RMIT

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Contents:

1. ESTABLISHING THE CONTEXT OF RISK MANAGEMENT

1.1 Introduction

Risk is defining a condition of an event that exposed to danger which lead to injury or loss. However, in engineering context this is known as project risk which defined an uncertain event that will affect objectives, internal and external parties of a project. Thus, risk management is utilised to identify risks and minimize those impacts on the project (Australian Standard, 2018). This can be achieved qualitatively and quantitatively.

1.2 Business Objectives of the project

Morley-Ellenbrook Line METRONET project is a $500 million Australian Government investment project. According to Infrastructure Australia, the construction phase of the project is proposed to start from 2020-2021 and expect to be completed around 2023-2024. Fortunately, the project is considered as priority project by Infrastructure Australia. Furthermore, the project aim reduces road congestion cost by minimizing the usage of private vehicle and enhances connectivity between metropolitan centres. The project will be a 21 Km rail line which connect

Morley → Noranda → Malaga → Whiteman Park → Ellenbrook

On the other hand, the integrated station is expected to meet the demand of the fast-growing city, safe people time on journey, capacity to meet demand, and provide jobs/business opportunities (METRONET, 2019). Finally, the project desire to minimise risks and impacts toward this project.

Figure 1
Morley-Ellenbrook Rail Line Map (Infrastructure Australia, 2020)

1.3 External Context

Western Australia experience population and employment growth due to its previous economic performance which created a legacy of its strength in skills and infrastructure. Meanwhile, north-east of Perth is required to assist in accommodating any future economic activity. There exist corridors, which connect Morley and Ellenbrook, where the region experience rapid population growth with the only corridors in Perth without rapid transit connection as the result of the accommodation.

The corridors cover 150,000 residents. Within 2016 and 2031, the region will experience population growth of 3.3% per annum which is greater than growth rate across Perth metropolitan area which 1.8% per annum. Hence, challenges are generated as the region has lack of connectivity, high road congestion, poor urban form and a risk of continued urban sprawl. Furthermore, *the State Planning*

Strategy, the existing government policies, and *the Morley Activity Centre Plan* the corridor will be supported by enhancing public transport.

However, due to COVID-19, it will automatically affect the economic condition across Australia including Western Australia. Despite the condition, the project is believed to be a key component to recover economic loss that Western Australia suffered due to COVID-19 (Government of Western Australia, 2020).

1.4 Internal Context

Morley-Ellenbrook Line project is the key component of METRONET program that belongs to WA's government program, therefore the main goal of the project is aligned with the goal of the organization which is to construct a well-connected Perth which provide more transport, housing and employment. Additionally, the prioritized construction will carry on Perth's pipeline of work which boosting WA economical position and assist local jobs.

2. RISK IDENTIFICATION

2.1 Introduction

Risk identification is utilised to search and recognize risks. It describes risks that potentially prevent an organization to achieve its goal in a specific project. To compute this process, it is essential to acquire up-to-date, relevant and appropriate information. An organization must identify if risks are/aren't under its control. Thus, one or more outcome(s) which led to variety of tangible and intangible consequences is/are produced. Since the project is prioritized and one of the biggest in Western Australia this method should be taken into account.

2.2 Methods

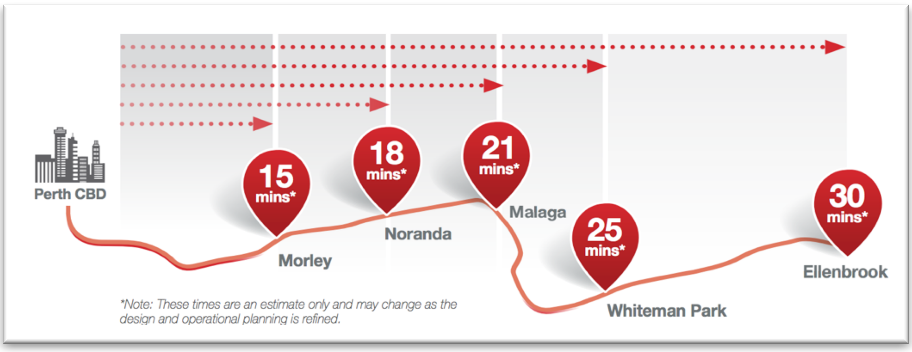
SWOT analysis is a method that identify **S**trength, **W**eakness, **O**pportunities, and **T**hreats of an organization/engineering project. This method will pursue insight of what are the features of the project and what factors that could positively impact the project at the present time or in the coming future. Nevertheless, it shows of what are lacking in the project and what factors that could negatively impact the project at the present time or in the coming future. Hence, it is advantageous to identify, eliminate/minimize hazards and risks.

