

Risk Analysis and Management Workshop Handbook

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1 INTRODUCTION

This handbook is not intended to be a highly technical document. It describes the methodology to be adopted and the techniques to be used when preparing for and during a risk workshop. Risk Management is a fundamental element in the implementation of a robust commercial management process. Regular risk review meetings are imperative to successfully lead a project. These will allow the project team the opportunity to continuously monitor risk, evaluate risks and introduce mitigating measures in a bid to reduce/eliminate potential impacts.

Risk workshops will/can be facilitated by TII Project Service or by an appointed consultant. The goal is to strive for optimal results based on the participants input, experience and expertise.

The outcome of risk workshops, up-dated risk register and results of Quantitative Risk Assessment (QRA) should/ must be reflected in the TSB documents. Please refer to the Cost Management Manual / Project Management Manual for further guidance.

- QRA – Quantitative Risk Analysis.
- QSRA – Quantitative Schedule Risk Analysis.
- QCRA – Quantitative Cost Risk Analysis.

2 AGENDA

The agenda timings are flexible, but all elements will be included.

- Introductions
- Brief Project Overview
- Workshop Objectives
- Risk Review
- AOB
- Next Steps
- Close
- Next Meeting

3 THE WORKSHOP

As part of implementing the TII's Cost Management procedures risk workshops must be scheduled to undertake a risk analysis and management review of the proposed scheme. The workshop objectives are:

- To present the scheme to participants, identifying the scope, engineering and environmental constraints, capital cost breakdown and overall programme.
- To undertake a:
 - Structured identification and assessment of potential risks associated with delivering the scheme.
 - Quantified Cost Risk Assessment (QCRA) in terms of probability and cost impact range (minimum, most likely, maximum) so that the risks can be analysed to establish a monetary risk allowance for the scheme and compare this with the allowances already made within early-stage budgets.
- Review all risks to assess the potential for mitigation, paying particular attention to high/medium rated risks.
- To confirm any actions arising from the workshop and the way forward for implementation of risk analysis and management on the project.

4 WORKSHOP LOGISTICS AND PREPARATION

Steps for preparing for a Risk Workshop;

- **Project Manager/ Project Team:** Up-date risk register (risk and evaluation), **four weeks** ahead of proposed workshop.
- **Project Manager:** Send up-dated risk register to TII Project Services/ Engineering Inspector, **three weeks** ahead of proposed workshop.
- **Project Manager:** Organise overview presentation of project to give TII Project Services an insight/update on the scheme, **two weeks** ahead of workshop.
- **Facilitator:** Send out agenda for Risk Workshop, **one week** ahead.

5 THE PROCESS

5.1 The Participants

For the workshop to be successful, total commitment is required from each individual. Therefore, it is of fundamental importance that:

- Everybody contributes fully.
- Political and seniority barriers are ignored.
- Everyone tables all their ideas or reservations on every issue.
- The focus of the discussions is maintained without diversions.
- The correct level of detail is maintained without dropping into too much detail or glossing over important items.
- Everyone participates in fully in the activities.
- It is a 'No Blame' culture. We are looking for participation, not victims.

5.2 The Facilitator

The Facilitator does not bring any answers to the group; he/she only brings a process. It is the facilitator's role to ensure that the expertise of the participants is utilised, and all relevant information made available to enable fully informed discussions to take place.

5.3 Risk analysis & Management process

The process of a project risk analysis and management workshop review follows a 4-step process:

1. Identification – what might go wrong?

For the purposes of this document, Risk will be defined as:

An uncertain event or set of circumstances that, should it occur, will have an effect on achievement of one or more objectives.

A risk with a negative effect on objectives is known as a **Threat**; a risk with a positive effect on objectives is known as an **Opportunity (opportunities may be listed but will be not included in the risk impact modelling process).**

2. Assessment – initial consideration of likelihood and impact using a Probability x Impact Matrix.

3. Risk Quantification – detailed review of cost estimate and risks to establish probabilities and cost impacts (Three-point estimates for minimum; most likely and maximum impact.).

