Sunshine Coast COUNCIL

Agenda

Special Meeting

(Nambour Heritage Tramway Project)

Monday, 13 May 2019

commencing at 9:00am

Council Chambers, Corner Currie and Bury Streets, Nambour

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1 DECLARATION OF OPENING

On establishing there is a quorum, the Chair will declare the meeting open.

2 RECORD OF ATTENDANCE AND LEAVE OF ABSENCE

3 INFORMING OF PERSONAL INTERESTS

3.1 MATERIAL PERSONAL INTEREST

Pursuant to Section 175C of the *Local Government Act 2009*, a Councillor who has a material personal interest in an issue to be considered at a meeting of the local government, or any of its committees must –

(a) inform the meeting of the Councillor's material personal interest in the matter and

(b) leave the meeting room (including any area set aside for the public), and stay out of the meeting room while the matter is being discussed and voted on.

3.2 CONFLICT OF INTEREST / PERCEIVED CONFLICT OF INTEREST

Pursuant to Section 175E of the *Local Government Act 2009*, a Councillor who has a real or perceived conflict of interest in a matter to be considered at a meeting of the local government, or any of its committees, must inform the meeting about the councillor's personal interest the matter.

The other Councillors must then decide

(a) whether the Councillor has a real conflict of interest or perceived conflict of interest in the matter and

(b) if they decide the Councillor has a real conflict of interest or perceived conflict of interest in the matter
    (i) whether the Councillor must leave the meeting room (including any area set aside for the public), and stay out of the meeting room while the matter is being discussed and voted on, or
    (ii) that the Councillor may participate in the meeting in relation to the matter, including by voting on the matter.

4 REPORTS DIRECT TO COUNCIL

4.1 NAMBOUR HERITAGE TRAMWAY PROJECT UPDATE

File No: P-B3798

Author: Coordinator Urban Projects
Liveability & Natural Assets Group

Attachments:

PURPOSE

Consistent with previous Council Resolutions, this report provides a summary of the Nambour Heritage Tramway project relative to secured budget, forecast expenditure and key risks, for Council's consideration of both capital and operational aspects.

EXECUTIVE SUMMARY

The Nambour Heritage Tramway project has been before Council on several occasions in the past, most recently in January and April 2019 where the matter was deferred until Special Meeting of Council 13 May 2019.

The project is identified within Council's Nambour Activation Plan and is a collaborative effort of Council and community group, The Nambour Tramway Company Ltd (TNTCo). A heads of agreement, lease and funding agreement (terminus building) exist between Council and TNTCo to guide and develop the project in accordance with the previous resolutions of Council.

The report prepared for the Ordinary Meeting 31 January 2019 identified a capital funding gap of $2.97 million. In accordance with previous Council resolutions a budget shortfall was to be reported to Council for capital budget deliberations. The report for the Ordinary Meeting 31 January 2019 was deferred to enable several actions to occur, an update of which was provided at the Ordinary Meeting 30 April 2019.

This report, in accordance with previous resolutions, has been prepared based on additional information not previously available. This information has been provided by TNTCo and their consultants, covering designs, costings along with updated operational expenditure and revenues (refer attachments 1, 2 and 3). The received information has been reviewed by various teams and officers within Council. An independent review by external consultants has also occurred (refer attachment 4). Two key aspects of the project are considered within this report prior to advancing into the construction delivery phase, being Capital Budget shortfall including options and operational cost and revenue risks.

<u>Capital Budget</u>

Through revised costings, alternative designs and additional revenue, the funding gap that exists for the project is now forecast as $0.763 million. This has reduced from previous forecasts due to

- Additional funding pledged to TNTCo from the Thompson Foundation
- Reduction in contingencies

- Lower rates for new trackwork installation (market pricing estimates vs. consultant estimates)
- Lower service relocation allowances
- Additional works with more expenditure for the TNTCo preferred alternate mid and end platform alternative designs.

The remaining funding gap can be addressed through the reallocation of Council funds already within the 10 year Capital Works Program from project "Nambour CBD Activation Plan" to the Nambour Heritage Tramway. There are some limitations to funding availability relative to financial years, most notably TNTCo (Thompson Foundation pledge cannot be accessed until after 30 June 2020) and Council's current allocated program limits within the 10 year Capital Works Program. Achieving a logical construction sequence that aligns with these limitations requires $0.463 million funding in Council's program for Nambour CBD Activation Plan to be brought forward from 2021/22 to 2020/21. In order to maintain program funding limits an alternative project within the 2020/21 streetscape program for Division 10 could be partially deferred to 2021/22 to ensure overall budget program totals remain consistent.
Advancing the alternative capital budgets through to construction has different delivery solutions to previous reporting and resolutions, which if supported will require changes to the existing heads of agreement and funding agreement along with, potentially, an additional funding agreement:

a) Terminus building to be constructed by TNTCo as per existing funding agreements with funding from both Council and the Australian Government. To be completed by end of March 2020.

b) Tramway to be designed and constructed by TNTCo as a specalised supplier with funding from both Council and TNTCo. To be completed across 2019/20 and 2020/21 financial years. TNTCo would be required to seek Council's and Department of Transport and Main Roads (DTMR) design and construction approvals as the local road authorities and asset owners.

c) Tram rolling stock, commissioning and certification to be undertaken by TNTCo directly through funding provided by the Thompson Foundation. To be completed in 2020/21 financial year as per funding availability limitations.

<u>Operational costs and revenues</u>
The legacy operations of the tram will reside with TNTCo as the accredited Rail Infrastructure Manager and Rolling Stock Operator under the Office of the National Rail Safety Regulator (ONRSR). TNTCo submitted in April 2019 an updated operational cost and revenue forecast for a 10 year period which has been reviewed by both Council internal officers and external engaged consultancy. The TNTCo forecast highlights their expected positive operational cashflow, including sink fund and future fund. As with all forecasts they are based on key assumptions, which depending on what eventuates can influence the outcome. As these are TNTCo risks to manage they will need to implement mitigation plans.

The proposed operating model appears a relatively low risk to Council as revenue and expenditure responsibility reside with TNTCo. If TNTCo are unable to sustain their operations in the future, then the tram operation could cease. The infrastructure created from this project consists of a terminus building, road corridor improvements and a tram rolling stock unit. Should the operation of the tram cease in future years, Council would retain ownership of the building (which could be repurposed) and the road corridor improvements, which other than some redundant signaling, would retain their general purpose of pedestrian activation along Howard Street. The tram rolling stock, acquired and funded by TNTCo, would be an asset for TNTCo to dispose of through sale or donation.

The operational financial risk only transfers to Council if the forecast expenditure and revenue are not achieved by TNTCo **AND** Council decides the tram service must continue.

OFFICER RECOMMENDATION

That Council:

(a) receive and note the report titled "Nambour Heritage Tramway Project Update"

(b) recognise the updated capital estimates for the project indicate a $0.763 million capital budget deficit which will need to be accommodated within the Council 10 year Capital Works Program

(c) adjust the 10 year Capital Works Program to transfer $0.763 million of funding from Nambour CBD Activation Plan Actions and defer other Division 10 non-essential infrastructure projects within the streetscape program in consultation with the Divisional Councillor to enable funding of the budget deficit

(d) vary the existing head of agreement between Council and TNTCo to reflect the change in tram purchasing and tramway construction responsibilities from Council to TNTCo along with the increase in the maximum Council funding from $1.5 million to $2.263 million subject to adequate funding arising from recommendation (c)

(e) acknowledge the risks associated with legacy operational costs and revenues reside with TNTCo as the accredited rail operator and any proposed transfer of risk to Council would require a change in the operating model and executed heads of agreement which would require a further decision of Council and

(f) endorse the commencement of the terminus building construction by TNTCo in alignment with nominated schedules.

FINANCE AND RESOURCING

Capital Budgets

Capital expenditure consists of costs incurred to date plus the forecast to complete three key pieces of infrastructure. Costs to date expenses have been incurred by both Council and TNTCo over multiple financial years in investigation and project development, including modification works to Council owned 28 Mill Street property. These costs total approximately $0.432 million and are sunken with no ability to alter or change based on risk acceptance or design options.

The remaining forecast capital expenditure by key infrastructure are:

a) Terminus building: previous and current estimates have remained consistent at $0.804 million. This includes all works within the 28 Mill Street site which is to be completed by TNTCo as a specalised supplier through an executed funding agreement with Council. There is a further funding agreement between Council and the Australian Government for these works.

b) Tram (rolling stock): previous TNTCo estimates were $0.6 million, however an open market tender undertaken by Council, using TNTCo specifications, in December 2018 returned pricing of $1.27 million. TNTCo have since revised the specifications and undertaken further market sounding directly. In the costing documentation TNTCo are adopting $0.6 million as the cost of tram rolling stock. While a detailed breakdown of elements has not been provided, the direct manufacturing estimates supplied are significantly less than this adopted figure which is in acknowledgment of potential additional costs for tram manufacturer selection, quality assurance, delivery, certification and commissioning in Australia.

c) Tramway: the works within the roadway to facilitate the tram movement along with passenger access / egress has various estimates relative to several slightly different designs (refer Attachment 3). The estimates range from $2.58 million (combination of Council and GHD estimating) to $1.375 million (TNTCo/Covey Associates estimating), a difference of $1.205 million. The following key factors influence the bulk of the variances between totals:

   i. Contingency: Council's estimating adopted 35% whereas TNTCo have applied 10%.

   ii. New trackwork/buffer stop: GHD estimating applied $0.63 million whereas TNTCo have used $0.18 million

   iii. Landscape/place making: Council's estimating includes $0.2 million for embellished streetscape outcomes at key nodes whereas TNTCo have allowed $0.05 million for landscaping.

   iv. Allowances for service relocations: Council included $0.1 million within estimates whereas TNTCo have not.

   v. Detailed design phase costs: Council's estimate, in error, did not include an allowance for these tasks whereas TNTCo's estimate includes $0.17 million.

   vi. Alternative designs for mid and end platforms: TNTCo have provided alternative designs for both the mid platform adjacent the Old Ambo building and the end platform adjacent Aldi. These alternatives have been estimated by TNTCo to cost an additional $0.440 million. While Council does not have a comparison estimate available the rates in TNTCo's estimate are consistent throughout original and alternative pricing.

Secured budget dedicated towards the Tram project and likely expenditure (excluding tramway) is shown in table one. The budget available has increased from previous reporting by $1 million from TNTCo due to an executed funding pledge from the Thomson Foundation (see attachment 2)

Table One- Budget and Expenditure (excluding tramway)

Revenue (secured for project)	$(million)
Council	$1.500
Australian Government	$0.500
TNTCo	$1.100
Total	**$3.100**
Expenditure	$(million)
Costs to date	$0.432
Tram	$0.600
Terminus	$0.804
Subtotal	**$1.836**
Balance available for tramway	*$1.264*

Significant variability exists between the multiple estimates that have been prepared for the tramway (see attachment 4). Commentary from external reviewers is that unknowns within the concept design exist that could influence the final costs incurred, in particular:

- Service relocations
- Signaling systems
- Track replacement

A typical manner to address unknowns at concept stage is to include adequate contingencies, effectively pricing the unknown. Industry practice varies as to the level of contingency applied at different phases of the planning, investigation and design process. Council's internal civil designers typically use 40% at planning phase and 20% at concept phase. GHD applied 35% contingency in their estimating of their concept design. Commentary from external consultancy review states that due to the unresolved design items at concept phase a contingency of 35% may not be adequate.

Alternatively, TNTCo have obtained a lump sum price from a reputable and sizeable civil contractor for the works which is substantially less than Council's external consultancy cost estimates.

Therefore, an option available to control and mitigate both risk and cost to Council is to engage TNTCo to deliver the tramway works. TNTCo would then engage suitable engineers and civil contractors to perform the works. It should be noted, TNTCo have previously been appointed as a specialised supplier for this project as development manager for construction of the terminus, track and signal infrastructure within and leading up to the 28 Mill Street site. This appointment was resolved by Council in Ordinary Meeting of 15 June 2017. This appointment would need to be extended to cover delivery of entire tramway along the Mill and Howard Street road corridor (stage 1).

For information, in June 2019, Council moved its procurement framework from the Default Contracting Procedures (DCP) of the Local Government Regulation 2012 to the Strategic Contracting Procedures (SCP). At the time of adopting the change a new set of procurement procedures and exceptions were introduced, with all appointed Specialised Suppliers migrating into the new framework. The Specialised Supplier exception under the DCP required a resolution of Council. Under the SCP, the Specialised Supplier exception may be exercised by the CEO after having received and approved a report justifying the use of the exception.

In this instance, TNTCo are already a Specialised Supplier, however that approval does not currently extend to the works now being proposed. An amended approval from the CEO would therefore be required.

The various estimates for the tramway component and resultant budget balance are shown in table two.

Table Two: Tramway expenditure

Scenario	**Estimate cost of Tramway $(million)**	**Budget Balance $(million)**
1. Lowest - *no allowance for service relocations* - *10% contingency* - *no streetscaping embellishments* - *not preferred TNTCo mid and end platform design outcomes* - *inclusive of design phase tasks*	$1.376	-$0.112
2. TNTCo (lump sum price) delivered - *TNTCo preferred mid and end platform design outcomes*	$1.877	-$0.613

Scenario	Estimate cost of Tramway $(million)	Budget Balance $(million)
- *Inclusive of design and construction management phase tasks* - *Delivered by TNTCo as development manager through engagement of suitable consultants and contractors for lump sum price*		
3. Proposed - *As above but inclusive of additional $0.15 million allowance to aid better streetscape outcomes (i.e. vegetation, embellished finishes).* - *0% project contingencies allowed for.*	$2.027	-$0.763
4. January Ordinary Meeting Report - *allowances for service relocations* - *35% contingency* - *streetscaping embellishments* - *not preferred TNTCo mid and end platform design outcomes* - *not inclusive of design phase tasks*	$2.58	-$1.316
5. Highest (GHD) - *higher allowances for service relocations* - *35% contingency* - *No streetscaping embellishments* - *not preferred TNTCo mid and end platform design outcomes* - *inclusive of design and construction management phase tasks* - *higher allowances for new track work*	$2.98	-$1.76

If adopted as specialised supplier based on a fixed amount of $1.877 million (inclusive of all detail design, construction and commissioning phases along with a $0.15 million allowance for streetscape embellishments as per scenario 3), a suitable funding agreement, similar to existing document executed between Council and TNTCo for the terminus building, would be required to encompass the administration, supervision and acquittal of Council's funding and its responsibilities as the road authority.

The resulting funding gap of $0.763 million can be addressed through the reallocation of Council funds already within the 10 year Capital Works Program. In addition to funding allocated towards the Nambour Heritage Tramway project the current adopted 10 year Capital Works Program has nominated funding within the Streetscapes Major Centre program for Nambour CBD Activation Plan. Funding is scheduled as $0.3 million in 2020/21, $0.95 million in 2021/22 and $1.74 million in 2022/23 for a total of $2.99 million over three financial years. The intent of these funds was to implement aspects of the Nambour Activation Plan other than the tramway.

There are some limitations to funding availability relative to financial years, most notably TNTCo (Thompson Foundation pledge cannot be accessed until after 30 June 2020) and

Council's current allocated program limits within the 10 year Capital Works Program. To align a logical expenditure sequence requires funding in Council's program for Nambour CBD Activation Plan to be brought forward a financial year. In order to maintain program funding limits an alternative project in 2020/21 streetscape program within Division 10 could be deferred a year to ensure overall budget program totals remain consistent. Existing and proposed budgets are shown in tables three and four.

Table Three: Current 10 year Capital Works Program

Project	**19/20**	**20/21**	**21/22**
Nambour Heritage Tramway	$0.7 million	$0 million	$0 million
Nambour CBD Activation Plan Actions	$0 million	$0.3 million	$0.95 million
Division 10 Streetscape program project (e.g. Eumundi Town Centre Placemaking).	$0.15 million	$0.65 million	$0 million
Total	$0.85 million	$0.95 million	$0.95 million

Table Four: Proposed 10 year Capital Works Program

Project	19/20	20/21	21/22
Nambour Heritage Tramway	$0.7million	$0.763 million	$0 million
Nambour CBD Activation Plan Actions	$0 million	$0 million	$0.487 million
Division 10 Streetscape program project (e.g. Eumundi Town Centre Placemaking).	$0.15 million	$0.187 million	$0.463 million
Total	$0.85 million	$0.95 million	$0.95 million

While TNTCo has submitted material for stage two of the tramway (design, estimates and accessibility), Council has not reviewed this information now as it is unfunded and considered beyond the 10 year horizon.

Operational Costs / Revenues

The legacy operations of the tram will reside with TNTCo as the accredited Rail Infrastructure Manager and Rolling Stock Operator under the Office of the National Rail Safety Regulator (ONRSR). The project operational parameters have been previously considered by Council through a feasibility analysis undertaken and reported to Council at the 23 April 2015 Ordinary Meeting. OM16/33 further nominated an updated business case to be submitted to Council, which was prepared by TNTCo and included in reporting to Council at the 15 June 2017 Ordinary Meeting. TNTCo has submitted in April 2019 an updated operational cost and revenue forecast for a 10 year period (refer attachment 1) which has been reviewed by both Council internal officers and external engaged consultancy (refer attachment 4).

The TNTCo forecast highlights their expected positive operational cashflow, including sink fund and future fund. As with all predictions they are based on key assumptions and risks, which depending on what eventuates can influence the outcome. The key assumption risks highlighted by the review of TNTCo supplied material are:

a. Single paid 0.5 Full Time Equivalent (FTE) employee. All other services and tasks to be undertaken by volunteers. Cost over runs may arise from higher than expected staffing costs if volunteer numbers are not achieved or sustained. The attraction and retention of a rail industry skilled person for 0.5 FTE and / or low salary is also a high risk. The training of volunteers by a suitably skilled / accredited entity has not been allowed for.

b. Average utilisation is estimated at 57% across the year. TNTCo's previous business case from 2017 adopted a utilisation rate of 30% with supporting text "Assumed 30% utilisation. Other heritage/tourist railways we have contacted have quotes between 65-85% utlilisation". A 10% fall in revenue is assumed in the second year of operation with growth of 3% per annum continuing across years 3 to 11. The implications of rain and the subsequent limiting days / hours of tram rolling stock operation do not appear to have been factored. As most of the revenue (79%) is linked to patronage through ticket and merchandising sales, should the utilisation numbers vary they will impact forecast revenue (either positively or negatively).

c. Maintenance (planned and unscheduled). While allowances have been made the external consultant reviewer has indicated they may be understated. In particular the use of volunteers compared to specialists (either employees or contractors) along with costs associated with materials and equipment that may need to be worked on by the rolling stock manufacture (freight and repair). Track maintenance for an aging rail line does not appear to have been adequately allowed for.

d. Insurance (comprehensive). TNTCo have advised through their submitted documentation in April 2019 that they have been unable to obtain comprehensive insurance for the tram rolling stock and require Council to insure with TNTCo reimbursing premium and excess costs. These costs, depending on magnitude, may influence TNTCo's cashflow. Council's insurer advice is:

    a. Current policy is only for Council owned or leased fleet. It would not be variable to include coverage of third party owned fleet

    b. A separate policy would therefore be required which would be difficult to obtain due to single unit coverage and risk appetite of insurers

    c. At the time of report writing a premium and excess cost estimate was not available but is being sought

The TNTCo operating fund is sensitive to decreases in initial revenue and increases in initial cost estimates. As these are TNTCo risks to manage they will need to implement mitigation plans:

- 5% change sees the operating fund balance flat line across all years
- 10% change sees the operating fund balance fall to zero in year 5
- 15% change sees the operating fund balance fall to zero in year 3.
- A tripling of wages ($45,000 to $150,000 as flagged by external reviewer) and a marginal increase in maintenance costs yields a negative outcome from year 1 of the operating fund with a closing balance in year 11 of -$1.467 million.

As TNTCo assume the tram operational responsibility, the on-going implications to Council's operational expenditure is the maintenance of enhanced streetscape elements (a task undertaken in all Council's streetscape projects consistently across the region) and the maintenance of additional signaling infrastructure (a service Council undertakes throughout the region).

The financial risk of the actual tram operation only transfers to Council if the forecast expenditure and revenue are not achieved by TNTCo **AND** Council decides the tram service must continue. In this circumstance Council may:

- be asked to contribute a payment (one off or annually) to TNTCo to cover gaps between revenue and expenditure. The actual amount would vary based on multiple possible scenarios;

- engage an alternate community group to take on the activity instead of TNTCo, which may or may not require contribution payments from Council; or
- operate the tram directly by becoming an accredited Rail Infrastructure Manager and Rolling Stock Operator under ONRSR. This would involve upfront accreditation costs along with likely much higher legacy expenditure through paid employees and contractors in lieu of volunteers.

CORPORATE PLAN

Corporate Plan Goal: ***A strong community***
Outcome: 2.4 - People and places are connected
Operational Activity: 2.4.5 - Progress the Nambour Activation Plan 2015.

CONSULTATION

Councillor Consultation

Divisional Councillor G Rogerson

Internal Consultation

- Transport Infrastructure Policy
- Transport and Infrastructure Management
- Project Delivery
- Business and Innovation
- Design and Placemaking Services
- Contract and Supply Services
- Legal Services
- Communication
- Property Management
- Finance

External Consultation

- Nambour Tramway Company Ltd
- Australian Government Department of Infrastructure and Regional Development

Community Engagement

Extensive community engagement was undertaken during the development of the feasibility study which was presented to Council on 23 April 2015, and also as part of the development of the Nambour Activation Plan, which was adopted by Council on 15 October 2015. Further targeted public consultation has not occurred since this time however the Tramfest events remain a highly effective and successful community engagement tool, as is The Friends of the Tram group who maintain a Facebook presence and issue monthly newsletters.

A draft community communication plan for project detail design and construction phase has been developed however its implementation has been on hold pending construction timeframes which is linked to addressing budget deficit. Like other Council streetscapes a process of communication with the community will need to occur in advance of the tramway works.

PROPOSAL

The Nambour Heritage Tramway project is designed to re-activate the heritage listed tram line that was initially established to transport sugar cane through the centre of Nambour (refer attachment 1). The project is a component of the Nambour Activation Plan 2015 which

is a joint initiative between the Sunshine Coast Council and the Nambour Alliance Inc., the town's peak business and community representative body. This Plan, adopted by Council in October 2015 for implementation, aims to provide a framework to activate Nambour to enable local businesses and communities to energise their township and celebrate their place.

The TNTCo tram operating model, as currently proposed, is a single tram running from 28 Mill Street, along Howard Street with additional passenger egress/access at tram stops outside of 80-82 and 127 Howard Street. TNTCo propose a 25-seat tram service tram operating six round trips between 8am - 5pm on weekdays, 3 round trips between 9am – 2:15pm on Saturdays and two round trips between 10:30am – 3:05pm on Sundays. Initial ticket prices are set at $2 for adults and $1 for concession/child tickets with annual passes priced at $150. The business model relies primarily on volunteer workforce for maintenance of the rolling stock and operation of the tramway scheme. TNTCo have several letters of support for the project, including Members of Parliament (refer attachment 1).

Elements of previous Council resolutions have been progressing over the last 2 years, with the report at Council's Ordinary Meeting 31 January 2019 arising from project cost estimate exceeding allocated funding and a requirement to report back to Council should this eventuate. As an outcome of the Council resolution and deferred report, additional information has been prepared and provided by TNTCo and their consultants in April 2019. This information covers a range of project elements including designs, costings along with updated operational expenditure and revenues (refer attachments 1, 2 and 3). The received information has been reviewed by various teams and officers within Council. An independent review by external consultants has also occurred (refer attachment 4) which considers the tramway designs and costings along with the legacy operational framework including expenditure and revenue forecasts.

Some packages of work are approaching 'shovel ready', however progression of the individual work packages has been placed on hold awaiting budget shortfall clarification and review of operational cost / revenues.

Project Tasks

Several key packages of works make up the overall project to create the necessary infrastructure for the Nambour Heritage Tramway to function:

Approvals/Legals

Multiple documents have been negotiated and executed to advance the project in accordance with previous Council resolutions. This includes:

a) Heads of Agreement between Council and TNTCo

b) Funding Agreement between Council and Australian Government

c) Funding Agreement between Council and TNTCo

d) Lease of portion 28 Mill Street by TNTCo from Council.

A necessary interface agreement between TNTCo and the Department of Transport and Main Roads (DTMR) has been agreed in principle (subject to final signaling design). This is a requirement of DTMR for TNTCo to operate the tram in the State road corridor (Currie Street). There is potential for Council to develop a similar but more condensed agreement with TNTCo for them to operate the tram in the local road corridor.

TNTCo has obtained accreditation from the Office of the National Rail Safety Regulator (ONRSR) that permits terminus construction and static commissioning of tram rolling stock within 28 Mill Street. Their accreditation currently excludes construction (tram or track) as well as the operation of tram rolling stock. A variation to their accreditation to operate the rolling stock will be required once the tram has been manufactured and is insurable. A variation to their accreditation to allow construction of tracks will need to occur prior to track works. While TNTCo have obtained accreditation for some of the required tasks, it remains a

risk to the project that the accreditation variation applications to enable other functions are not supported by the regulator.

Terminus building

The project includes a terminus building to occupy the TNTCo leased portion of 28 Mill Street. The design has been completed and necessary building / plumbing applications submitted. Council has previously resolved for TNTCo to be a specialised supplier to construct the building. The terminus functionality includes:

a) Tramway centre

b) Visitor information centre

c) Station platform (disabled compliant passenger access / egress)

d) Workshop (tram maintenance)

e) Tram storage

f) Tracks (including new tracks connecting terminus to existing tracks within road corridor)

g) Amenities

The Nambour Alliance successfully obtained $0.5 million from the Australian Government's National Stronger Regions Fund towards construction of the terminus building and associated tracks. In accordance with previous Council resolutions this funding has been transferred from the Nambour Alliance to Council with a $1.088 million funding agreement executed by Council and the Australian Government. The funding agreement requires works to be 30% complete on the terminus building by 30 September 2019 and fully complete / operating by 27 March 2020 with grant completion reporting and acquittal by 27 May 2020.

Tram rolling stock

TNTCo engaged a suitably qualified and experienced consultant to develop functional specifications for the tram rolling stock. The tram functionality includes being battery powered and compatible with the existing heritage listed tracks. Key safety aspects relating to operating on an active public road with vehicle and pedestrian traffic was included. In accordance with previous resolutions, Council was undertaking the tram procurement with the intention to transfer ownership, maintenance and operational responsibility to TNTCo. An open market tender using the TNTCo developed tram specification closed 18 December 2018 but was ceased 5 February 2019.

TNTCo have since revised their original tram specification by a suitably qualified consultant and undertaken further market sounding directly (see attachment 2). The securing of $1 million pledge from the Thompson Foundation now allows TNTCo to purchase the tram directly themselves, which negates the previous need for Council to purchase and gift the asset. The ability and cost to obtain comprehensive insurance remains unknown at the time of report writing.

Tramway

Tramway aspects in the road corridor need to be constructed for the rolling stock to operate and the tram to function. This includes additional track into 28 Mill Street, stations/platforms at two locations, footpath modifications, traffic signal changes and roadway alterations including lighting and extensive line marking. The works are similar to tasks associated with a streetscape, being a mixture of civil and landscape outcomes.

A concept design was completed by suitably qualified external design consultancy with input from both Council and TNTCo. This concept design included a mid and end platform within the road corridor which serve the dual purpose as pedestrian refuges when not functioning as tram platforms. These platforms were designed at effectively standard kerb height with

disabled access functions intended to be provided through mechanical lift mechanisms within the tram rolling stock itself. As a concept level design, a number of elements require further resolution during the next phase of design and investigations, accordingly a suitable contingency was applied to cost estimates.

Two alternative concept designs have been prepared by TNTCo engaged consultancy for the mid and end platforms. There are benefits to these two alternatives, however they are more expensive than the originals. The key changes are:

- Mid platform has shifted from north to south side of the road corridor. This platform remains at standard kerb height, but disabled access is proposed to be provided through a recessed scissor lift within the platform itself (not on the tram rolling stock)
- End platform has shifted to lot 1 SP266387 which is Council owned land currently serving drainage purposes and with some access easements. It is proposed that this platform height be level with tram rolling stock such that disabled access is provided through ramping. The overland flow drainage path on this land will need to be addressed in detailed design to ensure it is not impeded through the platform structure. Access easements will also need to be resolved.

The next phase of the tramway would be the completion of detail design and investigations, final approvals from both DTMR and Council as the relevant road authorities, then into construction.

Funding Deficit

To address the deficit identified in the report for Ordinary Meeting 31 January 2019 several options have been proposed by TNTCo and reviewed by Council:

Additional Revenue Sources:

a) State and Federal Government grants: none identified. Success of applications is also considered unlikely given the project has already attracted Australian Government funding which has not yet been acquitted.

b) TNTCo: as a not for profit community group TNTCo have undertaken significant community fund raising to contribute towards the project. They remain committed to continuing these efforts however at the time of report writing additional funds had not been secured, other than that noted in item c) Other 3rd Parties.

c) Other 3rd Parties: TNTCo have successful secured a funding pledge from the Thompson Foundation for $1 million to be available after 30 June 2020.

d) Council: partial diversion of funding from another streetscape program project for Nambour CBD activation. To remain within strict Capital Works Program limits, the financial years that the funding is available would require majority of tramway works to be completed in 2020/21 and a partial deferral of another Division 10 streetscape program project to 2021/22. A condensing of funding into a single financial year (2019/20) would require an increase in Council's program total or significant more adjustments to individual projects within the streetscape program.

The Streetscape program owner is Design and Place Making Services Branch. Regional streetscaping priorities are determined through a needs-based assessment using objective criteria. The Sunshine Coast community hold significant importance in the quality of the public realm. Several Council adopted documents provide direction and guidance to this outcome particularly in regard to a major regional activity centre such as Nambour:

- Environment and Livability Strategy
- Planning Scheme
- Centre Design Palettes Manal

Addressing the tram budget deficit with Nambour CBD Activation Plan allocated funds in Council's adopted 10 year Capital Works Program will consume approximately 25% of the overall multi-year project budget. This would leave reduced funds to further advance Placemaking locations as identified in the Nambour Activation Plan.

The Nambour Activation Plan highlights the following as improvements to be undertaken, albeit with only some being costed and partially budgeted:

Strategic Projects:
- Nambour splash water park (budgeted)
- Connecting town centre to Nambour Showgrounds
- Petrie Creek pedestrian and green spine
- Nambour Heritage Tramway (partially budgeted)

Placemaking Locations
- Howard Street – The Tracks
- Town Square and High Streets
- Forecourt/Currie St – the little Brunswick St (partially budgeted)
- C-Square – arts and entertainment mecca
- Petrie Creek Parklands – town touching nature

Reduce scope

a) Terminus building size reduced: not supported by TNTCo due to functionality requirements

b) Landscaping / streetscaping embellishment allowance in tramway removed: not supportive of placemaking / streetscaping outcomes for the Nambour CBD

c) Remove one or both tramway stations: not supported by TNTCo and reduces activation outcomes

d) Adopt original mid and end station designs: not supported by TNTCo

Value engineering

a) Terminus: building has already adopted low cost material choices

b) Tram rolling stock: TNTCo revised technical specification and alternative market sounding has resulted in significantly reduced estimates

c) Alternative tramway design / construction delivery: TNTCo have obtained a lump sum price significantly lower than previous estimates.

Aspects of the project could be undertaken in a staggered manner to mitigate the financial impact each financial year, with the overall cost to deliver remaining the same. The limitations of funding availability (Thompson Foundation and Council's Capital Works Program) necessitate this.