Table 1
Morley-Ellenbrook Line SWOT Analysis

Strength:	**Weakness:**
- Infrastructure Australia's priority project. - Integrated station that connect 5 Major Metropolitan Centres - Safe people travelling time (Passenger spent 30 minutes travelling from Ellenbrook Station to CBD). - Twice faster than resident utilizing public transport. - One of the largest public projects that being developed in Western Australia.	- Several areas in the project's economic analysis overstate its benefits including travel time are not sufficiently supported by local evidence - Net impact from benefits are unclear due to positive and negative impacts - Some areas cost-benefits analysis differed from national economic appraisal guidelines - Significant planning in the 13-km corridor between Morley and Ellenbrook

- Benefit-cost ratio of 1.10 with NPV of \$208 million with 7% real discount rate and utilise P50 cost estimate. - **Considering broader economic benefits:** Benefit-cost ratio is 1.2 and NPV = \$430 million and utilise P50. - A good strategic merit for the project in long term. - Minimise noise impact to the surrounding residents. - METRONET's project with minimum impact to environmentally sensitive areas. - It is projected that by 2031 a train every 10 minutes in the peak and off-peak in every 15 minutes.	but no investment in rapid public transport. - Not funded by commonwealth
<u>Opportunities:</u> - Opening new door for a well-connected Perth - Reduce road congestion cost and car dependency. - Malaga is a significant employment centre with 16,000 workers. - Meet demand of a fast-growing city. - Railway will support long-term growth within the corridor. - Morley is one of ten designated Strategic metropolitan Centre in Perth. - Ellenbrook is the secondary centre that being developed to support growth in the corridor. - Create room for jobs opportunities. - The project will support the state's economic recovery due to COVID-19 (Government of Western Australia, 2020).	**<u>Threats:</u>** - Poor connectivity leads to higher travel times to jobs, services, and education facilities across Perth. - 3.3% population growth rate per annum in the corridor is higher than growth rate of 1.8% across Perth metropolitan area. - In 2074, patronage is projected to grow by an average rate of 2.8% which is greater than historical observed growth rates. - Cost of delay is projected to be around \$3.6 million in 2031 due to the absence of additional capacity (Infrastructure Australia, 2020). - Growing car usage put pressure on road network. - Corridor has the highest level of car usage which rise road congestion. The issue will be more severe as population rises in coming years. - COVID-19 might delay construction process. - Urban sprawl will lead to additional economic cost

Figure 2:
Journey time spent diagram (METRONET, 2020)



2.3 Risks Identified

Table 2
Risk Identification Table of Morley-Ellenbrook Project

Risk Source Category	Risk Number	Description
Technology	1	Risk of rail misalignment
	2	Risk of equipment/utilities failure
	3	Risk of poor quality material chosen
	4	Risk of insufficient amount of equipment
Economic	5	Risk of delayed project due to COVID, hence increase cost of delay
	6	Risk of changing design will impact cost and time
	7	Risk of cost of delay to reach \$3.6 million in 2031 due to the absence of additional capacity
	8	Risk of urban sprawl will result in additional economic cost (Infrastructure Australia, 2020)
	9	Risk of poor work communication leads to delay
	10	Land acquisition risk
	11	Risk of defects found during construction phase will hold process
	12	Risk of delay in project activities
	13	Risk of overstated cost-benefit analysis, due to insufficient local evidence support, is within transport demand model. (Infrastructure Australia, 2020)
	14	Risk of patronage growth rate (Infrastructure Australia, 2020).
	15	Risk of unrealised changes of land use in the assumed timeframes (Infrastructure Australia, 2020).
Environmental	16	Risk of disturbing potential/existing projects within the corridor.
	17	Risk of project disruption due to traffic (Infrastructure Australia, 2020).
	18	Risk of site constraint. Since parts of the site are surrounded by the local road (Infrastructure Australia, 2020).
Safety	19	Risk of worker's safety during construction