4. Risk Management – mitigation or risk avoidance actions to be identified and allocation of ownership between Employer and Contractor.
5. Identify the cost heading which will be impacted by this individual risk.
6. Identify if the risk and its associated cost/time impacts has consequences for the project/scheme or programme/strategic outcome.

The following sub-sections provide details of the above steps in the risk process. **As part of the pre-workshop activities the Project Team and their consultant will produce a draft/up-dated risk register.**

5.4 Risk Identification

To assist the process of brainstorming “what might go wrong” the group utilises a risk categorisation agenda to ensure a full range of areas is explored. The following risk categorisation agenda is typically used:

Risk Identification Categories	Cat
Highway (excl structures)	A
Traffic	A1
Junctions	A2
Alignment	A3
X-sections, standards & safety	A4
Design for Maintenance	A5
Highway Construction risks	A6
Geotechnics	B
Design - Earthworks and ground conditions	B1
Drainage design	B2
Pavement design	B3
Construction geotechnics risks	B4
Structures	C
Tunnels	C1
Major Overbridges/underbridges & Skew bridges	C2
Viaducts	C3
Other	C4
Structures construction risks	C5
Technology	D
E&M	D1
High Tech	D2
IT Systems	D3
Lighting & comms	D4
Technology risks during construction	D5
Environment	E
Environmental mitigation incl archeology	E1
Statutory bodies	E2
Environmental NGO's	E3

Environmental construction risks	E4
3rd Parties	F
Statutory Undertakers	F1
Planning bodies & regulatory issues e.g LA's	F2
Accommodation Workss/NGO's other	F3
Protestors	F4
3rd party construction risks	F5
Land & Compensation	G
MSA's	G1
Land Acquisition	G2
Part 1 claims	G3
Land & compensation risks during construction	G4
Resources/Market	H
Resource/Market	H1
Other Resource/Market	H2
Pre-Construction Programme/Procurement	I
Public Inquiry & Objections	I1
Procurement Strategy change	I2
Other Pre-construction delay risks not already identified	I3
Buildability & Construction Programme	J
Buildability	J1
Traffic Management	J2
Phasing	J3
Interfaces with network and others	J4
Other Construction Delay Risks	J5
Finance	K
Error in Price basis risk - quants, methods,materials,equipment	K1
Inflation	K2
Tax	K3
Other-General	L
Legislation	L1
Political	L2
Other Strategic	L3
Traffic Modelling	L4
Economical Appraisal	L5
Other	L6
Vehicle Restraint System	L7

As part of the identification process, strategic risks will be marked as such and can/ should be included in the risk modelling as well if needed.

5.5 Risk Assessment

Having identified a range of potential risk issues, the group assesses the risks using the following risk assessment Pxl matrix:

	Probability						
	HARM %	Very High	5	10	15	20	25
	90%	5					
		High	4	8	12	16	20
	70%	4					
		Medium	3	6	9	12	15
	50%	3					
		Low	2	4	6	8	10
	20%	2					
		Very Low	1	2	3	4	5
	10%	1					
		Impact	Very Low	Low	Medium	High	Very High
			1	2	3	4	5
	= HIGH RISK	Cost	10K/ 60K	60K/120k	120K/360K	360K/600K	600k/1,200k
	= MEDIUM RISK	Time	<1 weeks	1 week –	4 weeks –	7 weeks - 14 weeks	> 14 weeks
				4 weeks	7 weeks		
	= LOW RISK						

Note – the above cost and time impact ratings will be agreed at the workshop.

The general guidance for initial Risk Assessment is as follows:

1. Establish what is in the current estimate (if anything) - record background notes.
2. The risk is the likelihood of it occurring over and above normal day/day project management/control activities.
3. Assess risk based on current knowledge/status e.g. do not pre-judge whether risk mitigation will be achieved.
4. Ask what is the likelihood /probability of this risk occurring, considering the above points.
5. Use the 1-5 probability scale to make an assessment. Medium being as equally likely as not.
6. Next impact is assessed:
 - Cost impact is the consequence of the risk if it materialises and are all-in costs e.g. construction + prelims.
 - Use the 1-5 cost impact scale of cost ranges to rate the impact.
 - Make notes on how the impact rating is derived
 - Use the time delay impact to rate the potential delay to the programme if the risk occurred again on the 1-5 scale.
 - Include two items; one for risks associated with pre-contract delay costs and the other for construction delay costs. Those risks for time delays/disruption can be assessed under these items.
 - Check for double counting/repeat risks and strike these out if necessary.

