GENG5505 (Sem2, 2022) - Major Group Project Marking Guide

Group Name:	Group H		
Project Name:	WA Railcar Program		
Tutorial class attended:	Monday 2pm		
Student Name	Corey Blake	**Student ID**	22295676
Student Name	Darcy Tan	**Student ID**	22708776
Student Name	Sachin Joseph Thekkooden	**Student ID**	23256725
Student Name	Wendy Wu	**Student ID**	23685729
Student Name	Xiaoli Yang	**Student ID**	23299752
Student Name	Yihan Liu	**Student ID**	22696718
Student Name	Zelong Zhou	**Student ID**	22668759

CONTENT ASSESSMENT CRITERIA

Marking	Very Poor		Fair		Good		Excellent	
Executive Summary (Maximum 1 page)								
Clarity & conciseness	0-1.5	2	2.5	3	3.5	4	5	
Executive Summary - Total								/5
Section A: Case study writing (Approx. 1,500 words)								
Clarity & conciseness of project background	0	4	5	6	7	8	10	
Quality & relevance of research material (i.e. info/facts)	0	4	5	6	7	8	10	
Total Section A								/20
Section B: Case Study Analysis (Approx. 2,500 words)								
Introduction (clarity of purpose & conciseness)	0-1.5	2	2.5	3	3.5	4	5	
Use & relevance of theories, models & frameworks	0	4	5	6	7	8	10	
Depth of analysis, clear & logical argument	0	4	5	6	7	8	10	
Total Section B								/25
Section C: Recommendations to the case (Approx. 2,000 words)								
Use & relevance of theories, models & frameworks	0	4	5	6	7	8	10	
Relevance & justification of recommendations	0-2.5	3	3.5	4	5	6	7.5	
Insight & synthesis, clear & logical argument	0-2.5	3	3.5	4	5	6	7.5	
Total Section C								/25
Conclusion (Maximum 1 page)								
Logical summary	0-1.5	2	2.5	3	3.5	4	5	
Conclusion - Total								/5
Table of contents (compulsory), references & appendices								
Appropriate table of contents, appendices & references	0-1.5	2	2.5	3	3.5	4	5	
Table of contents, references & appendices – Total								/5
Group meetings (agenda & minutes)								
Relevance & consistency of issues & outcome	0	4	5	6	7	8	10	
Clarity, conciseness, team reflections and leadership	0-1.5	2	2.5	3	3.5	4	5	
Group meetings (agenda & minutes) - Total								/15

TOTAL GROUP MARK /100 _____ **%**

Additional comments (if required):

Project Management and Engineering Practice GENG5505

THE UNIVERSITY OF WESTERN AUSTRALIA

Major Group Project

Case Study: WA Railcar Program

Group H

Corey Blake – 22295676@student.uwa.edu.au

Darcy Tan – 22708776@student.uwa.edu.au

Sachin Joseph Thekkooden – 23256725@student.uwa.edu.au

Wendy Wu - 23685729@student.uwa.edu.au

Xiaoli Yang - 23299752@student.uwa.edu.au

Yihan Liu – 22696718@student.uwa.edu.au

Zelong Zhou – 22668759@student.uwa.edu.au

Executive Summary

The WA Railcar Program is integral in supporting Perth and Peel's population growth and meeting the city's long-term transportation needs. The aim of the project is to replace the ageing railcars currently in service and increase the capacity of the rail network to accommodate the projected increase of passengers. It will also make the transport service more effective and reliable.

This report provides a review of the project life cycle including the concept, planning and execution stages. The finalisation stage of the life cycle was not included in this report as the project is ongoing. These life cycle phases were analysed considering how well Metronet has managed the project across the scope, cost, stakeholders, time, and risk aspects with regards to TBL. The analysis highlighted areas in which Metronet could improve upon its project management. The most critical area for improvement was their lack of risk management as this could have repercussions for all areas of the project. This report outlines recommendations for Metronet to conduct in-depth risk identification and analysis which includes the use of a risk register. Further areas noted for improvement were time management as the project is behind on schedule, procurement planning as this proved difficult due to skills and labor shortages, and planning for the future of the manufacturing facility.

The issues that were identified upon analysis of the project have been summarised along with their respective recommendations in Table 1 below.

Priority order	Issues	Recommendations
1	Lack of Risk Management	Comprehensive risk identification, analysis and management needs to be executed across all areas of the project.
2	Project is behind on schedule	Create Gantt charts for each project phase so that delays and their effects can be quickly recognised and more efficiently dealt with.
	Skills and labor shortages	Use surplus funds and/or government support to train the next generation in the skills required for the WA railcar. Source labor locally particularly from rural communities.
3	The future of the Bellevue Manufacturing and Assembling Facility	Utilise SWOT analysis and TBL considerations to determine the best use of the facility following the completion of the project.

Table 1: Summary of issues and recommendations

Contents

A1   Case Study

1.1 Project Background
The WA railcar program was conceptualised to manage the needs of the Perth and Peel population as it grows. The population of Perth and Peel is projected to grow from 2.02 million in 2017 to 3.5 million by 2050 (WA Railcar Program, 2018). The public transportation system will expand in tandem with the population. The WA railcar program will support this expansion through the manufacture of new railcars.

The $1.6b Railcar Program will return manufacturing back to Western Australia for the first time since 1994. This project will provide 246 new electric C-series railcars for the Perth metro area, with six new diesel railcars to replace the existing Australind services between Perth and Bunbury. These new C-series railcars will replace existing A & B-Series trains approaching the end of their operational life of 30 years, having been constructed in 1991.

(WA Railcar Program, 2018).

1.2 Project Scope
The WA Railcar Program will design, manufacture and commission 246 new c-series railcars equivalent to 41 six-car trains to replace the outdated A-series trains. These railcars will be maintained for a 30-year term and are expected to enter service between 2023 and 2028. New diesel cars will be designed and manufactured to replace the diesel railcars that operate the Australind service between Perth and Bunbury. The diesel cars will have continued maintenance support.

Previous B-series railcars employed in WA were outsourced from Queensland where they were manufactured and tested (WA Railcar Program, 2018). The WA Railcar Program is set to have all manufacturing and testing occur in WA. To achieve this, a proposal for an assembly and commissioning facility was split into 2 stages.

Stage 1 included building a Rail Car Assembly area and a high voltage commissioning and testing building including required hardstand, landscaping, and parking (Development Application, 2020). This stage was approved on the 20th of September 2018 and construction was completed in June 2021 (WA Railcar Program, 2018). The completion of stage 1 means all railcars can be tested and commissioned in WA.

Stage 2 proposed further developments of the facility. These include

• Driver's Sign-On Facility

• EMU (Electric Multiple Unit) Internal Cleaning Platform

• EMU External Train Wash Facility

• EMU (Electric Multiple Unit) Maintenance Facility

• Diesel Railcar External Wash Facility

• Wheel Lathe and Bogie Drop

• Traction Power Feeder Station

• Diesel Railcar Maintenance Facility

(Development Application, 2020)

The Manufacturing and Assembly facility will be constructed in Bellevue to enable the production of the railcars. Additionally, a maintenance and cleaning facility will also be constructed. The WA Railcar program is committed to the ongoing operation and maintenance of these facilities for the new trains. The program also wants to allow for further growth, such as new railcars when required, beyond the current scope of the project (WA Railcar Program, 2018).

1.3 Project Benefits
The primary benefits of the program are meeting passenger demand in accordance with projected population growth. This will enable more passengers to board during peak times as the new C-series trains have a greater capacity than their older counterparts. The more energy efficient C-series will replace the A-series trains due to them nearing the end of their operational life. Overall, this will improve customer satisfaction as the rail services will become more efficient, effective, and timely (WA Railcar Program, 2018).

1.4 Community and Stakeholders
Nine stakeholders have been identified including government agencies and the local community.