Legal

Multiple documents have been executed to date relevant to the Nambour Heritage Tramway project, including:

- heads of agreement, lease and funding agreement between Council and TNTCo
- funding agreement between Council and Australian Government

If the proposal is supported modifications and / or additional documents will be required relevant to changes to responsibilities within the heads of agreement and expansion of specalised supplier status of TNTCo to encompass the tramway design and construction. If

the proposal is not supported and the project does not proceed the termination clauses/processes within each relevant document will be implemented.

With respect to the Thompson Foundation pledge certificate, it is considered a binding promise to make the payment. It would have to be enforced in court if the person making the pledge elected not to proceed and the court would then decide if it was a binding contract. While the pledge has been reviewed by Council's Legal Services, as the pledge is in favour of TNTCo legal advice on the substance/legality of the document cannot be provided.

Policy

The Nambour Heritage Tramway project is an outcome of the Nambour Activation Plan.

In early 2018 the Nambour Master Plan was prepared by Strategic Planning Branch. Subordinate to this document, the Nambour Activation Plan remains live and provides the framework to activate the streets and places of Nambour and enable local businesses and community to continue to energise their township, celebrate their place and promote the town as a thriving and extraordinary place to live, work and play. The Nambour Heritage Tramway is a nominated strategic project within the Nambour Activation Plan. Council's Corporate Plan includes an operational activity to progress the Nambour Activation Plan 2015.

Additional work is being done on the 'Reimagine Nambour' project which is intended to bring together government, community and business leaders to deliver a strategy that unites the town and its leaders around an action plan. Funding for the action plan has been provided through the Federal Government's Building Better Regions Fund and Sunshine Coast Council.

Risk

The overall report documents the associated risks relative to this project. Key risks include:

- Actual costs incurred to the complete the project may be greater than updated estimate. Detail design of the tramway not yet completed. Transfer of risk to TNTCo as specialised supplier.
- Loss of investment to date if project does not proceed.
- Loss of Federal Government grant funding should terminus not be constructed. Loss of Thompson foundation pledge towards the project if does not proceed. Loss of revenue, loss of infrastructure investment into Nambour and Sunshine Coast region, loss of reputation with Australian Government through not delivering in accordance with funding agreement.
- Key task within the Nambour Activation Plan not being implemented. Outcomes intended of the Nambour Activation Plan not achieved.
- Tramway / streetscape construction consultation with businesses / community has not yet occurred.
- ONRSR accreditation variations for TNTCo to allow construction and operational tasks not yet obtained.
- Assumptions within TNTCo cashflow may not be realised resulting in tram operation ceasing or Council intervening, impacting Council's operational budgets.
- Comprehensive insurance for tram rolling stock may not be obtainable or at a high premium.

Previous Council Resolution

Ordinary Meeting 30 April 2019 (OM19/58)

That Council:

(a) receive and note the report titled "Nambour Heritage Tramway Project Status Update"

Ordinary Meeting 31 January 2019 (OM19/1)

That Council:

Defer consideration of 8.4.1 Nambour Heritage Tramway Project Update, until Council's Ordinary Meeting of April 2019, to enable the Divisional Councillor to work in partnership with the Nambour Tramway Company Ltd and Council Officers to:

(a) undertake investigations into alternative/value engineering and construction methods for the Tramway corridor

(b) request the CEO to cease the current tender process for tram rolling stock, that closed on 18 December 2018

(c) request the Chief Executive Officer to formally seek to vary the Funding Agreement with the Australian Government for the terminus building to the latest commencement and completion dates possible, noting this will require full acquittal by June 2020 and

(d) request the Chief Executive Officer to undertake a review regarding the operational costs and revenue streams for the Tramway and provide a clear forecast of operational costs and risks, depreciation and any expected further project stages over a minimum of a ten year period.

Ordinary Meeting 15 June 2017 (OM17/95)

That Council:

(a) receive and note the report titled "Nambour Heritage Tramway Project Update"

(b) request the Chief Executive Officer to finalise the Heads of Agreement document in accordance with the position outlined in this report

(c) receive and note The Nambour Tramway Company Ltd.'s Business Case

(d) resolve pursuant to section 236(2) of the Local Government Regulation 2012 that an exception to dispose of an interest in land (agreement) in the property identified in Appendix A – Site plan part thereof Lot 2 RP224422, other than by tender or auction be applied, as the disposal is to community organisations as per section 236(1)(b)(ii) and resolve to enter into an appropriate Community agreement with The Nambour Tramway Company Ltd

(e) adopt The Nambour Tramway Company Ltd as a specialised supplier pursuant to section s.235(b) of the Local Government Regulation 2012 as the development manager for the construction of the Western terminus as detailed in the Greenway Architect plans M13.003 (WD.01-WD.11), track and signal infrastructure within and leading up to the 28 Mill Street Nambour site, and request the Chief Executive Officer prepare an appropriate funding agreement to encompass the administration, supervision and acquittal of Council's, Nambour Alliance and the Federal Department of Infrastructure and Regional Development funding for the proposed capital works

(f) note that The Nambour Tramway Company has raised in excess of $650,000 funding towards the project via 'Tramfest' events, donations Department of Infrastructure and Regional Development, National Stronger Regions Fund grant of $500,000

(g) in recognition of the efforts stated in recommendation (f):

(i) commit to allocate a further $500,000 towards the project in the 2017/18 financial year in accordance with Council resolution (OM15/52[f]) and to complete Council's original commitment to the project totalling $1.5 million

(ii) commit to progress the procurement of the tram from project funds, to provide ownership and the full maintenance and operational costs and responsibilities to The Nambour Tramway Company Ltd by utilizing section 236(1)(b)(ii) of the Local Government Regulation 2012. Council will develop detailed specification and tender documentation in consultation with The Nambour Tramway Company

(iii) request the Chief Executive Officer to proceed with the preparation of the detailed designs and refined cost estimates for the project, prior to the commencement of the construction works

(iv) delegate authority to the Chief Executive Officer to authorise any applications to be submitted for any approvals required to enable the tram, ancillary buildings and operations to be considered by the relevant authorities and

(h) in the event of a budget shortfall, a report will be prepared by Council updating the current financial position of the project and seeking Council's future commitment within the 2018/19 financial year Capital Budget deliberations and

(i) subject to agreement of the funding agent, grants from The National Stronger Regions Fund and Queensland Tourism Demand Driver Infrastructure Grant Fund, that have been provided to any parties or grants under consideration, if successful, be transferred to Sunshine Coast Council.

Ordinary Meeting 25 February 2016 (OM16/33)

That Council:

(a) receive and note the report titled "Nambour Heritage Tramway Project Update"

(b) request the Chief Executive Officer to provide a project update to Council on the execution of the heads of agreement, project costing, business case, fund raising and grant funding status and

(c) note the works will continue to progress on the design development and associated approvals.

Ordinary Meeting 15 October 2015 (OM15/174)

That Council:

(a) receive and note the report titled "Nambour Activation Plan"

(b) adopt the Nambour Activation Plan (Appendix A) and

(c) refer a funding request to undertake a feasibility study for the establishment of a water splash park in association with the Nambour Aquatic Centre to the 2016/17 budget considerations.

Ordinary Meeting 23 April 2015 (OM15/52)

That Council:

(a) receive and note the report titled "Nambour Heritage Tramway Feasibility Assessment Report"

(b) note the Feasibility Analysis of the Nambour Heritage Tramway report

(c) note that an amount of at least $2.1 million in funding may be needed to deliver the project

(d) support the Nambour Heritage Tramway project via joint funding and partnership arrangement with the Nambour Heritage Tramway Group (the Group), whereby the Group is responsible for the purchase of the tram, is the act as the Infrastructure Manager and Rail Transport Operator of the Tramway; with the Council responsible for land acquisition, buildings, tram tracks and signalling upgrading

(e) note that considerable work has been completed and that additional work is required between Council and the Group to complete overall project governance and funding, key project hold points for future decision by Council and joint partnership arrangements, before a final project funding arrangement, project start date, can be confirmed by Council

(f) request the Chief Executive Officer to include an allocation of $500,000 in the 2015/16 draft Budget for future consideration by Council and further, that an additional amount of $500,000 be included in each for the 2016/17 and 2017/18 draft Budgets for consideration by Council at the time. Further that these funds represent the maximum funding allocation by Council for this project and further that such funding is to be available for land acquisition, building and other associated capital works approved from time to time by the Chief Executive Officer

(g) pending funding as per (f) above, being included in the 2015/16 budget request the Chief Executive Officer to draft a Heads of Agreement document in consultation with the Group, to formally recognise the parties' roles and responsibilities including the governance, funding and key project hold points described above; confirmation of the $600,000 project funds to come from the Group via a combination of fund raising and grants from other governments fully realisable by 30 June 2017 or such other earlier date; agreed assets and operations insurance coverage; recognition that Council supports the Group in any application for funding to other governments, provides support to the Group to obtain necessary accreditation and an Infrastructure Manager and Rail Transport Operator and continues to provide support and advice and

(h) pending funding as per (f) above, being included in the 2015/16 budget request the Chief Executive Officer to provide a project report to Council by 31 December 2015 on the status of key project hold points, project milestones, potential funding arrangements and the status of the Heads of Agreement document with the Group.

Ordinary Meeting 27 February 2014 (OM14/18)

That Council:

(a) receive and note the report titled "Nambour Heritage Tramway Issues Paper Report"

(b) receive the Nambour Heritage Tramway Issues Paper (Appendix A)

(c) give in principle support for the re-activation of the existing heritage listed tramway line, located in Howard, Currie and Mill Streets Nambour, to accommodate the future running of an electric tram and all associated historic rail vehicles

(d) request the Chief Executive Officer to have further due diligence assessment carried out considering:

(i) detailed costings, including asset condition reports of existing infrastructure and rolling stock

(ii) funding sources

(iii) cost-benefit / financial viability analysis

(iv) Council's legal and financial liability

(v) extent of community capacity and capability to support the project in terms of volunteers, sponsorship and funding from all sources and potential legacy implications for Council

(e) reallocate up to $50,000 from the 2013/2014 Division 10 Councillor Emergent Capital Works and Minor Operational Works Policy funding allocations for the due diligence assessment of the project and

(f) allocate further funds from the Division 10 Councillor funds in the 2014/2015 financial year should they be required to complete the due diligence assessment.

Ordinary Meeting 13 December 2012 (OM12/197)

Notice of Motion – Nambour Tramway Development

That Council request the Chief Executive Officer, in consultation with the Divisional Councillor, to bring to Council a report including an issues paper for the development of the Nambour Tramway utilising the existing heritage listed sugar cane locomotive line with such reports to cover the following:

- *outline of the proposal*
- *proposed ownership and operations of rolling stock*
- *route alignment*
- *property tenure issues*
- *essential infrastructure required*
- *planning and approval issues*
- *key stakeholders and any agreements required*
- *community aspirations and limitations*
- *cost estimates for:*
  - *construction (Capital Costs)*
  - *operating costs*
  - *revenue potential and*
- *other items as relevant.*

Related Documentation

No related documentation relevant to this report.

Critical Dates

The executed funding agreement between Council and the Australian Government for the terminus building includes a schedule for works to be 30% complete on the terminus building by 30 September 2019 and fully complete / operating by 27 March 2020 with grant completion reporting and acquittal by 27 May 2020. For these requirements to be met construction of the terminus building should commence following Council budgetary decision.

Other critical dates relate to Council funding and budget development / budget revisions within allocated financial years (2018/19 and 2019/20).

Implementation

Should the recommendation be accepted by Council, it is noted that the Chief Executive Officer will:

a) vary the existing heads of agreement between Council and TNTCo.

b) expand TNTCo's specalised supplier status to include tramway (stage 1 design and construction)

c) to facilitate item b), prepare an appropriate funding agreement (or vary existing) to encompass the administration, supervision and acquittal of Council's funds and responsibilities as the local road authority

d) at next available Capital Works Program budget revisions (likely BR1 2019/20) adjust projects and programs to reflect this report.

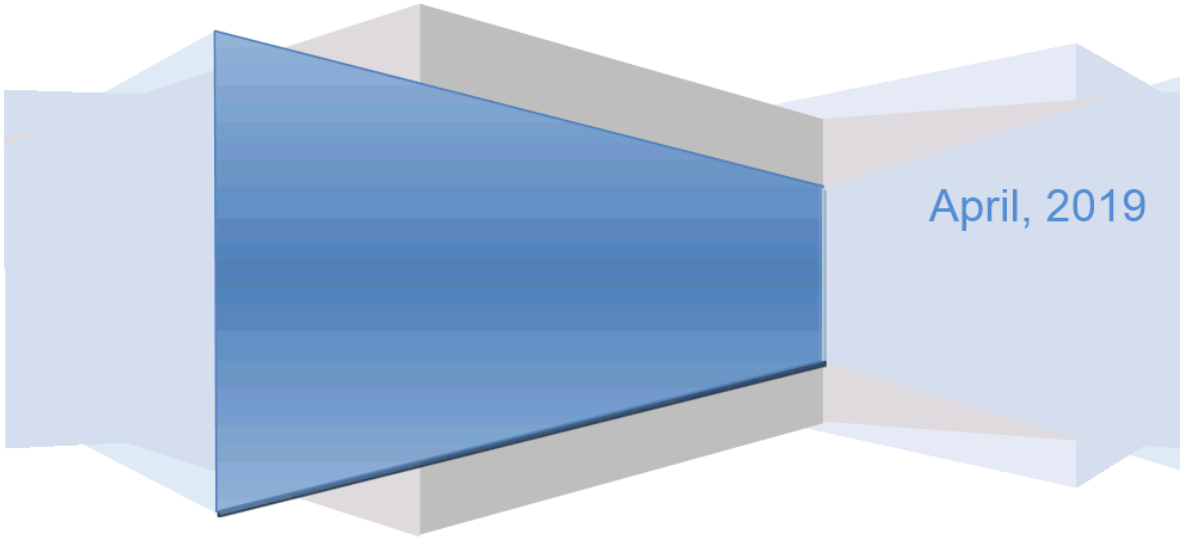
- NAMBOUR -

TRAMWAY

Est 1897

- COMPANY -

Response to Sunshine Coast Council



In response to the 5 elements of the Council Resolution passed at the January Ordinary Meeting, The Nambour Tramway Company (Tram Co), has undertaken an in-depth review of all our costings, designs and estimations to ensure each Councillor can be satisfied that –

(a) all reasonable care has been taken to give a clear picture of Stage 1 of the project and

(b) to also reassure those who have sounded reservations as to the capacity of Tram Co to deliver the future stage 2, that indeed Stage 2 is absolutely feasible and has support from the key stakeholders needed for access and egress.

In Answer To:

Part A of the Resolution – Undertake investigations into alternative/value engineering and construction methods for the Tramway corridor

With the substantial, in-kind assistance from prominent engineering firm Covey Associates Pty Ltd, the Road/Rail design for Stage 1 has been completely reviewed and construction pricings sought from two Civil Contractors, namely Shadforth Civil and Hall Contracting, to give a like for like comparison to the original estimate formed by engineering firm GHD of **$2.9m.**

We believe Council's Infrastructure Delivery Team have also costed the same design and come to a figure of **$1.9m,** which includes a 35% contingency. The brief to our Coast based contractors was for a "Community based approach", which still encompasses all Councils Safety and Work Method procedures. Their pricings are listed in the full Capital Expenditure document ***(Attachment A; Delivered to Council 5/04/19).***

As an additional service, Covey Associates have also investigated and undertaken –

(1) A re-design of the intermediate platform in front of the Old Ambo building in an attempt to alleviate the loss of on-street trees and car parking, with the salvaging of three of the four lost car parks highlighted in the original GHD design, and all on-street trees, saved.

(2) A deviation onto Council owned land West of and adjoining the Aldi building to allow the Tram to access the Nambour State College farm road (a non-gazetted road), without interfering with the current Aldi driveway.
Tram Co has entered into discussions and gained agreement with the landowner to the rear of Aldi, Mr. Andrew Bochenski, whose land would be gifted to Council as part of a current Development Application, under 'Appeal'.
The Principal of the Nambour State College, Mr. Anthony Green, has also given permission for the first Stage of the Nambour to Coolum Walking Trail to

traverse through the College grounds and to utilise the same route as that proposed for the Tram.

State Member for Nicklin, Mr Marty Hunt has also given his unequivocal support for the project. All three have been extremely enthusiastic toward the 'Tram Project' and given letters of support ***(Attachment's B, C and D) Please see note ****

(3) A plotting of the possible route and schematic overview of Stage 2 to ensure there is no gradient greater than the Tram's 3 degree, maximum gradient capability. ***Please see note*****

Note* - The proposed route at the rear of Aldi involves a section of concrete culvert or bridging and the Sunshine Coast University Engineering faculty have expressed their interest in facilitating that future project once Tram Co have secured State or Federal grant funding to finance the project. (Attachment E).

Note** - This exercise has clarified Tram Co's positive position on the future, Stage 2. Stage 2 will now link with the Nambour to Coolum walking trail and deviate off the trail, just past the College's farm buildings, to further connect with one of Nambour's major economic drivers, the Nambour Showgrounds.

Part B of the Resolution - Request the Chief Executive Officer to cease the current tender process for tram rolling stock, that closed on 18 December, 2018

The Council tender process for the purchase of the Tram has ceased.

Part C of the Resolution – Revise the functional specifications for the required tram rolling stock to enable the necessary procurement processes for this to occur

At Tram Co's cost, Bryan Turnbull Consulting (BTC) have fully reviewed and revised the specifications for the Tram and indicated they are capable of 'Signing-Off' a delivered vehicle, based on those specifications. ***(Attachment F), Please see note*****

Tram purchase costing has been included in the Capital Expenditure spreadsheet.

Note** - Given the substantial donation from the Roy and Nola Thompson Foundation, ***(Attachment J-1),***Tram Co believes it has the financial capacity to fully fund the purchase and operation of the Tram, ***(AttachmentJ-2a, J2b),*** thus excusing

Council of any role or responsibility in the purchase or running of the vehicle other than acting as a conduit for comprehensive insurance of the vehicle, (Not Public Liability Insurance), as required by Federal legislation, prohibiting any non-government body to insure a Train or Tram for public use.

Please read ***(Attachment G-1***), outlining the legislation and our preparedness to reimburse Council for the cost of that Insurance. All insurance costs for Construction Insurance, covered within the tender price of the building; Building and Content Insurance; Directors indemnity; Volunteers Cover and Public Liability. ***(Attachment – G-2)***

Part D of the Resolution - Request the Chief Executive Officer to formally seek to vary the Funding Agreement with the Australian Government for the terminus building to the latest commencement and completion dates possible, noting this will require full acquittal by June 2020

The CEO of the Sunshine Coast Regional Council has sought and received an extension to the funding deadline.

Tram Co has also sought a ***'change'*** to the funding guidelines, allowing the use of the balance of the NSRF grant to apply to the on-road track and points work leading into the 28 Mill Street site, (the Western Terminus and Information Centre site). That variation has been accepted giving access to the full $500,000 NSRF grant, rather than just the half earmarked for the $804,226 Terminus build. Please see (Attachment H)

Part E of the Resolution – Request the Chief Executive Officer to undertake a review regarding the operational costs and revenue streams for the Tramway and provide a clear forecast of operational costs and risks, depreciation and any expected further project stages over a minimum of a ten year period.

Tram Co have undertaken a root and branch review of all assumptions around operation expenditure. We stand by the key assumption made in 2013, with some variation.

(1) That the main income for this project will be derived from a number of branch activities, including fares, which we have kept at 2013 levels. Op Ex – ***(Attachment N)***
(2) Our Solar generation capacity with such a large, north facing roof area gives a substantial positive effect for energy costs. ***(Attachment K)***

(3) We recognise that year 2 may deliver a dip in revenue, and have factored that into our calculations.
(4) Depreciation and the coverage of future maintenance costs have been addressed under a sinking fund, projected over an 11-year term.
(5) Future capital requirements for the additional staging has been addressed in a Future Fund, also with an 11-year term

In Conclusion –

This project is not solely about a Tram, it is about building confidence and capacity in Nambour, about injecting energy and activity into the CBD. As a town, we wish to be an active participant in the greater Sunshine Coast success story, to offer something that will greatly benefit Nambour, add a 'point of difference' to Coast based visitor activity and to enable those visiting, to hear and see a unique and compelling story.

An important aspect to note, is that the Tram Co Tram will be the only 'Tram' of its kind, namely a 2 foot gauge, battery electric tram, operating on a Heritage Listed Rail Line, which runs through the CBD of a major town, anywhere in the world**!!**

In its first stage, the Tram Project offers a unique and genuine opportunity for Howard Street to prosper, for Nambour to tell its story and utilise the Terminus and Information Centre building to offer assistance and a welcoming face to those disembarking at the Nambour Bus/Rail interchange.

In stage two, it will interlink Council's expanded Quota Park precinct and open up the Nambour State College to an exciting Hospitality/Farm Gate experience, both for Tram patrons and College students alike and then finally give a much-needed link between the wonderful facilities and Events conducted within the Nambour Showgrounds, to the town's CBD.

The Tram Project has been recognised as one of the 5 key elements of the Council sponsored, Nambour Activation Plan. It flows into the Council supported 'Reimagine Nambour' initiative and is shovel ready and most importantly, supported by the vast majority of Nambour residents.

We would appreciate and urge your support to bring this 7-year 'Tram' journey to reality.

Letter of support from Destination Sunshine Coast – ***(Attachment L)***
Letter of support from Member for Fairfax, Ted O'Brien – ***(Attachment M)***
Tram Co's Operational expenditure forecasts – ***Attachment N)***
Tram Co's Merchandising projections @ 50% - ***(Attachment O)***

ATTACHMENT C

NAMBOUR STATE COLLEGE

Junior Campus: 07 5459 0333 Coronation Avenue, Nambour Qld 4560
Senior Campus: 07 5450 4111 1 Carroll Street, Nambour Qld 4560
PO Box 79, Nambour Qld 4560 E: info@nambboursc.eq.edu.au

LOCAL FOUNDATIONS; GLOBAL OPPORTUNITIES

19th March 2019

To whom it may concern

The Nambour Tramway Project – Letter of Support

- This is part of a bigger picture to energize and re-activate the Nambour CBD using the former cane train lines to establish a passenger tram that will eventually stretch from 28 Mill Street Nambour to connect with the Nambour to Coolum walking trail. (As per Strategic Direction 1.6 on Page 49 of the Visit Sunshine Coast strategic plan 2013-2020.)
- This will be a unique tourism product. It will be the world's first battery-powered and solar regenerated, heritage-styled commuter tram.
- Stage 1 (through Nambour) is due for completion in 2019/20.
- More tourism product like this will be required now the Sunshine Coast Airport is being upgraded to an International standard.
- The Tram will be broadly targeted to a number of sectors, including the Visiting Friends and Relatives (VFR) market segment, walking/cycling trail users, local visitors and residents using the services for transport between the two shopping precincts.
- The Tram will also be marketed at train and tram enthusiasts - locally, nationally and internationally. This is an interesting niche market segment. The tourism textbook 'Niche Tourism: Contemporary Issues' noted that in the mid-2000s in the UK alone there were more than 170 specialist bus or tram events being held annually. This is a burgeoning niche tourist market.

So far, the project has secured:

- $1.5 million in contributions from Sunshine Coast Council;
- $500,000 in grant funding from the Commonwealth Government through the National Stronger Regions Fund;
- $35,000 through the Queensland Government's Gambling Community Benefit Fund, to support design work;
- A $1 million pledge from the Roy and Nola Thompson Community Foundation;
- More than $155,000 fundraised through grassroots community events and activities;
- Many 1000's of volunteer hours with ongoing pledges of material and physical support to bring this to reality

On behalf of Nambour State College, the school is supportive of this program and I am happy to be interviewed or quoted to support in any way that we can help.
Regards

Anthony Green
College Principal
Nambour State College

ATTACHMENT D

Marty **HUNT** MP

Member for **Nicklin**

25 February 2019

The Nambour Heritage Tramway Co
PO Box 213
Nambour Q 4560

Attention Mr. Peter Clark
Re – Submission to the Sunshine Coast Regional Council by The Nambour Tramway Company

To whom it may concern,

I am writing in support of the Nambour Tram Project. I have met with representatives recently of the The Nambour Tramway Company and other local stakeholders including Nambour State College in relation to the future of the tram project and how it will enhance movement of people and students through Nambour and to attractions along the way.

The way the project is progressing with the community support shown over a long period of time, now I believe that the future of the project is looking bright in terms of how it will enhance a reinvigorated and reimagined Nambour.

I understand that the Tram project will be broadly targeted to a number of sectors, including the Visiting Friends and Relatives (VFR) market segment, walking/cycling trail users, local visitors and residents using the services for transport between the two shopping precincts.

The Tram will also be marketed at train and tram enthusiasts - locally, nationally and internationally. This is an interesting niche market segment. The tourism textbook 'Niche Tourism: Contemporary Issues' noted that in the mid-2000s in the UK alone there were more than 170 specialist bus or tram events being held annually. This is a burgeoning niche tourist market.

The people behind this project have worked very hard over many years to get to this point. I encourage and support the project to see it become a reality for Nambour and offer my assistance in any way I can.

Regards,

Marty Hunt MP | Member for Nicklin

Shop 3, 51 Currie Street, Nambour Qld 4560 PO Box 122, Nambour Qld 4560
07 5406 4100 nicklin@parliament.qld.gov.au martyhunt.com.au MartyHuntMP

ATTACHMENT E

28th March 2019

Cr Greg Rogerson
Division 10 Councilor
Sunshine Coast Council
Eddie DeVere building
Cnr Currie and Bury Streets
Nambour Qld 4560

Dear Cr Greg Rogerson

It was a pleasure to meet with you on the 8th March and hear about the exciting plans for the restoration and continuation of the Nambour tramway. The School of Science and Engineering is exceptionally pleased to be able to work collaboratively with the Nambour Heritage Tramway Company to progress this project.

Engineering students will be offered the opportunity to undertake their final year projects on the design of a bridge planned for construction within stage 2 of the works, which will bring the tram from the Howard Street stop to the back of the Aldi supermarket. This project will be offered to students commencing their final year in Semester 1 of 2020.

Please provide advice on who to liaise with to obtain the technical background for the project. The Head of Engineering, Dr Helen Fairweather, will follow up with this contact and ensure the project is advertised well in advance of the start of semester 1, 2020.

Yours sincerely

Professor Cathy Yule
A/Head School of Science and Engineering

Tel: +61 7 5430 1234 Fax: +61 7 5430 1234 Email: cyule@usc.edu.au
Locked Bag 4, Maroochydore DC Qld 4558 Australia
90 Sippy Downs Drive, Sippy Downs Qld 4556 Australia

ATTACHMENT F

The Nambour Tram Company Limited
(TNT Co.)

Battery Powered Light Rail Vehicle
(BPLRV)
Technical Specification

Version: 6.0

Author: The Nambour Tram Company Limited (TNT Co.)

Date: 28 March 2019

Table of Contents

List of Tables

Battery Powered Light Rail Vehicle (BPLRV) Technical Specification

1. Overview

1. The purpose of this document is to provide the technical, functional and performance requirements for a new Battery Powered Light Rail Vehicle (BPLRV) required to operate on the TNT Co. tram network.
2. The Successful Tenderer's (Contractor) scope of works covered within this Specification include;
   - The Design, Manufacture, Supply and Delivery of one (1) Battery Powered Light Rail Vehicle (BPLRV) in accordance with the technical requirements of this specification;
   - Type Approval Testing, Commissioning and Handover of the manufactured BPLRV, for operation on the TNT Co network;
   - Operating Manual/s;
   - Maintenance support in terms of maintenance manuals and recommended spare parts requirements;
   - Training Manuals for operator and maintainer
3. The Tenderer shall provide a complying response to this specification, including a concept design consisting of an artist's impression of the proposed BPLRV together with supporting documentation describing the key features of the vehicle, pricing and a proposed project timetable covering the design, construction and delivery.
4. Tenderers not wishing to provide a complying response may submit a non-complying response where the Tenderer considers the alternative proposal has merit, and distinct advantages over the complying offer. A Value Benefit case shall be provided for any proposed departure or alternative solutions to that specified.
5. **NOTE**: The Tender selection process will place a higher weighting on complying offers.

2. General Requirements

6. The BPLRV shall be designed to present a vehicle of heritage appearance and be substantially compliant with the technical requirements of this Specification.
7. This Specification describes the scope and performance requirements of the proposed BPLRV.
8. The requirements cover the design, construction, testing, commissioning and operation of the BPLRV, and suitable for operation on TNT Co tram network.
9. The BPLRV shall provide a high level of customer amenity in line with TNT Co requirements, offering as a minimum:
   - an easy and safe access and egress
   - a pleasant open-air experience
   - a comfortable and ergonomically designed interior;
   - a low internal noise levels;

- a sense of safety and security;
- a passenger information system

10. In addition, deliverables to enable the BPLRV to be operated, modified, repaired and maintained throughout the vehicle Design Life, including:
    - electrical and mechanical as-built drawings;
    - technical maintenance plans and maintenance instructions;
    - equipment spares;
    - specialist maintenance tools (including any software tools);
    - training materials;
    - operating instructions; and
    - documentation suitable to permit TNT Co. to have the BPLRV listed on its accreditation with ONRSR.
11. The BPLRV shall:
    - be capable of meeting all performance and minimum operating standards;
    - comply with the Disability Discrimination Act 1992 (Cth) and the Disability Standards for Accessible Public Transport 2002, as amended;
    - incorporate current technology proven in comparable light rail environments;
    - be designed and built to internationally recognised standards;
    - have a minimum Design Life of 20 years;
    - include redundancy within the equipment and systems to eliminate the risk of a single point failure disabling a complete BPLRV; and
    - be suitable for use by 5th percentile Australian females to 95th percentile Australian males (in both passenger and driver areas).
    - have a high level of maintainability
    - provide an optimum Whole of Life cost
    - be "Fit-for-purpose" to operate on the TNT Co tram network

2.1 Key Requirements and Intended Purpose

12. The primary objective of the BPLRV is to provide a transport service, safely convey passengers between TNT Co tram stops.