- If uncertain about the ratings, record the fact and note it for post workshop action.

5.6 Quantified Risk Analysis – QRA

Risk Quantification develops the initial assessment further. The aim of this stage is to quantify the potential impact of the assessed risks. The workshop will aim to quantify the assessed risks (by category) and the process involves:

- Reviewing the base estimate and the cost element affected by the risk in question to ascertain what if any allowance has already been made.
- Ascertaining the occurrence probability of the risk, typically around the following ranges: very low: less than 10%, low, less than 20%, medium 50%, high 70% and very high 90%.
- Estimating the cost impact range from minimum, most likely to maximum impact. (This can be independently from the risk matrix score band and should reflect the exact cost and time impacts of the risk.)

As each Risk is considered it is important to identify whether the Risk is an item already included in the estimate or an additional item. This emphasises the importance of having at least one participant who understands the breakdown of the current estimate.

Consideration as to the potential risk management/mitigation is to be considered and the quantification can be adjusted to reflect this provided that the mitigation is realistic and achievable. Opportunity costs (savings) can also be included so that the cost impact range does not have to commence with a positive figure. For example, an earthworks risk associated with acceptable versus unacceptable fill could have a range from - €0.15m to +€0.25m with a most likely figure of +€0.10m.

The QRA information will be logged/recorded on an excel sheet and provide the base data for undertaking further risk analysis must done using @Risk Modelling (Monte-Carlo-Modelling) for Major Projects. Excel sheet figures only may for Minor Projects applicable.

Please be aware: Time needed for doing the Monte-Carlo-Modelling can take 5 to 7 working days.