The Governmental agencies include but are not limited to:

Department of Communities plays a key role in the railcar project as it gives social guidance on the Access and Inclusion requirements for each railcar. These include:

- Accessible design: for equal useability for everyone,
- Inclusive design: for the needs of the widest possible audience,
- User-centred design: places users' perspectives and needs at the centre of the design process,
- Assistive technology: engineering to facilitate improved access and participation for people with disability,
- Resilience & adaptability: such as climate risks, infrastructure, community, ensuring connectivity, amenity, and liveability:

- Design appropriation, placemaking safety and wellbeing. (Access and Inclusion, 2022)

Development WA & **The Department of Training and Workforce Development** has worked with the WA railcar program to identify the economic and employment benefits long into the future.

Department of Water and Environment is a key stakeholder as it falls within the Metronet waterwise action plan with the railcar wash facility being constructed to increase "water efficiency" (Waterwise Perth Action Plan, 2019). This will reduce water wastage and recycling whilst offsetting the risk of water pollution into nearby storm drains. Permeable areas will be maintained to allow natural rain fall infiltration into the soil and groundwater.

Five additional key stakeholders involved with the project are:

- **Australian Government**
- **Government of Western Australia & City of Swan**
- **Department of Transport**
- **Public Transport Authority (PTA)**
- **Department of Planning, Land and Heritage**

1.5 Budget

The program has an approved budget of $1.6 billion. State-funded procurement is preferred for the project and payment will be received once the PTA determines a railcar set is ready for passenger train operations. The cashflow forecast can be seen in table 2.1.1.

Period	18/19	19/20	20/21	21/22	Outyears
Railcars	$28.9	$30.5	$71.4	$195.4	$1239.9

Table 2.1.1: Capital Budget Cashflow ($million) (WA Railcar Program, 2018)

1.6 Project TBL

The Triple Bottom Line (TBL) is a widely utilised framework that focuses on three factors: social, economic and environment. The WA railcar Program has adopted this framework in its sustainability strategy, identifying key sustainability themes relating to the three aforementioned factors (Metronet Sustainability Strategy, 2021). The WA Railcar Program falls under Metronet's Sustainability Strategy and employs its values.

1.6.1 Economy

Workforce is one of the key themes identified by Metronet under Economy (Metronet Sustainability Strategy, 2021).

The Bellevue Manufacturing Facility has allowed all testing and commissioning of railcars to be completed in WA. As such, the Railcar Program will create ongoing local employment. A minimum of 50% of contracts are to be awarded locally. As a result, it is estimated more than 200 long-term jobs will be generated as well as hundreds of indirect jobs (WA Railcar Program Fact Sheet, 2022).

1.6.2 Environment

Environment values and biodiversity, water, resource efficiency, and energy and carbon are the key themes under Environment as identified by Metronet (Metronet Sustainability Strategy, 2021). How the Railcar program demonstrates these themes is outlined below.

The Manufacturing Facility is constructed where the Cooperative Bulk Handling "CBH" Grain silo used to be located. State government aerial photos (Appendix A) suggest the CBH Grain silo was constructed prior to 1965 and was not subject to any environmental assessments. It was demolished in 2016 after failing to achieve Midland Council's Industrial Heritage List in September 2015. (CBH, 2016)

A detailed site investigation was completed in April 2019 by Golder Associates Pty Ltd to review the former CBH grain silo and transport yard. The objectives were to assess 1) if any soils and groundwater contamination was prevalent, 2) potential risk to human health or environment, 3) if area is suitable for redevelopment, 4) requirements for any further actions.

These works were undertaken in accordance with:

- Department of Water and Environmental Regulation (DWER) Contaminated Sites Guidelines, "Assessment and management of contaminated sites" (December 2014)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended (ASC NEPM 1999 as amended 2013).
- Environmental Protection Act 1986

The Site investigation findings showed elevated metals in some of the soil and groundwater samples. However, overall, the site was determined to "present a low human health and ecological risk, assuming the site continues to be used for ongoing commercial/industrial land use" (Golder, 2019).

The new C-series railcars will be more energy efficient and will have regenerative braking to reduce energy consumption (WA Railcar Program, 2018). The railcars have been designed so that they can accommodate future changes such as high-speed signalling. Overall, they are more sustainable than previous models. The railcar wash facilities are being designed to make maintaining the fleet more water efficient, minimising wastage and risk of pollution (Waterwise Perth Action Plan, 2019).

1.6.3 Social

People and Place (social) are incorporated into Metronet's strategy through governance, connectivity, amenity, and liveability (Metronet Sustainability Strategy, 2021).

The Railcar program demonstrates an emphasis on connectivity, amenity, and liveability. The program will ensure the railcars are designed to be inclusive and meet disability standards for accessible public transport (WA Railcar Program Fact Sheet, 2022). Overall, the program was conceptualised to keep up with population growth and will ensure liveability standards are not only maintained but improved upon with the contemporary designs.

B2   Case Study Analysis

WA Railcar Program is more than just a rail infrastructure program. It will support the growth of Perth over the next few decades as well as improving upon the public transport

system. The program will be analysed throughout the project-life cycle from concept to execution to evaluate how well the project has been managed.

The finalisation stage of the life cycle is defined as the completion of the project including closing out contracts, final reports and the client receiving the deliverable (Hartley, 2018). This stage will not be covered for the purposes of the report as the project has not yet been completed.

2.1 Concept Stage

The concept stage is the first phase of the project delivery process in project life cycle. This phase includes preliminary projections about costs, the community and stakeholders, project benefits and the goal of the project (Hartley, 2018).

2.1.1 Budget

A cost management plan ensures that all the cost estimation, budgeting, and cost-controlling processes are determined and executed as required (Hartley, 2018). It offers a predetermined spending plan and eliminates any uncertainty about the terms of financial commitment for the duration of the project (Hartley, 2018).

A well thought out budget involves setting a target for how much money you need to fund the project. Metronet has shown good practices in the concept stage of the Railcar Program with respect to cost estimations. A detailed study has been made during the concept phase that accounts for most of the expenses and they have segregated them into yearly cashflows. A well-documented report regarding the budget and expenditure was published every year. These reports included the budget updates, source of funds, and any additional expenses incurred.

Budgets are meaningless if the costs of planned activities are not compared to the actual results achieved and reported (Hartley, 2018). The comparison between the planned budget and actual cost is as follows:

- In the fiscal year 2015-16, it was decided that a total of 50 six-car sets will be delivered over a period of 10 years from 2019 at an estimated cost of $1.2 billion. An amount of $5 million was decided to be spent on planning in 2015-16 with expenditures from 2019-20. But, in the 2015-16 mid-year review, an additional $8.7 million was decided to be spent between 2015-16 and 2018-19 for the procurement of the railcars. The total cost of procuring 10 additional B-series three-car sets will then increase by $13.7 million primarily reflecting infrastructure works to accommodate the railcars. (Tenders WA, 2022)
- The 2017-18 budget included $508 million to procure 102 railcars to service Metronet projects. At $1.6 billion over the period of 2017-28, this significant investment will deliver 246 railcars, an assembly facility and associated infrastructure. (Tenders WA, 2022)
- The 2020-21 reports show an additional investment of $36.5 million was decided to be spent over 2019-24 to enable early contractor payments and establishment of local manufacturer for railcar bogie frames. (Tenders WA, 2022)

Even though Metronet's reports show additional, unplanned spending they have spent less than planned in other areas and overall reported they were underbudget by $347 million as of April 2020 (Railcar Program Update, 2020).

2.1.2 Stakeholder Management

Metronet have employed excellent stakeholder management. Stakeholders can be classified into two types: those that contribute to the project output and those that are impacted by the project output (Hartley, 2018).

The community is the primary stakeholder being impacted by the project. Early engagement with the community and local businesses has helped define the WA Railcar program. The program exists to benefit the community and as such there is constant engagement with stakeholders. The program is committed to ongoing communication that is open, transparent, and timely. The community have the space to share any concerns and will be well informed of any disruptions caused by the program. The community is also encouraged to contact the team if they seek more information and can expect prompt responses (Engagement, 2022).