    The BPLRV shall comply with the key requirements listed in Table 1 below:

Table 1 Key Requirements

Characteristic	Value
Fleet size	**1 x BPLRV**
Maximum length	**10m**
Number of Passenger	**Minimum of 26 (fully seated, no standing) + at least 1 DDA space**

Table 1 Key Requirements (Continued)

Seat Configuration	Rows, laterally across the passenger internal space
Principal Dimensions	Refer to Clause 9
Maximum Axle Load	5 tonnes
Maximum Operational Speed	15 km/hr (speed limited)
BPLRV Configuration	Bi-directional, driving from both ends
Track Gauge	610mm (-0mm, + 10mm)
Floor height, above rail (Tare condition)	720 mm
Maximum grade (starting and stopping, all conditions)	3% (1 in 33)
Minimum horizontal and vertical curve radii	Vertical: 50 m convex and concave Horizontal: 20 m
Acceleration rates	Maximum acceleration fully loaded: 1.24 m/s^2
Maximum roll back distance on 3% grade	<500 mm
Maximum deceleration rates in each braking mode (fully loaded condition)	Service: 1.29 m/s^2 Emergency: 2.8 m/s^2
Type of Wheel	Monobloc (low noise)
Maximum Jerk Rate	0.8 m/s^3
Centre of Gravity Limit	<=1000 mm above rail
Flooring co-efficient of friction	1.093 at dry condition 0.718 at wet condition
CCTV storage capacity	1.000 GB for 10 days (Minimum 30 days storage)
Data Logger storage capacity	1 GB for 30 days
Duration of emergency lighting	30 Mins
Number of spare cables, relay contacts and equipment outputs (future requirements)	10%

3. Glossary and Definitions

13. For the purpose of this Specification, the following definitions and acronyms have the related meanings as set out below:

Table 2 - Glossary and Definitions

Contractor	**Successful Tenderer, responsible for delivery of the finished product**
EMC	**Electro Magnetic Compatibility**
EMI	**Electro Magnetic Interference**
FAT	**Factory Acceptance Test (Static Testing)**
FAIT	**First Article Inspection Test (Exhaustive Testing)**
FMEA &	**Failure Modes and Effects (and Criticality) Analysis**
FOT	**First Of Type**
CCTV	**Closed Circuit Television System**
DDA	**Disability Discrimination Act 1992**
DKE	**Dynamic Kinematic Envelope**
DSAPT	**Disability Standards for Accessible Public Transport 2002**
IC	**Independent Certifier**
HMI	**Human Machine Interface**
IFAT	**Integrated Factory Acceptance Tests**
KPI	**Key Performance Indicator**
LCC	**Life Cycle Cost**
LED	**Light Emitting Diode**
BPLRV	**Battery Powered Light Rail Vehicle**
MDBF	**Mean Distance Between Failure**
MTBF	**Mean Time Between Failure**
OBCU	**On-Board Control Unit**
PA	**Public Address System**
PDS	**Passenger Display System**
PIDS	**Passenger Information & Display System**
Principle	**Sunshine Coast Regional Council**
Asset Owner	**TNT Co**
RAMS	**Reliability Availability Maintainability Safety**
Rolling Stock	**Means the BPLRV**
SAT	**Site Acceptance Test (Static and Dynamic Testing)**
RFP	**Request for Proposal**

SCADA	**Supervisory Control and Data Acquisition**
SIL	**Safety Integrity Level**
SIT	**Systems Integration Test**
Spare Parts	**Equipment, Components and Parts supplied to ensure maintainability and availability of the BPLRV**
Spare Parts List	**Equipment, components and parts listing and quantities required to support the BPLRV**
Specialist Maintenance	**Maintenance Tools required to undertake specialised maintenance activities.**
Passenger Mass	**75kg per person as calculated in accordance with EN15663.**
Provisional Completion	**Fit for purpose, passed all required Provisional Acceptance tests in Test and Commissioning plan, BPLRV completed with simulated fully loaded passenger performance requirements without fault, Technical Library updated, any rectification works**
Operational Completion	**BPLRV free from faults, completed simulated fully loaded passenger service timetable requirements (Trial and Capacity Performance Testing).**
Final Acceptance of BPLRV	**Fully commissioned and free from faults, all rectification works completed, training material,drawings and documents supplied, spares consumables, tools, equipment delivered to the nominated depot.**

4. Scope of Works

4.1 General

14. The Contractor's Scope of Works shall include the Design, Manufacture, Assembly, Supply (transport & loading/unloading), Testing and Commissioning of a single Battery Powered Light Rail Vehicle (BPLRV), suitable for the provision of passenger transport on the TNT Co network, in accordance with the minimum service requirements. The proposed BPLRV shall be reflective of a Heritage type operation.

15. The Contractor shall be responsible for the installation, integration, testing and commissioning of all BPLRV on-board systems. The Contractor shall make provision to future proof the design of the BPLRV as much as possible, incorporating spare ducting and wiring to accommodate any future upgrading of on-board systems.

4.2 Responsibilities Matrix

Table 3 Responsibilities Matrix

Documentation		Responsibility		
Item	Description	Principal	Contractor	Asset Owner
1	Establish quality, safety and environmental management systems and procedures for BPLRV manufacture, delivery, testing and commissioning operations		X	X

Table 3 Responsibilities Matrix (Continued)				
Documentation		Responsibility		
Item	Description	Principal	Contractor	Asset Owner
2	Implement and manage quality, safety and environmental management systems and procedures for BPLRV manufacture, delivery, testing and commissioning operations.		X	
3	Provision of configuration information (i.e. Component Serial numbers, Asset Tree, etc.) for the Asset Management System.		X	
Legislation		Responsibility		
Item	Description	Principal	Contractor	Asset Owner
4	Ensure the BPLRV design, construction and operational parameters meets relevant Australian Legislations		X	
5	Implement compliant OH&S (AS4801), Quality Management (ISO 90010 and Environmental Control (ISO 140001) policies and processes.		X	
6	Liaise with the Rail Safety Regulator for type approval and listing of BPLRV on the Purchaser's Accreditation		X	X
Risk and Technical Management		Responsibility		
Item	Description	Principal	Contractor	Asset Owner
7	Develop, implement and continuously update a Risk Management Plan for all activities within Contractor's scope.		X	
8	Undertake qualitative risk assessment and implement appropriate risk mitigating controls in relation to all activities involving the design, manufacture, assembly, loading and unloading, transport, commissioning and testing of BPLRV		X	
9	Structural integrity, dynamic performance and reliability engineering analysis (includes FEA modelling and FMECA analysis, where applicable).		X	

Table 3 Responsibilities Matrix (Continued)				
Risk and Technical Management		Responsibility		
Item	Description	Principal	Contractor	Asset Owner
10	Provision of all necessary Test Equipment and Resources to conduct Factory Acceptance and Site Acceptance Testing.		X	
11	Establish and maintain a Test Equipment Register and Calibration Register for all test equipment used for Testing and Commissioning.		X	
Management of BPLRV prior to Provisional Completion		Responsibility		
Item	Description	Principal	Contractor	Asset Owner
12	Management, Supervision and Administration of technical, testing commissioning and supporting personnel.		X	
13	Provision of suitable secure stabling facilities for the BPLRV to be stored following delivery to TNT Co.	X		X
14	Provision of resources to manage depot movements of the BPLRV and transfers of the BPLRV from storage to the depot for maintenance from the time of delivery to the commencement of revenue services.	X	X	X
15	Security of BPLRV at stabled locations following shipment.	X		X
16	Inspection and maintenance of BPLRV (as required) during commissioning, network and capacity trials, until commencement of revenue services.		X	X
17	Manage and coordinate in-field activities (testing and commissioning).		X	X
18	Correction of all defects identified during testing, commissioning and the defects liability period.		X	

4.3 Licences & Approvals

16. The Contractor shall obtain all necessary licences, insurances and approvals that will enable the completion of the Contractor's scope of works and responsibilities for delivering a fully operational BPLRV to the Purchaser's facility in Nambour.

17. The Contractor's required licences, insurances and approvals for the delivery of the BPLRV shall include (but are not limited to):
    - Obtain Permits for the shipping and transport of the BPLRV to the TNT Co stabling facilities.
    - Obtain Custom's clearance, in the event that the tram is an imported vehicle
    - Obtain insurance to cover transportation from the Contractor's facility to that of the Purchaser
18. The Contractor shall ensure it carries out all necessary responsibilities as defined in Table 2, notwithstanding any other responsibilities required for the Contractor to complete its scope of works.

5. Fitness for Purpose

19. The BPLRV shall be designed, constructed, tested and commissioned to demonstrate that it can reliably deliver the required passenger service capacity, on the TNT Co network, as follows:
    - Operation: 8am to 6pm (10 hours), six (6) days per week
    - Stage 1 - Twenty (20) round trips per day
    - Length of each round trip: 2 km (40 km per day)
    - Duration of each round trip: 30 minutes (12 minutes of travel time at an average speed of 10km/h plus 2 x 2 minute intermediate stops plus 2 x 5 minute turnarounds)
    - Stage 2 - Provision for a future 1 km tramline extension plus 2 intermediate stops
    - Stage 3 - Provision for a further 1 km tramline extension plus 2 intermediate stops
    - The BPLRV shall be available between 6pm and 8am for battery re-charging and running maintenance
    - Battery capacity shall be an additional 30% over and above the designed vehicle performance battery capacity

5.1 Design Life

20. The BPLRV and primary support systems are to provide a minimum operational design life of 20 years. All systems are to be of a proven design, providing Whole of Life value and optimum Life Cycle Cost (LCC) over the full duration of the operational design life.
21. The Tenderer for the BPLRV shall provide details of any BPLRV designs which have been previously manufactured by the Tenderer's Company and approved for operational service and are currently in operational service.
22. The Contactor shall provide a comprehensive maintenance plan including the life cycle requirements of sub-components including recommended frequencies for refurbishment or replacement for the full duration of the BPLRV operating design life (20 years).
23. The Contractor shall also provide details of any recommended mid-life upgrade requirements, based on usage / travelled kilometres.

6. List of Standards & Guidelines

24. Appendix A contains a general list of Standards, Codes of Practice and Guidelines, applicable to the rail sector. The Tenderer shall specify which Standards, Codes of Practice and Guidelines will be employed in the design, construction, assembly, testing and commissioning of the proposed BPLRV. Where the Tenderer proposes alternate Standards, Codes of Practice and Guidelines to those listed, they shall be nominated, with reasoning, in the Tender.

7. Project Plan and Reporting

25. Appendix B contains a list of Project Plans and Reporting requirements. The Contractor, within 1 month of the Contract signing, shall submit for review and approval, a draft project plan, itemising the key project steps and proposed timings. The final project plan shall be as agreed to by both parties and approved by the Purchaser.

7.1 Design Stages and Reviews

26. As defined in the approved project plan/timetable the Contractor shall submit design documentation for review. The Contractor will be encouraged to submit draft design documentation as it becomes available to assist in expediting the project and permitting the early detection of any design issues.

7.2 Stage 1 - Preliminary Design Documentation and Review

27. Stage 1 documentation shall include but not limited to the following:

- Artists impression of the tram exterior and interior
- Proposed tram arrangement drawing depicting key dimensional data
- Proposed tram internal seating layout drawings including Disability Space
- A listing of proposed equipment including masses
- Proposed tram equipment layout drawings and mass distribution
- Centre of Gravity calculations
- Proposed traction equipment
- Proposed traction performance calculations
- Proposed external and internal cladding materials
- Proposed painting scheme/colours

7.3 Stage 2 – Traction/Braking & Structural Design Documentation

28. Stage 2 documentation shall include but not limited to the following:

- Traction design documents and installation drawings
- Proposed traction battery installation details
- Electric circuit diagrams
- EMC compliance report
- Proposed braking equipment drawings and performance details
- Drawings of proposed body structural framework

- Drawings of proposed collision protection and energy absorption
- Strength calculations and/or FEA covering the structure
- FMECA covering equipment subsystems

7.4 Stage 3 – Final Design Review and Approval

29. Stage 3 documentation shall include but not limited to the following:
    - Final production drawings
    - Final external and internal paint scheme/colours

8. BPLRV General Design Requirements

8.1 Description of Proposed Vehicle

30. The proposed BPLRV shall be designed to present a heritage open appearance whilst incorporating modern construction materials, traction and control equipment. The vehicle body and framework shall be structurally sound, consistent with providing passenger and crew comfort together with personnel and pedestrian safety.

8.2 General Arrangement and Seating Configuration

31. The Tenderer shall submit a dimensioned General Arrangement drawing of the proposed BPLRV, together with the proposed seating configuration.

8.3 Vehicle Body

32. The vehicle body shall consist of a steel framing up to window sill height. The upper body/canopy structure maybe constructed of lighter materials consistent with providing passenger safety and security. Electrolytic compatibility between materials shall be considered when combining or joining dissimilar materials.

8.4 Exterior Finish, Livery & Styling

33. To maintain an enhanced overall appearance to the BPLRV, the painting process shall be established, implemented, fully documented and be provided to the Purchaser.
34. The BPLRV exterior finish shall not be affected by the multiple application and removal of safety vinyls.
35. The paints and covering shall be able to withstand a minimum of 10 years of repeated washes with appropriate commercial cleaning agents used on trams, with the frequency of washing being up to once per day.
36. The internal and external paint surfaces of the BPLRV shall be optimised for the removal of graffiti and be suitable for the continued application and removal of vinyls or decals.
37. The Successful Tenderer shall provide a detailed painting procedure to the Asset Owner to enable re-painting if required (due to accident damage requiring replacement panelling).
38. The BPLRV shall be finished in a livery that reflects the TNT Co livery requirements. All labelling and signage shall be straight and level, without any bubbling or defects.
39. Any external livery is to be made up of clear bold colours that blend function, form and customer-focussed ergonomics. Exterior painting and livery shall be appropriately colour-coded and colour matched to ensure aesthetics are maintained. Striping across

multiple panels shall be appropriately aligned to give the appearance of smooth continuous lines.

40. The exterior shall be fitted with retro-reflective adhesive safety strips in accordance with AS/NZS 1906.1 Retro-reflective materials and devices for road traffic control purposes – Retro-reflective sheeting. The safety strip size and position shall be subject to Purchaser approval before application

41. The Tenderer shall submit an artist's impression of the proposed BPLRV showing external livery and markings, including retro reflective safety strips

8.5 Company Logo

42. The BPLRV shall display "The Nambour Tramway Company" name or logo on each side of the vehicle. The logo design shall be subject to approval by the Purchaser.

8.6 Marking and Lettering

43. Marking and lettering associated with external and internal signage on the BPLRV shall be of a size, font and positioned to the approval of the Purchaser.

8.7 Manufacturer's Identification Plate

44. The BPLRV manufacturer may be attached a company logo/identification plate to each side of the vehicle, in a position to be approved by the Purchaser.

8.8 BPLRV Visibility

45. The BPLRV external appearance shall be designed to be clearly visible during daylight and night time operation. Daylight operation will require the judicious selection of a colour scheme which enhances visibility and prevents the vehicle blending into its surroundings.

46. Night time operation will require external perimeter lighting and front and rear marker lights.

47. The Purchaser may consider the use of a flashing light on the roof at each end of the BPLRV which would operate when the vehicle is in travel mode.

9. Principal Dimensions

48. **Vehicle Mass –** The maximum mass of the BPLRV shall be 20 tonnes for a maximum axle load of 5 tonnes. The vehicle mass shall be evenly distributed between bogies and laterally, to provide an even loading and balance on bogie centre pivots.

49. **Vehicle Width and Clearances –** The maximum vehicle body width shall be as shown in the table below.

Table 4 – Vehicle Width and Clearances

(a)	**Above Rail**	**Width**	**Clear Zone (either side of outline width)**
(b)	0-720mm	2,479mm	460.5mm
(c)	720mm +	1,900mm	750mm

50. The width below 720mm includes side steps which may extend further at door opening locations.

51. The Tenderer is invited to provide an option for folding side steps which are activated by the door locking system.

Table 5 – Dimensions and Capacity

Vehicle Length	The maximum vehicle length shall be 10 metres with a Driver/Passenger footprint of 8 metres.
Vehicle Height	The maximum BPLRV height shall be 3245mm above rail
Seating Capacity	The BPLRV shall be designed for a minimum of 26 seated passengers with provision for at least 1 disabled person wheel chair parking position. The seating configuration shall be 2 + 1 arrangement across the vehicle with 50% facing each direction and with an aisle width of nominally 500mm
Disabled Accommodation	A number of selected seats shall be of the sprung folding type which are normally folded against the seat back. These seat positions shall be capable of accommodating a parked wheel chair

10. Track Data

Table 6 – Track Data

Track Gauge	The track proposed for BPLRV operation is an existing sugar cane railway with a track gauge of 610mm. The rail profile is as depicted in Appendix C.
Stage 1 Track Alignment	Refer to Appendix D for the aerial views of the proposed track alignment
Maximum Track Gradient	The BPLRV shall be designed to operate on a maximum gradient of 1 in 33 or 3%.
Structural Corridor Width	The minimum width of the structural corridor is 3.4 metres made up of a vehicle width of 1.9 metre plus 0.75 metres operating clearance per side.
Minimum curve radii	Horizontal Curve – 20 metres Vertical Curves – 50 metres concave and convex

11. Climatic Conditions

52. Refer to Appendix E for Nambour Climate records.

12. BPLRV Structure

12.1 Underframe/Body

53. Due to the proposed open heritage appearance of the BPLRV, the main load supporting structure shall be below windowsill level. The upper portion of the vehicle body shall be in the form of a roof/canopy structure attached to the lower bodyside structure. The Design of the BPLRV structure shall be compliant with latest international standards, reflective of a BPLRV type vehicle and operation.

54. The underframe/body structure shall be constructed with a 10mm upward camber between bogie centres

12.2 Collision Protection

55. BPLRV crashworthiness shall be compliant with the latest requirements of EN15227:2008- Crashworthiness Requirements for Railway Vehicles, reflective of an light rail or tram type vehicle, or an equivalent standard.

56. The failure of a single fixing shall not lead to equipment or other components becoming detached from the vehicle or projecting beyond the approved vehicle kinematic outline.

57. The Contractor shall provide a detailed report at Design Stage 2 outlining all the load cases used in a crashworthiness assessment, together with a list of assumptions made.

58. As a minimum, the following criteria shall be demonstrated:

- Impact with a road vehicle (mass of 3 tonne), head on collision, 50 km/h closing speed
- Impact with a road vehicle (mass of 3 tonne), angled at 45º to the tram tracks, 50 km/h closing speed.
- Impact with a road vehicle (mass of 10 tonne), head on collision, 20 km/h closing speed

12.3 Energy Absorption

59. The BPLRV shall be designed to internationally recognised crashworthiness design codes by way of a total systems approach, preferably using crash energy management system (CEMS) principles to limit structural damage and driver/passenger injury during collisions. The CEMS needs to absorb collision loads in a controlled manner and include BPLRV based energy absorbing collision elements.

60. The Contractor shall incorporate all required energy absorption elements, in order to comply with crashworthiness requirements. That is, potential obstacles such as road vehicles are already designed with crumple zones to provide energy absorption capability. The total energy absorbed during a collision is shared by the collision objects and the energy is dissipated through structural deformation.

12.4 Collision Repairability

61. Where possible, all frontal external body panels and energy absorbing structure, below windscreen level, shall be removable using simple mechanical fasteners in order to minimise repair time. The BPLRV design shall seek to contain damage from most frontal area collisions to bolt-on elements without deformation of the main body structure/underframe.

62. Equipment, cabling and pipework within the driver's cab area shall be located, in order to minimise the risk and extent of damage to such equipment in the event of a frontal area collision. Collision repair should be as simple as possible.

12.5 Rollover Bodyside Protection

63. Because of the proposed open appearance of the BPLRV, the side strength of the structure shall be designed such that it will resist failure in the event of the vehicle rolling onto its side during a collision or derailment.

64. A window opening safety barrier shall run the length of the bodyside above window sill height to protect passengers seated adjacent to window openings, in the event of a vehicle rolling onto its side.

12.6 Roof/Canopy Stability

65. Whilst the vehicle roof/canopy is designed to provide an open passenger area appearance there shall be sufficient roof structure and side pillar stability and strength to resist upper body structural failure in a rollover situation.

66. Bodyside pillars shall be positioned between seat rows to minimise obstruction to passenger viewing.

12.7 Jacking & Lifting Points

67. The BPLRV shall be equipped with jacking and lifting points to permit lifting and/or re-railing, on track, including within the confines of the maintenance facility.

68. The body and bogie shall incorporate attachment points for ropes or chains which can be used to secure the bogie to the vehicle body whilst the suspension is compressed and before lifting, in order to minimise the lifting height.

69. The Contractor shall propose means to enable lifting of the BPLRV by mobile crane when in a platform zone where conventional under body jacking points cannot be accessed.

70. The Contractor shall take into account the need to lift the vehicle in the structural design of underframe/body.

12.8 Structural Performance Assessment

71. Recognised stress analysis techniques shall be used to assess structural performance of the BPLRV structure. These assessments shall include (but not limited to):

72. Stresses and deformations, under the most severe loading environment that the BPLRV is expected to encounter during its operational life. The assessment of the BPLRV structure shall include maximum passenger loading.

73. Fatigue life, ensuring a minimum operational design life for 20 years has been achieved. It will be up to the Contractor to provide evidence demonstrating that a 20 year operational design life will be achieved

74. The Contractor shall submit a detailed report at Design Stage 2 outlining all the load cases used in the structural and fatigue assessment, together with the list of assumptions made.

12.9 Body Vibration

75. The BPLRV underframe/body and bogie design shall ensure that the vehicle body structural modes of vibration are not excited by, and do not resonate, due to interaction with bogie suspension modes, body mounted equipment, bogie equipment components, body-bogie attachments, wheel ovality (wheel out-of-roundness) and / or track features.

76. The BPLRV shall be tested to assess interior vibration modes and ensure compliance with vibration requirements.

77. Ride comfort for passengers shall be measured and tested in accordance with BS EN 12299 to ensure acceptable Mean Comfort Index is achieved under all load conditions.

78. Other standards that the BPLRV should comply with include EN 14363, UIC 518 and IEC 61373.

13. Cladding

13.1 Structural Cladding

79. The exterior of the BPLRV bodysides, below window sill level, shall be clad with corrosion resistant steel sheeting which shall assist in forming the structural body of the vehicle. The sheeting shall be secured to the framework by either welding or riveting. The finished side panels shall be free of distortion or buckling.

80. The roof/canopy cladding may be of a lighter construction material but shall provide sufficient strength to maintain the roof/canopy structural integrity without showing signs of distortion or buckling.

13.2 Cosmetic Cladding/Trim

81. In order to achieve the desired heritage appearance, it may be necessary to add a cosmetic cladding/trim to the BPLRV body/roofing. Such cladding/trim shall be of low mass, fire resistant, graffiti resistant and suitable for the application of decals and/or signage. If such cladding is employed, its fixing shall be such that it can readily be replaced in the event of physical damage. Proposed materials shall be submitted for the approval of the Purchaser.

14. Exterior Finish, Livery & Styling

82. To maintain an enhanced overall appearance to the BPLRV, the painting process shall be established, implemented, fully documented and be provided to the Purchaser.

83. The BPLRV exterior finish shall not be affected by the multiple application and removal of safety vinyls.

84. The paints and covering shall be able to withstand a minimum of 10 years of repeated washes with appropriate commercial cleaning agents used on tram, with the frequency of washing being up to once per day.

85. The paint surface of each BPLRV shall be optimised for the removal of graffiti and is suitable for the continued application and removal of vinyls or decals.

86. The exterior including the materials and the finishes shall be vandal resistant

87. The Contractor shall provide a detailed painting procedure to the Asset Owner to enable re-painting if required (due to accident damage requiring replacement panelling).

88. The BPLRV shall be finished in a livery that reflects the TNT Co livery specification for Light Rail Vehicles. All labelling and signage shall be straight and level, without any bubbling or defects.

89. Any external livery is to be made up of clear bold colours that blend function, form and customer-focussed ergonomics. Exterior painting and livery shall be appropriately colour-coded and colour matched to ensure aesthetics are maintained. Striping across multiple panels shall be appropriately aligned to give the appearance of smooth continuous lines.

90. The BPLRV exterior shall be fitted with retro-reflective adhesive sheeting in accordance with AS/NZS 1906.1 Retro-reflective materials and devices for road traffic control purposes – Retro-reflective sheeting.

15. Passenger Compartment

91. The BPLRV passenger interior shall be designed to provide an interior comfort based on accessibility, ergonomics, visibility, comfort and passenger safety.

92. Materials chosen for the passenger interior shall be "fit-for-intended-purpose" for application and long-term durability. Materials selected shall meet fire retardancy and performance standards.

93. The interior shall have no finger or limb trap hazards.

94. The interior shall have no areas where hazardous or malicious items may be concealed.

95. The interior shall be fitted with LED lighting.

96. The BPLRV shall be equipped with an emergency lighting mode for use in the event of a battery power supply failure.

97. The interior of the BPLRV shall incorporate space for:

- interior signage
- statutory notices
- passenger notices; and
- a TNT Co network map

98. All access panels to equipment shall be locked with access only permitted to authorised personnel using a specialised security key.

99. The BPLRV interior shall be designed to minimise maintenance and enable ease of cleaning. Easy access to BPLRV equipment/components is critical.

100. The BPLRV shall have provision for emergency equipment to be fitted, as required by TNT Co Operator Plan (to be provided by TNT Co).

101. The interior including the materials and the finishes shall be vandal resistant.

102. The interior and exterior shall not be affected by cleaning materials and techniques used to remove Graffiti.

103. The design of the interiors shall minimise visible screws or gaps and prevent vandals from removing equipment or accessing areas behind panelling or covers.

15.1 Interior Styling and Finish

104. Materials selected for the interior of the BPLRV shall be robustly designed with "whole of life" considerations including maintenance, refurbishment or replacement.

105. Surfaces selected shall have been carefully considered to ensure ease of cleaning, removal of graffiti and the avoidance of dirt traps.

106. The BPLRV interior finishes shall not be affected by multiple application and removal of safety signage vinyls.

15.2 Internal and External Noise and Vibration Isolation

107. Noise and vibration emanating from the BPLRV traction system and bogies shall be isolated by a sound proofing medium applied to the underfloor area.

108. With the BPLRV operating at the max speed of 15 km/h during late night low ambient noise conditions the noise at the middle of the passenger compartment shall not exceed 75 dB(A) when measured using fast response.

109. The sides of the BPLRV below floor level shall be skirted to minimise traction and bogie borne noise being transmitted to the surroundings.

110. External noise levels under BPLRV operation shall not exceed 82 dB(A) at 15 km/h measured 15 metres from the track centreline and shall otherwise be the minimum level practicable.

16. Interior Materials and Appointments

16.1 Flooring Structure

111. The BPLRV floor structure material shall be secured to the underframe structure with a suitable insulation layer sandwiched at the interface. The insulation layer shall provide isolation for structure borne vibrations, whilst also providing heat and sound insulation.

112. The floor assembly shall have thermal and noise insulation properties, resistance to vibration and abrasion.

113. The floor structure material shall be waterproof and fully sealed to prevent moisture ingress to the underframe structure below the floor. The floor system shall have drainage holes strategically located to shed any water which enters the vehicle. Drain holes shall be fitted with duck bill seals beneath the floor to allow water to escape but restrict track noise propagating back through the drain holes.

114. The floor design shall allow the floor covering to be removed without damage to the floor substrate or sub structure.

16.2 Floor Height

115. The Contractor shall provide a floor system design with a nominal floor level of 720mm above rail whilst the vehicle is in the tare load condition.

16.3 Floor Covering

116. The floor covering material shall be wrapped 100 mm up the side walls and sealed joints shall be impervious to and chemically unaffected by water, paint, human waste, Graffiti removers, train wash solutions, cleaning solutions, food and drink spills. See the requirement above for drain holes.

117. The floor covering materials shall have the following features:

- Easy to clean
- Resistance to chemical agents tested according to EN 423 : Resilient Floor Coverings: Determination of Resistance to Staining
- Heat resistance against abrupt temperature changes.
- Slip resistance shall not degrade over time with wear.
- Good thermal and acoustic insulation
- Resistant to vibrations
- Have excellent flexibility and folding features
- Resistant to cigarette burns, greater or equal to the class 3 a of EN 1399: Resilient Floor Coverings: Determination of Resistance to Stubbed and Burning Cigarettes
- Fire and smoke behaviour R10 according to EN 45545 Railway Applications. Fire protection on railway vehicles

- High toughness, 85 ± 5 shore A a/ISO 7619: Floor Covering Toughness
- Resistant to punching test according to EN 433 Resilient Floor Coverings: Determination of Residual Indentation after Static Loading
- Resistant to abrasion test according to ISO 4649: Rubber, Vulcanized or Thermoplastic: Determination of Abrasion Resistance
- Anti-slip finish in both dry and wet conditions, at R9 level according DIN 51130: Floor Coverings: Determination of Anti-slip Properties
- Colour stability against lighting sources, tested according to ISO 105-B02. Tests for Colour Fastness, Colour Fastness to Artificial light
- Floor covering material slip resistance shall be listed in the Testing and Commissioning Plan and evaluated in accordance with:
- AS/NZS 4663 Slip resistance measurement of existing pedestrian surfaces.
- DIN 51130: Floor Coverings: Determination of Anti-slip Properties.

16.4 Seating

118. The preferred seat and backrest design shall be either a single unit or as two separate parts. The seat shall be designed to eliminate the potential for foreign objects to be placed between any parts of the seat. All seat parts shall be quick and easy to replace. The Contractor shall provide details of the proposed seating with the Concept Design.
119. All seat rows shall be aligned with the bodyside window openings to provide a clear view to the vehicle exterior for all seated Passengers.
120. Seating shall be arranged in a 2 +1 configuration placed laterally across the width of the BPLRV internal floor area and separated by an aisleway. 50% of the seating shall face each end of the BPLRV.
121. Seat width dimensions shall be optimised in conjunction with aisle width to provide a reasonable level of passenger comfort and access.
122. Seating material shall be vandal resistant and fire resistant. With the proposed open saloon heritage design it is important that the seating be weather resistant to sun and rain.
123. Seat structures shall be supported between the side wall and a single post at the in-board end to facilitate easy access below the sets for cleaning.
124. Seating shall be designed to be readily removable, in order to provide more internal space, if required
125. The Tenderer shall submit the proposed seating layout as a part of the Concept Design at the tender stage.
126. The Contractor shall provide a seating mock up to give an indication of available Passenger space such as shoulder room and legroom and of seat comfort.

16.5 Impaired and Priority Seating Requirements

127. The BPLRV shall have at least a single (1) allocated space for a wheelchair (or pram), preferably located in the middle of the internal passenger space. This space may be accomplished by allocating a number of folding seats which shall be wall or partition mounted with a sprung hinged seat base in order to accommodate a wheelchair or a person with limited mobility.

128. The allocated space shall provide adequate manoeuvring space for mobility aids or wheelchairs.

129. The allocated space shall include the appropriate signage and systems including:

- The international symbol for accessibility
- An outline of the allocated space provided. The outline is to be a highly visible and wear resistant contrasting strip that is flush with the floor covering of the BPLRV.

130. A Priority seating allocation shall be located at or near the entry doorway and one (1) seat is to be made available in the passenger saloon area.

131. For ease of recognition, priority seats shall have a differing colour scheme to the rest of the seating and there shall be a "priority seat" sign placed adjacent to the seat.

16.6 Aisleway

The aisle or gangway shall be wide enough to enable passengers to comfortably move through the vehicle without interfering with seated passengers.

16.7 Handrails, Grab-rails and Hand-holds

132. Handrails, grab-rails and hand-holds shall be installed to safely provide passengers, access/egress throughout the internal passenger space.

133. Handholds and handrails shall be rigidly connected to the body structure and comply with requirements of EN 12663: Structural requirements of railway vehicle bodies

134. The Contractor shall provide details of handrail, grab-rail and hand-hold designs and nominate their mounting locations within the BPLRV, on the proposed passenger compartment seating layout.

135. Handholds and handrails shall be able to be differentiated from the rest of the interior colours and be fully compliant with DSAPT.

136. Handrails, grab-rails and hand-holds shall be resistant to abrasion and provide a high level of grip comfort.

16.8 Windows/Window Openings

137. Window openings shall be provided adjacent to each seat row.

138. The window opening design shall reflect the proposed open heritage style of the BPLRV passenger compartment.

139. Window sills shall be generous in width and set at a height above floor level equivalent to the shoulder height of a seated a 50th percentile female.

140. See Clause 12.5 for the window opening safety barrier requirement.

16.9 Glazing

141. In keeping with the BPLRV open heritage design the passenger compartment side windows may not require glazing, however there may be a need for partitions to provide wind shelter and in this case glass window panels may be used to maintain the open environment.

142. The Contractor shall ensure that all glass to be used in the BPLRV meets AS/NZS 4667 Quality requirements for cut-to-size and processed glass.

16.10 Passenger Safety

143. The passenger compartment shall be designed with occupant safety in mind. There shall be no sharp edges or corners or areas where limbs or clothing can become trapped.

144. Handrails/hand-holds shall be strategically placed to ensure passengers can steady themselves whilst standing to move through the aisle to alight from the vehicle.

16.11 Side Doors and Door Security

145. Half height internally hinged or preferably internal cavity sliding doors shall be fitted to one (1) side of the BPLRV, at each end, behind or adjacent to the driver's cab. The doors shall be capable of being remotely locked and the locking system shall be interlocked with the driving controls such that the vehicle cannot be moved until the doors are closed and secure.