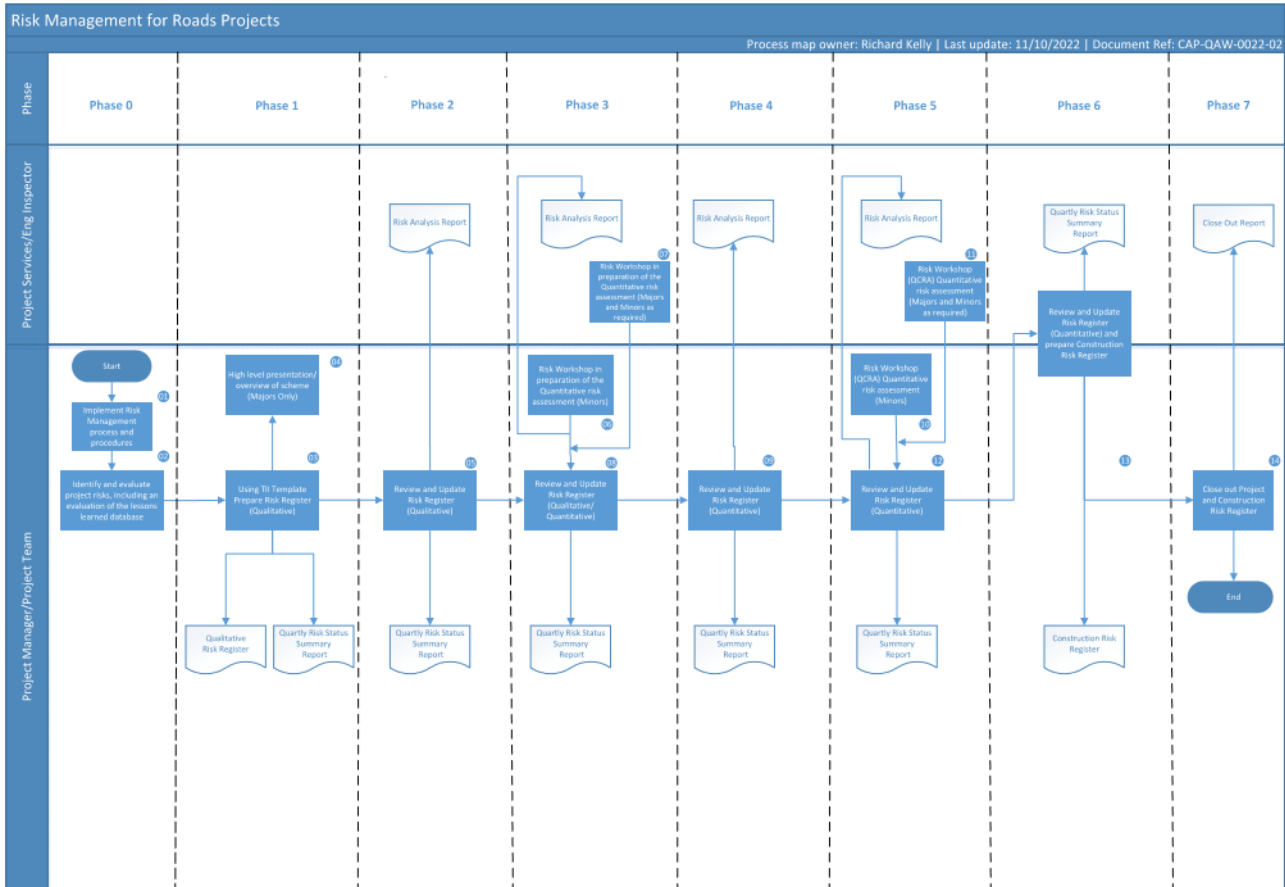
5.7 Risk Management

All identified risks should be reviewed by the participants to ascertain what management measures, they will be undertaking in a bid to reduce the likelihood or impact of the said risks. Consideration will be given to: avoidance, mitigation (treat and reduce), transference to main contractor.

Actions will be identified for the agreed risk management activity. Eventual allocation of risk between Employer and Contractor will be agreed.

It is more likely that risk management actions will be developed by the project team following the workshop as part of the ongoing development of the risk register throughout the entire life cycle of the project/scheme.

6 APPENDIX



Risk Process				
Ref	Activity summary	Activity owner	Detailed description	Outputs (if any)
1.	Risk Management Process and Procedures	Project Manager/Project Team	During Phase 0 the Project Manager should Implement Risk Management Process and Procedures.	
2.	Identify and evaluate project risks, including an evaluation of the lessons learned database	Project Manager/Project Team	The Project Manager will identify and evaluate potential Project risks. Project particulars at Phase 0 will be limited and reference will be made to projects of a similar scale, complexity, or type when identifying and evaluating potential Project risks. This will include an evaluation of 'Lessons Learned' from previous projects.	
3.	Using TII Template Prepare Risk Register (Qualitative)	Project Manager/Project Team	The Project Manager will identify and analyse risks and prepare the Project Risk Register. Risk will be evaluated via Qualitative Risk Analysis . The Project Manager will prepare a quarterly Risk Status Summary Report incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis . The Project Manager will issue Risk Status Summary Report to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.	Qualitative Risk Register/Quarterly Risk Status Summary Report
4.	High level presentation/overview of scheme (Majors Only)	Project Manager/Project Team	The project team will give a high-level presentation to the TII project services section	
5.	Review and Update Risk Register (Qualitative)	Project Manager/Project Team	The Project Manager will prepare a quarterly, Risk Status Summary Report, incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate. The Project Manager will prepare a Risk Analysis Report during Phase 2, incorporating Preliminary Risk Response Strategies and Sensitivity Analysis (including inputs/outputs of Qualitative Risk Analysis), as appropriate. The Risk Analysis Report will be issued to the TII Senior Engineering Inspector. The Risk Analysis Report will also be issued to Peer Reviewers as part of the Option Selection Peer Review during Phase 2.	Quarterly Risk Status Summary Report / Risk Analysis Report
6.	Risk Workshop in preparation of the Quantitative risk assessment (Minors)	Project Manager/Project Team	Risk Workshop	Risk Register Updated