Communication with those contributing to the project has also been executed well. Metronet exercise a clear plan to involve and interact with stakeholders including executive management (Metronet office), third-party providers (delivery agency and contractors), external consultants (specialist expert) and community.

For example, to communicate with the Access and Inclusion Reference Group (AIRG) the Metronet office will schedule and convene meetings as required (Access and Inclusion, 2022). For these meetings, the agendas will be prepared prior for chair approval and sent out to all members including any supporting documents at least 5 business days prior to the meeting. During the meeting, minutes will be taken and outline any actionable items that will be sent out within 5 business days of the meeting to be confirmed by all members.

2.2 Planning Stage

The planning stage is the agreement to continue with the project. A good plan will describe how the team will execute the project goals and continue to oversee the process to ensure quality results and that it reflects their policies (Hartley, 2018).

2.2.1 Procurement Planning

The Procurement planning phase embeds value into the project by seeking enduring benefits, not just immediate benefits, at the lowest cost. These procurement activities must abide by the Western Australian Procurement Act and Rules (Western Australian Procurement Rules, 2021).

The first railcar procurement tender called the "Perth C-Series Railcars" was for the purchase of a minimum of 50 railcars with 15 years of maintenance, supplying all designs and maintenance facilities. This tender had a total of 12 submissions with all offers being declined in January 2015 (Tenders WA, 2022). This shows that not all procurement processes and tenders are successful. Following this, the project scope was broken into two stages. Stage One consisted of 13 major Tenders for construction (Figure 2.2.1.1) and over 37 additional tenders for supply (Appendix B).
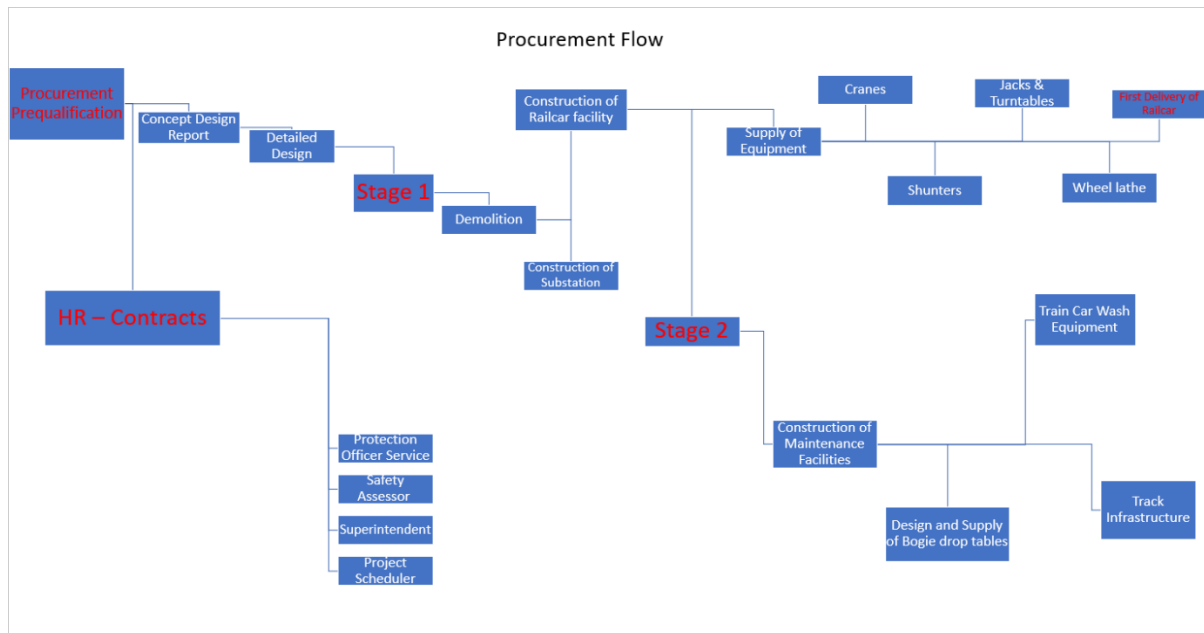
Figure 2.2.1.1 Procurement Flow Chart

Stage 2 consisted of 4 Tenders with more to be added for supplying equipment to the maintenance facilities upon construction. Each stage requires the completion of the previous stage for the project to continue, risking the timeline of the overall schedule.

The procurement process of the WA railcar project consists of four major works documents, suppling the tenderer with all the relevant information for the project. This includes:

- Conditions and information for tendering
- Information Requested from the Tenderer & Contract of Sum Schedule
- General Conditions of Contract
- Scope of Works and Specification

Each tender has been dated and aligned with the overall scope of the project allowing the project to stagger the procurement activities such as variations and negotiations before the expiry date of each tender. Having the project broken into multiple tenders allows the review of previous procurement activities, by assessing the work orders, quality, and performance of each contractor. This will help in future stages by allowing terms & procurements to be updated and refined for the benefit of the stakeholders.

In total, 54 tenders were submitted to Tenders WA, breaking the project into multiple phases. This incorporates issues due to multiple vendors and suppliers, each relying on the previous stage to be supplied and completed prior. This places the project at risk for each tender, as any delay in the first contract can have ongoing effects until the final stage (Hartley, 2018). This makes the actual timeline of the project hard to follow and track from an external view and many tenders have not stated an estimated price at the beginning of the process. This will prove difficult in the analysis of the final stages of the project that have not yet been completed.

Covid-19 has had a negative effect on global supply chains making procurement of parts and labor a difficult phase of this project. As all tenders listed for the WA Railcar Program are on a fixed-priced contract this increases the risk to contractors as their contracts stipulate "under

no circumstances can contractors be entitled to cost or damages due to Covid-19" (Tenders WA, 2022). This can result in breaches to contract terms and can significantly hurt contractor/stakeholder relations as any supply issues can affect subsequent contracts.

2.2.2 Project Quality Assurance

To ensure that the railcars are produced to the best quality, an extensive testing regime was put in place. Each railcar will undergo rigorous testing in WA before they can be utilized on the passenger rail network. The safety and experience of passengers is of utmost importance and therefore the quality cannot be compromised on.

After each individual railcar passes a series of static and diagnostic tests, the first six-car train will roll onto the network for nine months of intensive trials along the Mandurah and Joondalup lines. Once final adjustments are made, they will be applied to future railcars which will allow for a shorter testing phase. (WA Railcar Program Fact Sheet, 2022)

This intensive approach ensures that future railcars can help move more than 103,000 daily boardings on these lines as safely, efficiently, and smoothly as possible (WA Railcar Program Fact Sheet, 2022).

2.3 Execution Stage

The execution stage of the life cycle begins once the project has commenced and is progressing as per the defined schedule (Hartley, 2018). Throughout this stage there is constant monitoring of the process, and any updates are implemented as required (Hartley, 2018).

2.3.1 Scope Management

Currently, stage 1 of the project scope has been completed. This included the Bellevue Manufacturing and Assembly Facility. Metronet has been utilising this facility for all its purposes laid out in the project scope. However, there is concern for the facility following the completion of the WA Railcar Program.

The purpose of the facility is to produce the railcars for the project. As the project has a 10-year life, by extension the facility has a maximum life of 10 years. The building of the facility had a budget of 46 million dollars (Building for Tomorrow, 2022). Following the completion of this phase there are further additions to the facility proposed in the scope. The abundance of resources required to complete this phase leads to questions regarding how reasonable this portion of the scope is.

TBL was taken into consideration concerning the duration of the project however, it is less clear it has been considered following completion of the project. Economically, the Bellevue facility is an expensive phase of the project not including the proposed additions. Socially, the project is set to create local long-term jobs, 100 of which are associated with the Bellevue facility (Building for Tomorrow, 2022). However, if the facility proves redundant once the project is completed there is uncertainty about the long-term employment opportunities available. Metronet mentioned the possibility of continuing to use the facility outside of the current scope however, there is no discussion on what this use is and is not definitive and therefore poses a risk.