	20	Risk of workers not wearing mask (Not safe in the current COVID-19 situation)
	21	Risk of noise-induced hearing loss
Social	22	Risk of conflict with residents within major metropolitan areas.
Natural Event	23	Risk of extreme weather change
	24	Risk of extreme wind and rainfalls
	25	Risk of heat fatigue in summer. Since, the construction start by the end of 2020 or in the beginning of 2021.
Financial	26	Risk of increased tax in Australia by 2022 (PwC Australia, 2020)
Political	27	Risk of change in government regulation/legislations (Lim, 2020)
Market	28	Risk of changing demands due to COVID-19
	29	Risk of changing project demands due to new introduced technology.
Human	30	Risk of conflicts among workers
	31	Risk of low staff moral
	32	Risk of poor management
	33	Risk of low labour number
	34	Risk of community's lack of engagement with the project

3. RISK ANALYSIS

3.1 Introduction

Risk analysis is a process, that can approached qualitatively and quantitatively, to pursue further understanding about characteristics and nature of risks. Furthermore, it deduces of how an event can lead to multiple consequences and causes. Followed by considerations of how the event may/can affect objectives of a project.

There are two notions to be considered in this process, which are to:

1. Identify likelihood of a risk.
2. Identify risks consequences.

In order to generate appropriate risk level.

Likelihood indicates frequency of specific event occur in the past or probability of specific event to occur in the future. Consequences indicates the impact of specific event/risk if and only if it occurs. For a prioritize project like Morley-Ellenbrook Line, to obtained convincing of likelihood value, it is recommended to utilize simulations, historical data, and solid modelling computer-aided design software.

Monte Carlo simulation is recommended as the system will simulate random sampling. Furthermore, the process able to generate probability of risk to occur, and the potential outcomes of the risk. It will be advantageous for decision making process to treat the potential risk.

Historical data of potential risk that occur in the past can be utilize as an input for statistical modelling analysis to see the trend line or frequency of occurrence.

Solid modelling method can be utilized to identify likelihood of the risk by simulating complex engineering design. The software will determine further details of the design internally, externally and what conditions will the design to fail.

However, those values are lacking in sense of judgement since it is computed through software which only take in and out fixed values/information. Hence, the rating system for both likelihood and consequences is utilized, in order to add sense of judgement in those numbers based on evidences and problems at hand. The approach is utilized for awareness before construction phase of this project commence (Dosumu, 2017).

Likelihood and consequences of risks in this case will be rated from 1- 5, judging by facts if those risks occur in reality. Below is the risk matrix, likelihood and consequences criteria utilized to tackle this analysis.

Figure 3
Risk Matrix (Hou, 2020).

		Consequences				
		1 - Negligible	2 - Minor	3 – Moderate	4 - Major	5 - Extreme
Likelihood	5 – Almost Certain	**Moderate (5)**	**Moderate (10)**	**High (15)**	**Critical (20)**	**Critical (25)**
	4 – Likely	**Low (4)**	**Moderate (8)**	**High (12)**	**Critical (16)**	**Critical (20)**
	3 – Feasible	**Low (3)**	**Moderate (6)**	**Moderate (9)**	**High (12)**	**Critical (15)**
	2 – Unlikely	**Low (2)**	**Low (4)**	**Moderate (6)**	**High (8)**	**High (10)**
	1 – Rare or Never	**Low (1)**	**Low (2)**	**Moderate (3)**	**High (4)**	**High (5)**

Likelihood:

Table 3
Likelihood Score (Hou, 2020)

Score	**Category**	**Justification**
1	Rare or never	The event has never happened before or has occur in very rare circumstances
2	Unlikely	The event has never occurred on long period of time but possible to occur
3	Feasible	The event has 50/50 chance to occur.
4	Likely	The event is quite possible to occur under most circumstances
5	Almost Certain	The event is most likely or expected to happen if hazard of an event takes place

Consequences:

Table 4
Consequences Score (Hou, 2020)

Score	Category	Justification
1	Negligible	Negligible impact or minor nuisance
2	Minor	Minor impact that is easily dealt with
3	Moderate	Impact that will disrupt objectives
4	Major	Major impact that prevent some key objectives to be achieved
5	Extreme	Critical impact that prevent most of objectives to be achieved

3.2 Qualitative & Quantitative Risk Analysis

Table 5
Morley-Ellenbrook Line Risk Score analysis.