146. The doorway/vestibule area shall be wide enough to permit access for a standard width wheel chair.

17. Driver's Compartment (Cab)

147. A driving cab shall be centrally located at each end of the BPLRV. The cab area shall have sufficient floor area to permit the driver to be seated comfortably without being cramped. Cab access shall be from the passenger area with provision for a quick exit in case of an emergency.

148. Lining materials used within the Cab area shall be wear and abrasion resistant.

17.1 Ergonomics and Comfort

149. The BPLRV driving console position shall be centred with respect to the vehicle longitudinal axis, ensuring comfortable driving from the seat, without the need to adopt a forced posture.

150. Driving controls, switches, buttons and indicators shall be positioned such that they can be viewed and/or reached without undue effort by a 50th percentile male or female Driver.

17.2 Driver's Field of Vision

151. The driving position shall provide optimum visibility for the driver through window/windscreen and cab pillar design.

17.3 Driver's Windscreen

152. The Driver's windscreen shall provide the required visibility, ensuring that it has the widest dimensions possible.

153. The windscreen shall be impact and spall resistant and comply with internationally recognised standards. The windscreen glazing shall comply with AS 2080-2006: Safety Glazing for Land Vehicles. Testing for optical; properties shall be to ISO 3538: Road Vehicles-Safety Glazing Materials

154. The Contractor shall give consideration to the impact resistance of the front windscreen glazing based on BR (British Rail Board) 566 Type-1 Standard.

155. The windscreen shall have minimal distortion of vision over the whole of the vision area and shall not cause secondary image separations that may confuse or distract the driver.

156. The windscreen shall not cause any colour diffraction effects that are noticeable to the driver.

157. The transmissive colour of the windscreen shall not adversely affect the perceived colours of objects, particularly of colour light signals or traffic lights.

158. Appropriate means (visibility aids) shall be provided to maintain sighting, visibility and optical requirements through the windscreen under all internal and external ambient conditions, including: rain, solar glare, dust, high humidity, etc.

159. A broken windscreen glass shall be retained in situ and held intact to allow the BPLRV to complete its journey without endangering the driver and passengers.

160. The Contractor shall utilise a window sealant compatible with ASTM C920 Standard Specification for Elastomeric Joint Sealants

17.4 Sun Visor/Blind

161. All Driver's Cab windows shall be fitted with blinds/sun visor or similar, to control light interfering with the Driver's vision through the window and of controls/ instrumentation.

162. The blind operation on the front windscreen, shall be restricted such that vision through the lower 100 mm of the window cannot be obstructed.

17.5 Driver's Console and Controls

163. The BPLRV shall be uni-directional and fitted with a Driver's console in the Driver's Cab at each end. The driver's console will house all the required instrumentation necessary to drive and control the BPLRV.

164. The light sources and indicators used on the driving console shall be designed and positioned so that they do not affect the Driver's night vision or cause glare or reflection on the driving cab windscreen or other cab interior surfaces.

165. All gauges, switches and indicators on the console shall be illuminated by the use of backlighting that incorporates brightness control down to zero.

166. The BPLRV driver console area shall be designed to provide a comfortable working environment for the driver.

167. The driving console finish shall minimise glare and reflection.

168. All control labelling, digitally displayed messages and component identification markings shall be in English.

169. Each driving console of the BPLRV shall be fitted with two (2) speedometers graduated in km/h. One (1) speedometer shall be an analogue gauge with zero to the maximum speed displayed over at least 180^{O} of the dial. The second speedometer shall provide a digital readout to one (1) decimal point.

170. The driving console and controls shall be secure from unauthorised access. This may be achieved with the use of a fold down or roller lockable cover which is pulled from a stored location behind the console.

17.6 Cab Security & Access

171. The BPLRV Driver's console activation and direction selection shall be securely controlled, so that authorised staff will only have access to systems in accordance with their level of responsibility.

172. All panels requiring access by maintenance staff shall be secured by one (1) simple "push and turn" key.

173. Non-secure panels shall be accessible to all staff with the appropriate security key.

174. In the event that a driver leaves the driving cab temporarily, it shall be possible to activate a temporary operation mode, whereby the BPLRV shall not be able to be driven, however on-board sub-systems shall continue in normal operation, for a period of time which will be determined during commissioning.

17.7 Driver's Seat

175. The driver's seat shall comply with all relevant safety standards and be ergonomically designed.

176. The seat shall comply with EN 45545 for Fire Resistance and UIC 564-2 Fire Testing.

177. The seat is also to meet IRIS certification standards, as related to ergonomics and shall be of a proven design.

178. The seat shall include a mechanical suspension and be of a basic functional design.

179. Adjustment shall be provided so that the seat can provide comfortable seating for both male and female drivers, of varying height and weight. The following seat adjustments shall be possible:

- Full rotation
- lumbar support;
- seat height;
- seat back tilt;
- fore and aft travel;
- raiseable arm rests

180. The driver seat shall be able to be removed with minimal effort for maintenance purposes.

17.8 Windscreen Wiper/Washer

181. Windscreen wipers and washers shall be fitted to each windscreen. The wiper and washer system may be integrated such that the spray system is mounted on the wiper arm.

182. A single Wiper/Washer rotary control switch shall be installed on each Driver's console. The control switch shall be a full sweep type with the following positions:

- Off
- Intermittent
- Continuous slow speed
- Continuous fast speed.
- Off

183. The Contractor shall propose wiper speeds, timing and sweep area taking into account the Driver's area of vision and the size of the windscreen. The sweep area of the wiper blade shall be maximised within the confines of the windscreen.

184. In the Off position the windscreen wiper shall park in a position that will not impair the Driver's line of sight in all weather conditions.

185. The washer water tanks shall be positioned on the underframe in the vicinity of each Driver's cab with a filling point located behind a flap type door in the bodyside skirt.

17.9 Horn/Bell Control

186. The BPLRV shall be equipped with a town horn and a bell. The horn and bell controls shall be provided on the Driver's console, within easy reach the Driver.

187. As both horn and bell are regarded as emergency warning devices the position of the controls shall be such that the Driver can activate the control without any delay.

17.10 Video Monitor

188. A video monitor shall be positioned on the Driver's console in a suitable location within easy view of the Driver. This monitor shall display video images from a series of video cameras monitoring strategic locations on and around the BPLRV.

17.11 Radio Console

189. Provision shall be made in the Driver's cab for a portable two (2) way radio system/charging point. The two (2) radio system shall be supplied by the Purchaser for utilisation between BPLRV crew and Maintenance personnel.

190. Refer to Clause 29 for on board communication requirements.

18. Driver Safety Systems

191. The following driver safety systems shall incorporated into the BPLRV design.

18.1 Vigilance System

192. The BPLRV shall be supplied with a Vigilance Monitoring System which is task-linked so that the driver's presence and attention is monitored automatically, whilst the vehicle is moving with the brakes released. The following Driver tasks will reset the vigilance system cycle:

- A minimum meaningful brake handle movement
- A minimum meaningful throttle handle movement
- Horn activation
- Bell activation
- Operation of the headlight high/low beam switch
- Vigilance acknowledgement button

193. The vigilance system cycle timing shall be configurable by the Asset Owner, and determined during Testing and Commissioning stage.

194. In the case where task-linking does not detect any presence of driver activity, the vigilance system shall progress through it's defined cycle. The vigilance cycle shall consist of the following timed actions commencing at a defined interval after the acknowledgement or the task detection:

- A flashing light positioned in a prominent position on the Driver's console
- A distinctive audible alarm positioned and protected from isolation
- Loss of traction power and penalty brake application

195. An acknowledgement button shall be provided on the Driver's console or on a vertical surface to permit the driver to cancel the vigilance alarm and/or reset the vigilance cycle. The acknowledgement button shall be positioned such that the driver shall be able to reach the button with an outstretched arm and without upper body movement.

196. The button shall not be located such that the movement of the driver's thigh, knee or foot can operate it.

197. If the vigilance alarm is not cancelled by a driver action after a defined period of time the traction power shall be removed and an emergency brake applied.

198. For compactness the vigilance system may be integrated into a multi-function tram management system/data logger with an interactive touch screen display.

199. It shall not be possible for the driver to isolate the vigilance system. In the event of a vigilance system failure there shall be an over-ride button in the Driver's cab outside the reach of the Driver. That button shall be held by a 2nd person such as the conductor, another Driver or a maintenance person, with TNT Co safe working qualifications. The BPLRV can then be driven in a degraded mode back to the maintenance facility.

200. All vigilance hardware and related software shall be supplied with the BPLRV.

18.2 Operator Enable System

201. The BPLRV shall be fitted with an Operator Enable System (OES).

202. The function of the OES is to detect the presence of the driver or operator at the controls of the vehicle. If a required continuous control input by the driver is interrupted or not detected whilst the vehicle is in operating mode, then the system shall react by making an emergency brake application and removal of (cutting the) traction power.

203. The driver shall be required to maintain input to a suitable OES (for example a spring-loaded pedal, sprung controller handle or both) continuously in a predetermined position or range, such that the detection circuit continuity is maintained. An emergency brake application shall be initiated if all OES controls are released and the detection circuit is opened, whilst the train or vehicle is in motion with the brakes released.

18.3 Driver's Door/Emergency Exit

204. The Driver's door shall be designed to open outwards towards the passenger compartment to provide a Driver's escape route in the event of an emergency.

205. The cab door shall be positioned such that the exit will be opposite the passenger compartment aisleway.

206. The door shall require a security lock access from the outside but shall be fitted with an emergency push bar release from the inside.

207. The Driver's seat position and console shall be designed to provide unobstructed seat rotation to enable the Driver to quickly approach and release the door.

208. The Driver's door shall be fitted with suitable safety glass window with one (1) way viewing from the Driver's side.

19. BPLRV Control

209. The BPLRV shall be capable of being driven from only one (1) driver's Cab at a time.

210. There shall be a Driver's Control key which shall only be effective in one (1) Driver's console. That key once inserted shall lock out the key functionality in the other Driver's cab.

211. The inserted Control key shall bring on line all control equipment and lighting within the Driver's cab and permit the Driver to take full control of the vehicle.

19.1 Start Up and Shutdown

212. It shall NOT be possible to drive the BPLRV during the preparation and start-up sequence. Shut-down and start-up anywhere on the network shall be possible without any dangerous condition (or risk) of an uncommanded movement of the BPLRV.

19.2 Speed Control

213. The BPLRV maximum operational design speed shall be set at 15km/h and it shall not be possible to apply traction power above this maximum speed limit.

214. The BPLRV shall be designed to have the capability to vary the maximum speed setting, if required in the future.

215. The software required to vary the maximum speed setting shall be supplied with BPLRV.

20. BPLRV Monitoring System

216. The BPLRV shall be fitted with an on-board BPLRV monitoring system. The on-board BPLRV monitoring system shall:

- interface with and monitor the various sub systems and equipment throughout the BPLRV;
- display fault information to the Driver (for BPLRV faults that affect operational performance or require Driver action);
- display fault information to the maintenance staff;
- The BPLRV monitoring system shall record, as a minimum, the performance and availability of the following systems:
- on-board Public Address (PA);
- on-board CCTV (internal and external);

217. The BPLRV Monitoring System shall comply with IEC 61375: Electronic Railway Equipment-Train Communication Network standard or equivalent standard.

20.1 Diagnostic Systems & Fault Reporting

218. The BPLRV control system shall include condition monitoring, diagnostic and fault logging capability. This shall include (as a minimum) the following features:

- Monitoring the condition and health of all on-board systems critical to the BPLRV performance and service reliability.
- Wording of fault descriptions and recommended courses of action shall be displayed to the Driver and the system details shall be provided with Design Documentation Stages 1 & 2;
- Fault logs to be downloaded on each visit to a depot.
- Only faults which are currently present shall be displayed to the Driver.

219. It shall be possible to configure the BPLRV so that in the event of system critical faults appearing, it can be speed limited and/or distance limited to prevent further/catastrophic damage to the critical sub-system or component.

220. If a distance and/or time limitation is in place, the remaining distance and/or time shall be displayed to the driver.

20.2 Data Logger

221. The BPLRV shall be fitted with a data logger which meets the minimum requirements outlined in ONRSR Rail Safety Compliance Code – Data Loggers.

222. The data logger shall only be accessible by authorised personnel.

223. The storage media shall be removable without affecting the integrity of the stored data.

224. The data logger shall have sufficient capacity to record and store a minimum of 30 days of operational data before overwriting.

225. The data logging system shall be capable of logging data associated with BPLRV performance, as well as logging data associated with safety incidents.

226. The data logger shall comply with:

- EN 50155: Railway applications. Electronic equipment used on rolling stock and
- EN 50121: Railway Applications. Electromagnetic compatibility (set of standards)

20.2.1 Data Logger Event Recording

227. The Data Logger event recorder records at least the following functions, at a GPS location accuracy resolution of 1m or better:

- Time stamp (synchronised)
- Speed
- GPS position
- Distance travelled
- Master controller position (not just whether power, brake, or coast but the amount of power or braking requested)
- Vigilance button operation
- Bell/Horn activation
- Horn-Changes in direction warning
- Safety Brake
- Emergency Brake
- Forward/Reverse Direction selected
- Turn Indicator activation
- Traffic Light Control Indication

228. Spare digital input channels (a minimum of 16) shall be provided so that additional items can be added in the future.

229. Data shall be stored on a removable, portable data storage medium, which takes no more than 30 seconds to exchange. The data storage medium shall be mechanically secured in the BPLRV using a unique key / tamper proof tag.

230. Data storage devices shall be of a type, which will remain readable for the life of the BPLRV.

21. Passenger Safety

21.1 Access and Egress

231. The passenger and crew access door at each end of the BPLRV shall be fitted with external and internal handrails securely attached to pillars either side of the doorway opening.

232. With a BPLRV floor height of nominally 720 mm above rail and a proposed street platform height of nominally 200 mm above rail, the 520 mm difference shall be made up of three (3) steps within the side structure of the vehicle, the bottom step being nominally 330 above rail.

233. In order to maximise floor space and align with the edge of the platform it may be necessary to create a folding bottom 265 mm step tread to permit the extended bottom step to temporarily infringe the rolling stock outline whilst the vehicle is stationary.

21.2 Pedestrian and Public Safety

234. The front of the BPLRV shall be designed to minimise the risk of a pedestrian passing under the tram (and injury), in the event of a frontal impact.

235. The BPLRV shall be fitted with a lifeguard (cow catcher) at each end, so designed with a bottom trip bar which when contacted by an object in front of the vehicle, shall initiate the emergency brakes.

236. The Lifeguard shall be positioned to meet envelope requirements for minimum radius horizontal and vertical curves

237. The Tenderer shall provide details and costing for the option of mounting a scanning laser object detector at each end of the BPLRV. The object detector shall be mounted such that it does not impact on the frontal aesthetics of the vehicle. The detector function shall be programmable to enable a no-go arc field to be projected in front of the vehicle.

238. An object that impinges the scanner perimeter shall cause the scanner switching software to operate the horn and if the driver hasn't reacted, apply the emergency brakes.

22. Bogies

239. The BPLRV bogies shall be of a proven design with examples of the type already in operational service. Bogie design shall comply with BS EN 13749: Railway Applications-Wheelsets and Bogies, Method of Specifying Structural Requirements of Bogie Frames.

240. Where the Tenderer proposes an alternate bogie design standard, then that shall be stated in the tender with argument to substantiate the change.

241. Bogies shall be capable of negotiating the tightest curve on the TNT Co track network with no or minimal curve squeal or tendency to derail. If there is any tendency for curve squeal, the bogie shall be fitted with dry stick flange lubricators.

242. The bogie suspension shall be designed to safely negotiate the TNT Co track network and provide an acceptable ride quality when operating up to maximum design speed of 15 km/hr (speed limited).

243. Both the primary and secondary suspension systems shall comply with performance requirements specified in EN 14363: Testing of Running Behaviour and Stationary

Tests and in EN 12299: Ride Comfort for Passengers. Measurement and Evaluation, for a maximum operational design speed of 15 km/hr (speed limited).

244. The bogie frame shall be either fabricated or cast in steel having provision for a primary and secondary suspension. The bogie frame shall provide the necessary torque reaction/support for the traction motor drive system and the reactions for the brake system forces.

245. Each bogie frame shall be designed to provide support for the mounting of a traction motor on each axle. Bogies shall be identical and interchangeable.

246. The bogie frame shall be fitted with wheel guard irons which are designed to minimise the chances of objects passing under the wheels

22.1 Primary Suspension

247. The primary suspension system shall be designed to accommodate track twist and absorb track induced vertical forces, accelerations and displacements thus reducing the transmission of such forces, accelerations and displacements into the secondary suspension.

248. The primary suspension elements may be steel coil, steel leaf or rubber chevron type springs.

249. The primary suspension system shall be designed to permit the lifting of the complete bogie as an assembly and provide compensation for wheel wear effects, if necessary

22.2 Secondary Suspension

250. The secondary suspension system shall be designed to provide an acceptable vertical and lateral ride quality, control body roll and effectively isolate the vehicle body from track borne disturbances.

251. The primary suspension elements may be steel coil, steel leaf or rubber type springs.

252. Secondary vertical suspension damping shall be provided where necessary to control and resonant body bounce and/or roll tendencies.

253. The secondary suspension system shall be designed to permit the lifting of the bogie and BPLRV as a single assembly.

22.3 Bogie Side Bearers and Centre Pivot

254. The bogie side bearers and centre pivot combination shall be designed to effectively control body roll whilst maintaining a low bogie rotational resistance to minimise the potential for wheel climb derailments.

255. The lubrication of constant contact side bearers and centre pivots will be permitted provided it does not result in bogie hunting or instability.

22.4 Wheels and Axles

256. Wheel material shall be selected to comply with Railway Group Standard GM/RT2466 or at least meet that required of an AAR Standard for a Class B wheel. The Contractor shall submit, with the Concept Design, the proposed Wheel Material together with the proposed rim hardness.

257. Wheels shall be of monobloc design and have sufficient rim thickness to permit tread re-profiling, and be marked with minimum rim thickness condemning groove (diameter limit).

258. The Tenderer shall submit an option for wheels fitted with wheel damping, designed to minimise or eliminate wheel disc resonant and/or flange squeal.

259. The wheel rim width shall be at least 130mm and the tread profile shall be as specified by the Purchaser.

260. Axle material shall be selected to comply with Railway Group Standard GM/RT2466 or at least meet that required by AAR standard M-101 Grade F.

261. Axle journal bearings shall be in accordance with EN 12080 or an equivalent international standard and be able to achieve, as a minimum, the same period between overhauls as the bogies. The Contractor shall submit calculations in accordance with EN 12080 demonstrating the predicted bearing life. The bearing lubricant shall be in accordance with EN 12081.

262. Wheels shall be mounted on axles using either a press-on or shrink-on techniques and wheels shall be designed for assisted removal from axles by oil injection.

22.5 Traction Motor Application

263. There shall be at least two (2) traction motors installed on the BPLRV. The motors shall be either both mounted on one (1) bogie or one (1) mounted on each bogie, whichever provides the optimum traction and bogie performance, consistent with an even vehicle mass distribution.

264. The traction motors may be axle hung/nose suspended or fully frame mounted depending on the motor design being proposed.

22.6 Bogie Mounted Brakes

265. Each bogie will be fitted with a braking system that is capable of meeting the BPLRV specified deceleration requirements.

266. The braking system can operate either through brake blocks acting on the wheel tread of all wheels or through a disc brake system operating on axle mounted and/or wheel check mounted discs.

267. The Tenderer is invited to submit a proposal and pricing for each system, including an estimate of predicted brake consumable life and consumable unit costs.

268. The Tenderer shall also submit a proposal and pricing for an electro-magnetic emergency rail brake system, fitted to each bogie. If this proposal is accepted the bogie frame shall have the necessary bracketing included to support this braking system.

269. Brake consumables shall be able to be readily replaced from a maintenance pit environment.

22.7 Bogie Operating Clearances

270. The application of the bogies to the BPLRV shall be such that there is adequate operating clearance between all relative moving parts due to the worst combination of suspension displacement, bogie rotation and wheel wear whilst negotiating the tightest curve on the TNT Co track network.

23. BPLRV Brake Control System

23.1 General

271. The BPLRV shall have a brake control system which smoothly blends both regenerative and friction braking to accomplish the required braking performance.

272. Braking control shall be via the Driver's Power/Braking controller and the braking shall be effected through electro pneumatic control of the friction brakes on the bogies.

273. The BPLRV brake monitoring system shall manage the required braking demand from the brake controller and apply regenerative braking as a priority and supplement that with friction braking as required, in order to meet the total brake demand.

23.2 Friction Braking

274. Friction braking shall be applied on all wheelsets.

275. The friction braking force shall be based on a failsafe system where either the brakes are applied using a spring force and the brakes are held off by controlled pneumatic pressure or, the brakes are held off by a charged brake pipe which when discharged causes the brakes to apply. The pneumatic supply shall be provided by a motor driven compressor resiliently mounted on the vehicle underframe.

276. Pressure vessels shall comply AS 1210 or an equivalent International Standard.

277. The spring applied version of the friction brake could be used also as the parking brake.

278. The net brake force percentage shall be within the ranges as follows:

Table 7 – Net Brake Percentage Limits

Load Condition	Brake Block/Pad Type	Net Brake Percentage
Tare	Medium Friction	55% Maximum
	High Friction	20% Minimum
Crush	Medium Friction	35% Maximum
	High Friction	13% Minimum
Parking Brake (Crush Load)	Medium Friction	20% Minimum
	High Friction	13% Minimum

The net brake percentage = Total brake block/pad force / the maximum vehicle weight

23.3 Regenerative Braking

279. The BPLRV shall be equipped with regenerative braking which returns traction motor current to the traction battery bank whilst the brake controller is demanding a brake retardation.

280. The traction system shall be configured such that when the throttle/brake controller is placed into braking mode the traction motors will generate power which is stored in the traction battery.

281. The vehicle shall also be fitted with resistor bank which is capable of dissipating excess power from traction motor regeneration in the case where the vehicle traction batteries are fully charged and not capable of meeting the electric braking demand.

282. The BPLRV Contractor shall establish the most effective blending between regenerative and friction braking in order to ensure safe braking is achieved at all times and under the most demanding braking requirements.

23.4 Brake Load Compensation

283. The braking system may require load compensation, but only if it is absolutely necessary for effective braking performance.

284. If required, the BPLRV shall have the capability to measure passenger load variations and be designed to provide optimum braking, based on this passenger load variation.

285. If load compensation is required and the bogie suspension deflection is not sufficient to detect the passenger load variations then it may be necessary for the Driver to enter the passenger numbers into the traction management system before the vehicle can be operated.

23.5 Electro-Magnetic Rail Brake Option

286. The Tenderer shall submit an option and pricing for an electro-magnetic rail brake application fitted to one (1) bogie and alternatively two (2) bogies. This rail brake is proposed for use as an emergency brake only and it shall be energised from the auxiliary power supply battery.

23.6 Fail Safe Parking Brake

287. The BPLRV braking system shall comply with EN 13452-1: Railway Applications: Braking Mass Transit Systems-Performance Requirements.

288. The parking braking brake shall be effective on both bogies (4 axles) and shall be spring applied, requiring pneumatic, hydraulic or electrical supply to release the brakes, under normal operation.

289. In the event of a traction supply failure or a flat traction battery the spring parking brakes shall apply.

290. The parking brake on one (1) bogie shall be capable of holding the fully loaded BPLRV on a 1 in 30 gradient indefinitely under all weather conditions.

291. The electro-magnetic brake, if fitted, shall not be used as a parking brake.

23.7 Roll Back Prevention

292. The BPLRV shall be designed with a system to automatically prevent uncontrolled movement in either direction from standstill under any combination of load and gradient in all driving modes and regardless of driver action.

293. If electro-magnetic rail brakes are employed they may be used to provide this function in conjunction with the throttle controller.

294. Where there is no electro-magnetic rail brake present the throttle controller may be set up with a delay function which enables a minimal traction power to be applied before the vehicle brakes release. This requirement will have to be tested and proven at the BPLRV commissioning stage

23.8 Brake Equipment Release and Isolation

295. The BPLRV brake system shall be designed such that in the event of a brake equipment failure on one (1) bogie, that bogie brake system, including the parking brake, can be isolated and not function.

296. The BPLRV shall have a means of mechanically releasing parking brakes, to enable the BPLRV to be recovered, if there is no battery power available. It shall also be possible to connect another portable battery to the brake system to permit the brakes to be released for recovery purposes.

297. Any special tooling required for this purpose is to be included in the Spares Tools Listing submitted with the Concept Design.

24. Safety Integrity Levels (SIL)

298. The Contractor shall provide the Safety Integrity Levels (SIL), for each critical sub-system, including the braking system. An indication of SIL levels are indicated below:

Table 8 - Vehicle Safety Integrity Level Requirements

Function	SIL
Vigilance Control System	SIL2
Braking	SIL3
Rollback protection	SIL1
Speed signal generation	SIL2
Speed visualization	SIL2

25. Traction/Power Equipment

25.1 Traction Battery

299. The traction battery shall supply the required power to the traction motors via suitable approved control system.

300. The Tendrerer shall submit the type of traction battery proposed for use in this application. The Tenderer shall provide a product datasheet and evidence of proven use of the proposed traction battery in previous rail or traction applications. If the battery being proposed is of a lead acid low maintenance type, it shall be in accordance with EN 60254 or another international standard to be submitted for Approval.

25.2 Traction Battery Performance

301. The capacity of the traction battery (from full charge to complete discharge) shall be designed to meet the maximum performance requirements of the BPLRV. The Contractor shall demonstrate that all performance scenarios have been covered in determining the proposed capacity of the traction battery.

25.3 Battery Capacity

302. The traction battery performance shall be achieved for all ambient temperatures less than or equal to 50°C. Calculations demonstrating the thermal degradation of traction battery performance at temperatures above 50°C shall be submitted for Approval.

303. The traction battery shall be rated to maintain the performance throughout the life of the battery.

304. The Contractor shall provide calculations of the traction battery life-expectancy. As a minimum, the battery shall be designed to ensure that as a result of normal usage, after five (5) years without renewal of the electrolyte the battery shall retain not less than 90% of the rated capacity. After six (6) years, under the above conditions, the battery shall retain not less than 80% of the rated capacity.

25.4 Battery Charging

305. The traction battery shall be charged from the depot 240 volt 50Hz AC/inverter shore supply electrical socket.

306. The algorithm for charging the battery shall follow the recommendations of the battery supplier to optimise the battery performance and maximise battery life. This clause is applicable to both the on-board battery charger and when the battery is being charged from the shore supply.

307. The battery temperature shall be monitored using a 3 or 4 wire thermal sensor to enable the accurate measurement of the battery temperature. The battery charging profile shall be automatically adjusted according to battery temperature to avoid under charging or overheating the battery.

308. The Contractor shall optimise the battery charging scheme to extend battery life as recommended by battery supplier.

309. The Contractor shall submit the design of the charging system, including the proposal for battery thermal management, for Approval.

310. The traction battery shall not produce any gas and/or the battery compartment shall be designed to prevent the possibility of gas being concentrated which may constitute a safety hazard.

25.5 Maintenance

311. The Contractor shall ensure that with normal usage and the charging system provided, the battery shall not require the electrolyte to be refilled more than once every two (2) months. The battery arrangement shall be designed to minimise the time taken for this maintenance activity and any equipment fitted to satisfy this requirement shall be submitted for Approval.

312. To ensure that there is no danger to personnel during routine maintenance of the traction battery, a safe means of connection / disconnection of the terminals of the battery shall be provided.

313. The battery isolation shall not expose personnel to hazards of electrical arcing or live electrical energy from adjacent equipment.

25.6 Battery Construction & Housing

314. The construction of the battery shall be in accordance with the shock and vibration requirements as specified in BS EN 61373 or another international standard, to be submitted for Approval.

315. Materials employed in the construction of the battery, interconnections and its enclosure shall meet the fire performance requirements.

316. The battery box shall be constructed of steel, which shall be in accordance with the BS EN 60254-1 and BS EN 60254-2, suitably insulated to prevent earth faults and corrosion, with an earthed drain plug located in the base of the battery box to earth it to the vehicle body. The earthed connection shall be located for ease of access to permit removal of the battery box.

317. It shall be possible to remove sections of the battery by means of a fork lift truck or other suitably designed lifting/lowering device once the battery cables have been disconnected. The housing for the battery shall allow easy access to all cells for ease of maintenance.

318. The battery compartment shall provide adequate ventilation to atmosphere.

25.7 Battery Protection and Isolation

319. Overload protection and current balance protection shall be provided to ensure that the traction battery is not damaged in the event of a fault. The protection device shall be connected directly to both the positive and negative poles of the battery. In the event of operation of the protective device, it shall ensure that when the battery negative is disconnected from earth, it is achieved as close to the negative pole of the battery as possible.

320. The current balance protection device shall operate in the event of a battery terminal fault to earth if the unbalance in current between the positive and negative terminals of the battery exceeds 100mA. Any operation of the above protection device shall also cause the traction power electronics to switch off and the line switches to open.

321. An overload protection device shall be designed to protect the battery in the event of the battery charging current exceeding the normal operating level or excessive traction current being drawn from the battery.

322. Fault indications and a reset facility shall be provided. In the event that the BPLRV is operating and before the battery has been drained down to the cut-out voltage, a means shall be provided to warn the Driver of the low voltage situation.

26. Traction System

323. The preferred traction drive system is via variable frequency converter driven AC traction motors. The proposed traction motors and associated drive system shall be designed to perform all normal and emergency functions as specified in Section 26, without damage or deterioration to the motors or their associated connections which may lead to subsequent premature failure.

324. The traction system proposed shall be of proven design suitable for the specified performance levels. The design of the power converter shall be in accordance with IEC 61287-1:2005 and IEC 61287-2:2001 or another approved international standard and shall be tested to IEC 61377-1:2006 or other approved international standard. Where alternate standard are proposed their details and reasoning for the use shall be submitted for approval.

325. Modular design shall be used where practical to permit easy replacement of sub-systems and Line Replaceable Units.

326. The Contractor shall submit an energy efficiency calculation for the Traction System and demonstrate the efficiency of major components is comparable with equipment used in similar rail applications.

26.1 Traction Performance

327. The mass of the BPLRV shall be evenly distributed across each driving axle such that the load on each axle is within ±2% of the average axle load. The distribution of mass on the BPLRV shall not negatively affect adhesive tractive effort. Wheel/rail adhesion shall be at least 35%.

26.2 Traction Load Compensation

328. The traction system may require load compensation, but only if it is absolutely necessary for effective traction performance.

329. If required, the BPLRV shall have the capability to measure passenger load variations and be designed to provide optimum adhesive tractive effort, based on this passenger load variation.

330. If load compensation is required and the bogie suspension deflection is not sufficient to detect the passenger load variations then it may be necessary for the Driver to enter the passenger numbers into the traction management system before the vehicle can be operated.

26.3 Traction System & Power Circuit

331. The proposed propulsion system shall be of proven design and shall utilise a proven electric device for power conversion.

332. The traction system shall be configured using proven modern power semiconductor devices. The Contractor shall submit the proposed design for Approval.

333. The Contractor shall make every design effort to maximise the efficiency of the traction converter when operating under traction battery power. The minimum efficiency of the traction system when measured at the wheels under nominal load conditions shall not be less than 90%.

334. Electronic and mechanical overload protection shall be provided in both motoring and regenerative braking operating modes. The overload protection shall also be capable of protecting the semiconductor devices.

335. The use of fuses in the power circuit is not preferred. If it is unavoidable, indication shall be provided to alert the driver and maintenance personnel of its status.