2.3.2 Time Management

For an effective project schedule, the agreed schedule needs to be published. Schedule for tenders were published on 3 May 2017 and indicated the due date for each stage (Project Definition Report, 2017).

The timeline for WA Railcar Program was in 6 parts: Procurement, Manufacture, First Testing, Driver Training, First Service and Staged Delivery.

The Manufacturing and Assembly facility was completed in June 2021 allowing for the manufacturing of railcars to commence (WA Railcar Program, 2022). The High Voltage Testing Facility was completed in March 2022 and now extensive testing can be done (Metronet, 2022). The first railcar has taken over a full year to complete and the first full 6-car train was delivered on the 14th August 2022 (Metronet, 2022). The railcar is still undergoing extensive dynamic testing which was originally set for mid-year of 2021 as seen in figure 2.3.2.1 (Railcars Testing, 2022)
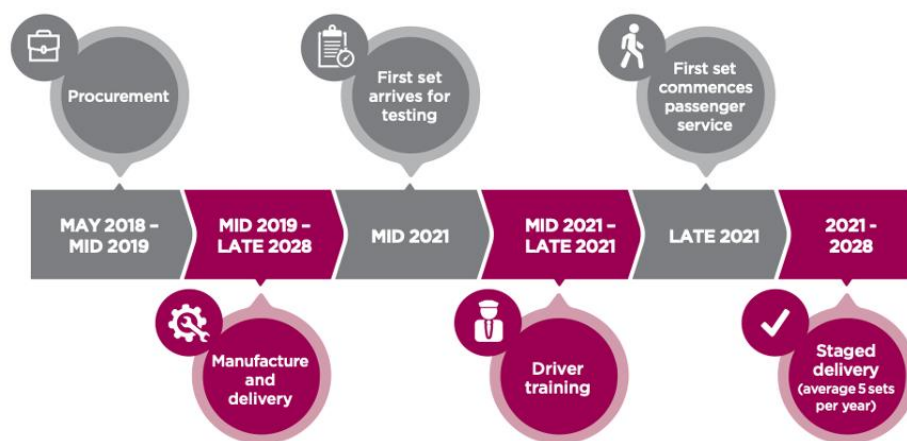

Figure 2.3.2.1 Timeline (WA Railcar Program, 2018)

The schedule at this point is a year behind and as this project has a finish-start relationship this pushes the following parts forward. Metronet updates now state passenger service will begin in 2023, one to two years behind schedule (Latest News, 2022). This delay will continue for the staged delivery and will likely result in the project finishing in 2030, 2 years behind schedule.

Metronet can operate under a revised timeline as they know every stage will be delayed by one to two years and continue as normal. Different risk, cost, quality, and scope decisions with implications for the schedule are referenced in the contract to the stakeholder. (Detailed Design, 2018). To deal with any delays that have/may occur, Metronet has defined responsibilities in their contracts. The contractor must notify the superintendent of anything that may delay the schedule within 5 business days of becoming aware (Railcar Maintenance Facilities, 2020). This notice must include all the details of the day as well as the cause.

2.3.3 Risk Management

Risk management includes first identifying risks and then planning risk responses and how to control the risks (Hartley, 2018). Under Metronet's sustainability strategy themes one of the

outcomes is to have resilience assessments that include key risks (Metronet Sustainability Assessment, 2021). However, it is unclear whether the WA Railcar Program has executed any kind of risk assessment.

Metronet stated it was committed to open and transparent communication with the community, yet there is no information available to the public regarding any risk assessment. Therefore, this report will operate under the assumption there was no extensive risk assessment or management for the program. This is not to say there was absolutely no consideration of risks. For example, the site investigation for the Bellevue facility discovered there was little to no risk building there, as the heavy metal content would be acceptable for the purposes of the facility. However, had the site investigation uncovered anything that made it an unfit location for the facility there was no information suggesting the program had planned for this possibility i.e., there was no management for that potential risk.

The lack of information regarding risk management suggests that it was not a priority. For a program so heavily focused on the community, a risk assessment and management plan could be crucial in gaining the community's trust and in general ensure a well-executed program. Thus, it is evident the WA Railcar Program could be improved by employing a meaningful and clear risk management plan.

2.4 Summary of Issues Identified
The most critical issues that were identified throughout the analysis of the WA Railcar Program have been summarised below in order of importance.

- Lack of Risk Management
- Project is behind on schedule (time management) *
- Skills and labor shortages *
- The future of the Bellevue Manufacturing and Assembling Facility

* Since both factors contributed to the project being behind schedule, time management and labor shortages are viewed as equally important.

C3   Recommendations
Several areas for improvement were identified after analysing the WA Railcar Program. Recommendations are provided below, outlining how the WA Railcar Program could improve its project management.

3.1 Risk Management

Risk Management has been identified as the most critical issue regarding the WA Railcar Program. This is because there is no clear risk management plan that has been adopted for the project and this could have a cascading effect on all other areas of project management. It will also be useful in understanding the potential TBL impacts. For there to be a risk management plan, there must first be risk identification and risk analysis. Thus, this report will provide recommendations for risk identification, analysis and management as the project fell short in all three areas.

3.1.1 Risk Identification

Risk identification should be completed across all areas of the program. Splitting it up into the project aspects such as scope, costs, time, procurement etc., will aid in a thorough analysis for all areas. Risk cannot be assessed with absolute certainty, but care should be taken to provide as thorough identification of potential risks as possible. Historical research on similar projects can be used as case studies to help identify the risks associated with the project. Part of the scope of the WA Railcar Program is to replace the A-series railcars. It would be prudent to conduct research on the original A-series project because they are similar projects and can serve as a source of potential risks throughout all project life cycle stages.

Following a comprehensive identification of risks, the risks can be categorised as internal or external. Internal risk is defined as risk over which those involved in the project have some control and/or influence (Hartley, 2018). External risk is risk over which the project team has no direct control (Hartley, 2018).

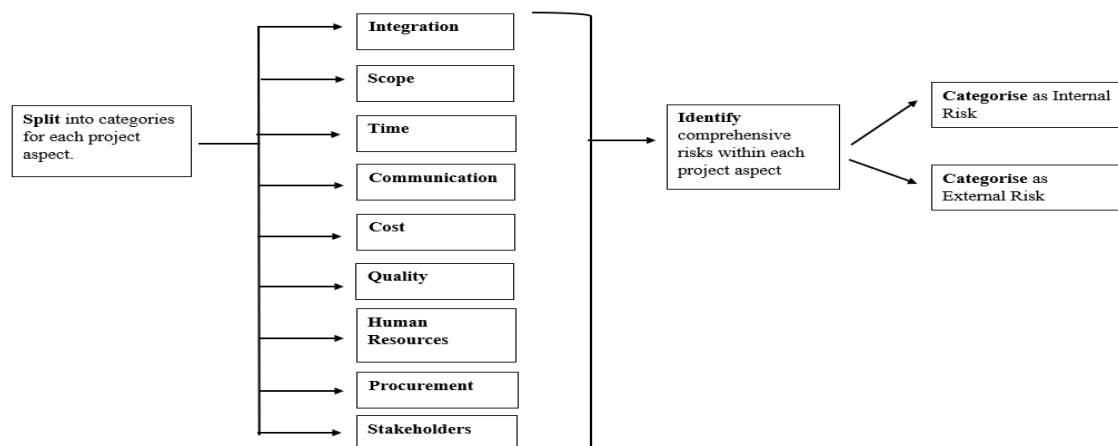This process has been summarised below in figure 3.1.1.1

Figure 3.1.1.1 Risk Identification Flow Chart

3.1.2 Risk Analysis

The identified risks should be qualified and quantified. Metronet can do this by assigning numerical values that correspond to the probability and impact of a risk as seen in figure 3.1.2.1.