Risk Process				
Ref	Activity summary	Activity owner	Detailed description	Outputs (if any)
7.	Risk Workshop in preparation of the Quantitative risk assessment (Majors and Minors as required)	Engineering Inspector/Project Services	Risk Workshop	Risk Register Updated
8.	Review and Update Risk Register (Qualitative/Quantitative)	Project Manager/Project Team	<p>The Project Manager will prepare a quarterly Risk Status Summary Report incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.</p> <p>The Project Manager will prepare a Risk Analysis Report, incorporating Detailed Risk Response Strategies and Sensitivity Analysis (including inputs/outputs of Qualitative and Quantitative Risk Analysis) as appropriate. The Risk Analysis Report will be issued to the TII Senior Engineering Inspector. The Risk Analysis Report will also be issued to Peer Reviewers as part of the Design Peer Review during Phase 3.</p>	Quarterly Risk Status Summary Report / Risk Analysis Report
9.	Review and Update Risk Register (Quantitative)	Project Manager/Project Team	<p>The Project Manager will prepare a quarterly Risk Status Summary Report incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans) and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.</p>	Quarterly Risk Status Summary Report / Risk Analysis Report
10.	Risk Workshop (QCRA) Quantitative risk assessment (Minors)	Project Manager/Project Team	Risk Workshop	Risk Register Updated
11.	Risk Workshop (QCRA) Quantitative risk assessment (Majors and Minors as required)	Engineering Inspector/Project Services	Risk Workshop	Risk Register Updated

Risk Process				
Ref	Activity summary	Activity owner	Detailed description	Outputs (if any)
12.	Review and Update Risk Register (Quantitative)	Project Manager/Project Team	<p>The Project Manager will prepare a quarterly, Risk Status Summary Report, incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.</p> <p>The Project Manager will prepare a Risk Analysis Report, incorporating detailed Risk Response Measures and Sensitivity Analysis (including inputs/outputs of Qualitative and Quantitative Risk Analysis) as appropriate. The <i>Risk Analysis Report</i> will be issued to the TII Senior Engineering Inspector.</p>	Quarterly Risk Status Summary Report / Risk Analysis Report
13.	Review and Update Risk Register (Quantitative) and prepare Construction Risk Register	Project Manager/Project Team/Project Services	<p>The Project Manager will prepare a quarterly Risk Status Summary Report incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.</p> <p>Note: The Contracting Authority's Representative will report progress on Risk Management, incorporating an updated Construction Contract Risk Register within monthly construction progress reports.</p>	Quarterly Risk Status Summary Report / Risk Analysis Report
14.	Close out Project and Construction Risk Register	Project Manager/Project Team	<p>Risk Management processes will be closed out during Phase 7. The Project Manager will identify and evaluate Project risks and close out the Project Risk Register. Remaining items within the Construction Contract Risk Register will also be closed out by the Project Manager. Closing out risks in Phase 7 is related to preparing the Project Closeout Report, and, if outstanding, the Final Account Report. Within this report, the Project Manager will outline how risks were handled, identify and review lessons learned, and indicate whether there are any outstanding issues and how these will be resolved.</p>	Close Out Report