336. Power semiconductors shall be arranged in modules complete with snubbing and protection components. Paralleled connection of the power semiconductors is not preferred. Should this arrangement be inevitable, consideration shall be given to the nominal rating of the device, and the design proposal shall be submitted for Approval.

337. The Contractor shall demonstrate that all traction equipment is capable of operating at ambient temperatures in accordance with Clause 25.3. No component shall exceed its maximum operating temperature in any modes of operation including emergency and degraded modes.

338. The maximum air temperature within any equipment case shall not exceed 65°C under all conditions of normal and emergency duties, over the full range of ambient conditions specified herein.

339. The thermal ratings of all power circuit components including semiconductor junctions and heat sinks shall be submitted for Approval.

26.4 Degraded Mode of Operation

340. With a loss of 50% of traction power (ie 50% battery power available for traction or one (1) traction motor isolated), the BPLRV shall be able to complete its journey under full passenger load to the next scheduled stop in order to detrain passengers.. The BPLRV shall then be able to complete its journey to the Depot, in empty condition.

26.5 Loss of Traction Battery Power

341. In the event of a complete loss of traction battery power, the BPLRV shall degrade to the emergency battery power mode, in which the following equipment shall remain functional (for a minimum of 30 minutes):

- Two way Radio (if provided)
- External Hazard lights
- Public address
- Horns

- Release of brakes (by command)
- Event Recorder (Data logger)

342. The activation of the degraded emergency power mode shall automatically occur within 2 minutes of the traction battery supply failure, with a notification showing on the Driver's console.

26.6 Wheel Slip-Slide Protection

343. The BPLRV shall have a means of controlling wheel slip-slide to optimise available adhesion during traction and regenerative braking. The wheel slip-slide system shall be active in all braking modes and shall comply with EN 15595-2011-Railway Applications, Braking: Wheel Slide Protection (General Requirements). Also, the wheel slip-slide system shall comply with EN 50155: Electronic Equipment used on Rolling Stock and EN 13452: Braking Requirements for Mass Transit Systems.

344. The wheel slip protection shall enable the optimum use of the available adhesion level during powering and prevent any damage to wheels, traction motors and/or transmissions, during wheel slip. The system shall be capable of detecting both individual axle slip and synchronous slip of all powered axles.

345. If wheel slip is detected, tractive effort shall be smoothly ramped down and smoothly reapplied as soon as wheel slip has been corrected. The system shall be fully adaptive to varying adhesion conditions.

26.7 Future Proofing

346. The design and construction of the BPLRV and all associated equipment and systems shall allow for future upgrade and replacement as technology advances and improvements in performance of systems, or changes in operating requirements occur.

347. Key wiring looms and connectors shall include an additional capacity to accommodate any additional equipment that may be retrofitted to the BPLRV in the future.

348. The traction and braking systems shall incorporate flexibility to adjust the acceleration and deceleration rates.

349. The vehicles shall include wiring and space provision for the installation of Wi-Fi equipment for use by passengers and other authorised personnel.

350. The Contractor shall submit details of proposed future proofing at Design Stage 1.

27. Electrical Systems

27.1 Auxiliary Supply

351. An auxiliary supply socket shall be provided on the BPLRV to recharge the auxiliary batteries whilst in the maintenance depot and permit the control equipment to be energised. It may be internal or external socket on BPLRV and the supply shall be from an industrial mains Australian 240V AC 50Hz supply. The supply socket shall be secured behind a lockable cover or door. The auxiliary battery charger shall be installed on the BPLRV.

27.2 Auxiliary Batteries

352. The auxiliary battery power shall provide redundancy to mitigate the risk of a failure in the battery power supply and associated equipment causing complete failure of the BPLRV.

353. The auxiliary supply arrangement shall ensure that if one inverter fails, lighting is available throughout the BPLRV.

354. Batteries shall comply with:

- IEC 60623: Secondary Cells and Batteries Containing Alkaline or other Electrolytes.
- IEC 60086-1: Primary batteries - Part 1: General

355. Refer to Clause 26.4 degraded mode of operation, due to loss of battery power supply.

356. Refer to Clause 25.7 for battery protection and isolation.

27.3 Electronics and Electrical Wiring

357. The BPLRV electrical wiring, insulation and components shall meet the requirements of:

- EN 50124:2001 Railway applications. Insulation coordination. Basic requirements. Clearances and creepage distances for all electrical and electronic equipment
- IEC 60571 Railway applications – Electronic equipment used on rolling stock

358. Electronics, electrical enclosures and protection selected for use by the Contractor shall be in accordance with:

- EN 50155: Electrical Equipment used on Rolling Stock.
- AS 1939 Degrees of protection provided by enclosures for electrical equipment (IP Code)
- IEC 60529 Degrees of protection provided by enclosures (IP Code)

359. The Contractor shall submit with the Concept Design, details of the wiring design and compliance with relevant standards.

360. The Contractor shall provide comprehensive electrical schematics for all on-board electrical equipment.

361. All wiring, cables and connectors shall be fixed and supported to prevent:

- chaffing, wear; and
- connectors working loose.

362. Ducts and conduits shall be designed to prevent the ingress of dust, water and liquids.

363. Wiring ducts shall have no sharp bends or internal corners which could pose a risk of cable damage/abrasion.

27.4 Control System

364. All control wiring shall be ducted between Driver's compartments consoles/control cabinets and the BPLRV central control cabinet (if such is necessary). Wiring duct/s shall be appropriately sized to accommodate all necessary control wires plus adequate spares to cover future continuity failures as well as future equipment/control additions.

365. Wiring ducts shall have no sharp bends or internal corners which could pose a risk of cable damage/abrasion.

27.5 BPLRV Control Systems

27.5.1 Traction/Braking Control

366. It is preferred that the Driver's traction/braking controller be a single "T bar" handle which operates in the fore and aft direction.

367. For safety, the direction of operation shall be forward, towards the front of the vehicle for braking and backward for power. Without adversely impacting on the control of the vehicle in traction, the angular movement of the traction/brake control handle in the braking range shall be maximised to permit braking to be performed in a smooth and Jerk free manner.

368. To comply with the requirement for an Operator Enable System the "T bar" handle shall rotate through 45^{O} until the handle is nominally at 90^{O} to the vehicle centreline before it can be moved backwards in power mode.

27.5.2 Road Traffic Control

369. The BPLRV shall be fitted with the necessary on-board equipment to enable it to interface with the traffic light control system to facilitate prioritisation for the BPLRV through traffic lights on the TNT Co. Network.

370. The Contractor shall provide to the purchaser a test report covering the operation of the on-board equipment.

27.6 Earthing

371. All BPLRV metallic boxes, cases, conduits and enclosures containing electrical equipment, which are not intended to be part of the live circuit, shall be earthed in accordance with EN 50153:2002, Railway Applications-Rolling Stock: Protective Provisions Relating to Electrical Hazards.

372. All power equipment shall be connected to earth, via installed earthing devices. Earthing return currents shall be prevented from passing through, traction motor bearings, axle journal bearings or axle boxes.

28. Electromagnetic Compatibility

373. The design of the BPLRV and its sub-systems shall control the levels of radiation to ensure that medical devices such as pacemakers and hearing aids and personal electronic equipment such as computers, mobile phones and audio equipment are not affected by operation of the BPLRV.

374. As a minimum, the maximum levels of radiated Electro Magnetic Interference (EMI) and conducted emission of BPLRV borne equipment shall not exceed the levels specified in the following Standards:

- EN 50121:2006: Set of Standards: Railway Applications: Electromagnetic Compatibility
- EN 50155-2007: Railway Applications-Electronic Equipment used on Rolling Stock
- 2004/108/EC: European Directive for Electromagnetic Compatibility
- AS/NZS 61000.6.2: Electromagnetic Compatibility (EMC): General Standards - Immunity for Industrial Environments
- IEC 62236-3-1 Railway applications - Electromagnetic compatibility - Part 3-1: Rolling Stock - Train

375. On-board apparatus installed on the BPLRV shall fully comply with the requirements of IEC 62236-3-2 Railway Applications – Electromagnetic compatibility – Part 3-2: Rolling Stock – Apparatus.

376. The Contractor of the BPLRV shall perform an assessment on radiated and conducted emissions compatibility with road traffic signalling equipment and work with equipment suppliers to establish any susceptibility and compliance to EMC requirements. The Contractor of the BPLRV shall provide an EMC Management Plan (as per Appendix B of this Specification)

377. The Contractor shall ensure tests for EMC are conducted during Testing and Commissioning in accordance with (but not limited to):

- AS/NZS 61000.4 Electromagnetic Compatibility (EMC): Testing and measurement techniques (All parts)
- BS EN 50500 Measurement procedures of magnetic field levels generated by electronic and electrical apparatus in the railway environment with respect to human exposure

29. Communication Systems

29.1 Passenger Information & Communication

378. The passenger information and communication system shall be capable of the following communications:

- live public address announcements by the driver;
- non-routine, but pre-recorded announcements which can be initiated by the Driver and
- automatic pre-recorded announcements made throughout the BPLRV .

379. Under all service conditions and in all locations announcements shall have a speech transmission index of at least 0.6 when measured in accordance Section 16 of IEC 60268: Sound System Equipment

380. Pre-recorded announcements shall have the capability to be easily updated by TNT Co. The pre-recorded announcements shall be controlled either manually (by the driver) or automatically, from a remote location.

381. All software and hardware shall conform to AS/NZS 4295: Analogue Speech and AS/CA S004-2013: Voice Performance Requirements for Customer Equipment.

382. The pre-recorded audible announcements shall be linked to the passenger area displays.

383. The PA system shall not be affected by the loss of battery power while the BPLRV is at a Stop.

384. External destination indicators shall be provided to aid in the timely provision of passenger information. Indicators shall be provided at the front and rear of the BPLRV.

385. A minimum of two (2) external destination indicators shall be provided per side of the BPLRV. Side displays shall be positioned in the most optimum locations along the BPLRV, to enable an un-obstructed view by waiting passengers.

386. Internal Passenger Information Displays shall enable passengers to read the information from all seated locations within the vehicle without turning more than 90°.

387. Hearing augmentation facilities shall be fitted to the BPLRV for hearing impaired passengers.

388. The hearing augmentation shall convey all PA announcements (manual and automatic).

389. Passenger Information Displays shall be capable of being remotely monitored and controlled from a central location.

390. The BPLRV shall be fitted with stop request buttons to enable passengers to alert the Driver to their intention to disembark at the next Stop.

391. The Contractor shall recommend the maximum allowable LCD screen size that can be used allowing for the 95th percentile of population and ensuring visibility for all passengers within the BPLRV. The maximum viewing distances shall be in accordance with DSAPT requirements.

392. The passenger information system shall comprise:

- One central unit for PA in the BPLRV
- 1 saloon loudspeaker
- 2 driver console speakers
- 2 driver console microphones
- 2 frontal LED exterior displays.
- 2 side LED exterior displays.
- 2 internal LED displays
- Hearing augmentation facilities

29.2 External Destination Displays

393. The BPLRV external displays shall show route information (designation and route number). The route information shall be able to be readily modified by TNT Co.

394. External displays shall be located on both sides of the BPLRV and at the front and back of BPLRV.

395. The brightness of all displays shall be automatically adjusted, based on light conditions (both internal and external).

396. External Passenger Information Display screens shall display route number and destination.

397. The external displays shall comply with EN 50155: Electrical Equipment used on Rolling Stock.

29.3 Wi Fi Network

398. The Contractor shall submit a proposal and costing for the installation of free a Wi Fi system which meets the current Australian Communication Regulations

29.4 CCTV Recording

399. The BPLRV shall be fitted with a digital colour Closed Circuit Television (CCTV) system with an on-board recording of all cameras.

400. CCTV Cameras shall provide complete coverage of internal passenger areas and both driver locations.

401. Forward-facing CCTV cameras shall be provided in both driving locations.

402. External CCTV cameras shall be provided giving full visibility of all passengers (including children) entering and exiting the BPLRV.

403. External CCTV cameras shall clearly capture footage from all access/egress points.

404. On-board recording equipment shall be capable of recording a minimum of 30 days footage.

405. On-board recording equipment shall only be accessible by authorised persons and the storage media shall be capable of being removed without affecting the integrity of data stored.

406. The CCTV footage shall contain sufficient resolution and detailed information to ensure it can be used as evidence in court proceedings (Queensland). For these purposes:

- the quality of the CCTV footage shall be sufficient for the purpose of recording events and identifying individuals; and
- TNT Co. shall be able to properly authenticate the CCTV footage.
- All CCTV images shall be identified by the BPLRV number, camera number, date and time to the nearest second.
- Data shall be retained for at least 30 days of service, after which the oldest data shall be overwritten by new data.
- Continuous real-time CCTV recording is preferred. The Contractor shall provide examples of CCTV quality at Design Stage 1.

30. Lighting Systems

407. External Lighting - Visability

408. All external lighting shall comply with Vehicle Standard (Australian Design Rule 13/00 – Installation of Lighting and Light Signalling Devices on other than L-Group Vehicles) 2005 and referenced documents.

409. The BPLRV shall be fitted with the following external lighting at each end of the vehicle:

- Dual Head lights (high/low beam)
- Daytime lights
- Direction indicator lights
- Clearance lights
- Tail lights
- Brake Lights
- Flashing beacon (on top of Driver's cab)

410. The BPLRV shall be fitted with the following external lighting/reflectors on each side of the vehicle:

- Side clearance lights
- Side reflectors

30.1.1 Dual Purpose Lights

411. The following lights may be used as dual purpose lights by using colour changing LED lights:
    - Daytime lights/Tail lights (White/Red LED)
    - Clearance lights (White/Red LED)
    - Hazard lights/Direction Indicator lights (Orange LED)

30.2 Step Lights

412. For evening, night and poor ambient light situations, step lights shall be provided to ensure that each step up into the vehicle is adequately lit.
413. The light/s shall be linked to the door interlock system such that the lights are activated when the door security is released.
414. The light power supply will be controlled from a switch on each driving console

30.3 Interior Lighting

415. Interior lighting in the passenger saloon area shall be of the LED type.
416. Uniform interior lighting shall be provided along the full length of the BPLRV and be able to manually switched on from the Driver's cab on when there is low ambient light.
417. The interior lighting shall conform to standard EN 13272: Railway Applications-Electrical Lighting for Rolling Stock in Public Transport or equivalent standard.

30.4 Emergency Lights

418. The BPLRV interior including the Driver's cabs shall be provided with emergency lighting for use in the event of a battery power supply failure. Emergency lights shall automatically switch on in the event of a vehicle power failure.
419. Emergency lighting shall comply with EN 13272:2001 Railway Applications – Electrical lighting for Rolling Stock in public transport systems (clause 4.3 *Emergency Lighting*) and GM/RT 2130:2014 Vehicle Fire, Safety and Evacuation; Part 4: Requirements for Emergency Lighting
420. Emergency lighting shall provide sufficient illumination to allow movement around the vehicle and to access or egress the vehicle with illumination levels not less than:
    - 1 lux at floor level along exit paths.
    - 20 lux at floor level at emergency exit doors.
    - 20 lux on any equipment necessary to provide emergency egress.

30.5 Driver's Cab Lights

421. The Driver's cab lights shall be dimmable LEDs recessed into the cab ceiling panels.
422. The cab lighting shall be controlled by a switch and rotary dimming switch located on the Driver's console.

31. Fire Safety

31.1 Fire Performance

423. The BPLRV shall be designed and constructed to provide a level of fire safety for an above ground rail bound vehicle operation, that includes street running.

424. All materials used shall comply with the requirements of internationally recognised fire performance standards.

425. The Contractor shall provide a summary of the proposed fire resistant materials during Design Stage 2.

426. The materials selected for use in the interior of the BPLRV shall be in accordance with EN45545, as shown in the table below:

Table 9 - Vehicle Material Selection – Minimum Fire Performance

Vehicle Area	Requirement
Flooring panels	R10
Rubber flooring	R10
Bogie linings	R1
Lighting diffuser	R4
Driver console front fairings	R17
Driver desk	R1
Driver console cupboard linings	R1
Sunblinds	R1
Bogie underframe insulation	R7
Ceiling insulation	R1
Roof fairing insulation	R7
Passenger seat	R18
Driver seat	R19
Exterior paint	R7

427. The Contractor shall provide all fire performance test results of materials selected that demonstrates nil detrimental effects on passengers from the release of toxic fumes or gases in the event of a fire.

428. The Contractor shall supply and maintain a schedule of non-metallic materials used in the construction of the BPLRV.

429. The schedule shall include a fire load calculation for the vehicle. This shall be used to highlight materials with particular fire hazard potential so that special attention can be paid to the fire test results, with a view to ensuring that this potential is not realised.

430. All material shall be tested individually and as part of an assembly.

31.2 Fire Performance of Cables & Wiring

431. Cables shall be low smoke, free of halogen and capable of operating between 0°C and 120°C.

432. Cables shall be fire retardant, heat resistant and non-toxic in accordance with EN 45545-2, EN 50264, EN 50266, EN 50306, EN 50355 and EN 50382.

31.3 Fire Fighting Equipment

433. Provision shall be made for the installation of a 4.5kg powder-type fire extinguisher in each Driver's cab. The location of the fire extinguisher shall not protrude into the Driver's access pathway with operation of the vehicle, but shall be easily and safely accessible to the Driver or other maintenance personnel in case of an emergency.

434. Fire extinguishers shall be positively secured by a mounting bracket. No tools shall be required to remove a fire extinguisher from its mounting bracket.

435. Fire extinguishers will be free-issue by the Purchaser to the Contractor and will comply with Australian Standards. The fire extinguishers shall be installed by the Contractor.

31.4 Smoke Detectors

436. A smoke detection system shall be provided to detect smoke in the passenger and Driver compartments.

437. The smoke detection system shall be fail safe, including the transmission of safety-critical alarms. The health of the smoke detection system shall be monitored and faulty or dirty detectors shall be reported to the Driver and maintenance personnel.

438. The smoke detection system shall minimise false detection.

439. The smoke detection system shall be resistant to tampering and vandalism.

440. Upon detection of smoke, indication and an alarm shall be provided to the Driver.

32. Manufacturing

32.1 Welding

441. All welding shall be performed tested and verified in accordance with ISO 3834 Quality Requirements for Welding.

442. All welding procedures shall be documented by the Contractor and shall be available for review by the Purchaser.

443. All welding work shall be under the control of a suitably qualified welding engineer nominated by the Contractor as its representative.

444. The Contractor shall maintain records of welder approvals, welding operator approvals and resistance weld setting approvals, together with full supporting evidence. This information shall be made available to the Purchaser upon request.

445. The Purchaser reserves the right to require the quality of individual welds, particularly in critically stressed areas, to be verified by an approved non-destructive testing procedure.

446. The Contractor shall not use permanent backing strips unless approved by the Purchaser.

447. The surface of welds which adversely affect the appearance of the BPLRV shall be ground to a smooth finish.

448. All structural welding on the BPLRV underframe and body shall be in accordance with EN 15085.

449. The Contractor's welding procedures, including for the rectification of defects, welder training and the approval of welders shall be in accordance with EN 15085.

450. The Contractor's welding inspection and examination procedures, including Non-Destructive Testing (NDT) shall be in accordance with EN 15085-5.

451. Other equivalent procedures shall be submitted for Purchaser Approval prior to being used.

452. Welding processes shall be in accordance with EN 1011 in addition to the relevant requirements of EN 15085. Where welding processes not described by EN 1011 are proposed, the Contractor shall submit the proposed standard for Purchaser Approval.

453. As part of the Initial Design Submission, the Contractor shall submit for Purchaser Approval a checklist, procedure or other description of how welds will be classified in accordance with EN 15085-3.

454. As part of the Substantial Design Submission, the Contractor shall submit for Purchaser Approval a list of all welds of performance class CPA, CPB and CPC1.

455. The Contractor shall clearly identify the weld performance class on drawings.

32.2 Painting

456. Paint work shall be applied in a professional manner.

457. There shall be no paint runs or blooming on any visible paint finish.

458. Paints containing lead, cadmium and chromates shall not be used on the BPLRV.

459. All isolating cock handles employed on the BPLRV shall be painted white to make them clearly visible to maintenance and operating personnel.

32.3 Corrosion Protection

460. The Contractor shall submit a Durability and Corrosion Management Plan which demonstrates how protection of the BPLRV from chemical reactions with the environment will be incorporated into the design.

461. The Durability and Corrosion Management Plan shall detail how corrosion arising from the contact of dissimilar metals will be managed. This shallt include contact at joints as well as incidental contact during material storage and manufacturing of the vehicle.

462. The Durability and Corrosion Management Plan shall detail how paints and coatings shall be used to protect the BPLRV from atmospheric corrosion, particularly for external and underframe equipment.

463. The Durability and Corrosion Management Plan shall detail the approach to corrosion management for specific subsystems, including but not limited to the underframe, body, pneumatic pipe work, underframe equipment and bogies.

464. Steel structures shall be designed to avoid creating areas where water or other liquids can accumulate. Where any such areas are necessary, they shall be sealed and/or drained to prevent corrosion

32.4 Unacceptable Materials

465. The following materials/elements shall not be used in the manufacture of the BPLRV:

- Asbestos;
- Chlorofluorocarbons (CFCs)*;
- Polychlorinated Biphenyls (PCBs);
- Exposed Lead. Paints containing lead shall not be used;

- Chromates;
- Cadmium; and
- Cyanide.

32.5 Quality Management

466. Finishing materials shall be applied to commercially acceptable tolerances with respect to flatness, finish and fitting of joints, as applicable.

467. Materials shall be integrally coloured, of uniform colour throughout the BPLRV, and fabricated to extend durability and provide consistency of appearance throughout the life of the BPLRV.

468. The design of all components shall provide protection from damage arising from vermin, including insects, arthropods, birds and rodents.

469. The entire BPLRV structure, including any associated attachments, shall be free from sharp edges, weld spatter and swarf.

470. The Contactor shall implement a Quality Management Plan, during the BPLRV build stage. This is to include a Staff Competency Plan.

33. Project Plans and Reporting

471. The Contractor of the BPLRV shall supply Project Plans, related to the procurement and manufacture of the proposed vehicle.

472. Refer to Appendix B for all Project Plans that are to be provided to the Purchaser, within the periods indicated.

34. Static Tests

473. The following static tests shall be conducted on the BPLRV before any on-track dynamic testing is undertaken:

Table 10 – Static Test Requirements

Bogie Rotation Test -	To ensure there is adequate operating clearance between the bogies and the underframe/equipment. This shall involve rotating the bogies under the vehicle body to simulate the vehicle negotiating the tightest horizontal curve on the TNT Co. Track network. The test shall be conducted with a simulated solid suspension.
Twist Test -	The complete vehicle shall be subjected to a twist test simulating a combined local and long track twist. The maximum wheel unloading shall not exceed 60%. The twist criteria shall be confirmed by the Purchaser
Roll Natural Frequency Test	This test shall be conducted by rocking the vehicle laterally on its suspension to ascertain the resonant roll frequency
Net Brake Force Test	Brake block force measurements shall be taken at each wheel and the summation of all block forces shall be compared with the vehicle weight.
Hand/Park Brake	This test ascertains the park brake's ability to hold the vehicle

Grade Test	on the 1 in 30 gradient. This can be accomplished by using 1 in 30 wedges under the wheels or by a drag test which determines the load required to haul the vehicle against its parking brake effort.
Rail Brake Holding Test	This is a similar test the the park brake holding test to determine the holding force of the rail brake.

35. On-Track Dynamic Performance

474. The Contractor shall ensure that the BPLRV is dynamically stable (i.e. resistant to bogie hunting) under all operating conditions, is safe against derailment and does not exceed acceptable track force limits (both axle-load and speed (ie un-sprung mass limits)) on the TNT Co track network.

35.1 Traction Performance

475. The BPLRV shall have braking, acceleration and a maximum speed that enables the service requirements to be achieved.

476. The BPLRV shall have a demonstrated ability to start and operate on all combinations of grades and curves on the TNT Co network.

477. The BPLRV shall be designed with sufficient redundancy such that it shall be capable of starting and stopping in all weather and load conditions, anywhere on the TNT Co Network with only 50% of traction available (ie in degraded mode).

478. BPLRV acceleration and braking rates shall be achieved under the full passenger load condition.

479. The BPLRV shall be capable of being towed by a suitable road or rail vehicle back to the depot.

35.2 Acceleration, Deceleration and Jerk

480. The BPLRV shall meet the minimum service requirements for acceleration and deceleration as per the following table:

Table 11 - Vehicle Traction/Braking Performance

Maximum acceleration	1.24 m/s^2
Maximum deceleration	1.29 m/s^2
Deceleration (emergency braking)	2.8m/s^2
Jerk	0.8m/s^3

35.3 Braking

481. The Contractor shall demonstrate through testing that the BPLRV braking system shall meet deceleration rates/stopping distance requirements under all operating conditions in accordance with EN 13452-1: Railway applications. Braking. Mass transit brake systems. Performance requirements.

482. The Contractor shall demonstrate through testing that the primary service braking is performed using the regenerative brake, and provide the amount of recovered braking energy fed back into the battery system.

483. The friction brake system shall be primarily used to supplement the regenerative brake system and the two (2) braking systems shall be blended to ensure a smooth, jerk free brake retardation with minimal friction brake wear.

35.4 Ride Quality

484. The Contractor shall demonstrate the BPLRV ride quality performance through testing in accordance with EN 12299: Ride Comfort for Passengers.

485. The ride quality requirements shall be met for across the full range of load conditions, and track conditions over the full range of speed up to 110% of maximum operating speed (ie 17 km/hr).

36. BPLTV Recovery

486. Recovery of the BPLRV shall be required where there is a complete traction or control system failure.

487. Traction failure shall include seized traction motor/gearbox, severely damaged wheel tread/s, frozen or seized journal bearing, broken axle or broken suspension.

36.1 Towing & Recovery

488. The towing and recovery modes to be dealt with are listed below:

- Lifting of an empty BPLRV onto a low loader, for transport to the Maintenance Facility.
- Pushing an empty BPLRV to the Maintenance Facility.
- Towing of an empty BPLRV to the Maintenance Facility.

36.2 Recovery Preferences

489. The Contractor shall include provisions for the recovery of a stranded BPLRV on the TNT Co track. The recovery methods proposed shall include the following in order of preference:

- The provision of a limp mode (BPLRV powered by auxiliary batteries) enabling the BPLRV to be recovered without the intervention of another vehicle, followed by;
- Pushing or towing the stranded BPLRV with by a recovery road vehicle, followed by;
- Lifting of an empty BPLRV onto a low loader.

37. System Configuration Management

490. All software which includes operator-configurable elements shall have the ability to store a configuration code, as well as a software version number, so that the Purchaser and maintenance personnel can easily check which configuration is in use.

491. The Contractor of the BPLRV shall provide a Configuration Management Plan, as per Project Plans.

492. There are several requirements for Owner-configurable features and software. Such configurations shall only be accessible to high-level technical personnel.

493. The Purchaser shall be provided with appropriate licences to use all applicable software.

494. The Contractor shall make all source code information available in Escrow for the Purchaser to access as required.

38. RAMS & FMECA Analysis

495. The Contractor of the BPLRV shall prepare a comprehensive RAMS and FMECA assessment of the proposed systems and components for submission with the Concept Design.

496. The assessment shall be performed in accordance with:

- EN 50126 Railway applications. The specification and demonstration of reliability, availability, maintainability and safety (RAMS).
- IEC 60812 Analysis techniques for system reliability – Procedure for failure mode and effects analysis.

497. Components shall be sufficiently identified and traceable to demonstrate technical maintenance planning decisions.

498. The Contractor shall submit with the Concept Design an explanation of the basis for original design and equipment selected for installation (e.g. performance requirements); and a statement of any assumptions made as part of the assessment.

499. Reports are to include actual calculations (including details of assumed values).

39. Asset Register

500. The Contractor shall provide a comprehensive Asset Register for the supplied BPLRV.

501. The Asset Register shall including system, subsystems and all equipment details.

40. Maintenance

502. The Contractor shall provide a detailed Asset Maintenance Plan for the BPLRV covering its whole service life of 20 years.

503. The detailed Technical Maintenance Plans shall include the following:

- step by step instructions in preventative and corrective maintenance procedures, nominating the work to be carried out by qualified tradespersons and others, and the designated service periods, such as service hours or distance;
- relevant maintenance standards;
- maintenance instructions for each of the service periods subdivided into the following categories: unit running, unit stopped;
- location of maintenance action (on-system, in workshop etc);
- consumables and Special Tools and Equipment required;
- list of recommended lubricants, stating quantities, methods and frequency for application;
- troubleshooting instructions in tabular form listing “fault”, “possible cause” and “remedial action”, with testing regimes and instructions;
- schedule of Special Tools and Equipment and facilities; and

- schedule of finishes containing the finishing materials installed with descriptive details, location, manufacturer, colour, cleaning instructions, warranties, maintenance requirements and contacts for supply / repairs.

41. Spares Parts & Special Tools

41.1 Spare Parts

504. The Contractor shall provide a detailed recommended Initial Spare Parts List for key/critical components required of the BPLRV. The list is to be validated from the outputs of the FMECA analysis submitted with the Concept Design.

505. The Contractor shall provide an explanation for the recommended quantity based on:

- Component criticality to the BPLRV
- The resultant MDBF where component failure occurs
- The procurement lead-time for each part (inclusive of delivery to TNT Co)
- The available suppliers for each spare part.
- The individual cost per item.

506. The Contractor shall provide details of:

- the recommended minimum level at which spares are to be held (e.g. component, assembly, sub-system or system level);
- expected failure rates;
- maintenance policies that the spares selection is based on;
- expected procurement lead time;
- ongoing availability of Spares;
- spare parts list including both supplier and manufacturers part numbers and lead time to order;
- Special Tools and Equipment required for maintenance;
- storage requirements, including storage environmental constraints such as temperature and humidity; and any other requirement; and
- Spares schedule, divided into "general spares" and "Insurance spares" categories.

507. The Purchaser shall have the option to modify the type and quantity of Spare Parts upon review and shall provide notification to the Contractor of the Agreed Spare Parts List to be procured.

508. The Contractor shall ensure that the initial order quantity of collision and vandalism spares are available before the start of driver training.

41.2 Special Tools

509. Tools and equipment required to maintain, inspect, diagnose faults, manage on-board systems shall be individually priced and submitted with the Contractor's Concept Design.

510. Once the agreed items have been selected by the Purchaser, the Contractor shall ensure items are delivered to the Purchaser's nominated delivery location prior to commencement of necessary Dynamic SIT (System Integration Testing).

511. Tools and equipment shall be delivered prior to the commencement of maintainer and technician training (so that they can be trained in the effective use of all tools and equipment).

512. For tools which require their own maintenance, detailed maintenance information shall be provided.

513. The Contractor shall provide information for all such tools and equipment, so that any additional tools and equipment can be purchased directly from local suppliers.

42. Design Reviews

514. The Contractor shall prepare and submit design documentation in two (2) stages, in accordance with agreed due dates in the Supply Contract.

515. Stages 1 & 2 Design Documentation shall be combined and submitted no later than the agreed due date indicated in the Supply Contract.

516. Stage 3 Final Design Documentation shall be submitted no later than the agreed due date indicated in the Supply Contract.