Risk event	Probability	Impact
Inclement weather	4	5
Operational priorities	3	4
Uncontrolled scope changes	5	5
Fluctuating exchange rate	1	4

Figure 3.1.2.1 Risk Analysis (Hartley, 2018)

Probability is assigned values 1-5 from rare to certain occurrence. Impact is also assigned value 1-5 depending on how much it impacts a project aspect, for example would it impact the product quality in a minor way (1) or render the product useless (5) (Hartley, 2018). To keep the values consistent the rankings should be qualified in a table and referred to for each numerical assigning.

Once this has been completed priority can be assigned to each risk by using the 5x5 grid seen in figure 3.1.2.2

		Impact				
		1	2	3	4	5
Probability	1	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

Figure 3.1.2.2 Priority Grid (Hartley, 2018)

By assigning priority, the product of the probability and impact values, Metronet can determine how important it is for them to deal with the risks. This will aid them in determining how to deal with each risk.

3.1.3 Risk Management

Once risks have been analysed Metronet must develop a strategy for how to manage the risks if they do occur. For example, the potential risk of not being able to build the manufacturing facility at the Bellevue location could be mitigated by having a back-up location prepared. Following a strategy plan, the risk management must be assigned to a stakeholder. Who is assigned the responsibility will depend on the priority of the risk and whether it is internal or external. The manufacturing facility is instrumental for the project, so not being able to build it in Bellevue may be assigned a high impact but low probability. This is an internal risk and assigned medium priority and accountability may be assigned to the project manager. Accountability is essential in risk management as risks are unlikely to be appropriately dealt with otherwise.

All risks must be reviewed, documented, and agreed on by all stakeholders (Hartley, 2018). For ease of this process all identified risks can be added into one document that every stakeholder has access that can be electronically signed once finalised and reviewed. This can be achieved by a risk register; an example can be seen in figure 3.1.3.1.

Risk event	Probability	Impact	Priority	Strategy	Accountability
Inclement weather	4	Catastrophic (5) Schedule postponement	20	Seek approval for time extensions	Logistics officer
Operational priorities	3	Major (4) missed deadlines	12	Identify replacement resources	Production manager
Uncontrolled scope changes	5	Major (5) Revisions in schedule and budget	25	All proposed changes in writing and authorised	Project manager

Figure 3.1.3.1 Risk Register (Hartley, 2018)

The risk register provides a clear outline of all risks, summarises the quantitative and qualitative analysis that was done for each risk, details the response plan and who is responsible for it. The register must be updated as new risks are identified throughout the life cycle.

Metronet must implement a comprehensive risk management strategy. The WA Railcar program has a 10-year life, and risks can accumulate quickly, causing a domino effect of setbacks that could lead to failure if no contingency plan is in place. As accountability is essential, this strategy relies on stakeholder communication. Metronet's communication with stakeholders was well executed, which is why it was incorporated into the recommended risk management plan.

3.2 Time Management

Time management is important as the schedule may be delayed by a variety of factors. To minimise the risk of these delays preventive or corrective action must be taken (Hartley, 2018).

The project is currently two years behind schedule. There is a finish-start relationship between the goals of the WA Railcar Program meaning each stage cannot 'start' until the previous stage is 'finished'. Delays in the completion of the manufacturing delayed the testing by about a year, and subsequent delays in the first testing phase will continue to cause delays in the first service and staged delivery phases thereafter.

If the project is to be completed on time, it is necessary to shorten the time of the subsequent stages. However, this would be at the expense of the railcar quality (minimising the testing time) or at an increased cost (more resources required to complete extensive testing in a shorter period). Metronet have prioritised project quality and have come underbudget. Therefore, it makes most sense for Metronet to revise their timeline. This revised timeline can be seen in the form of a Gantt chart in figure 3.2.1.
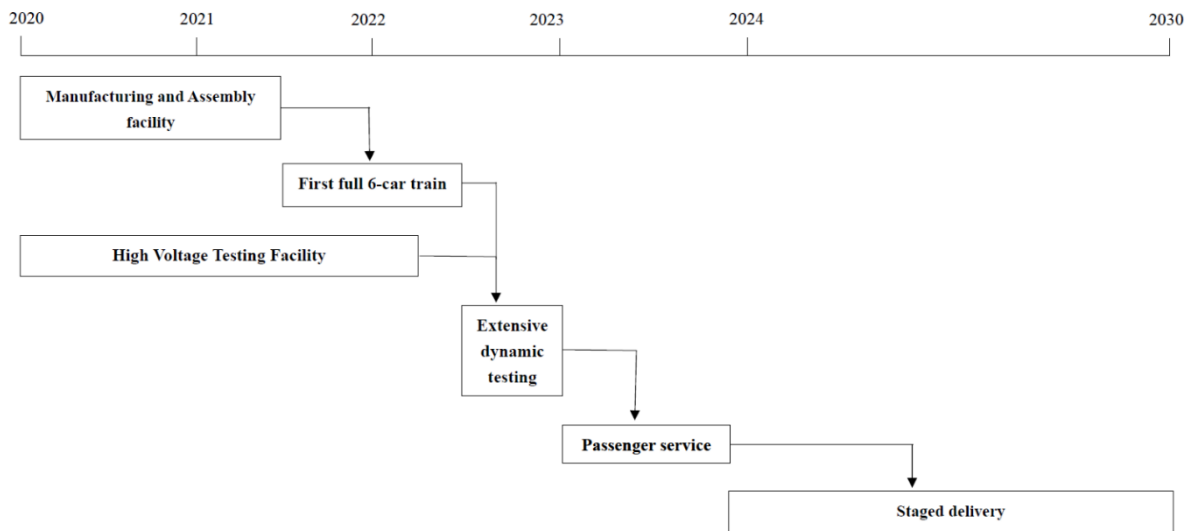
Figure 3.2.1 Revised Timeline (Gantt Chart)

The project manager and the team need to know in advance of any changes to the schedule and how to respond (Hartley, 2018). Metronet have shown excellent communication with stakeholders and their contracts, as previously discussed, have contingencies in place so that any delays can be promptly dealt with. Figure 3.2.1's Gantt chart shows the whole project, but it is advised Metronet construct more detailed Gantt charts for each stage so delays can be easily recognised, and the timeline can be amended accordingly. This will enable Metronet to identify delays more efficiently and overall, their time management process will be more efficient.

3.3 Procurement Planning

The procurement planning stage of the WA Railcar Program has been selected as an area for improvement. The project has come underbudget, but complexities have arisen in the procurement process due to the Covid-19 pandemic and the resulting labour and supply chain issues.

3.3.1 Tenders

The overall process for the WA Railcar Program has shown to have over 54 total tenders associated with the project, with 50 of said tenders being associated with stage 1. Whilst having multiple contractors can have some benefits as mentioned in Section 2.2.1, it also increases the risk of delays due to previous contractors failing to follow the schedule outlined in their contract. This increases the risk for the contractors and their ability to achieve project delivery dates resulting in them missing out on incentives (Hartley, 2018).

The recommendation would be to consider consolidating the whole project into one tender as per the initial procurement tender. After the failure of securing the initial tender in 2015 which would have allowed Metronet to purchase the railcars without requiring an assembly facility at an overall cost of $1.2b, there could have been re-negotiations. This could have been done at an increased cost as it would likely result in the project finishing further under budget. Costs could have been further reduced by increasing local supply as international outsourcing and procurement would increase costs due to the effects of Covid-19.

3.3.2 Supply chain & skill shortages

Covid-19 has disrupted supply chains and resulted in labor shortages, throughout Australia. The WA Railcar Program has stipulated a minimum of 50% of contracts are to be awarded locally throughout the project's life, leaving the remainder to be sourced elsewhere. Global supply issues have made it difficult to receive goods into Western Australia and as a result has caused variations to contracts at almost every phase of the project (Tenders WA, 2022). Increasing the percentage of contracts awarded locally could help relieve the strain due to supply chain issues from international sources. However, sourcing locally will be difficult due to the current skilled labor shortages.

