattended)
- STMS qualification (if attended)
- Standard SCR form
- Technical guidance documentation for G1 – G8 (from compliance-based review guidance)

Steps (the how and when)

For more detail, see guidance on G1 – G8 in full compliance TTM SCR. No particular order applies for the following bullet points.

For more detail on each of the checks, refer to separate documentation relating to the technical aspects:

- Does approved TMP exist (and not emergency) (G5)
- Is TMP present on attended worksite (G6)
- Assess TMP relative to actual environment and workspace/activity/hazards (G7)
- TTM closure type/broad layout relative to approval (G8)
- Verify STMS (or the person delegated as responsible) qualification relative to worksite requirement (G1)
- Is OSR completed and a fair reflection of actual site condition (G4)
- Is traffic travelling through site reasonably unencumbered and within their own dedicated path (might be part time) (G3)
- Is TSL appropriate and has integrity (at least one at any change) (G2)

A general assessment of the overall site TTM mitigations should be done. If considered unsafe, escalation to a full compliance-based review is required.

The partial review must be documented using the G-checks section of the full compliance-based review form.

If:

1. The site is active and any of G1, G2, G3 or G5 fail, issue Stop Work Order (SWO) until such time as failure is resolved.
2. Any other failure triggers, raise with PCBU/STMS as soon as possible for remedy (failure to remedy in a timely manner will trigger escalation and possible SWO).

Flow

1. Identify review
    a. Establish the need for the review, verify competence of reviewer and conditions for review to happen (time, permissions etc.)
2. Undertake review
    a. Compelte G Checks process
    b. Recieve site safety briefing as required
3. General assessment
    a. Do a general risk risk assessment ('feel good factor')
4. Document review
    a. Document the review using the G checks section of the full compliance-based review (A6)
5. Escalation (if required)
    a. Escalate to a full compliance-based review if unsafe environment exists, or specific G failings occur

Outputs generated

1. Partial review result issued to all parties/PCBU
2. Any issues highlighted
3. Clarity that the review is a partial (Other Checks) review only
4. Increased sample size and trend analysis (report to industry/stakeholders/PCBUs)
5. Potential escalation process

Exceptions to standard process flow

If site is considered significantly unsafe, escalate to full review – separate process.

If the review is being done for the purpose of reviewing a project/work and you are with the PCBU, the partial review is not recommended. A full review should be done:

- If you are supervising the project, you need to be looking at the works as a whole rather than a sample of the works.
- As a partial is a quick review for trend analysis across multiple sites, it still has benefits but isn't fit for purpose on single sites.

Risks

	Risk	Mitigation
Process risks	TTM reviewer gets it wrong – poor knowledge	▪ TTM review panel ▪ Joint/peer reviews ▪ Full compliance review escalation opportunity ▪ Appeal system is available and active
	TTM reviewer gets it wrong – having a bad day (either reviewer or site staff)	▪ Appeal system is available and active
	TTM reviewer gets it wrong – misunderstanding or miscommunication	▪ Appeal system is available and active
	SCR system flawed outcome	▪ Continuous review of effectiveness of this program
	Safety of sites – in undertaking a partial SCR of a worksite, some poorly operating sites may pass.	▪ Where the TTM reviewer believes that a site may be operating poorly despite a pass in the partial review, a full review will be done.
	Compliance of sites – some sites might be given a pass despite failing in checks not reviewed	▪ Where the TTM reviewer believes that a site may be operating poorly despite a pass in the partial review, a full review will be done.
	Consistency of reviews – in doing some partial reviews, the industry will note variance these reviews	▪ Communication of programme scope prior
	Performance KPI – the reviews carried out as part of this programme will pass some worksites that would normally fail, that is, they're non-compliant for other reasons. Inclusion of these statistics in the monthly KPI would incorrectly imply better performance of worksites.	▪ It's been found that the performance in only the Other Checks is similar to the performance across full reviews. ▪ Data record keeping including a flag (a unique Audit ID) for audits done under this programme will allow appropriate analysis of performance
Verifications	**1.** This process will be effective wherever there's a less than probable (<95%) likelihood of a pass in the checks done. **2.** Some of the G Checks might be able to be eliminated (or partially eliminated) from the general program when their pass rate is above 98% and all pass is above 95%.	