42.1 Design Documentation – Stage 1 & 2

517. **Design Stage 1** Design Documentation for the BPLRV shall include:

- electrical and mechanical drawings of the BPLRV, its sub-systems and equipment;
- A technical description of the BPLRV, including detailed specifications for its sub-systems and equipment and the BPLRV interfaces with the infrastructure and shore-based equipment;
- A description of how the BPLRV has evolved from earlier BPLRV designs and details of any customisation to meet the requirements of the TNT Co Project.
- A list of the specific elements from each relevant standard listed in the Specification that the BPLRV will comply with, including all sub-systems and equipment;
- A list of the manufacturers of the sub-systems and equipment and evidence of previous usage together with performance experience during that usage;
- A description of the system architecture and identification of any new BPLRV system design;
- A gauging report including static, kinematic and swept outlines drawings and confirmation that the BPLRV will be compatible with the structure outline and track on the TNT Co network. The report shall include discussion of any proposed modifications required to the TNT Co network infrastructure;
- A detailed mass report providing a complete mass breakdown for the BPLRV incorporating all on-board systems, including axle and wheel loads;
- An Electromagnetic Compatibility (EMC) Plan describing the EMC management processes that will be applied during the design and testing of the BPLRV;
- A Human Factors and Ergonomics Assessment describing how Human Factors and Ergonomics considerations will be incorporated in the design of the BPLRV;
- A Disability Standards Compliance Plan detailing how the requirements of the Disability Standards for Accessible Public Transport will be incorporated into the design of the BPLRV; and

- Details of the proposed driving console design including the drivers desk and operator controls;
- Details of the BPLRV control system interfaces (Event Recorder, Data Logger, Vigilance Control, CCTV) and the proposed parameters to be recorded.
- A detailed Testing and Commissioning Plan covering proposed testing activities including incoming inspection, manufacturing inspection, bogie inspection, factory type test, factory routine tests, on-track type tests, on-track routine tests, dynamic systems integration tests.
- A initial RAMS analyses for the BPLRV ;

518. **Design Stage 2** Design Documentation for the BPLRV shall include:

- vehicle dynamics calculations including wheel unloading, derailment factors etc for the BPLRV;
- Bogie curving performance calculations;
- Tractive effort and braking effort curves, including regenerative braking data;
- Braking stopping distance calculations in all braking modes including emergency brake applications;
- Interior layout drawings and an updated copy of the design report;
- Calculations and simulations related to BPLRV performance, including run times, energy consumption and degraded mode operation;
- Structural analysis of the BPLRV body shell, key systems, sub-systems and equipment;
- A finalised body shell design evaluation identifying modes of vibration between the body shell and bogie and confirmation that these modes of vibration do not lead to structural resonance, noise generation or reduction of body shell fatigue life;
- Performance of condition monitoring systems including fault descriptions and recommended courses of action for each fault type;
- The results of all simulations and studies;
- A human factors report covering driving cab controls, key passenger controls and maintenance activities detailing how human factors have been considered during the design development of the BPLRV;
- An ergonomics report for the driving console and passenger area, detailing how ergonomics has been considered during the design development of the BPLRV.
- Battery, auxiliary battery and battery charger rating calculations;
- A final listing of Special Tools to be provided;
- A detailed testing and commissioning plan that defines the method of validation for each of the Rolling Stock specification requirements, including a detailed Testing Programme, Test Procedures and Test Report Templates;
- Draft training materials, operating and maintenance manuals; and
- Initial verification requirements matrix confirming that compliance to technical requirements has been achieved.

- An accessibility report describing how compliance with the Disability Discrimination Act 1992 and the Disability Standards for Accessible Public Transport 2002 has been achieved.

42.2 Design Documentation – Stage 3 Final Design Review

519. **Design Stage 3** - Final Design Review Documentation shall be submitted by the due date indicated in the Contract and shall include:

- Finalised versions of documentation issued for Design Stages 1 & 2;
- Test specifications and procedures including, but not limited to, type and routine tests for all equipment, systems, sub-systems, and the completed BPLRV.
- Manuals including operation, maintenance (technical maintenance plans), training.
- Technical documentation including technical schematics, detailed sub-system and component drawings, spare parts manuals.

43. Manuals

43.1 Operating Manuals

520. The following table provides details of the minimum requirements for Operating Manuals to be provided by the Contractor.

521. The Contractor shall provide both printed and electronic copies of all manuals covering the BPLRV that will enable individual tasks to be quickly searched, extracted and referenced as separate files by a computerised asset management system.

Table 12 - Requirements for Manuals

MANUAL REQUIREMENTS	Manufacturer's / Supplier's Operations and Maintenance Manuals.
General	**Front Cover** The front cover of the BPLRV shall contain: • The TNT Co logo; • The document description consisting of the key element description (e.g. area or discipline) and the words "BPLRV Manual "; and • the document number.
General	**Page Headers** The page headers of the BPLRV Manual shall contain the project name and the document description.
General	**Page Footers** The page footers of the BPLRV Manual shall contain: • the document number and revision number; and • page numbers in the format "Page x of y". Page numbers shall be continuous throughout the main chapters of the document and not reset at section breaks.

General	**Revision History** The revision history of the BPLRV Manual shall be included in a "Revision Control Table" at the start of the Manual. The revision control table shall provide, for each revision: • revision letter or number with no decimal places; • date of revision; and • summary of change(s) in comparison to the previous version.
General	**Glossary of Terms** A glossary of terms for each BPLRV Manual shall be included at the start of the Manual, including all acronyms and technical terms listed in the Manual.
General	**Table of Contents** A table of contents, listing sections and sub-sections of the BPLRV Manual.
Section 1	**Purpose of the BPLRV Manuals** • brief description of the BPLRV's Manual purpose, structure and content; • identification of document owner and other involved parties; and • tabulation of relevant interfacing parties, together with contact details for each significant element of the Assets.
Section 2	**Operating Policies and Standards** • inclusion of the relevant polices (e.g. safety, customer service); and • inclusion of the relevant operating standards.
Section 3 onwards	**The Rules, Procedures and Instructions for the particular area** Comprehensive step by step rules, procedures and instructions for the operations processes to be followed for the particular subject matter and area of operation.

43.2 Technical Drawings and Schematics

522. The Contractor shall provide (as a minimum) the drawings listed below:

- Hydraulic/pneumatic schematics (whichever is applicable);
- Electrical schematics;
- Wiring diagrams;
- Software logic schematics;
- Assembly drawings of major sub-assemblies;

- Any drawing which is needed for any specified maintenance task or conditional maintenance task;
- Manufacturing drawings and full specifications for parts;
- Manufacturing drawings for all parts likely to be needed in collision repairs, or which may be damaged and repaired during collision repairs;
- General arrangements

523. The Contractor shall provide and maintain Technical Descriptions and configurations of the Supplied BPLRV, so that TNT Co. can obtain details of BPLRV configuration if documentation is misplaced.

524. Hold full manufacturing information in Escrow, the conditions under which manufacturing information is to be released to be negotiated under a separate Escrow Agreement with the Contractor.

43.3 Maintenance Manuals

525. The BPLRV Contractor shall provide (and subsequently maintain) a maintenance manual, detailing the scheduled tasks to be performed and the frequency of maintenance tasks.

526. Preferred scheduling shall be based on kilometres run rather than time.

527. Frequencies shall match or be multiples of each other so that the maintenance schedule as a whole consists of a set of examinations, each including a group of tasks.

528. The Manuals shall include comprehensive scheduled maintenance and testing for all on-board items.

529. For each scheduled task, the maintenance manual shall include:

- A detailed job description of what is to be done (including any safety precautions to be taken before starting work or during the task);
- What tools and equipment are to be used;
- What components or materials are required, including part numbers;
- Where appropriate, unambiguous assessment criteria for deciding whether equipment is fit for further service or not. These should appear in the task instruction rather than in a separate document or source;
- What conditional task (for example, component exchange or a fault-finding procedure) is to be carried out if the equipment fails the scheduled examination or test
- What information is to be recorded;

530. For each conditional task, the manual shall include:

- A detailed job description of what is to be done (including any safety precautions to be taken before starting work or during the task;
- What tools and equipment are to be used;
- What components or materials are required;
- What information is to be recorded;

531. Conditional tasks may include tasks which are in response to specific circumstances, rather than in response to the outcome of a scheduled task. In this case the manuals shall include:

- Examination following derailment;
- Collision repair procedures;

532. The Contractor shall include conditional tasks for:
    - Examination following minor derailment
    - Examination following severe derailment
    - Examination following allegation of poor brake performance
    - Examination following collision with vehicle, pedestrian or another tram
    - Examination following allegation of rough riding
533. It should be noted that the purpose of such post-incident investigations is to establish the level and extent of repairs required, and also to assist in identifying whether or not relevant equipment on the BPLRV was functioning correctly at the time of the incident.
534. The descriptions of these conditional tasks are to be prepared in conjunction with TNT Co.
535. All versions of the Maintenance Manual shall be available before maintainer training starts.

43.4 Parts and Special Tools Listing

536. The Contractor shall provide an illustrated parts and special tools list, including:
    - 2 x hard copies and 2 x soft (electronic) copies
    - Part numbers
    - Clear concise descriptions of all parts which are exchangeable by the maintainer;
    - A list of acceptable lubricants and consumables, including at least two (2) acceptable alternatives for each;
537. The Contractor shall provide an interactive parts location system, which uses pictures and drawings to enable maintenance staff to identify parts by their location on the vehicle, keywords, etc.
538. The parts list and interactive system shall be made available to the Maintainer before maintainer training starts, so that maintainers can be trained on how to use it to identify the parts required.
539. The parts list and interactive parts identification system shall be maintained by the Contractor for the duration of the BPLRV operational life.

44. Training

540. The Contractor shall provide to the Purchaser all sufficient training material to enable delivery of appropriate training for operation and maintenance personnel during the testing and commissioning phase. The material shall include:
    - Train the trainer style Manuals appropriate to the personnel associated with the operation and maintenance of the system; and
    - Catalogue of training presentations, course handouts for learners, trainer guidance

- Manual for each course, examination sheets, video demonstrations of key activities and requirements for any parts, tools or materials required as part of the training programme.
- These training materials referred to in the catalogue shall be included and stored in the quality management system document register.

45. Inspection, Testing & Commissioning

45.1 General

541. The BPLRV Contractor shall prepare and conduct tests, inspections, analyses, demonstrations or audits as defined in the Testing and Commissioning Plan and provide documentary evidence to demonstrate that each requirement of the BPLRV design has been achieved.

542. The scope of Static Testing to be undertaken by the Contractor shall include (but not limited to) the following:

- Incoming Material Inspection
- Manufacturing Inspection – structural and fitting processes, vehicle body structure and body shell finishing
- Component Type Tests
- Component Routine Tests
- Factory Type Tests (Contractor site)
- Factory Routine Tests (Contractor site)

543. The scope of Dynamic Testing to be undertaken by the Contractor shall include (but not limited to) the following:

- On-Track Type Tests (Nambour)
- On-Track Routine Tests (Nambour)
- Dynamic Systems Integration Testing (Nambour)

544. The Testing shall verify that key systems and subsystems operate in accordance with the specified technical requirements and that all safety requirements have been met.

545. Testing and commissioning results shall be accurately recorded to provide sufficient evidence to support the Rail Safety Accreditation Application made by TNT Co.

546. Type Testing shall be conducted on all major systems and components to demonstrate system performance under conditions to be experienced on the TNT Co track network.

547. The Contractor shall conduct routine tests of the key systems and functions on the BPLRV in order to confirm that the BPLRV is correctly manufactured according to this Specification and the Approved Final Design Documentation.

45.2 Testing and Commissioning Plan

548. The Contractor shall develop a detailed Testing and Commissioning Plan in accordance with best practice international standards including (but not limited to):

- IEC 61133 Railway applications – Rolling stock – Testing of rolling stock on completion of construction and before entry into service
- EN 12299 Railway applications. Ride Comfort for Passengers. Measurement and evaluation

- BS EN 14363 Railway applications. Testing for the acceptance of running characteristics of railway vehicles. Testing of running behaviour and stationary tests
- BS EN 14531-1 Railway applications. Methods for calculation of stopping distances, slowing distances and immobilisation braking.
- BS EN 50215 Railway applications. Rolling stock. Testing of rolling stock on completion of construction and before entry into service
- IEC 61373 Railway applications - Rolling stock equipment - Shock and vibration tests.
- IEC 62278 Railway applications - Specification and demonstration of reliability, availability, maintainability and safety (RAMS)
- UIC 518 Testing and approval of railway vehicles from the point of view of their dynamic behaviour – safety, track fatigue and ride quality

549. The Contractor shall have prepared and submitted detailed test plans, specifications and procedures in accordance with the standards listed in this specification.

550. Testing and commissioning shall be conducted on completion of the BPLRV construction and before entry into service. The full scope of testing undertaken shall be defined using industry norms and best practice, internationally recognised standards and the risk and hazard analysis undertaken as part of this project.

45.3 Factory Acceptance Testing (Static Tests)

551. The Contractor shall conduct First Article Inspection Tests (FAIT), Routine Factory Acceptance Testing (FAT) and Integrated Factory Acceptance Testing (IFAT) in accordance with the approved Testing and Commissioning Plan upon completion of manufacture and prior to shipping the BPLRV.

552. The test results shall be provided to the Purchaser for review and shall be subject to independent verification before approval/sign off can occur. Successful completion of all Factory Acceptance Testing is required prior to preparing the BPLRV for shipment.

45.4 Site Acceptance Testing (Static & Dynamic Tests)

553. The Contractor shall conduct First Article Site Acceptance Testing, Exhaustive Site Acceptance On-Track Testing and Routine Site Acceptance On-Track Testing (SAT) in accordance with the approved Testing and Commissioning Plan following delivery of the BPLRV to Asset Owner.

554. SAT's shall include all static and dynamic operational tests as identified in the Testing and Commissioning Plan to confirm compatibility with the Asset Owner infrastructure and facilities. Testing shall include (but not limited to):

- braking system performance
- propulsion system performance
- infrastructure compatibility
- BPLRV Maintenance and Stabling Facilities interfaces;
- traffic light operation
- recovery and re-railing
- ride quality testing

- EMC testing

555. Tests shall be conducted on the TNT Co tram network using the BPLRV to demonstrate that the vehicle is compatible with, and can safely and reliably operate on the network.

556. The Contractor shall provide the necessary number of commissioning teams to ensure vehicles are commissioned within the timeframes allocated in the Delivery Programme.

557. Access to a suitably commissioned test track shall be provided by the TNT Co.

558. The movement and driving of BPLRV during Testing and Commissioning shall be carried out by the TNT Co staff, after training and competency assessment has been provided by the Contractor.

559. The test results shall be provided to the Purchaser for review and shall be subject to independent verification before approval/sign off can occur.

45.5 Dynamic Systems Integration Test (SIT)

560. Following completion of SAT, the Contractor shall undertake a Dynamic Systems Integration Test (SIT) which incorporates trial running of the BPLRV through all allowable moves, in all load conditions up to fully loaded, within the network, to confirm compatibility with all on-board systems and infrastructure.

561. The vehicle dynamic performance, ride stability, comfort, acceleration and deceleration, jerk & vibration shall not be compromised at any stage of the Dynamic SIT.

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APPENDIX A - Standards, Codes of Practice and Guidelines

A1 Reference Standards

Table A1 List of Standards

AS 1100 (Set)	Set of standards: Technical drawing
AS 1210	Pressure Vessels
AS 1319	Safety signs for the occupational environment
AS1428.2-2001	Design for Access and Mobility
AS 1670.1	Fire detection, warning, control and intercom systems – Systems design, installation and commissioning - Fire
AS 1670.4	Fire detection, warning, control and intercom systems - System design, installation and commissioning - Sound systems and intercom systems for emergency purposes
AS 1851:2005	Maintenance of fire protection systems and equipment (Fire Extinguisher)
AS 1939	Degrees of protection provided by enclosures for electrical equipment (IP Code)
AS 2074	Cast steels
AS 2700	Colour Standards for General Purposes
AS 3112	AC Socket Outlets and Plugs
AS 4292.1	Railway safety management - General requirements
AS 4292.3	Railway safety management - Rolling stock
AS 4418.1	Supervisory control and data acquisition (SCADA) - Generic telecommunications interface and protocol - General
AS 4418.2	Supervisory control and data acquisition (SCADA) - Generic telecommunications interface and protocol - Fire alarm systems.
AS 4806.2	Closed circuit television (CCTV) - Application guidelines
AS/CA S004	Voice Performance Requirements for Customer Equipment.
AS 60598.2.22	Luminaires - Particular requirements - Luminaires for emergency lighting
AS 60870.1.1	Tele-control equipment and systems - General considerations - General principles
AS 60947 (Set)	Set of standards: Low Voltage Switchgear and control gear
AS IEC 61131 (Set)	Set of standards: Programmable controllers
AS/NZS 1020	The control of undesirable static electricity
ASNZS 1906.1	Retro-reflective materials and devices for road traffic control purposes – Retro-reflective sheeting
AS 2080 2006	Safety Glazing for Land Vehicles
AS/NZS 3112	Approval and test specification - Plugs and socket-outlets
AS/NZS 3439.3	Low-voltage switchgear and control gear assemblies - Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access for their use - Distribution boards
AS/NZS 3679.1	Structural steel - Hot-rolled bars and sections
AS/NZS 3679.2	Structural steel - Welded I sections
AS/NZS 4295	Analogue speech (angle modulated) equipment operating in land mobile and fixed services bands in the frequency range 29.7 MHz to 1 GHz

AS/NZS 4663	Slip resistance measurement of existing pedestrian surfaces
AS/NZS 4667	Quality requirements for cut-to-size and processed glass
AS/NZS 61000.4	Electromagnetic Compatibility (EMC): Testing and measurement techniques (All parts)
AS/NZS 61000.6.2	Electromagnetic Compatibility (EMC): General Standards - Immunity for Industrial Environments
ADR 13/00-2005	Installation of Lighting and Light Signalling Devices on other than L Group Vehicles
ASTM C920	Standard Specification for Elastomeric Joint Sealants
BS 6290-3	Lead-acid stationary cells and batteries. Specification for the flat positive plate type
EN 433	Resilient Floor Coverings: Determination of Residual Indentation after Static Loading
EN 423	Resilient Floor Coverings: Determination of Resistance to Staining
EN 1399/3a	Resilient Floor Coverings: Determination of Resistance to Stubbed and Burning Cigarettes
EN 12299	Railway applications. Ride Comfort for Passengers. Measurement and evaluation
BS EN 12663-1	Railway applications. Structural requirements of railway vehicle bodies. Locomotives and passenger rolling stock (and alternative method for freight wagons)
BS EN 13272	Railway applications. Electrical lighting for rolling stock in public transport systems
BS EN 13452-1	Railway applications. Braking. Mass transit brake systems. Performance requirements
BS EN 13749	Railway applications. Wheelsets and bogies. Methods of specifying structural requirements of bogie frames
EN 13979	Railway Applications. Wheelsets and Bogies: Mono Bloc Wheels Technical Approval Procedure-Forged and Rolled Wheels
BS EN 15227	Railway applications. Crashworthiness requirements for railway vehicle bodies
EN 15595	Railway Applications: Braking-Wheel Slide Protection (General Requirements)
BS EN 15663	Railway applications. Definition of vehicle reference masses
BS EN 45545 (Set)	Set of standards: Railway Applications. Fire protection on railway vehicles
BS EN 50121 (Set)	Set of standards: Railway Applications. Electromagnetic compatibility
BS EN 50124-1	Railway applications. Insulation coordination. Basic requirements. Clearances and creepage distances for all electrical and electronic equipment
BS EN 50126	Railway applications. The specification and demonstration of reliability, availability, maintainability and safety (RAMS)
BS EN 50128	Railway applications. Communications, signalling and processing systems. Software for railway control and protection systems
BS EN 50129	Railway applications. Communication, signalling and processing systems. Safety related electronic systems for signalling
BS EN 50153	Railway Applications, Rollingstock: Protective Provisions Relating to Electrical Hazards.
BS EN 50155	Railway applications. Electronic equipment used on rolling stock
EN 50163	Supply Voltages for Traction systems

BS EN 50264-1, 2, 3	Railway applications. Railway rolling stock power and control cables having special fire performance. (1) General requirements. (2) Cables with cross-linked elastomeric insulation. Single core cables. (3) Cables with cross-linked elastomeric insulation with reduced dimensions. Single core cables.
BS EN 50306-1, 2, 3, 4	Railway applications. Railway rolling stock cables having special fire performance. Thin wall. (1) General requirements. (2) Single core cables. (3) Single core and multicore cables (pairs, triples and quads) screened and thin wall sheathed. (4) Multicore and multi-pair cables standard wall sheathed.
BS EN 50382-1	Railway applications. Railway rolling stock high temperature power cables having special fire performance. General requirements
BS EN 50382-2	Railway applications. Railway rolling stock high temperature power cables having special fire performance. Single core silicone rubber insulated cables for 120°C or 150°C
BR 566 Type 1	Glazing Impact Resistance
DIN 51130:	Floor Coverings: Determination of Anti-slip Properties
DIN 5566.1	Railway vehicles - Driver cabs – Part 1: General requirements
DIN 5566.3	Railway vehicles - Driver cabs – Part 3: Additional requirements for urban and suburban rolling stock
DIN 27201.5	State of railway vehicles - Basic principles and production technology – Part 5: Checking of wheel forces and vertical wheelset forces of railway vehicles
DIN 5510	Fire Test to Railway Components-German Standard
2004/108/EC	European Directive for Electromagnetic Compatibility
GMRT 2461	Sanding Equipment fitted to Multi-units and On-track Machines
GMRT 2472	Data Recorders on Trains
IEC 11170-3	Fire Test to Railway Components-Italian Standard
IEC 60086-1	Primary batteries - Part 1: General
IEC 60268	Sound System Equipment
IEC 60349-2	Electric traction - Rotating electrical machines for rail and road vehicles - Part 2: Electronic converter-fed alternating current motors
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60571	Railway applications – Electronic equipment used on rolling stock
IEC 60623	Secondary Cells and Batteries Containing Alkaline or other Electrolytes.
IEC 60812	Analysis techniques for system reliability – Procedure for failure mode and effects analysis
IEC 60850	Railway Applications: Voltages for Traction Systems
IEC 61131	Programmable Controllers Part 3: Programming Languages
IEC 61375	Electronic Railway Equipment-Train Communication Network
IEC 61000: Parts 1- 4	Electromagnetic compatibility (EMC)
IEC 61881-1:2011	Railway applications – Rolling stock equipment – Capacitors for power electronics – Part 1: Paper/plastic film capacitors
IEC 62236-3-1 and 2	Railway applications - Electromagnetic compatibility - Part 3-1: Rolling stock - Train and complete vehicle; Part 3-2: Apparatus
NFF 16101.16102	Railway Rollingstock Fire Behaviour: Choice of Materials and Choice of Materials Application for Electrical Equipment
ISO 1996-2	Acoustics-Description, Measurement and Assessment of Environmental Noise, Paer-2, Determination of Environmental Noise Levels
ISO 3834	Quality Requirements for Welding
ISO 4649	Rubber, Vulcanized or Thermoplastic: Determination of Abrasion Resistance

UL 94	Standard for Safety of Flammability of Plastic Materials
ISO 105/B02:2013	Tests for Colour Fastness , Colour Fastness to Artificial light
UIC 7619	Floor Covering Toughness
UIC 617-7	Regulations concerning conditions of visibility from driving compartments of electric powered stock
UIC 651	Layout of driver's cabs in locomotives, railcars, multiple-unit trains and driving trailers'
UIC 564-2	Regulations relating to fire protection and firefighting measures in passenger carrying railway vehicles or assimilated vehicles on international services
GM/RT 2100:2012	Requirements for Railway Vehicle Structures
GM/RT 2130:2014	Vehicle Fire, Safety and Evacuation; Part 4: Requirements for Emergency Lighting
GM/RT 2130:2014	Vehicle Fire, Safety and Evacuation; Part 7: Requirements for Evacuation
GM/RT 2472:2002	Data Recorders on Trains - Design Requirements

A2 Testing & Commissioning Standards

Table A2 Reference Testing & Commissioning Standards

BS EN 50215	Railway applications. Rolling stock. Testing of rolling stock on completion of construction and before entry into service
BS EN 14363	Railway applications. Testing for the acceptance of running characteristics of railway vehicles. Testing of running behaviour and stationary tests
BS EN 50500	Measurement procedures of magnetic field levels generated by electronic and electrical apparatus in the railway environment with respect to human exposure
ESR 0222	Transport for NSW – ASA – Engineering Standard for Rolling Stock: Testing of Vigilance Control System
IEC 61133	Railway applications – Rolling stock – Testing of rolling stock on completion of construction and before entry into service
IEC 61287-1	Railway applications - Power convertors installed on board rolling stock - Part 1: Characteristics and test methods
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests
IEC 62278 Ed. 1.0	Railway applications - Specification and demonstration of reliability, availability, maintainability and safety (RAMS)
ISO 2631-1	Mechanical vibration and shock -- Evaluation of human exposure to whole-body vibration -- Part 1: General requirements
ISO 2631-4	Mechanical vibration and shock- evaluation of human exposure to whole-body vibration. Part 4: Guidelines for the evaluation of the effects of vibration and rotational motion on passenger and crew comfort in fixed-guideway transport systems
ISO 3095	Railway applications – Acoustics - Measurement of noise emitted by rail bound vehicles
ISO 3538	Road Vehicles-Safety Glazing Materials, Test Method for Optical Properties
UIC 518	Testing and approval of railway vehicles from the point of view of their dynamic behaviour – safety, track fatigue and ride quality
UIC 581	Wagons, lifting and re-railing
AS 1055.1	Acoustics - Description and measurement of environmental noise - General procedures
AS/NZS 3827.1	Lighting system performance - Accuracies and tolerances - Overview and general recommendations

AS/NZS 3827.2	Lighting system performance - Accuracies and tolerances - Compliance requirements
BS EN 12299	Railway applications. Ride Comfort for Passengers. Measurement and evaluation
BS EN 14531-1	Railway applications. Methods for calculation of stopping distances, slowing distances and immobilisation braking. General algorithms utilising mean value calculation for train sets or single vehicles

A3 Management System Standards

Table A3 Reference Management System Standards

AS/NZS ISO 9000	Quality management systems – Fundamentals and Vocabulary
AS/NZS ISO 9001	Quality management systems - Requirements
AS/NZS ISO 31000	Risk management - Principles and guidelines
ISO 55000	Asset Management – Overview, principles and terminology
AS/RISSB 7660	Railway Network Control Mobile Communication Systems
HB 167	Security risk management
IEC 60300-3-4	Dependability management – Part 3-4: Application guide – Guide to the specification of dependability requirements
IEC 60706-2	Maintainability of equipment - Part 2: Maintainability requirements and studies during the design and development phase.
IEC 60812	Analysis techniques for system reliability - Procedure for failure mode and effects analysis (FMEA)
ISO 14001	Environment Management Systems – Requirements with guideline for use
ISO 14040	Environmental Management - Life Cycle assessment – Principles and Framework
ISO 14044	Environmental Management – Life Cycle Assessment – Requirements and guidelines
ISO 19011	Guidelines for auditing management systems
NOHSC 1010	Safe Work Australia: National Standard for Plant
AS IEC 60300.3.11	Dependability management - Application guide - Reliability centred maintenance
AS IEC 62508	Guidance on human aspects of dependability
AS ISO 15489.1	Records management - General
AS ISO 15489.2	Records management - Guidelines
AS/NZS 4536	Life cycle costing - An application guide
AS/NZS 4801	Occupational Health and Safety Management Systems – Specification with guidance for use

A4 Applicable Codes of Practice and Guidelines

Table A4 Reference Codes of Practice and Guidelines

Aust. Government	Australian Design Rule 13/00	Installation of Lighting and Light Signalling Devices on other than L-Group Vehicles
Aust. Government		Disability Standards for Accessible Public Transport 2002 (as amended)
Aust. Government	COAG	National Code of Practice for CCTV Systems for Mass Passenger Transport Sector for Counter Terrorism
French Standards Organisation	NF F 16-101 NF F 16-102	Railway Rolling Stock Fire Behaviour (1) Choice of Materials. (2) Choice of Materials for electrical equipment
International Standards Organisation	ISO/IEC 26702	Systems engineering - Application and management of the systems engineering process
NSW EPA		Rail Infrastructure Noise Guideline, 2012
Office of Rail Regulation (UK)	Railway Safety Publication 2	Guidance on Tramways
Rail Industry Safety and Standards Board (RISSB)		National Code of Practice Accessible Rail (25/03/2011)
Safe Work Australia		Safe Design, manufacture, Import and Supply of Plant Draft Code of Practice
Standards Australia	AS ISO 10007	Quality management system - Guidelines for configuration management
FRA1	Part 223	Federal Railway Administration: Safety Glazing Standards – Locomotives, Passenger Cars & Cabooses

APPENDIX B – Project Plan and Reporting

List of Project Plans to be provided

Project Plan Title	Documentation content	Recipient	Issue date	Min Review Frequency
BPLRV Delivery Management Plan	Description of the delivery process for the BPLRV including design, production, quality management, client consultation, dispatch from the manufacturing facility, mode and method of transport for each stage of delivery, on-track testing and commissioning.	Asset Owner, IC	Within 1 month of Contract signing	As required
Reporting	Progress Report showing progress against plan	Asset Owner, IC	Monthly	Monthly
Safety Management System (SMS)	The Contractor's Safety Management System and Assurance Procedures relevant to the project scope of works	Asset Owner, IC	Within 1 month of Contract signing	As required
Quality Management Plan	The Contractor's Accredited Quality Management System, Plan and Procedures relevant to the project scope of works, in accordance with ISO9001.	Asset Owner	Within 2 months of Contract signing	As required
Risk Management Plan	All potential risks associated with the design, manufacture, testing, commissioning and operation of the BPLRV shall be identified on a Risk Register together with proposed mitigation measures	Asset Owner, IC	Within 3 months of Contract signing	As required
Design Management Plan	Description of the processes in place to manage the development and validation of the BPLRV design	IC	Within 1 months of Contract signing	As required

Project Plan Title	Documentation content	Recipient	Issue date	Min Review Frequency
Disability Standards Compliance Plan	A description detailing Supplier's compliance with the requirements of the Disability Standards of Accessible Public Transport in its design of the BPLRV .	Asset Owner	Design Stage 1 and updated as required	Continuous
System Hazard Analysis	System safety hazard analysis for the BPLRV including systems and sub-systems	IC	Design Stage 1 and with each Safety Case	Continuous
Environmental Management Plan	The Suppliers Accredited Environmental Management System, Plan and Procedures relevant to the project scope of works in accordance with ISO9001.	Asset Owner	Within 2 months of Contract signing	As required
EMC Management Plan	A description of the processes for establishing, assessing and confirming EMC compliance of all BPLRV components and sub-systems	Asset Owner	Stage 2 Design review	As required
Incident and Emergency Response Plan	The Suppliers Accredited OH&S System and Incident Management Policies and Procedures relevant to the project scope of works.	Asset Owner	Within 2 months of Contract signing	As required
Failure Modes, Effects and Criticality Analysis (FMECA)	Subsystem level FMECA in accordance with relevant standard	IC	First issue Design Stage 2 and with the safety case – Design and Construction	As required
BPLRV Livery Design	Visual design of BPLRV livery	Asset Owner	Design Stage 1 submission. Updated at subsequent design stages	As required

Project Plan Title	Documentation content	Recipient	Issue date	Min Review Frequency
Design Review Work Breakdown Structure	BPLRV system and sub-system breakdown to be used in packaging Design Review Submissions	Asset Owner	First issue 2 months prior to the commencement of the Design Stage 1	Quarterly
Detailed Supplier and Manufacturing Plan	The BPLRV Manufacturing Plan shall provide durations and linkages to: • Procurement of critical and long lead time items • First article inspections • Manufacturing stations and associated durations • Key static testing activities and associated durations • Key document reports preparation and submission • Any activity that is required to be witnessed (or reviewed) by the Purchaser The plan shall also include detailed supply chain processes covering: • Car body structure • Bogies • Traction system • BPLRV control system	Asset Owner, IC	Within 2 months of Contract signing.	Monthly
FLS strategy plan	A description of the fire management process to be applied during the fire load design of the BPLRV	Asset Owner, IC	Design Stage 1 submission. Updated at subsequent design stages	As required
Configuration Management	A description of the process used to manage the configuration of the BPLRV, its equipment and software	IC	Design Stage 1 submission. Updated at subsequent	As required

Plan	versions (if any)		design stages	

Project Plan Title	Documentation content	Recipient	Issue date	Min Review Frequency
Configuration Register	Record of configured items fitted to the BPLRV, including software versions (where applicable)	Asset Owner	Prior to dispatch of the BPLRV from the manufacturing facility and updated as required	As required
Quality Guide	A description and photographs of acceptable fit and finish for the BPLRV for use in manufacture and inspection activities. This document shall provide guidance for staff from TNT Co in order to assess the manufacturing quality of the BPLRV	Asset Owner	Design Stage 1 submission. Updated at subsequent design stages	As required
Design Certification	Certification for each key design configuration that the BPLRV has been designed to be fit for purpose for operation in Queensland, Australia, in accordance with the Contract. To include but not limited to: • Body Structure including collision protection • Passenger and Pedestrian Safety • Bogies • Traction system • Brakes	IC	Design Stages 2 and 3 as designs are completed and approved for manufacture	As required
Construction Certificate	Certification that the BPLRV has been constructed in accordance with the Contract, including the BPLRV Specification and the Final Design Documentation with cross reference to the design configuration of the BPLRV	IC	Prior to dispatch of BPLRV from manufacturing facility Revised certificates required after any modifications to / or addition of configurable items	As required

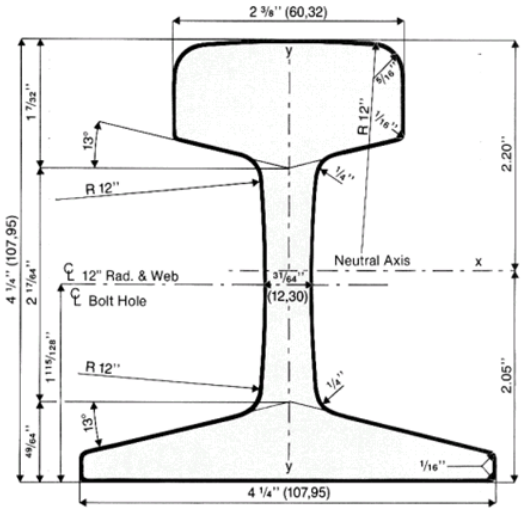
Project Plan Title	Documentation content	Recipient	Issue date	Min Review Frequency
Testing and Commissioning Plan	Description of testing process and plans, details of any track access and other items which the Contractor requires and an indicative schedule including, but not limited to, development testing, type testing, routine testing and commissioning testing.	IC	Design Stage 1 draft issue; and Design Stage 2 submission	As required
Test Reporting	Reports issued and their status, for each of the BPLRV / equipment tests listed in the Testing and Commissioning Plan	IC	Design Stage 2 - First issue. Final issue as a precondition to Operational Ready	As required

APPENDIX C – Rail Profiles

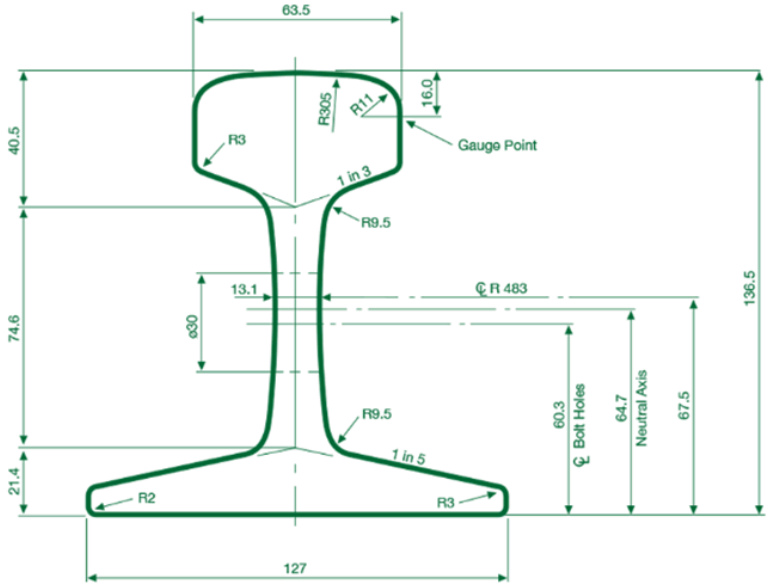
The TNT Co. Track network consists of a mixture of 60 lb/yard and 41 kg/metre rail. The actual rails profiles are field worn for these new profiles are foe information only.