Skilled labor shortages are set to continue due to a lack of training. Railcar signaling courses are still limited to people who are licensed electricians and engineering courses are 3 years away from entering the workforce, well after the demand and supply of newly constructed railcars. Hence a continued skills shortage in these areas are expected to continue until 2024, 2 years after the first constructed railcar set. One potential option would be to add occupations to the Priority Migration Skilled Occupation List (PMSOL) allowing a priority entry for VISA applicants into Australia for people who meet the skill requirements. However, to ensure Metronet can meet its local sourcing goal, it is recommended they seek support from the government who could potentially reduce course fees and/or make them free, particularly for job seekers aged under 25. If this is not feasible, Metronet could offer to pay for the required courses themselves. Metronet has come $347 million dollars under budget. This surplus of funds could be used so that Metronet can directly ensure they can hire employees who have the exact desired training for their role in the program. They could tackle the skills shortage firsthand by providing career progression workshops, paying for tuition to ensure employees have the appropriate skills, and outsourcing to other existing stakeholders or contractors.

3.4 The Bellevue Manufacturing and Assembly Facility

The Bellevue facility is crucial to the execution of the WA Railcar Program. However, its impact following the completion of the project should still be considered. Metronet mentioned the potential to use the facility for another project but have not considered how. The new railcars will have an operational life of 35-years thus the facility cannot serve the same purpose for a substantial amount of time. Metronet needs to consider the cost of maintaining this facility and how they intend to utilise it. It is recommended that Metronet conducts a SWOT Analysis and incorporates TBL to determine the best future for the facility.

A SWOT analysis details the strengths, weaknesses, opportunities, and threats and can be organised in a grid as seen in figure 3.4.1.

Figure 3.4.1 SWOT Analysis Grid (Hartley, 2018)

This tool can be used to strategise, assess, and justify a project (Hartley, 2018). In this case Metronet can assess the potential uses for the facility as well as the justification of the initial and ongoing costs. One of the project's goals was to create hundreds of long-term local jobs, many of which would be associated with the Bellevue facility. This may present an opportunity for Metronet; if they stay in the same line of business, they can retain employees, thereby increasing economic benefit and encouraging a loyal social network, which could be identified as a strength. This would also allow most if not all aspects of the facility to continue to be used. However, this only applies if the facility is similarly utilised. Therefore, it is recommended that Metronet conducts a SWOT analysis considering if they will use the facility for a similar project or something different. From here they can reach the best conclusion for the company. This is achieved by determining how they can exploit the strengths and opportunities of the facility while minimising the weaknesses and threats. Social, environmental, and economic impacts should be considered within the SWOT analysis as per TBL.

This should be executed prior to the finalisation of the WA Railcar Program to ensure Metronet has sufficient time to have a plan in place to avoid unnecessary maintenance costs for the facility in the interim.

Conclusion

First conceptualised in 2015, the WA Railcar Program was created to support the growing transportation requirements due to the projected growth in population over the next few decades. Initially budgeted for $1.6 Billion, the WA Railcar Program will deliver 246 C-Series railcars manufactured locally in the Midland Precinct. Through the completion of stage 1, the Bellevue Manufacturing and Assembly Facility, the WA Railcar Program can continue to stage 2 to meet production targets. This WA Railcar Program has also achieved a local procurement rate of greater than 50% in line with the initial project conditions.

Throughout this project, Metronet has employed a number of basic and advanced project management strategies which has allowed the project to progress with minimal disruption. There is, however, scope for improvement.

Detailed analysis of the Railcar Program has uncovered several areas for improvement. The most critical issue identified was Metronet's lack of a detailed and public risk management process. This was deemed most critical as it could have follow through effects for every phase of the project. To counter this, it was recommended Metronet employ a comprehensive risk identification, analysis, and management plan. Another major concern identified was the ongoing skill and labor shortages in WA due to Covid-19. As discussed, this shortfall can be mitigated by utilising the project budget surplus to proactively train new workers and encourage skilled migration to fill any shortfalls. The project is currently behind schedule to best deal with this, this report recommends Metronet create detailed Gantt charts for each phase of the project. Lastly, the ambiguity surrounding the continued use of the Bellevue Manufacturing and Assembly Facility needs to be addressed. A detailed SWOT analysis needs to be conducted on the long-term viability of maintaining the facility or repurposing it for another project to avoid.

References

2019. *Bellevue Rail Yard, Former CBH Area*. [ebook] Western Australia 6005, Australia: Golder Associates Pty Ltd. Available at: <https://www.tenders.wa.gov.au/watenders/tender/display/tender-details.do?CSRFNONCE=6F34185C844BFECA2A57B2F78073981F&id=44008&action=display-tender-details&returnUrl=%2Ftender%2Fsearch%2Ftender-search.do%3Faction%3Dsearch-from-main-page%26amp%3BCSRFNONCE%3DD69E85A8A7C4219A1D1DA97908F21CF8> [Accessed 7 August 2022].

Abc.net.au. 2018. *Metronet Perth train project could be derailed by a national skills shortage of rail workers*. [online] Available at: <https://www.abc.net.au/news/2018-07-10/metronet-rail-workers-in-demand-as-skills-shortage-takes-grip/9957992> [Accessed 22 August 2022].

Alstom. 2022. *Alstom's first six-car C-Series train for METRONET leaves Bellevue for dynamic testing*. [online] Available at: <https://www.alstom.com/press-releases-news/2022/8/alstoms-first-six-car-c-series-train-metronet-leaves-bellevue-dynamic> [Accessed 21 August 2022].

Building for Tomorrow. 2022. *Bellevue Railcar Manufacturing and Assembly Facility*. [online] Available at: < https://www.buildingfortomorrow.wa.gov.au/projects/bellevue-railcar-manufacturing-and-assembly-facility/>[Accessed 26 August 2022].

Civil Works Package for the Bellevue Depot Traction Power Feeder Station [online] Available at: < https://www.tenders.wa.gov.au/watenders/login.do?CSRFNONCE=5EEB4DE5B8C587E50033963762B7056D&downloadSpec=yes> [Accessed 20 August 2022]

Construction of New Railcar Maintenance Facilities at Bellevue [online] Available at: Tenders WA | Display Tender PTA210168 [Accessed 20 August 2022]

Developmentwa.com.au. 2021. *PROPOSED ASSEMBLY AND COMMISSIONING FACILITY, BELLEVUE (STAGE 2) DEVELOPMENT APPLICATION*. [online]. Available at: <https://developmentwa.com.au/docs/planning-and-approvals/planning-items/midland/Bellevue-Depot-Stage-2-DA---January-2021-Final_web.pdf> [Accessed 15 August 2022]

DevelopmentWA - Shaping our State's future. 2022. *Shaping our State's future*. [online] Available at: <https://developmentwa.com.au/about> [Accessed 20 August 2022].

Hartley, S 2018, Project Management (A Practical Guide to Planning and Managing Projects)

International Railway Safety Council, 2022. *Railway Safety*. [online] Available at: <https://international-railway-safety-council.com/common-risks-managed-railway-industry/> [Accessed 22 August 2022].

Metronet.wa.gov.au. n.d., *WA Railcar Program*. [online] Available at:<https://www.metronet.wa.gov.au/projects/wa-railcar-program#bellevue-assembly-facility> [Accessed 15 August 2022].

METRONET: Midland Station Project Definition Report and Bellevue Station Concept Design Report[online] Available at: Tenders WA | Download for Tender Documents [Accessed 20 August 2022]

Metronet.wa.gov.au. 2018. *WA Railcar Program*. [online] Available at: <https://metronet.wa.gov.au/Portals/31/Project%20Documents/Railcars/Railcar%20Project%20Definition%20Plan%20.pdf> [Accessed 7 August 2022].