Quality, assurance and control process 4 – site condition review

Version No. 1.1
Created by: Quality assurance and review working group

Process description

The compliance-based review happens during the site implementation phase and compares the applied TTM controls to what was proposed and agreed as part of the TMP.

A variety of partial reviews can be done using certain sections of the full compliance review form.

Purpose of process (the why)

A clear and consistent compliance-based audit – reviewed, measured, and weighed against the TMP.

A validation of on-site administrative requirements to document compliance.

An escalation process from a partial review.

Scope

Process start

The reviewer arrives in the vicinity of the site to do the review.

Process end

The review documentation is provided to the PCBUs in the system, and the STMS.

Overlapping reviews

- A1. Systems review
- A3. Full risk-based review
- A4. STMS/Contractor review
- A5. Partial review (G checks)

Parties involved

The compliance-based review is an onsite function aimed at verifying accurate installation of the TMP. It may be triggered by any PCBU in the system to confirm the agreed methods for managing risk on site are being done.

The review involves:

1. A suitably qualified site reviewer to do the compliance-based review
2. The STMS
3. The work activity supervisor (if required)

Scope

1. Identifies areas where proposed TTM controls have not been applied, or have been applied incorrectly in line with the TMP
2. Should enable the correction of onsite TTM controls to match the risk-assessed controls in the TMP if appropriate
3. May identify areas where proposed TTM controls in the TMP are not fit for purpose and trigger appropriate onsite changes

Limitations

1. Won't fully address the appropriateness of the controls proposed in the TMP, only their accurate application.

Outcomes of process

The process outcomes are:

1. To improve the condition and operation of the site.
2. Site is identified as dangerous must include areas that must be addressed before activities re-start.
3. Corrections should be communicated and agreed between the relevant parties. Record them on the form so there's a clear understanding of any requirements, including timeframes and who is responsible for the changes.

Resource (the who)

These organisations – contracting PCBU, contracted PCBU or RCA, can engage the following suitable qualified assurance personnel:

1. TTM reviewer
2. NZQA TTM auditor
3. Contracting PCBU
4. STMS
5. Engineer to contract
6. RCA representatives

A PCBU may instruct a suitably competent person to do an informal SCR Review.

Steps (the how and when)

Process steps

Steps specific to different scenarios are noted accordingly

1. Compliance based review may be planned or reactive – reactive may be triggered by incident or complaint etc.
2. Site drive through is done
3. Announce arrival to the STMS (if active site) and get appropriate safety briefings. The reviewer must seek approval from Working Space Supervisor if access to the working space is required.
4. Do the review
5. Determine the outcome
6. Provision of review outcome:
   a. High standard/acceptable outcome – provide feedback
   b. Unacceptable outcome – supervise immediate improvements
   c. Dangerous outcome – supervise immediate improvements or Stop Works Order. Will require corrective action plan (CAP)
7. Follow up meetings or later reviews depending on original outcome – that is a SWO/CAP may require another review to allow work to restart

Inputs required

1. Qualified Reviewer
2. Vehicle with camera (for recording purposes)
3. Network access report/data from RCA
4. Approved TMP and associated paperwork (active site)
5. Number of reviews is based on:
   a. Number of worksites on each region
   b. Number of available reviewers

Flow

1. Review triggered
   a. May be planned or reactive
2. Site drive through
   a. Undertand the full site environment and conditions
3. Site induction
   a. Announce presence to STMS and recieve appropriate safety briefings
4. Review conducted
   a. Do the review
5. Result actioned
   a. Deliver and record the outcome
   b. Do any immediate corrective actions
6. Further actions undertaken
   a. Finalise and action follow up actions as required

Outputs generated

1. Produce SCR form with result. Show evidence of items reviewed.
2. Produce Improvement Notice (where required)
3. Increasing data set to enable analysis

Exceptions to standard process flow

If significant safety risks are identified but not captured adequately in the form for example, scoring doesn't justify the feel good factor (FGF).