Risk Source Category	Risk Number	Description	Likelihood α	Consequence β	Risk Significance Score (S)	Risk Level
Technology	1	Risk of rail misalignment	3	3	9	Moderate
	2	Risk of equipment/utilities failure	4	3	12	High
	3	Risk of poor quality material chosen	2	4	8	High
	4	Risk of insufficient amount of equipment	4	3	12	High
Economic	5	Risk of delayed project due to COVID, hence increase cost of delay	2	4	8	High
	6	Risk to possibility of change of design which negatively impact cost and time	3	5	15	Critical
	7	Risk of cost of delay to reach $3.6 million in 2031 due to the absence of additional capacity (Infrastructure Australia, 2020)	5	3	15	High
	8	Risk of urban sprawl will result in additional economic cost (Infrastructure Australia, 2020)	5	3	15	High
	9	Risk of poor work communication leads to delay	3	3	9	Moderate

	10	Land acquisition risk	1	4	4	Low
	11	Risk of defects during construction phase which delay process.	3	4	12	High
	12	Risk of delay in project activities	3	4	12	High
	13	Risk of overstated cost-benefit analysis, due to insufficient local evidence support, is within transport demand model. (Infrastructure Australia, 2020)	5	3	15	High
	14	Risk of patronage growth rate (Infrastructure Australia, 2020).	5	3	15	High
	15	Risk of unrealised changes of land use in the assumed timeframes (Infrastructure Australia, 2020).	5	3	15	High
Environmental	16	Risk of disturbing potential/existing projects within the corridor.	2	3	6	Moderate
	17	Risk of project disruption due to traffic (Infrastructure Australia, 2020).	4	5	20	Critical
	18	Risk of site constraint. Since parts of the site are surrounded by the local road (Infrastructure Australia, 2020).	5	5	25	Critical
Safety	19	Risk of worker's safety during construction	4	3	12	High
	20	Risk of workers not wearing mask (Not safe in the current COVID-19 situation)	3	2	6	Moderate
	21	Risk of noise-induced hearing loss	2	4	8	High

Social	22	Risk of conflict with residents within major metropolitan areas.	3	1	3	Low
Natural Event	23	Risk of extreme weather change	2	3	6	Moderate
	24	Risk of extreme wind and rainfalls	2	3	6	Moderate
	25	Risk of heat fatigue in summer. Since, the construction start by the end of 2020 or in the beginning of 2021.	4	2	8	Moderate
Financial	26	Risk of increased tax in Australia	3	1	3	Moderate
Political	27	Risk of change in government regulation/legislations (Lim, 2020)	2	4	8	High
Market	28	Risk of changing demands due to COVID-19	2	1	2	Low
	29	Risk of changing project demands due to new introduced technology.	1	1	1	Low
Human	30	Risk of conflicts among workers	3	1	3	Low
	31	Risk of low staff moral	2	2	4	Low
	32	Risk of poor management	3	4	12	High
	33	Risk of low labour number	1	3	3	Moderate
	34	Risk of community's lack of engagement with the project	2	2	4	Low

Note. Quantitative Analysis – Risk Significance Score (S) = $\alpha \times \beta$, & Qualitative – Risk Level

4. RISK EVALUATION

4.1 Introduction

Risk evaluation is utilized to support for decision making that responds to identified risks in the project. In the beginning, it is mentioned that the project desire to minimise risk and its impact towards the project. However, realistically there are large number of possible risks to be identified from an engineering project which limit resources to treat those risks. Decision making is required to prioritized risks based on facts, scientific proof and evidence of problems at hand (Aven, 2016).

Furthermore, criteria to evaluate these risks may base on the likelihood of risk events/outcomes, the consequences of each risk, risk that creates more risks, and range of uncertainty of risk level at provided confidence level (Hou, 2020).

4.2 Methodology

There are 4 categories generated to label priority level of all specified risks that require treatment (Priority level is assigned based on Table 5).

- Critical and high risk Level → Intolerable risk which require immediate treatment (P.1).
- Moderate risk level → Treatment must be done if and only if there are sufficient amount of resources and evidences (P.2).
- Low risk level → Monitoring is required. However, treatment is unnecessary (P.3).
- Very low risk level → No monitoring or treatment required (P.4).

Table 7
Risk Priority Table

Risk Priority Category	Risk Number	Description	Likelihood α	Consequence β	Risk Significance score (S)
P.1	17	Risk of project disruption due to traffic (Infrastructure Australia, 2020).	4	5	20
	18	Risk of site constraint. Since parts of the site are surrounded by the local road (Infrastructure Australia, 2020).	5	5	25
	13	Risk of overstated cost-benefit analysis, due to insufficient local evidence support, is within transport demand model. (Infrastructure Australia, 2020)	5	3	15
	12	Risk of delay in project activities	3	4	12
	14	Risk of patronage growth rate (Infrastructure Australia, 2020).	5	3	
	15	Risk of unrealised changes of land use in the assumed timeframes (Infrastructure Australia, 2020).	5	3	15
	8	Risk of urban sprawl will result in additional economic cost (Infrastructure Australia, 2020)	5	3	15
	5	Risk of delayed project due to COVID, hence increase cost of delay	2	4	8
	6	Risk to possibility of change of design which negatively impact cost and time	3	5	15