Wa.gov.au. 2019. *Waterwise Perth Action Plan*. [online] Available at: <https://www.wa.gov.au/system/files/2020-06/Waterwise-perth-action-plan.pdf> [Accessed 23 August 2022].

Metronet.wa.gov.au. 2020. *Railcar Program Update*. [online] Available at:<https://metronet.wa.gov.au/Portals/31/Project%20Documents/Railcars/Railcar%20Program%20Update%20-%20April%202020.pdf> [Accessed 14 August 2022].

Metronet.wa.gov.au. 2020. *Railcar Program Update*. [online] Available at: <https://metronet.wa.gov.au/Portals/31/Project%20Documents/Railcars/Railcar%20Program%20Update%20-%20September%202020.pdf> [Accessed 23 August 2022].

Metronet.wa.gov.au. 2020. *Bright future ahead at METRONET Trade Training Centre*. [online] Available at:< https://metronet.wa.gov.au/news/latest-news/category/railcar-program/bright-future-ahead-at-metronet-trade-training-centref> [Accessed 23 August 2022].

Metronet.wa.gov.au. 2021. *METRONET Sustainability Strategy*. [online] Available at: <https://metronet.wa.gov.au/Portals/31/Project%20Documents/Sustainability/Sustainability%20Strategy.pdf?ver=4PzHzqBB0-Zj4DJoMJTraw%3d%3d> [Accessed 10 August 2022].

Metronet.wa.gov.au. 2022. *Made in WA, first METRONET six-car train rolls out for testing*. [online] Available at: <https://www.metronet.wa.gov.au/news/latest-news/category/wa-railcar-program/made-in-wa-first-metronet-six-car-train-rolls-out-for-testing-1> [Accessed 30 August 2022].

Metronet.wa.gov.au. 2022. *WA Railcar Program Fact Sheet*. [online] Available at:<https://metronet.wa.gov.au/Portals/31/Project%20Documents/Railcars/WA%20Railcar%20Program%20Fact%20Sheet.pdf> [Accessed 14 August 2022].

Metronet.wa.gov.au. 2022. *Latest News First of 246 METRONET C-series Railcars Testing Underway. [online] Available at:* <https://www.metronet.wa.gov.au/news/latest-news/first-of-246-metronet-c-series-railcars-testing-underway> [Accessed 21 August 2022].

Metronet.wa.gov.au. 2022. *Access and Inclusion*. [online] Available at: <https://www.metronet.wa.gov.au/Portals/31/Project%20Documents/Access%20and%20Inclusion%20Reference%20Group/Access%20and%20Inclusion%20Reference%20Group%20Terms%20Of%20Reference.pdf?ver=86VQRNI9okO3wxAX4Nuxvw%3D%3D> [Accessed 16 August 2022].

Metronet.wa.gov.au. 2022. *Engagement*. [online] Available at: <https://www.metronet.wa.gov.au/engagement> [Accessed 13 August 2022]

Public Transport Authority. 2020. *Australind train taken out of service for major repairs*. [online] Available at: < https://www.pta.wa.gov.au/news/media-statements/australind-train-taken-out-of-service-for-major-repairs> Accessed 23 August 2022].

Tenders WA. 2022. *The Provisions of Project Scheduler Services for the METRONET Railcar Procurement Project.* [online] Available at: < Tenders WA | Display Tender PTA220027> [Accessed 21 August 2022].

Tenders WA. 2022. *Construction of New Railcar Maintenance Facilities at Bellevue* [online] Available at: Tenders WA | Display Tender PTA210168 [Accessed 20 August 2022]

Wa.gov.au. 2021. *Western Australian Procurement Rules*. [online] Available at: <https://www.wa.gov.au/system/files/2021-04/WA%20Procurement%20Rules%2020201218_1.pdf> [Accessed 17 August 2022].

Appendices

Appendix A

Bellevue Rail Yard (Former CBH Area, 2016)

Appendix B

PACKAGE	Estimated date
Bogie Brackets & Secondary Structure	16/06/2020
Bogie Fasteners	25/06/2020
Bogie Suspension Components	23/07/2020
Automatic Coupler	30/04/2020
Carbody - Fittings	05/08/2020
Horn	23/07/2020
Rain Sensors - Wiper	23/07/2020
Sunblind	21/06/2020
Electrical - cabinet (Sheet Metal Work)	22/06/2020
Electrical - cable tray	04/07/2020
Electrical - Event recorder	05/06/2020
Electrical - Inverters, converters, transformers & rectifiers	30/06/2020
Electrical - Jumpers, relays & relay racks, junction boxes, earthing systems	30/06/2020
Electrical Material for wiring & harness assemblies	30/06/2020
Fire Detection System	28/05/2020
Glazing	28/05/2020
Interiors - Catering module	23/09/2020
Interiors - Thermal insulation	25/06/2020
Interiors - Pipe/Pneumatic Fitting	27/07/2020
Seats	11/03/2020
Floor Covering	05/06/2020
Floor	13/05/2020
Labels	20/07/2020
Signage	20/07/2020
Anti Graffiti Coating	20/07/2020
Other - Fastener and consumables	13/07/2020
Other - Metal Fabrication & Tooling	13/07/2020
Pantograph	06/04/2020
Passenger Information System / CCTV System	06/04/2020
Toilet System	11/08/2020
Traction Motor Bearing	01/05/2020
Mechanical Tools and Fixtures	26/07/2020
IT Infrastructure for Depot	24/06/2020
Railcar Cleaning Services (Indirect)	18/09/2020
Depot Equipment Maintenance	13/09/2020
IT Support	31/08/2020
Telecommunications, Phones, IT, Internet	31/08/2020

Procurement Schedule (Gateway.Org, 2022)

Meeting minutes

First Bi-Weekly Mine Design Meeting

Date/Time: 10am Sunday 31/07/2022

Chairperson	
Minutes	Corey Blake
In attendance	Darcy, Sachin, Xiaoli, Yihan, Wendy
Absent	Nick

Agenda	
Item	**Person(s)**
5 preferred projects	All
Summary of preferred project	All
Project timeline	All
Decide on task assignments	All
Submission of Summary	All

Minutes		
Item	Notes	Status
5 preferred projects	• End of today	Due: 31/07/2022
Summary of preferred project	• Preferred project to write summary	Due:2/08/2022
Project timeline	• Completed today	Today agreed
Decide on task assignments	• Pending response from Cosimo	Due:
Submission of Summary	• Corey Blake	Due: Tuesday 5/08/2022
Details of next meeting		
Date of Next Meeting	10am – Sunday 13/08/2022	
Next Chairperson (responsible for composing agenda)	Corey Blake	

Signed:

Corey Blake – 22295676@student.uwa.edu.au		Xiaoli Yang - 23299752@student.uwa.edu.au	
Darcy Tan – 22708776@student.uwa.edu.au		Yihan Liu – 22696718@student.uwa.edu.au	
Sachin Joseph Thekkooden – 23256725@student.uwa.edu.au		Wendy Wu - 23685729@student.uwa.edu.au	

Second Bi-Weekly Mine Design Meeting

Chairperson	Corey Blake
Minutes	Corey Blake
In attendance	Darcy, Sachin, Xiaoli, Yihan,
Absent	Wendy, Nick

Agenda	
Item	**Person(s)**
Decide on task assignments 1500 words	All

Minutes		
Item	Notes	Status
Background & All A4 section-safety ,Enviro,Economy	- Corey Blake	All Due 12/08 as per summary
Concept intro	- Darcy tan	
Costs	- Yihan Liu	
community / stakeholders	- Sachin Joseph	
HR	- Wendy	
Project scope	- Lilly	
Planning Phase	- Nick	
Details of next meeting		
Date of Next Meeting	10am – Sunday	
Next Chairperson (responsible for composing agenda)	Corey	

Section A: Case study writing

In addressing this section, students should provide a short background of their chosen project and present the relevant information and facts - That is, students should report only the relevant information and facts that, in their opinion, are useful for analysing the steps of the project's life cycle in Section B. As specified earlier, the facts and other relevant information should be gathered from reliable sources (e.g. company reports, official publications on the Australian Securities Exchange (ASX) and information available from other government agencies, or primary research carried out with relevant stakeholders, etc.). This section should be approximately **1,500 words**, excluding references and appendices.