The rails mounted vertically. That is the is no rail cant.

60 lb/yard Rail Profile



41 kg/metre Rail Profile



APPENDIX D – Proposed Map of Tram Route

This appendix is proposed to contain the GHD maps of the proposed tram route.

Does it require GHD or Nambour Council approval to reproduce that information?

APPENDIX E – Nambour Climate -

Nambour Climate													
Nambour Long-term Averages													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Mean Max (°C)	29.4	28.8	28	26.2	23.6	21.5	21.1	22.5	25	26.6	27.9	29.1	***25.8***
Mean Min (°C)	19.4	19.6	18.2	15.2	12.1	9.1	7.5	7.9	10.5	13.7	16.1	18	***13.9***
Mean Rain (mm)	238.9	258.1	219.6	136.7	129.2	84.6	78.3	56.8	48.3	98.7	137.8	174.2	***1649.5***
Median Rain (mm)	180	173.5	145.6	94	102.2	39.8	52	48.7	31.8	81.1	110.8	106.2	***1473.2***
Mean Rain Days	13.2	14.7	15.3	11.5	10.6	7.9	7.2	6.2	7	10	10.3	10.9	***120.8***
Nambour Daily Records													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
High Max (°C)	40.8	40.5	37.5	34.5	30.6	28.6	28.7	32	35.4	39.9	40.2	40.5	***40.8***
Low Max (°C)	19.8	21.5	21.2	18.8	15.3	13.1	13	13.9	15.4	18.3	18.9	19.8	***13***
High Min (°C)	27.3	26.9	24.3	21	20.4	18.5	17.7	17.8	20.1	22.6	25	25.5	***27.3***
Low Min (°C)	12	11.9	10	5.8	1.3	-2.3	-2.9	-0.9	0.3	2.2	5.4	5.9	***-2.9***
High Rain (mm)	244	511	346.7	212.1	141.7	349.2	384.3	166	122.2	162	141	318	***511***
Nambour Monthly Records													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
High Mn. Max (°C)	31	31.2	29.8	28.1	25.3	22.8	22.4	24.2	28	28.5	31	32	***26.6***
Low Mn. Max (°C)	27	26.5	26.2	24.9	22.3	20.1	19.8	20.8	22.9	24.3	25.5	26.3	***24.8***
High Mn. Min (°C)	21.4	21.1	20.2	16.9	14.6	12.1	11.7	11.8	14.3	16.6	18.2	20.8	***15.6***
Low Mn. Min (°C)	17.4	17.6	16.3	12.6	8	5.6	3	4.7	7.5	10.9	14.1	16.1	***12***
High Rain (mm)	1218.3	876.1	742.5	421.9	422	542.9	845.2	365.4	242.4	316.7	397.7	612.1	***3039.8***
Low Rain (mm)	12.8	33.7	19.4	9.8	2.4	0.6	1.3	0	0	3.9	16.9	24.8	***750***

Source: www.weatherzone.com.au

ATTACHMENT G1

Hi Paul

Thank you for your patience while I investigated the proposed tram insurance for Nambour Tramway Company.

I have spoken with many insurers and underwriting agencies around Australia, including an agency who only deals with trams and trains. Unfortunately, I was unable find a company to place cover for the tram itself (rolling stock). My enquires lead me to discover that the specialist agency have been unable to place cover for rolling stock for the past 5 years. More interestingly, the head underwriter of a major insurer also informed me there is an all-out exclusion in place for trams within the Australian re-insurance agreements, with the only exception being an umbrella style policy held by the Councils. For this reason, most trams are either self-insured, or insured by the local Council. Unfortunately, I am unable to get access to the Council policy to fully understand how it is structured or who it is underwritten through, but I would suggest this information might be available to your Council if they made some enquiries of other Councils who currently have trams, or particularly a heritage rail arrangement currently in place.

I have been able to obtain a quote for the tram liability. $20m liability cover for the 12-month period would be approximately $4,000.

I have been quoted $3,910 however the quote is only valid for 30 days and subject to change after that time.

INTEREST INSURED:

Underwriters hereon agree to indemnify the Insured against all sums that they shall become legally liable to pay for damages or compensation and claimants' costs and expenses consequent upon accidental Bodily Injury or Property Damage or Other Contingencies arising out of an Occurrence within the Policy Territory during the Period of Insurance in connection with the Business.

DEDUCTIBLE/EXCESS:

$ 1,000 for each and every claim, except for

$ 5,000 in respect to each and every rail/tram related claim

If you require further information about the liability quote, please let me know. I'm sorry I couldn't assist further with the tram insurance.

Kind regards,

MGA INSURANCE GROUP

Vicki Parker

Senior Broker
Adv. Dip FSIB

Shepparton Office | 119 Wyndham Street Shepparton VIC 3630 | PO Box 1287 Shepparton VIC 3632
e: Vicki.Parker@mga.com | p: (03) 5825 6408 | f: (03) 5825 6499

ATTACHMENT G2a

- NAMBOUR -

TRAMWAY

Est 1897

- COMPANY -

10/04/2019

Insurance cover and costings overview.

1.	Construction Insurance – G2b - (Covered in costings for Terminus)	$2,500.00
2.	Directors Indemnity – G2c -	$1,083.00
3.	Public Liability – G2d -	$875.00
4.	Volunteers Cover – G2e -	$360.00
5.	Tram Liability Insurance – G2f –	$3910.00
6.	Tram comprehensive vehicle cover – (Unknown, note letter G1)	$5000.00 est
	Total	**$13,728.00**

The Nambour Tramway Company Ltd
PO Box 213, Nambour Qld. 4560
ACN 607 814 488
Email: nambourtram@gmail.com

ATTACHMENT G2b

SURA CONSTRUCTION PTY LTD
LEVEL 14 / 141 WALKER ST
NORTH SYDNEY NSW 2060
PO BOX 1813
NORTH SYDNEY NSW 2059

ABN 35 147 580 756
TELEPHONE: 02 9930 9500
FACSIMILE: 02 9930 9501
SURA.COM.AU

SURA CONSTRUCTION

CERTIFICATE OF CURRENCY

SINGLE PROJECT CONSTRUCTION INSURANCE

This document certifies that the Policy referred to below, is currently intended to remain in force until 4.00pm on the expiry date shown and will remain in force until that date, unless the Policy is cancelled, lapsed, varied or otherwise altered in accordance with the relevant policy conditions or the provisions of the Insurance Contracts Act,1984 as amended.

NAMED INSURED	Nambour Tramway Company		
NAMED INSURED'S BUSINESS	Construction of a new tram terminal and on-site rail infrastructure (excluding on street track work) and associated works thereto		
PRE-EXISTING PROPERTY	Not Insured		
ADDITIONAL INSUREDS			
INTERESTED PARTIES			
PROJECT SITE ADDRESS	28 Mill Street NAMBOUR, Queensland, 4560		
SPECIAL CLAUSE			
POLICY NUMBER	SURA-CONS-509801		
PERIOD OF INSURANCE	31 October 2018 to 31 October 2019 4pm Local Time		
LIMITS OF LIABILITY	Section 1	Contract Value	$1,100,000
		Material Damage	$1,100,000
	Section 2	Public Liability	$20,000,000
INSURER	Certain Underwriters at Lloyd's	UMR: B1000P047712018	

SIGNED DATED 31 October 2018

IMPORTANT INFORMATION

This Certificate has been arranged by us in our capacity as agents for the Insurer named above. It does not reflect in detail the policy terms and conditions and merely provides a brief summary of the insurance that is, to the best of our knowledge, in existence at the date we have issued this certificate. If you wish to obtain details of the policy terms, conditions, restrictions, exclusions or warranties, you must refer to the policy contract.

DISCLAIMER - In arranging this Certificate, we do not guarantee that the insurance outlined will continue to remain in force for the period referred to as the policy may be cancelled or altered by either party to the contract at any time in accordance with the terms of the Insurance Contracts Act, 1984 as amended. We accept no responsibility or liability to advise any party who may be relying on this certificate of such alteration or cancellation of the policy of insurance.

ATTACHMENT G2c

BROOKLYN
An XL Group Platform

Management Liability Insurance - Policy Schedule

Policy number:	BXLC-MLI-2016-000603
Insured:	The Nambour Tramway Company Ltd
Insured's Main Address:	At and from Nambour 4560
Insurer:	Certain Underwriters at Lloyd's under Agreement No. B0334SC334201835
Policy Form:	Brooklyn Management Liability Insurance Policy Wording 01.01.18 The Insuring Clauses of this Policy only covers Claims first made against the Insured and notified to the Insurer during the Policy Period.
Period of Insurance:	From 12/04/2018 at 4pm AEST To 12/04/2019 at 4pm AEST
Limit of Indemnity:	$1,000,000 in the aggregate

Specific Coverages - Forming part of the total Limit of Indemnity

Inquiry Representation Expenses:	$1,000,000 in the aggregate
Work Health & Safety:	$1,000,000 in the aggregate
Fidelity:	Not Included
Pollution Defence Costs:	Not Included

Excesses - each and every claim, inclusive of costs and expenses

Management Liability:	$1,000
Company Reimbursement:	$1,000
Company Liability:	$2,000
Crisis Management:	$1,000
Employment Practices Liability:	$10,000
Superannuation Trustees Liability:	NIL
Fines and Penalties:	NIL
Fidelity:	N/A
Pollution Defence Costs:	N/A
Retroactive Date:	Inception, excluding known claims and circumstances
Geographical Limits & Jurisdiction:	Worldwide excluding USA & Canada
Endorsements:	Not Applicable

To be valid, this Schedule must be signed by an authorised officer or agent of the Insurer.

T: +61 2 8270 1790
F: +61 2 9252 2538
W: brooklynunderwriting.com.au

GPO Box 4668
Sydney NSW 2001

Angel Place, Level 28
123 Pitt Street
Sydney NSW 2000

Catlin Australia Pty Ltd, trading as Brooklyn, an XL Group Platform
(ABN 64 108 319 786) (AFSL 301617)

BROOKLYN
An XL Group Platform

LLOYD'S CERTIFICATE OF INSURANCE

THIS POLICY SCHEDULE CERTIFIES that in accordance with the authorisation granted under the Agreement Number listed below by Certain Underwriters at Lloyd's, whose definitive numbers and the proportions underwritten by them, which will be supplied on application, can be ascertained by reference to the said Agreement, and in consideration of the premium specified above, the subscribing insurers' obligations under contracts of insurance to which they subscribe are several and not joint and are limited solely to the extent of their individual subscriptions. The subscribing insurers are not responsible for the subscription of any co-subscribing insurer who for any reason does not satisfy all or part of its obligations.

This Policy Schedule is Insurance Council of Australia's General Insurance Code of Practice compliant, apart from any claims adjusted outside Australia. Underwriters at Lloyd's proudly support the General Insurance Code of Practice. The purpose of the Code is to raise standards of practice and service in the general insurance industry. Any enquiry or complaint relating to this Insurance should be referred to Catlin Australia Pty Ltd in the first instance. If this does not resolve the matter or you are not satisfied with the way a complaint has been dealt with, you should contact Lloyd's via the details below who will then refer your dispute to Policyholder & Market Assistance at Lloyd's:

Lloyd's Underwriters' General Representative in Australia
Level 9
1 O'Connell Street
Sydney NSW 2000
Australia
Telephone Number: +61 (0)2 8298 0700
Fax Number: +61 (0)2 8298 0788

Complaints that cannot be resolved by Policyholder & Market Assistance may be referred to the Financial Ombudsman Service (UK). Further details will be provided at the appropriate stage of the complaints process. The Underwriters hereon agree that:

A) In the event of a dispute arising under this Insurance, the Underwriters at the request of the Insured will submit to the jurisdiction of any competent Court in the Commonwealth of Australia. Such dispute shall be determined in accordance with the law and practice applicable in such Court.

B) Any summons notice or process to be served upon the Underwriters may be served upon:

Lloyd's Underwriters' General Representative in Australia
Level 9
1 O'Connell Street
Sydney NSW 2000
Australia
Telephone Number: +61 (0)2 8298 0700
Fax Number: +61 (0)2 8298 0788

who has authority to accept service and to enter an appearance on the Underwriters' behalf, and who is directed at the request of the Assured to give a written undertaking to the Assured that he will enter an appearance on the Underwriters' behalf.

C) If a suit is instituted against any one of the Underwriters, all Underwriters hereon will abide by the final decision of such Court or any competent Appellate Court.

The amount of Premium specified above is the amount due to the Underwriters and any commission allowed by them is to be regarded as remuneration of Catlin Australia Pty Ltd for placing this Insurance.

In the event of a claim arising under this Insurance, IMMEDIATE NOTICE should be given to Catlin Australia Pty Ltd.

Robin Johnson
For and on behalf of Catlin Australia Pty Ltd, trading as Brooklyn, an XL Group Platform
(ABN 64 108 319 786) (AFSL 301617)

T: +61 2 8270 1790
F: +61 2 9252 2538
W: brooklynunderwriting.com.au

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Sydney NSW 2001

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123 Pitt Street
Sydney NSW 2000

Catlin Australia Pty Ltd, trading as Brooklyn, an XL Group Platform
(ABN 64 108 319 786) (AFSL 301617)

BROOKLYN
An XL Group Platform

Signed for and on behalf of Certain Underwriters at Lloyd's under Agreement No. B0334SC334201835

Issued in Sydney on 11/04/18

PRIVACY COLLECTION STATEMENT

The Privacy Act 1988 (Cth) requires Catlin Australia Pty Ltd to make the following disclosure before collecting personal information about you:

Catlin Australia Pty Ltd collects personal information in order to provide its various services which include insurance broking, claims management, risk management consultancy, underwriting management, and reinsurance.

If the personal information Catlin Australia Pty Ltd requests from you is not provided, Catlin Australia Pty Ltd or any involved third party may not be able to provide the appropriate services.

Catlin Australia Pty Ltd discloses personal information to third parties who are involved in the provision of our services. For example, in arranging and managing your insurance needs Catlin Australia Pty Ltd may provide information (including sensitive information such as health information) to insurers, reinsurers, other insurance intermediaries, its advisors such as loss adjustors, lawyers and accountants, and other parties involved in the claims handling process. By submitting your proposal and continuing to deal with us, you confirm on your behalf and/or on behalf of those you represent consent to Catlin Australia Pty Ltd and these parties collecting, using and disclosing personal and sensitive information about you.

Catlin Australia Pty Ltd has a duty to maintain the confidentiality of its clients' affairs which includes their personal information. Our duty of confidentiality applies except where disclosure of your personal information is with your consent or required by law.

Catlin Australia Pty Ltd may make use of your personal information to provide you with information about its products and services.

Please visit our website.

Contact Us

Simply contact the Catlin Australia Pty Ltd Privacy Officer on the details below if you would like to:

- Access the personal information Catlin Australia Pty Ltd holds about you
- Update or correct the information Catlin Australia Pty Ltd holds about you
- Discuss your privacy concerns
- Be removed from the mailing list to receive information about Catlin Australia Pty Ltd products and services

Privacy Officer - Catlin Australia Pty Ltd, trading as Brooklyn, an XL Group Platform - GPO Box 4668, SYDNEY NSW 2001. Telephone: 02 8270 1790, Fax: 02 9252 2538, Email: privacyaustralia@xlcatlin.com

Key Factors

When determining your premium, the key factors taken into account include the nature of services provided, fee income, experience of the principals, claims history, risk management procedures and limit of indemnity.

Please visit our website at www.brooklynunderwriting.com.au/aboutus to view our Privacy Policy in full.

T: +61 2 8270 1790
F: +61 2 9252 2538
W: brooklynunderwriting.com.au

GPO Box 4668
Sydney NSW 2001

Angel Place, Level 28
123 Pitt Street
Sydney NSW 2000

Catlin Australia Pty Ltd, trading as Brooklyn, an XL Group Platform
(ABN 64 108 319 786) (AFSL 301617)

ATTACHMENT G2d

ARENA UNDERWRITING

CERTIFICATE OF CURRENCY

Arena/Berkley Entertainment and Events General Liability
Our Reference: 16040085

POLICY NUMBER: ARBIAE/000910

INSURED: The Nambour Tramway Company

INSURED ADDRESS: Nambour QLD

THE BUSINESS: Organiser of monthly fundraising events and annual street market.

SECURITY: Berkley Insurance Australia

PERIOD OF INSURANCE: 12/04/18 to 12/04/19 At 4pm Local Time

Covering

Section 1 Public Liability	INSURED
Section 2 Products Liability	INSURED

Please take note of the Exclusions that apply to this Policy (Exclusions 4.1 to 4.19 in the Policy Wording).

It is hereby declared and agreed that:

Section 4.
4.16 Crowd Surfing, Moshing And Stage Diving is deleted from the Policy and will have no effect.

Berkley Insurance Australia (ABN 53 126 559 706) is the Insurer of this Policy.

Arena Underwriting Pty Ltd (ABN 26 125 869 481, AFSL 317617) acts under a binding authority given to it by the Insurer to administer and issue policies, alterations and renewals, and acts on behalf of the insurer and as agent of the insurer, not as your agent.

Sum Insured

Section 1 Public Liability
Limit of Liability $20,000,000 Defence Costs in Addition

Section 2 Products Liability
Limit of Liability $20,000,000 Defence Costs in Addition

Excess

Section 1 Public Liability
Each & every occurrence: $500
Alcohol related claims: $1,500
Defence Cost Inclusive

Section 2 Products Liability
Each & every occurrence: $500
Alcohol related claims: $1,500
Defence Cost Inclusive

Geographical Limits

PO Box 752 Hamilton NSW 2303
T: 02 4952 4477 F: 02 4915 5376
E: info@arenaunderwriting.com.au W: www.arenaunderwriting.com.au
AFSL: 317617 ABN: 26 125 869 481

Worldwide excluding United States of America and Canada.

POLICY WORDING: BIA GL G2 Arena Ent - 2016

NOTES

Interested Party:

Sunshine Coast Council.

SPECIAL NOTE

This Certificate of Currency is prepared as a summary of the insurance policy. It is not a complete description of all the policy's terms, conditions and exclusions.

In determining a claim, or questions with regard thereto, the provisions of the policy will prevail.

-oo0oo-

PO Box 752 Hamilton NSW 2303
T: 02 4952 4477 F: 02 4915 5376
E: info@arenaunderwriting.com.au W: www.arenaunderwriting.com.au
AFSL: 317617 ABN: 26 125 869 481

ATTACHMENT G2e

QBE Insurance (Australia) Limited
ABN 78 003 191 035

VOLUNTARY WORKERS - POLICY SCHEDULE

Broker/Agent: M.G.A. INSURANCE BROKERS PTY. LTD.

QBE Issuing Office: Level 5, 2 Park Street, Sydney, NSW 2000

POLICY NUMBER	61-A046433-PAD
INSURED	THE NAMBOUR TRAMWAY COMPANY LTD
PERIOD OF INSURANCE	From 4.00pm on the 12 April 2018 To 4.00pm on the 12 April 2019
WORDING	QM182 - Voluntary Workers
GEOGRAPHICAL LIMITS	Australia Wide
AGGREGATE LIMIT OF LIABILITY	$1,000,000 We will not pay more than the amount stated below for all claims under section A arising out of or in connection with: - Charter Aircraft / Light Aircraft $250,000 - Helicopter $250,000

INSURED PERSONS AND BENEFITS

Category 1.

Insured Persons: ALL VOLUNTARY WORKERS OF THE INSURED

Time of Operation of Cover: Cover under this Policy shall only apply whilst the Insured Person is actually engaged in unpaid voluntary work performed on behalf of the Insured provided always that the Policy shall apply only in respect of such work officially organised by and under the control of the Insured including necessary direct travel to, from or during such voluntary work.

Benefits:

Section A: Capital Benefits

	Fixed Sum Insured	**Payable Conditions**
Capital Sum Insured	$50,000	Benefits 1 to 30

Section B: Weekly Benefits - Injury & Section D: Injury Assistance Benefits

	Percentage of pre-disability earnings	**Maximum Weekly Earnings**	**Benefit Period**	**Excluded Period of Claim**
Maximum Weekly Benefits	100.00%	$500	104 Weeks	7 Days
Injury Assistance Benefits	100.00%	$500	26 Weeks	7 Days

Endorsements to the Policy - Category 1.

Not Applicable

ADDITIONAL BENEFITS CONTAINED WITHIN THIS POLICY:

- Broken Bones Additional Capital Benefit - up to $5,000
- Disappearance Additional Capital Benefit - aligned to Death Benefit within Section A
- Lifestyle Modification Additional Capital Benefit - up to $20,000
- Rehabilitation Additional Benefit (resulting from injury) - up to $5,000
- Injury Assistance benefit amount will be the same as weekly benefits, with benefit period of up to 26 weeks, and exclusion period the same as weekly excess.

For full details of terms, conditions and limits applicable to these benefits, please refer to our Product Disclosure Statement and policy wording issued by QBE Insurance (Australia) Limited ABN 78 003 191 035, AFS Licence No. 239545 of 2 Park Street Sydney.

ATTACHMENT G2f

Hi Paul

Thank you for your patience while I investigated the proposed tram insurance for Nambour Tramway Company.

I have spoken with many insurers and underwriting agencies around Australia, including an agency who only deals with trams and trains. Unfortunately, I was unable find a company to place cover for the tram itself (rolling stock). My enquires lead me to discover that the specialist agency have been unable to place cover for rolling stock for the past 5 years. More interestingly, the head underwriter of a major insurer also informed me there is an all-out exclusion in place for trams within the Australian re-insurance agreements, with the only exception being an umbrella style policy held by the Councils. For this reason, most trams are either self-insured, or insured by the local Council. Unfortunately, I am unable to get access to the Council policy to fully understand how it is structured or who it is underwritten through, but I would suggest this information might be available to your Council if they made some enquiries of other Councils who currently have trams, or particularly a heritage rail arrangement currently in place.

I have been able to obtain a quote for the tram liability. $20m liability cover for the 12-month period would be approximately $4,000.

I have been quoted $3,910 however the quote is only valid for 30 days and subject to change after that time.

INTEREST INSURED:

Underwriters hereon agree to indemnify the Insured against all sums that they shall become legally liable to pay for damages or compensation and claimants' costs and expenses consequent upon accidental Bodily Injury or Property Damage or Other Contingencies arising out of an Occurrence within the Policy Territory during the Period of Insurance in connection with the Business.

DEDUCTIBLE/EXCESS:

$ 1,000 for each and every claim, except for

$ 5,000 in respect to each and every rail/tram related claim

If you require further information about the liability quote, please let me know. I'm sorry I couldn't assist further with the tram insurance.

Kind regards,

MGA INSURANCE GROUP

Vicki Parker

Senior Broker
Adv. Dip FSIB

ATTACHMENT H

(Attachment F)

From: Matthew Dagan <Matthew.Dagan@sunshinecoast.qld.gov.au>
Sent: Tuesday, 2 April 2019 4:54 PM
To: peter clark; Steve Brazier; moriarty.paul@yahoo.com.au; ron@wilenco.com.au
Cc: Cr Greg Rogerson
Subject: RE: Tram April OM Council meeting

Hi Peter,

I have been contacted by representative from the Australian Government funding agency and they have verbally advised they will reconsider the funding agreement variation request to include track work from existing tracks into the terminus. They have stated that this additional scope would not come with any additional budget or time (i.e. would need to be completed within existing funding and timeframe milestones which is 27 March full completion).

Please advise if TNTCo still support the trackwork inclusion within the NSRF funding agreement, including timeframe for delivery, and I will progress accordingly.

Thanks,
Matt

Re: Tram April OM Council meeting
peter clark
Tue 2/04/2019 5:03 PM
Hi Matt,
Thanks for this news, it's something we've been waiting on and in answer to your question, yes, we would appreciate having it included with the understanding that there's no addition to the time frame or original grant amount.

Regards,
Peter Clark

Ph - 0754 416 723
Mob - 0417 620 828
PO Box 141, Nambour Q 4560

ATTACHMENT J-1

- NAMBOUR -

TRAMWAY

Est 1897

- COMPANY -

PLEDGE CERTIFICATE

I, ***ROY FRANCIS THOMPSON***

as an authorised representative of ***THE ROY and NOLA THOMPSON FOUNDATION***

hereby pledge the amount of $1,000,000.00 as a donation towards the Nambour Heritage Tramway Project. I have read and understand the terms and conditions below and acknowledge that this pledge is a binding commitment towards the fundraising effort.

Signed RF Thompson

in the presence of:

.....

Witness

GREGORY JOHN ROGERSON

Full name of witness

Dated 27/4/2019

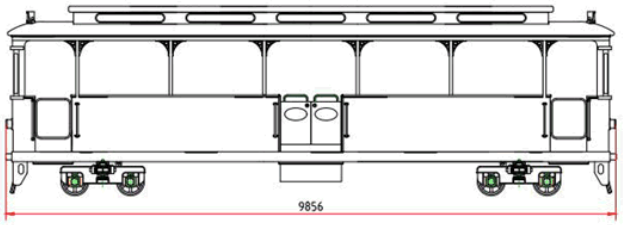
Terms and conditions –

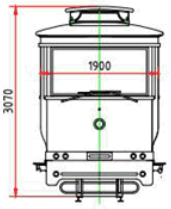
- This document forms a contract between the signatory and the Nambour Tramway Company Limited.
- This document is a written undertaking by the signatory to pay the above amount upon receiving a written request by The Nambour Tramway Company, ***with such request not to be made before 30 June 2020.***
- The Nambour Tramway Company will publicly acknowledge the donor and the donation amount, unless anonymity is requested.
- Any special request regarding acknowledgement..... N A .....
- Should the project not proceed, the pledge certificate, along with any funds already contributed as part of the pledge, will be returned to the donor.
- Other terms - ..... N A .....