Risk Process				
Ref	Activity summary	Activity owner	Detailed description	Outputs (if any)
15.	Risk Management Process and Procedures	Project Manager/Project Team	During Phase 0 the Project Manager should Implement Risk Management Process and Procedures.	
16.	Identify and evaluate project risks, including an evaluation of the lessons learned database	Project Manager/Project Team	The Project Manager will identify and evaluate potential Project risks. Project particulars at Phase 0 will be limited and reference will be made to projects of a similar scale, complexity, or type when identifying and evaluating potential Project risks. This will include an evaluation of 'Lessons Learned' from previous projects.	
17.	Using TII Template Prepare Risk Register (Qualitative)	Project Manager/Project Team	The Project Manager will identify and analyse risks and prepare the Project Risk Register. Risk will be evaluated via Qualitative Risk Analysis . The Project Manager will prepare a quarterly Risk Status Summary Report incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis . The Project Manager will issue Risk Status Summary Report to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.	Qualitative Risk Register/Quarterly Risk Status Summary Report
18.	High level presentation/overview of scheme (Majors Only)	Project Manager/Project Team	The project team will give a high-level presentation to the TII project services section	
19.	Review and Update Risk Register (Qualitative)	Project Manager/Project Team	The Project Manager will prepare a quarterly, Risk Status Summary Report, incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate. The Project Manager will prepare a Risk Analysis Report during Phase 2, incorporating Preliminary Risk Response Strategies and Sensitivity Analysis (including inputs/outputs of Qualitative Risk Analysis), as appropriate. The Risk Analysis Report will be issued to the TII Senior Engineering Inspector. The Risk Analysis Report will also be issued to Peer Reviewers as part of the Option Selection Peer Review during Phase 2.	Quarterly Risk Status Summary Report / Risk Analysis Report
20.	Risk Workshop in preparation of the Quantitative risk assessment (Minors)	Project Manager/Project Team	Risk Workshop	Risk Register Updated
21.	Risk Workshop in preparation of the Quantitative risk assessment (Majors and Minors as required)	Engineering Inspector/Project Services	Risk Workshop	Risk Register Updated
22.	Review and Update Risk Register (Qualitative/Quantitative)	Project Manager/Project Team	The Project Manager will prepare a quarterly Risk Status Summary Report incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate. The Project Manager will prepare a Risk Analysis Report, incorporating Detailed Risk Response Strategies and Sensitivity Analysis (including inputs/outputs of Qualitative and Quantitative Risk Analysis) as appropriate. The Risk Analysis Report will be issued to the TII Senior Engineering Inspector. The Risk Analysis Report will also be issued to Peer Reviewers as part of the Design Peer Review during Phase 3.	Quarterly Risk Status Summary Report / Risk Analysis Report
23.	Review and Update Risk Register (Quantitative)	Project Manager/Project Team	The Project Manager will prepare a quarterly Risk Status Summary Report incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans) and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.	Quarterly Risk Status Summary Report / Risk Analysis Report

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24.	Risk Workshop (QCRA) Quantitative risk assessment (Minors)	Project Manager/Project Team	Risk Workshop	Risk Register Updated
25.	Risk Workshop (QCRA) Quantitative risk assessment (Majors and Minors as required)	Engineering Inspector/Project Services	Risk Workshop	Risk Register Updated
26.	Review and Update Risk Register (Quantitative)	Project Manager/Project Team	<p>The Project Manager will prepare a quarterly, Risk Status Summary Report, incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.</p> <p>The Project Manager will prepare a Risk Analysis Report, incorporating detailed Risk Response Measures and Sensitivity Analysis (including inputs/outputs of Qualitative and Quantitative Risk Analysis) as appropriate. The Risk Analysis Report will be issued to the TII Senior Engineering Inspector.</p>	Quarterly Risk Status Summary Report / Risk Analysis Report
27.	Review and Update Risk Register (Quantitative) and prepare Construction Risk Register	Project Manager/Project Team/Project Services	<p>The Project Manager will prepare a quarterly Risk Status Summary Report incorporating an updated Project Risk Register detailing the current status of the Risk Response Strategies (specific action plans), and documenting progress made during the quarter with updated Risk Analysis. The Project Manager will issue Risk Status Summary Reports to the Steering Group on Major Projects and to the Sponsoring Agency Management Group on Minor Projects. This report will include a listing and prioritisation ranking of the top ten key risks, as appropriate.</p> <p>Note: The Contracting Authority's Representative will report progress on Risk Management, incorporating an updated Construction Contract Risk Register within monthly construction progress reports.</p>	Quarterly Risk Status Summary Report / Risk Analysis Report
28.	Close out Project and Construction Risk Register	Project Manager/Project Team	<p>Risk Management processes will be closed out during Phase 7. The Project Manager will identify and evaluate Project risks and close out the Project Risk Register. Remaining items within the Construction Contract Risk Register will also be closed out by the Project Manager.</p> <p>Closing out risks in Phase 7 is related to preparing the Project Closeout Report, and, if outstanding, the Final Account Report. Within this report, the Project Manager will outline how risks were handled, identify and review lessons learned, and indicate whether there are any outstanding issues and how these will be resolved.</p>	Close Out Report



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