P.2	1	Risk of rail misalignment	3	3	9
	2	Risk of equipment/utilities failure	4	3	12
	4	Risk of insufficient amount of equipment	4	3	12
	11	Risk of defects found during construction phase will hold process	3	4	12
	19	Risk of worker’s safety during construction	4	3	12
	21	Risk of noise-induced hearing loss	2	4	8
	16	Risk of disturbing potential/existing projects within the corridor.	2	3	6
	9	Risk of poor work communication leads to delay	3	3	9
	32	Risk of poor management	3	4	12
P.3	7	Risk of cost of delay to reach $3.6 million in 2031 due to the absence of additional capacity (Infrastructure Australia, 2020)	5	3	15
	20	Risk of workers not wearing mask (Not safe in the current COVID-19 situation)	3	2	6
	22	Risk of conflict with residents within major metropolitan areas.	3	1	3
	23	Risk of extreme weather change	2	3	6
	24	Risk of extreme wind and rainfalls	2	3	6
	25	Risk of heat fatigue in summer. Since, the construction start by the end of 2020 or in the beginning of 2021.	4	2	8
	27	Risk of change in government regulation/legislations (Lim, 2020)	2	4	8
	33	Risk of low labour number	1	3	3
P.4	10	Land acquisition risk	1	4	4
	26	Risk of increased tax in Australia	3	1	3
	28	Risk of changing demands due to COVID-19	2	1	2
	29	Risk of changing project demands due to new introduced technology.	1	1	1

	30	Risk of conflicts among workers	3	1	3
	31	Risk of low staff moral	2	2	4
	34	Risk of community's lack of engagement with the project	2	2	4

Note. P.1 = First Priority (High), P.2 = Second Priority (Moderate), P.3 = Third Priority (Low), & P.4 = Last Priority (Negligible).

5. RISK TREATMENT

5.1 Introduction

Risk treatment is utilised to select treatment options based on the associated risk. The process to select appropriate treatment will be iterative, which is to:

1. Select and formulated risk treatment options
2. Plan and implement risk treatment
3. Identify the effectiveness of that treatment
4. Decide if the remaining risk is still acceptable
5. Decide not execute further treatment if the remaining risk is unacceptable.

5.2 Risk treatment options

According to Australian Standard AS ISO 31000:2018, there are 7 major options available to treat the risk. These options will be advantageous for project's potential benefits and balanced it.

Now, let T be treatment

T.1 → Do not start or continue the activity that leads to another risk (Avoid risk).
T.2 → Absorbing risk to pursue opportunities
T.3 → Eliminate source of risk
T.4 → Transform risk probabilities
T.5 → Modify consequences of risk (challenge)
T.6 → Risk mitigation (i.e. share/transfer or insurance/contracts)
T.7 → Keep risk at a hold depending on informed decision

5.3 Risk treatment plan and implementation

To implement those options, treatment plan is executed to specify how the chosen options will be applied. This will provide understanding to those involved and any progress against the plan can be monitored. There are major/specific criteria that must be contained in the treatment options (Australian Standard, 2018). Those treatment option plans will involve:

1. Irrationality and advantages gained from the treatment option
2. Proposed actions
3. Those who are responsible and accountable for approving and implementing the plan
4. Resources and contingencies
5. Performance measurement