1. Subjectiveness of the reviewer... picking up 50 dirty cones.
2. Capital Works reviews (sectional reviews?)
3. Could also be done as a partial review such as Other Checks (Section G) or Mobile Operations review (Section B) of the SCR form.

Risks

	Risk	Mitigation
Process risks	Process not followed by reviewer or supported by the contractor/STMS.	• Peer review system • Organisational PCBU engagement to ensure buy-in
	Misunderstanding or miscommunication between parties	• Appeal system available • CAP system ensure ability to explore issues and remedies
	Lack of competence of those doing the review and/or lack of STMS objectivity	• Reviewer supervision or peer review system • STMS mentoring and/or coaching opportunities
Verifications	1. Peer review or moderation process to make sure auditors are working to the same level. 2. Review incident data and check causes to make sure they're considered on future reviews 3. Record developing trends and corrective actions	

Quality, assurance and control process 5 – full risk-based review

Version No. 1.1
Created by: Quality assurance and review working group

Process description

A full risk review of a TTM site explores all risks and controls. This is needed for long term or high-risk sites to make sure risks are adequately captured and managed across the entire TTM operational workflow.

Purpose of process (the why)

A full risk review means that all risks are considered properly, not just those examined in compliance type audits. The full risk review also enables a more extensive root cause analysis of identified gaps that may be a result of other parts of the system, such as TMP Design or a risk review earlier in the operational workflow.

Scope

Process start

Triggers for a full risk review:

- High risk sites
- Long term sites – desktop prior to deployment, on road after deployment
- Post incident
- Contractual trigger – such as a periodic, contractual obligation
- As part of a wider review of TTM standards and processes to ensure they're capturing risks adequately

The process starts through engagement of a suitably qualified full risk reviewer.

Process end

1. Confirmation of appropriate control selection and application
2. Resolution of unresolved risk through application of alternative controls, or stopping of work if necessary

Overlapping reviews

A1. System audit – may involve this review as a part of the overall systems audit

A2. TMP review – may be part of this review or be supplementary/complementary to this review on larger more complex high-risk sites

A4. Contractor/STMS review – may be part of this review, or trigger this review

A5. Partial review – may be part of this review, or trigger this review

A6. Compliance based review – may be part of this review, or may trigger this review

Parties involved

The full risk review may be triggered by any PCBU in the system but most likely by the lead contractor PCBU as part of a more comprehensive risk management process for high risk environments, or in a post-incident setting.

All PCBUs may be involved in the review, however roles such as TMP designers, construction or project managers or engineers, consulting engineers or engineers representatives may be heavily involved or responsible for the process.

Scope

The overall scope of the full risk review is to explore the best risk-based solution for the site, regardless of whether this found through design or implementation. It's intended as an outcome based review. The review:

- should uncover the full range of risks associated with all road users and road workers
- Should determine the origin of risk decisions across the operational workflow. This will allow adjustment across that workflow. It won't be purely isolated to on-site application and TMP implementation like with the compliance-based audit

Limitations

1. Won't explore risks that are solely contained within the work activity area
2. Won't necessarily initiate corrective action across the operational workflow as the focus is on the safest possible solution onsite – not how it should have been arrived at.

Outcomes of process

A full report detailing the risks, controls for the risks, any residual risk and an assessment of the controls.

Generally, report wouldn't include specific suggestions for improvement, only if onsite outcome was sufficient and why or why not.

Resource (the who)

1. Road safety auditors with relevant experience in TTM
2. TTM specialists trained in road safety auditing
3. Minimum 2-person team, generally at least 1 qualified engineer or equivalent

Steps (the how and when)