Signed:

Corey Blake – 22295676@student.uwa.edu.au		Xiaoli Yang - 23299752@student.uwa.edu.au	
Darcy Tan – 22708776@student.uwa.edu.au		Yihan Liu – 22696718@student.uwa.edu.au	
Sachin Joseph Thekkooden – 23256725@student.uwa.edu.au			

Third Bi-Weekly Mine Design Meeting

Chairperson	Corey Blake
Minutes	Corey Blake
In attendance	Darcy, Sachin, Xiaoli, Nick
Absent	Wendy, Yihan

Agenda	
Item	**Person(s)**
Sections not Completed by the 12/08 (completed 14/08)	Wendy.W & Nick.Z
Part A planning section not complete	All
Part A Review and proofread (finalise as per unit outline)	All
Decide on task B assignments	All
Would anyone else like to run the next meeting?	All

Minutes			
Item	Notes	To be completed by	Status
Part A planning section	• Scope of Works • Community and Stakeholders -	• Darcy	Behind Was due on 12/08 as per summary
Part A Review and proofread (finalise as per unit outline)	tidy up and re-write / crop	• Darcy	
Decide on task B assignments	• Concept intro • 1.1 - • 1.2 - • 2.1 - • 2.2 – • 2.3 - • 2.4 - • 3.1 - • 3.2 – • 4.1	• Xiaoli • Sachin • Corey • Corey • Nick • Wendy.W • Yihan • Wendy.W • Sachin • Nick	Completed by 23/08 as per summary 2500 words Max 250 words per section NOTE: change from original schedule (19/08)
For Part C	• Xiaoli, Yihan- will be given additional tasks to cover for less in part B		
Details of next meeting			
Date of Next Meeting		10am – Sunday	
Next Chairperson (responsible for composing agenda)		Corey Blake	

Priority Project Timeline Summary

- Approval of Project – Friday 5th August 5pm
- Bi-Weekly meetings equipped with agenda and documented minutes
  - 10am Sunday
- Final Edit of Section A (1500 words) to be completed by 12th Aug
- Final Edit of Section B (2500 words) to be completed by 19th Aug
- Final Edit of Section C (2000 words) to be completed by 2nd September
- Final Edit of Report and meeting to discuss presentation – 11th September
- Group presentation Due 16th September

Signed:

Corey Blake – 22295676@student.uwa.edu.au		Xiaoli Yang - 23299752@student.uwa.edu.au	
Darcy Tan – 22708776@student.uwa.edu.au		Zelong Zhou – 22668759@student.uwa.edu.au	Nick
Sachin Joseph Thekkooden – 23256725@student.uwa.edu.au			

Fourth Bi-Weekly Mine Design Meeting

Date/Time: 6:15pm Tuesday 23/08/2022

Chairperson	Corey Blake
Minutes	Corey Blake
In attendance	All.

Agenda	
Item	**Person(s)**
Decide on task C assignments	All
Any concerns or issues	All

Minutes		
Item	Notes	Status

Into
 	
C1   Concept
 	
1.1   Community and Stakeholders
 	
1.2   Cost
 	
1.3   Scope
 	
C2   Planning
 	
2.1   Cost
 	
2.2   Risk Management
 	
2.3   Time Management
 	
2.4   Human Resource
 	
C3   Execution
 	
3.1   Community and Stakeholders
 	
3.2   Time Management
 	
C4   Evaluation of Project
 	
4.1   Project Current Status
 	
4.2   Timeline
	Part B review- Darcy
	Intro-Darcy
	    1.1-Xiaoli
	    1.2 -, Yihan
	    1.3 – Xiaoli
	2.1- Sachin
	2.2 - nick
	2.3 – Wendy
	2.4 – Corey
	        3.1 – Yihan
	        3.2 Wendy
	        4.1 Nick
	        4.2 Corey
	Conclusion
	Sachin
	Review task C
	– Sachin
	
	Final Review -
	Darcy
		Task C due the 31/08/2022

Darcy raised issue: Most failed to reference correctly in section A	Harvard refence and intext. MUST be used as per unit outline, and UWA policy	All to go back to Part A and redo any not referenced material. **ASAP**
Wendy asked where to find stakeholder information?	Review to previous section	Solved

	1.2 and attached reference	

Details of next meeting	
Date of Next Meeting	4pm – Friday 09/09
Next Chairperson (responsible for composing agenda)	Corey Blake

Signed:

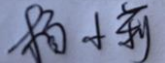| Corey Blake – 22295676@student.uwa.edu.au		Xiaoli Yang - 23299752@student.uwa.edu.au	
Darcy Tan – 22708776@student.uwa.edu.au		Yihan Liu – 22696718@student.uwa.edu.au	
Sachin Joseph Thekkooden – 23256725@student.uwa.edu.au		Zelong Zhou – 22668759@student.uwa.edu.au	
Wendy Wu - 23685729@student.uwa.edu.au			

Fifth Bi-Weekly Mine Design Meeting

Date/Time: 4:00pm Friday 09/09 /2022

Chairperson	Corey / Darcy
Minutes	Corey Blake
In attendance	All

Agenda	
Item	**Person(s)**
Changes to document structure	All
Assemble Document (allocation of incomplete sections)	Corey / Darcy
Final Revision/ Submission of Document	Darcy
Task assignments for Video (4 min each)	All
Submission of Video	All

Minutes		
Item	Notes	Status
Reason for changes to final document	Updated following final revision considering tips given by Balin during the tutorial	
Assemble Document (allocation of incomplete sections)	Finish Document on Friday Night -Darcy / Corey	
Final Revision/ Submission of Document	Saturday- All	10/09
Task assignments for Video (4 min each)	Slides completed Monday Lunch time	
Submission of Video	Video Completed Tuesday	Due Friday 16/09
Details of next meeting		
Date of Next Meeting	N/A	
Next Chairperson (responsible for composing agenda)	N/A	

Signed:

Corey Blake – 22295676@student.uwa.edu.au		Xiaoli Yang - 23299752@student.uwa.edu.au	

Darcy Tan – 22708776@student.uwa.edu.au		Yihan Liu – 22696718@student.uwa.edu.au	
Sachin Joseph Thekkooden – 23256725@student.uwa.edu.au		Zelong Zhou – 22668759@student.uwa.edu.au	Nick
Wendy Wu - 23685729@student.uwa.edu.au	Wendy Wu		

Team Reflections

The overall team performance was good. However, there were a few delays as some team members did not always finish their tasks on time but usually caught up within a couple of days. The initial time chosen for bi-weekly meetings (10am Sundays) was often not convenient so meetings were scheduled as required and the time was voted on by all team members. The time that most could attend was chosen. Tasks were split up in the meeting agenda and during the meeting, team members had the opportunity to choose the tasks they preferred. Those who were unable to attend were allocated any leftover tasks. Some members were assigned more tasks some weeks, but to keep things fair they would be assigned less in following weeks to ensure on average everyone had a similar number of tasks.

Some team members were more assertive (Corey, Darcy) while others more passive (Nick, Sachin, Xiaoli, Wendy, Yihan). The more assertive team members kept the team organised and encouraged the passive personalities to engage and communicate. The assertive personalities continually checked in with everyone to ensure everyone was happy and felt they had the chance to actively participate.

However, there was sometimes a lack of cohesion due to poor communication. Active members were always the one to correct any issues in the report or had to direct the other members to correct any issues. But when directed, these members did so happily and in a timely manner. To overcome the lack of cohesion, passive members need to take more responsibility and participate in team conversations more readily.