6. Constraints
7. Reporting and monitoring
8. Consideration of when actions will be operated and completed.

Table 8

Risk Treatment Table

Risk Priority Category	Risk Number	Description	Risk Treatment & Justification
P.1	17	Risk of project disruption due to traffic (Infrastructure Australia, 2020).	T.3: Upgrade or provide alternative road access T6: Contract
	18	Risk of site constraint. Since parts of the site are surrounded by the local road (Infrastructure Australia, 2020).	T.3: Construction site design management. T.6: Contract
	13	Risk of overstated cost-benefit analysis, due to insufficient local evidence support, is within transport demand model. (Infrastructure Australia, 2020)	T.3: Research management plan T.6: Contract
	12	Risk of delay in project activities	T.6: Contract
	14	Risk of patronage growth rate (Infrastructure Australia, 2020).	T.6: Contract BOOT, BOT
	15	Risk of unrealised changes of land use in the assumed timeframes (Infrastructure Australia, 2020).	T.6: Contract BOT, and BOOT
	8	Risk of urban sprawl will result in additional economic cost (Infrastructure Australia, 2020)	T.6: Contract BOOT, BOT
	5	Risk of delayed project due to COVID, hence increase cost of delay	T.6: Contract BOOT
	6	Risk to possibility of change of design which negatively impact cost and time	T.3: Design management plan
P.2	1	Risk of rail misalignment	T.3: Design management plan
	2	Risk of equipment/utilities failure	T.6: Contract PPP, BOT
	4	Risk of insufficient amount of equipment	T.6: Contract PPP, BOT
	11	Risk of defects found during construction phase will hold process	T.6: Contract PPP, BOT
	19	Risk of worker's safety during construction	T.3: Construction Work Standard T.6: Insurance
	21	Risk of noise-induced hearing loss	T3: Ear protector (Work Standard). T6: Insurance
	16	Risk of disturbing potential/existing projects within the corridor.	T.3: Construction site management. Community and stakeholder's management
	9	Risk of poor work communication leads to delay	T.3: Contractors communication plan
	32	Risk of poor management	T.3: Design Plan T.6: Management plan
P.3	22	Risk of conflict with residents within major metropolitan areas.	T.3: Work ethics management plan

	20	Risk of workers not wearing mask (Not safe in the current COVID-19 situation)	T.3: Update/Additional regulation in Work Safety Standard
	7	Risk of cost of delay to reach \$3.6 million in 2031 due to the absence of additional capacity (Infrastructure Australia, 2020)	T.2
	23	Risk of extreme weather change	
	24	Risk of extreme wind and rainfalls	
	25	Risk of heat fatigue in summer. Since, the construction start by the end of 2020 or in the beginning of 2021.	
	27	Risk of change in government regulation/legislations (Lim, 2020)	
	33	Risk of low labour number	
P.4	10	Land acquisition risk	
	26	Risk of increased tax in Australia	
	28	Risk of changing demands due to COVID-19	
	29	Risk of changing project demands due to new introduced technology.	
	30	Risk of conflicts among workers	
	31	Risk of low staff moral	
	34	Risk of community's lack of engagement with the project	

Note. BOT = Build-Operate-Transfer Contract, BOOT = Build-Own-Operate-Transfer Contract, & PPP = Public Private Partnership.

6. RISK MONITORING AND CONTROL

6.1 Introduction

Risk monitoring and control must be done at all stages of a project. This method is utilized to guide/monitor the running operation to operate within the budget, scope, and time. Furthermore, this method will provide feedbacks of what can be improved, followed by communicating all risk management activities and feedbacks across the organization. Hence, minimizing any potential risks generated with improved quality of risk management activities.

6.2 Risk Monitoring and Control plan

Below are the recommended monitoring and control plan to be applied for this project at the current and future phase.

1. Continuous Meeting: Meeting regularly at all project stages will re-analyse risk management analysis to pursue opportunities and provide feedbacks across the organization of what has been found. Furthermore, the method able to identify unrealised risks lie within the project.
2. Analytic techniques: the method involves forecasting, trend and variance analysis which provide realistic quantitative value of the project management. The outcomes of the process will identify relationship and behaviour of the project variables with other variables (e.g. Environmental variables, political variables, etc.).
3. Work performance report: This process will record work performance of the project which provide more awareness, support for decision making and measure of what proper action should be done.
4. Risk audit: The goal of this process is to record and evaluate the effectiveness of risk management process and responses toward identified risks and its source
5. Reserve analysis: The method is recommended to analyse if the budget at a certain point of time is sufficient to treat the existing/remaining risk.

7. CONCLUSION

Finally, this report provides risk assessment for METRONET's Morley-Ellenbrook Line project. The estimations for possible risk from this project has been considered to meet the standard quality of what should be anticipated from a railway construction project. However, since the construction phase and contracts will be awarded by the end of 2020 or at the beginning of 2021, there will be further analysis and work to be developed in the real construction phase and completion phase. Further work will be required because there will be new discoveries to be found in future which will affect the quality of this assessment. This assessment is recommended to be done continuously at every stage/phase of this project. It is recommended to utilize advance technology to perform advanced quantitative risk analysis for the assessment in order to enhance estimation quality of risk. Hence, provide more accurate and realistic information. Hence, systematic and practical risk treatments are generated. Furthermore, it will be wise to consider how the process of the project will respond to any progress of COVID-19 in the future to minimise its impact to the construction phase of the project.

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