Process steps

Steps specific to different scenarios are noted accordingly

1. Assemble review team and select sites
2. Notify parties of the review and request information – collect data multiple days before the audit where possible (post incident not applicable)
3. Briefing meeting with STMS, TMP designer and site manager/lead. Provide a briefing on the review
4. Compile information, review and request clarification as required
5. Identify potential areas of concern – desktop review
6. Site visit
    a. May require multiple visits – day and night, possibly different times of day or weather conditions if available and applicable
    b. Collect photos/video of all site visits
    c. In vehicle – drive through
    d. On foot inspection of site controls – for example, barrier systems and footpaths/cycle paths
    e. Written site visit notes
7. Debrief with team and relevant PCBUs involved
    a. Discuss preliminary findings
    b. Make sure no information is missing from the planning stage, such as why a particular option was selected
8. Prepare detailed report

Inputs required

1. Traffic management plan including all diagrams (TMDs)
2. Designers notes on risks and mitigations
3. Summary of overall project stages
4. Overview of works including phasing
5. Crash history of site – CAS and TTM incident emails
6. Traffic data for site – volume, traffic mix etc.
7. Previous compliance reviews or other reviews
8. On site records
9. TTM related contractor incident reports

Complex, post incident, early project works sites that would be covered by this style of review

Flow

1. Enact the review
   a. Assemble review team
   b. Notify parties and do briefings
3. Information gathering
   a. Gather relevent information
   b. Do the desktop process
3. Site visit
   a. Gather site information
   b. Multiple visits if required
4. debrief
   a. Do a debrief with preliminary findings
   b. Gather and review additional information if provided
5. Detailed report
   a. Compile detailed report
6. Re-review
   a. Do a re-review if required following corrective actions – certain circumstances only

Outputs generated

The main output of the process is a detailed report containing:

1. a summary of the reason for an audit – see triggers above
2. the parties involved
3. the information received
4. findings
5. recommendations – point to issues to resolve, not specific solutions

The detailed report aims to confirm the achievement of risk management for the site from a TTM perspective.

The key output is the confirmation of appropriate control selections and the management of risk to the lowest possible level.

If this can't be achieved, the report will outline where the risks aren't yet sufficiently managed.

Exceptions to standard process flow

If critical risks are identified on site, where controls or lack of controls present an immediate danger, this must be escalated as soon as possible.

This may result in pausing the review process and stopping works until improvement can be done and normal operations and the review can continue.

	Risk	Mitigation
Process risks	Inaccurate, or incomplete evidence creates an incorrect review picture	▪ Establish and authorise organisational co-sponsored buy-in ▪ Make sure experienced and qualified reviewers are appointed ▪ Ensure planned review activities are scheduled and catered for as part of work programmes
	Full risk review restricts site progress or activity	▪ Ensure planned review activities are scheduled and catered for as part of work programmes ▪ Set out efficient review processes before starting ▪ Use more targeted review activities where appropriate to isolate specific risk areas ▪ Use experienced reviewers
	Competency of reviewers is lacking	▪ Make sure a suitably experienced two-person team is selected and agreed prior to starting ▪ Make sure the appropriate qualifications are held for the context of the site – that is, road safety barrier systems, STMS qualifications etc. ▪ Set out minimum qualification and track record expectations for reviewers ▪ Set up a peer-review system for emerging reviewers to ensure adequate supervision
	Review outcomes are not resolved or actioned	▪ Any actions must be connected to the review process ▪ Review must establish appropriate conditions before work can be done – minimum actions ▪ Re-review activities must be planned and agreed as part of audit outcomes
Verifications	**1.** Peer review or moderation process to make sure auditors are working to the same level. **2.** Review incident data and check causes to make sure contributing factors are considered on future reviews.	

Quality, assurance and control process 6 – systems audit

Version No. 1.1
Created by: Quality assurance and review working group

Process description

The TTM specific module may include some of the following ISO 9001 Quality Assurance Components:

- Leadership
- Commitment
- Customer focus
- Org roles and responsibilities
- Addressing risks
- Competence
- Communication
- Monitoring, measurements, analysis and evaluation
- Non-conformity and corrective action

Purpose of process (the why)

Quality assurance systems are required for organisations to provide TTM services that meet the needs and expectations of customers and other affected parties.

Scope

Process start

The process is triggered either voluntarily, or through an action such as a significant incident, system review, or contractual process.

Process end

Audit outcomes are published in accordance with ISO processes.

Overlapping reviews

The systems audit includes all other reviews and may involve using one or more of the other processes as part of the audit.

Parties involved

The systems audit will involve all PCBUs in the system including contracting, lead contractor, RCA and sub-contractor PCBUs.

Scope

The process may be triggered:

1. Where required by the Client
2. Where required by the RCA as part of an organisational NNC.
3. Voluntarily by an organisation.

The process should:

1. Uncover system shortfalls that could cause failures across the entire operational workflow
2. Identify failures between system intent and system outcomes
3. Assign actions to responsible parties within the system to improve the system

Limitations

The systems audit focusses on information flow and value but may not necessarily uncover failures in specific technical areas. This may be better served through application of one of the other assurance processes.

Outcomes of process

The process outcomes are:

1. Improve PCBU collaboration, consultation, and coordination across the system
2. Establish a more robust and fit-for-purpose processes that sit beyond operational activity

Resource (the who)

The systems audit will involve all PCBUs in the system including contracting, lead contractor, RCA and sub-contractor PCBUs.

Steps (the how and when)

Process steps

Steps specific to different scenarios are noted accordingly

1. Trigger of systems audit
2. Engagement of qualified systems auditor
3. Investigative process including:
   a. Interviews and site visits
   b. Documentation reviews
   c. Independent research
   d. Testing of system components
4. Compilation and publication of audit outcomes which may include:
   a. Performing or equivalent standard
   b. Marginal or equivalent standard
   c. Not performing or equivalent standard

Standards to be developed based on industry engagement

It's expected that any thorough systems audit would involve the collection of recommendations and outcomes across the range of system areas – not just summarised through the assignment of a singular score or standard.

Inputs required

1. All system documentation, policies, procedures, reports, or other evidence that allows for a thorough examination of the system.
2. A fairly large amount of time by a competent auditor or auditors. This may vary depending on the component or size of the system being audited.
3. Organisational support from the audited entity to ensure transparency and authenticity of evidence.

Flow

1. Audit triggered
   a. Start audit through one or more of the various triggers
2. Appointment of auditor
   a. Formalise agreement between organisations and auditor including verifying competency to audit
3. Investigation
   a. Investigative process (audit) involving interviews, documentation provision, inspections or any other ways to inform the audit
4. Compilation of findings
   a. Compile investigative findings including further data gathering using previous step if required
5. Presentation of findings
   a. Publish audit report or any other way of presenting findings agreed between auditor and organisations
6. Agreement on next steps
   a. Conclude the audit process and get agreement on any next steps

Outputs generated

The outputs of this review come from three areas:

1. System performance – Analysis of the performance of the system for the purpose of generate safe TTM outcomes across the whole lifecycle of work
2. System appropriateness – Analysis of the appropriateness of system components and methods to generate the desired outcomes – is it fit for purpose?
3. System compliance – Analysis of system compliance to generate the desired outcomes.

	Risk	Mitigation
Process risks	Significant time and resource investment does not return meaningful outcomes	• Establish conditions or criteria for a full systems audit and only use when there's clear evidence • Utilise lower-resource audits first for more targeted diagnosis
	Time or resource constraints result in insufficient audit depth	• Establish mandated organisational buy in – co-sponsored • Identify and appoint in-organisational leads (sponsors) to ensure transparency • Use of multiple sources of data for to reduce subjective lens
	Inaccurate, or incomplete evidence creates an incorrect system picture	• Establish and authorise organisational co-sponsored buy-in • Identify and appoint in-organisational leads (sponsors) to ensure transparency • Make sure formal binding confidentiality and non-disclosure agreements result in containment of findings to ensure audit trust
	Ineffective or inexperienced auditor	• Establish qualification or competency requirements for auditors • Use multiple auditors with a range of skills to ensure diversity of thought • Check auditors track record before the audit starts to verify credibility
Verifications	**1.** Record and analyse recommendation trends and post-audit implementation plan adherence **2.** Do consistent audits regularly to verify system improvements **3.** Use lower-level reviews to verify improvements across isolated aspects of the system	

Te Kāwanatanga o Aotearoa
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