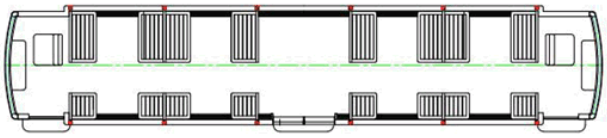
ATTACHMENT J-2a

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

TYD-6L-26B 铛铛车参数







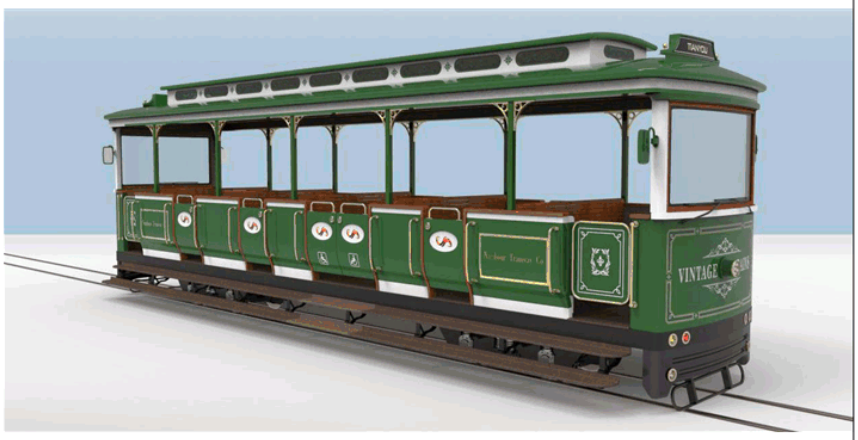
归属	项　目	参　数	备　注
车辆参数	轨距	610mm	
	外形尺寸	9.9m*2.14m*3.1m	
	游客坐席区最低内空（mm）	1800	进入口
	坐席（布置方式未确认）	26 席（实木）	荷载 30 人
	驾驶席	2 席（站姿）	双向司控台
运行性能	最高时速	15km/h	
	限制坡度	35‰	
	最大加速度	1.24m/s²	
	限制曲线半径	20m	
	紧急制动减速度	2.4m/s²	
	行车照明	疝气大灯（近/远）	
走行系统	驱动电机	15kw*2=30kw	
	电源（锂电池）	DC72v 1000AH	磷酸铁锂电池组
	工作制动	再生制动	电机馈电制动
	紧急制动	气液钳盘制动	失效制动
结构	地板	车船地板革	
	车门	金属	
	驾驶座	2 套	
	照明	复古 LED 灯	
安全措施	脚踏式铃铛		行车声音警告
	视频监控		司机位监控车厢
	后视镜	4 套	
	雨刮器	4 套	
轮椅	轮椅升降平台	电动（隐藏式）	300KG

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

升降

侧面效果图一

侧面效果图(轮椅升降侧)



效果图

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

注：

a. 设计前业主应提供以下设计规格书表 3 及表 4 资料（规范与标准）：

ATTACHMENT J-2b

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

BPLRV 项目报价单

一、 联系方式： **报价日期：2019-3-31**

客户公司：	China Advisory Services	报价公司：	浙江天佑铁路设备科技有限公司
接 收 人：	Russell J. Smith	发 件 人：	徐新建
电 话：	+61 467993272	电 话：	18957112329
传 真：		传 真：	0570-8077898
邮 箱：	russell.smith@chinadvisory.com.au	邮 箱：	404112060@qq.com

二、报价主题: BPLRV

尊敬的客户：

非常感谢阁下对 我司 的关注及支持，作为国内知名景区慢行轨道交通系统供应商，我们很高兴将阁下所需产品的信息及报价提供给您，并深感荣幸！

序号	项目	型号	单价（usd）	备注
1	BPLRV	TYD-6L-26B	$162000	参数见附件

付款方式： 车辆部分合同签订后支付合同款的 40%为定金，生产完成后在厂家场地内组织试运行验收合格后支付余款后提货；

货 期：收到您的订单和首款后 3-4 个月。

浙江天佑铁路设备科技有限公司

ATTACHMENT K

Greg Machin <ggm@gegroup.com.au>
Thu 28/02/2019 11:36 AM

Hi Peter,

Thanks for coming in this morning to discuss the project. I have summarised the key points we discussed below.

- The roof structures as presently documented have limited suitability for the installation of solar arrays. The clearstories in their present design will create shading issues for any modules placed on the low level roofs. A suggestion of lowering the height to 300mm would help and applying an overhang to the last northern roof gives a substantial increase in panels.

- The clearstory roofs could be used for locating modules in landscape, but will need some revision to be suitable.

- Assuming both the all NE orientated low level and clearstory roof space is utilised, it appears we could land about 100 modules on the roof areas if some design changes are incorporated. Based on 320 watt modules this is 32kw of array.

- No matter what design changes are made, some shading of the array will be unavoidable. For this reason I'm recommending micro-inverters are utilised (see attached flyer for differences between micro and string inverters).

- Based on the attached Helioscope report attached we would estimate an annual system yield of around 47,000 kWh's (129 kWh's a day ave)

- Based on an export tariff rate of 20 cents per kWh, a import rate of 25 cents per kWh and very low self-consumption percentage of say 10%, the annual return would be in the order of $9,800.00. Working on an assumption that the recharge of the batteries would consume 60kWh x 286days per year and ancillary appliances, e.g. Visitor info centre air-con; day and night LED lighting; Refrigeration and workshop use would consume an additional 40kWh per day, the cost of power based on 25c per kWh would equate to $7150 leaving a surplus of $2650 per annum.

- On the figures provided on the tram battery it appears each charge cycle will require 60 to 70 kWh's of grid power (some assumptions have been made).

In regard to the issue of battery charging, a night off peak tarrif looks to be the most viable option. We will need to investigate the most suitable tariff (or tariffs) to maximise the solar returns but still provide economical night charging of the tram batteries. On initial investigation it appears a ToU (time of use) tariff could be the solution provided that solar can be connected to it as well.

Look forward to working on this further with you. Regards, **Greg Machin** – Solar and HVAC Project ManagerA.M.AIRAH, CEC Accreditation no.A5370457 (GC & SPS systems)

Unit 3 / 9 Windsor Rd NAMBOUR QLD 4560
Ph: (07) 5441 2866 Fax: (07) 5441 1472 Mob: 0415 386 616

ATTACHMENT L

Thursday 11 April 2019

Councillor Greg Rogerson, Division 10
Sunshine Coast Council
Eddie DeVere Building,
Corner Currie and Bury Streets,
Nambour 4560

Dear Cr Greg Rogerson,

LETTER OF SUPPORT – NAMBOUR TRAMWAY HERITAGE PROJECT

As the Regional Tourism Organisation (RTO) for the region, Visit Sunshine Coast (VSC) is continually working with industry and stakeholders to develop new and innovative ways to market the Sunshine Coast, attract new visitors and support the region's economy.

On behalf of Visit Sunshine Coast, I would like to offer this Letter of Support for the Sunshine Coast Nambour Heritage Tramway Project. Pending successful funding and sustainable operation; VSC sees the potential this project has to positively impact visitation and become an attraction for the region.

This project is core to the revitalisation of Nambour which will appeal to a vast range of visitors. VSC actively supports the Nambour Heritage Tramway Project and looks forward to providing input from a tourism perspective.

Please don't hesitate to contact me if you have any queries.

Yours sincerely

Simon Latchford
Chief Executive Officer
Visit Sunshine Coast

Visit Sunshine Coast Limited
PO Box 9325 Pacific Paradise QLD 4564
T 61 7 5458 8800 **F** 61 7 5448 7330 **E** info@visitsunshinecoast.com **W** visitsunshinecoast.com
ABN: 14 144 749 717

ATTACHMENT M

TED O'BRIEN MP
Federal Member for Fairfax

Mr Peter Clark
Director
Nambour Tramway Co
PO Box 141
Nambour QLD 4560

Dear Peter,

I wish to acknowledge the work that you and your Tram Co colleagues continue to undertake for the Nambour community.

Restoring the heritage tramway would deliver a unique piece of street theatre that will play a vitally important role in rebuilding the town of Nambour. While the project would deliver considerable economic and cultural benefits for the town, let's also remember the value of future phases into the Nambour to Coolum Walking Trail and in its final phase, to the Nambour Showgrounds.

This bold vision has to start somewhere and I believe Tram Co is right to propose that it starts with a Terminus and Visitor Information Centre.

I am also proud that the Federal Government has committed half a million dollars towards this project and I stand with you in wanting to see the project become a reality.

Driving change and delivering a bold vision is never easy, but it's always due to the leadership and hard work of a few good citizens that ultimately makes it happen. Please therefore accept my sincere gratitude for everything you and your Tram Co colleagues are doing to help rebuild Nambour with this fine project that offers such wonderful economic and cultural promise.

Yours sincerely,

Ted O'Brien MP
Federal Member for Fairfax

4 April 2019

17 Southern Drive, Maroochydore QLD 4558 ☎ 5479 2800 @ ted.obrien.mp@aph.gov.au
tedobrien.com.au TedOBrienLNP

ATTACHMENT N

THE NAMBOUR TRAMWAY COMPANY LTD
SUMMARY OF SCENARIO 4/2019

Scenario 4/2019 relates to the following:

Terminus located on land at 28 Mill Street

Partially funded through volunteers	Cost $804,226k
Lease of land from council	Community Lease @$250 pa.

THE NAMBOUR TRAMWAY COMPANY LTD
PROJECTED OPERATING CASHFLOW STATEMENT
NAMBOUR HERITAGE TRAMWAY PROJECT

OPERATING FUND			3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
	NOTE	Yr1 $	Yr2 $	Yr3 $	Yr4 $	Yr5 $	Yr6 $	Yr7 $	Yr8 $	Yr9 $	Yr10 $	Yr11 $
Opening Balance of Operating Fund		*40,000*	*78,083*	*88,183*	*98,742*	*109,776*	*121,302*	*133,338*	*145,904*	*159,017*	*172,699*	*186,970*
Revenues												
Daily Ticketing		58,351	52,516	54,091	55,714	57,385	59,107	60,880	62,706	64,587	66,525	68,521
Annual passes		30,000	27,000	27,810	28,644	29,504	30,389	31,300	32,239	33,207	34,203	35,229
Merchandising/Shopper Dockets		63,632	57,268	58,986	60,756	62,579	64,456	66,390	68,382	70,433	72,546	74,722
Advertising/Sponsorship		28,500	25,650	26,420	27,212	28,028	28,869	29,735	30,627	31,546	32,493	33,467
Tramfest			-	-	-	-	-	-	-	-	-	-
Electricity credits		9,800	10,094	10,397	10,709	11,030	11,361	11,702	12,053	12,414	12,787	13,170
Interest Income (2% of opening balance)	5	800	1,562	1,764	1,975	2,196	2,426	2,667	2,918	3,180	3,454	3,739
Total Revenues	10	*191,082*	*174,090*	*179,467*	*185,010*	*190,721*	*196,608*	*202,674*	*208,925*	*215,368*	*222,007*	*228,849*
Operating Costs												
Bank charges		861	777	800	823	847	872	897	923	950	978	1,007
Labour		45,000	46,350	47,741	49,173	50,648	52,167	53,732	55,344	57,005	58,715	60,476
Utilities		7,150	7,365	7,585	7,813	8,047	8,289	8,537	8,794	9,057	9,329	9,609
Rail Accreditation		-	-	-	-	-	-	-	-	-	-	-
Security		2,700	2,781	2,864	2,950	3,039	3,130	3,224	3,321	3,420	3,523	3,629
Promotions		10,000	10,300	10,609	10,927	11,255	11,593	11,941	12,299	12,668	13,048	13,439
Maintenance		10,000	10,300	10,609	10,927	11,255	11,593	11,941	12,299	12,668	13,048	13,439
Merchandise COGS		37,899	39,036	40,207	41,414	42,656	43,936	45,254	46,611	48,010	49,450	50,933
Insurance		14,000	14,420	14,853	15,298	15,757	16,230	16,717	17,218	17,735	18,267	18,815
Lease of Terminus Land	7	250	258	265	273	281	290	299	307	317	326	336
Workcover Insurance		2,000	2,060	2,122	2,185	2,251	2,319	2,388	2,460	2,534	2,610	2,688
Sundries		4,000	4,120	4,244	4,371	4,502	4,637	4,776	4,919	5,067	5,219	5,376
Total Operating Costs	9	*132,999*	*136,989*	*141,099*	*145,332*	*149,692*	*154,183*	*158,808*	*163,572*	*168,479*	*173,534*	*178,740*
Net Annual Surplus		*58,083*	*37,100*	*38,369*	*39,678*	*41,030*	*42,425*	*43,866*	*45,353*	*46,889*	*48,473*	*50,109*
Initial setup costs		15,000										
Less transfer to Sinking Fund		5,000	12,000	12,360	12,731	13,113	13,506	13,911	14,329	14,758	15,201	15,657
Less transfer to Future Fund		-	15,000	15,450	15,914	16,391	16,883	17,389	17,911	18,448	19,002	19,572
Closing Balance of Operating Fund		*78,083*	*88,183*	*98,742*	*109,776*	*121,302*	*133,338*	*145,904*	*159,017*	*172,699*	*186,970*	*201,851*

* Please note 10% decrease in fare revenue at year 2 to reflect the novety factor in year 1.

THE NAMBOUR TRAMWAY COMPANY LTD
PROJECTED CAPITAL & SINKING FUND CASHFLOW STATEMENT
NAMBOUR HERITAGE TRAMWAY PROJECT

SINKING FUND												
	NOTE	Yr1 $	Yr2 $	Yr3 $	Yr4 $	Yr5 $	Yr6 $	Yr7 $	Yr8 $	Yr9 $	Yr10 $	Yr11 $
Opening Balance of Sinking Fund		-	*5,000*	*17,100*	*29,802*	*43,129*	*57,104*	*71,752*	*87,099*	*103,169*	*119,991*	*137,592*
Transfer from Operating Fund		5,000	12,000	12,360	12,731	13,113	13,506	13,911	14,329	14,758	15,201	15,657
Council Funding		1,500,000										
National Stronger Regions Grant		500,000										
Donations		1,000,000										
Tramway Fundraising		100,000										
Shortfall in funding		377,734	-	-	-	-	-	-	-	-	-	-
Interest Income	5	-	100	342	596	863	1,142	1,435	1,742	2,063	2,400	2,752
Total Inflows		*3,482,734*	*12,100*	*12,702*	*13,327*	*13,975*	*14,648*	*15,346*	*16,071*	*16,822*	*17,601*	*18,409*
Capital Costs	8	3,477,734	-	-	-	-	-	-	-	-	-	-
Tram Overhauls	3	-	-	-	-	-	-	-	-	-	-	98,285
Building Overhauls	3	-	-	-	-	-	-	-	-	-	-	33,598
Total Outflows		*3,477,734*	-	-	-	-	-	-	-	-	-	*131,883*
Closing Balance of Sinking Fund		*5,000*	*17,100*	*29,802*	*43,129*	*57,104*	*71,752*	*87,099*	*103,169*	*119,991*	*137,592*	*24,119*

THE NAMBOUR TRAMWAY COMPANY LTD
PROJECTED FUTURE FUND CASHFLOW STATEMENT
NAMBOUR HERITAGE TRAMWAY PROJECT

FUTURE FUND												
	NOTE	Yr1 $	Yr2 $	Yr3 $	Yr4 $	Yr5 $	Yr6 $	Yr7 $	Yr8 $	Yr9 $	Yr10 $	Yr11 $
Opening Balance of Future Fund		-	-	*15,000*	*30,750*	*47,279*	*64,615*	*82,790*	*101,835*	*121,782*	*142,666*	*164,521*
Transfer from Operating Fund		-	15,000	15,450	15,914	16,391	16,883	17,389	17,911	18,448	19,002	19,572
Interest Income	5	-	-	300	615	946	1,292	1,656	2,037	2,436	2,853	3,290
Total Inflows		-	*15,000*	*15,750*	*16,529*	*17,336*	*18,175*	*19,045*	*19,947*	*20,884*	*21,855*	*22,862*
Total Outflows	4	-	-	-	-	-	-	-	-	-	-	-
Closing Balance of Future Fund		-	*15,000*	*30,750*	*47,279*	*64,615*	*82,790*	*101,835*	*121,782*	*142,666*	*164,521*	*187,383*

THE NAMBOUR TRAMWAY COMPANY LTD
NAMBOUR HERITAGE TRAMWAY PROJECT

NOTE 1 - STRUCTURE

- The Nambour Tramway Company Ltd is structured as a company limited by guarantee.
- The Company is registered as a charity and deductible gift recipient.

NOTE 2 - GST AND PAYG WITHHOLDING

- We have assumed for simplicity that any commitments will be paid monthly when incurred.

NOTE 3 - SINKING FUND EXPENDITURE

Assumptions

- Operated by The Nambour Tramway Company Ltd
- Operating hours factored around a workforce of 0.5 FTE worker
- Only single-person operating tram with conductor supervising and ticketing
- Kiosk at Western Terminus manned by volunteers
- Low maintenance vehicle
- Low infrastructure maintenance (track, buildings, depots)
- Vehicle has an overhaul every 10 years including a full replacement of the batteries
- Revenue amounts and increases have been adopted as provided by The Nambour Tramway Company Ltd

Item	Unit	Quantity	Rate	Annual Cost	Comment
Current quote for periodic overhauls (included in capital costs)					
Tram	Overhaul every 10 years			73,133	
Buildings - repaint etc.	Every 10 years			25,000	
Future Cost of Periodic Overhauls (indexed at 3% CPI)					
Tram				98,285	
Buildings - repaint etc.				33,598	

NOTE 4 - FUTURE FUND EXPENDITURE

Future Fund is to be used for:

- The on street enhancement of Howard Street
- Track extensions to the Nambour State College/Walking Trail and Nambour Show Grounds

NOTE 5 - INVESTMENT EARNINGS

Assumed rate of interest on investment earnings 2%

NOTE 6 - FUNDING SOURCES

Initial Funding Sources:

- Corporate sponsorship
- Community funding
- Grant applications
- Council and non-council contributions
- Philanthropic donations

For the purpose of this cashflow statement the monetary value of these different funding sources has not been dissected.
Various funding scenarios have been modelled by The Nambour Tramway Company Ltd. This modelling has not been included as part of this cashflow statement.

NOTE 7 - LEASE OF TERMINUS LAND

Lease Cost per Year 250

THE NAMBOUR TRAMWAY COMPANY LTD

NOTE 8 - CAPITAL EXPENDITURE

NAMBOUR HERITAGE TRAMWAY PROJECT

as covered in the Covey and Associates report - 5/04/2019

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THE NAMBOUR TRAMWAY COMPANY LTD

NOTE 9 - OPERATIONAL EXPENDITURE

NAMBOUR HERITAGE TRAMWAY PROJECT

Assumptions

- Operated by The Nambour Tramway Company Ltd
- Operating hours factored around a workforce of 0.5 FTE worker
- Only single-person operating tram
- Kiosk at Western Terminus manned by volunteers
- Low maintenance vehicle
- Low infrastructure maintenance (track, buildings, depots)
- Vehicle has an overhaul every 10 years including a full replacement of the batteries
- Revenue amounts and increases have been adopted as provided by The Nambour Tramway Company Ltd

Item	Unit	Quantity	Rate	Annual Cost	Comment
Operating				**Budget Estimate**	
Labour					includes on-costs
Manager	FTE	1	45000	45,000	Assume half this for Sc 3 and 4
Staff	FTE	0	0	-	All staff volunteers
Utilities	Item			7,150	Power, water supply/sewerage, telecoms
Rail Accreditation	Item			-	Nil for revenue <$250k. $6.5k for revenue>$250k
Security				2,700	2 nightly drive-by patrols incl lock up check $225.61 p/mth
Promotions				10,000	Facebook, twitter
			Operating Cost	**64,850**	
Maintenance					
Tram				8,000	
Depots/Stations				1,000	Repairs, graffiti removal
Infrastructure				1,000	Minor only expected
		Annual Maintenance Costs		**10,000**	
Current quote for periodic overhauls (included in capital costs)					
Tram	Overhaul every 10 years			73,133	
Buildings - repaint etc.	Every 10 years			25,000	
Future Cost of Periodic Overhauls (indexed at 3% CPI)					
Tram				98,285	
Buildings - repaint etc.				33,598	

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THE NAMBOUR TRAMWAY COMPANY LTD

NOTE 10 - INCOME PROJECTION

NAMBOUR HERITAGE TRAMWAY PROJECT

SCENARIO 4

Spreadsheet for tram movements, passenger numbers and fare revenue, working on a capacity of 25
The below chart is designed to stimulate a realistic estimate of usage and income to provide the committee with workable figures for budgeting and grant submissions
*** I see a potential for relieving the traffic congestion around Nambour State High by utilising the tram and pedestrian links between Howard Street and the School
*** Other sources of revenue could be monthly and yearly tickets, as well as off peak tickets. The funds would be received in advance and refreshed each month or year

Day	Station	Arrival	Departure	Full Fare	Concession	Child	TOTAL	Usage rate
Monday to Friday	Aldi		8.10am	9	4	5	**18**	72%
	Town Cnr	8.15am	8.20am					
	Coles	8.25am	8.40am	7	4	4	**15**	60%
	Town Cnr	8.45am	8.50am					
	Aldi	9.00am	9.30am	5	2	2	**9**	36%
	Town Cnr	9.35am	9.40am					
	Coles	9.45am	10.15am	7	4	4	**15**	60%
	Town Cnr	10.20am	10.25am					
	Aldi	10.30am	11.00am	9	4	5	**18**	72%
	Town Cnr	11.05am	11.10am					
	Coles	11.15am	11.45am	9	4	5	**18**	72%
	Town Cnr	11.50am	11.55am					
	Aldi	12 noon	12.30pm	4	2	2	**8**	32%
	Town Cnr	12.35pm	12.40pm					
	Coles	12.45pm	1.45pm	4	2	2	**8**	32%
	Town Cnr	1.50pm	1.55pm					
	Aldi	2.00pm	2.30pm	6	3	3	**12**	48%
	Town Cnr	2.35pm	2.40pm					
	Coles	2.45pm	2.50pm	8	4	4	**16**	64%
	Town Cnr	2.55pm	3.00pm					
	Aldi	3.05pm	3.10pm	11	6	6	**23**	92%
	Town Cnr	3.15pm	3.20pm					
	Coles	3.25pm	4.30pm	3	2	1	**6**	24%
	Town Cnr	4.35pm	4.40pm					
	Aldi	4.45pm						
Per Day				82	41	43	**166**	55%
Per week				410	205	215	**830**	55%
Saturday	Aldi		9.00am	6	3	3	**12**	48%
	Town Cnr	9.05am	9.10am					
	Coles	9.15am	10.00am	7	4	4	**15**	60%
	Town Cnr	10.05am	10.00am					
	Aldi	10.05am	11.00am	13	6	6	**25**	100%
	Town Cnr	11.05am	11.10am					
	Coles	11.15am	11.20am	13	6	6	**25**	100%
	Town Cnr	11.25am	11.30am					
	Aldi	11.35am	12.30pm	5	3	3	**11**	44%
	Town Cnr	12.35pm	12.40pm					
	Coles	12.45pm	2.00pm	3	2	1	**6**	24%
	Town Cnr	2.05pm	2.10pm					
	Aldi	2.15pm						
Sunday	Aldi		10.30am	13	6	6	**25**	100%
	Town Cnr	10.35am	10.40am					
	Coles	10.45am	10.50am	13	6	6	**25**	100%
	Town Cnr	10.55am	11.00am					
	Aldi	11.05am	2.30pm	7	4	4	**15**	60%
	Town Cnr	2.35pm	2.40pm					
	Coles	2.45pm	2.50pm					
	Town Cnr	2.55pm	3.00pm	3	2	2	**7**	28%
	Aldi	3.05pm						
Total over a 7 day period				**493**	**247**	**256**	**996**	57%
One-way fare cost				$ 2.00	$ 1.00	$ 1.00		
Weekly takings based on a one-way fare				$ 986.00	$ 248.00	$ 257.00		
Utilisation adjustment				57%	57%	57%		
Total annual fare income				$ 51,272.00	$ 12,896.00	$ 13,364.00	$ 77,532.00	
Discount Applied to Allow for people using annual passes							$ 19,181.42	24.74%
							$ 58,350.58	
Annual Passes - $150 x 200							$ 30,000.00	
Shopper Docket revenue							$ 5,500.00	
Merchandise sales							$ 58,131.60	
Sponsorship/advertising revenue							$ 28,500.00	
TOTAL ANNUAL REVENUE							**$ 180,482.18**	

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THE NAMBOUR TRAMWAY COMPANY LTD
SUMMARY OF SCENARIO 6
PREPARED BY AMANDA GATES, 27 JUNE 2016

ASSUMPTION CHANGES	CURRENT	NEW	FINANCIAL IMPACT
No longer relevant.			

Repairs to Network required in year 10

Current year		3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Tram	73,133	75,327	77,587	79,914	82,312	84,781	87,325	89,944	92,643	95,422	98,285
Building	25,000	25,750	26,523	27,318	28,138	28,982	29,851	30,747	31,669	32,619	33,598

- NAMBOUR -

TRAMWAY

Est 1897

- COMPANY -

30th April, 2019

Attention Matt Dagan

Re – Responsibility for the purchase of the Tram

Dear Matt,

To clarify the statement made in Peter Clark's previous email, the Nambour Tramway Company Ltd, have secured a written pledge from the Roy and Nola Thompson Foundation and will accept full responsibility for the purchase of the Nambour Tram.

We attach two quotations from specialist Tram manufacturers based on the specifications provided by BT Consulting. It is noted that both fall well under the $600,000 amount originally budgeted for in our capital expenditure document.

We request that the original amount of $600,000 be retained in the budget to ensure all ancillary costs are well covered.

Regards,
Steve Brazier – Board Chairman.

The Nambour Tramway Company Ltd
PO Box 213, Nambour Qld. 4560
ACN 607 814 488
Email: nambourtram@gmail.com

- NAMBOUR -

TRAMWAY

Est 1897

- COMPANY -

PLEDGE CERTIFICATE

I, ***ROY FRANCIS THOMPSON***

as an authorised representative of ***THE ROY and NOLA THOMPSON FOUNDATION***

hereby pledge the amount of $1,000,000.00 as a donation towards the Nambour Heritage Tramway Project. I have read and understand the terms and conditions below and acknowledge that this pledge is a binding commitment towards the fundraising effort.

Signed RF Thompson

in the presence of:

.....

Witness

GREGORY JOHN ROGERSON

Full name of witness

Dated 27/4/2019

Terms and conditions –

- This document forms a contract between the signatory and the Nambour Tramway Company Limited.
- This document is a written undertaking by the signatory to pay the above amount upon receiving a written request by The Nambour Tramway Company, ***with such request not to be made before 30 June 2020.***
- The Nambour Tramway Company will publicly acknowledge the donor and the donation amount, unless anonymity is requested.
- Any special request regarding acknowledgement..... N A .....
- Should the project not proceed, the pledge certificate, along with any funds already contributed as part of the pledge, will be returned to the donor.
- Other terms - ..... N A .....

Brief for

- NAMBOUR -
TRAMWAY
Est 1897
- COMPANY -

On
China Manufacturing Options

Russell Smith | Principal | China Advisory Services

Key Points

- Two Chinese manufacturers have been identified that could potentially manufacture a battery-powered tram, that aligns with the specified performance requirements. They are:

Company Name	Address	Website	Quoted FOB Price
Hangzhou Trains Equipment Co Ltd	No.12 Guofu Road, Fengdu Industrial Zone, Pingyao Town, Yuhang District, Hangzhou 311115 Tel: +86-571-26287698 Fax: +86-571-87855085 Email: wxy@trainscn.com	www.trainscn.com	**US$132,900**
Zhejiang Tianyou Railway Equipment Technology Co., Ltd	No. 46 Donggang 1st Road, Qujiang District, Quzhou City, Zhejiang Province Phone: +86 0570-8077988 Mobile: +86 18957112329 Email: trainscn@qq.com	www.vintage-trains.com	**US$162,000**

- Other potential Chinese manufacturers have been excluded (namely Tianjin Brother Tourist Train Co. Ltd and Wuhan Dising Co Ltd) from further consideration because their tram does not meet the stated performance requirements for turn radius, acceleration, deceleration and other safety specifications.
- If the Nambour Tram Co wishes to purchase a tram from one of the above manufacturers, it is strongly recommended that a specialist delegation visit both to make a more complete assessment and decision on the preferred manufacturer. Criteria like quality, transparency, price and specifications compliance are just some of the recommended aspects that should form the core of the suitability assessment.
- Once a preferred manufacturer has been identified, an appropriate Quality Control Plan and more detailed discussions on the requirements should be initiated. As an example of some quality control measures, Nambour Tram Co should seek to identify an appropriate engineer who could carry out regular inspections during the manufacturing process, to ensure compliance with the stated specifications.
- The quoted price includes Freight on Board Shanghai. An additional A$15,000 should be set aside to cover shipping to, insurance and Customs Clearance in Australia.

Annexes: A. Hangzhou Trains Equipment Co Ltd Quotation

Appendix 1: Hangzhou Tram Drawing

B. Zhejiang Tianyou Railway Equipment Technology Co. Ltd Quotation and Translation of Quotations

Appendix: 1. TYD-6L-26B Brake Parameters

2. Translation

Hangzhou Trains Quotation

Hangzhou Trains Equipment Co.,Ltd

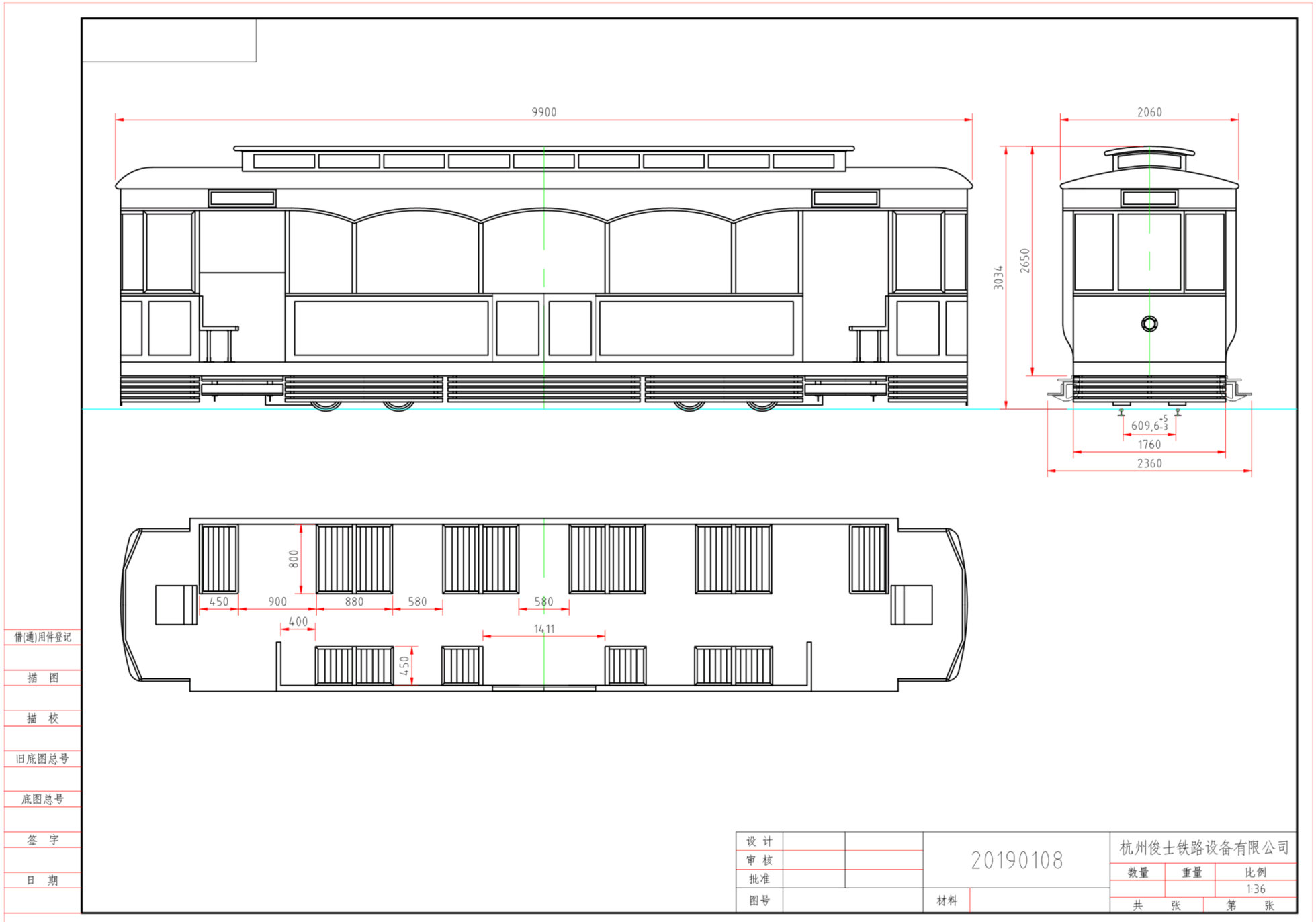
No.12 Guofu Roads,Changming Village,Pingyao Town,
Yuhang District,Hangzhou,Zhengjiang,China
Tel:86-571-26287698 Emai:cxm@trainscn.com

QUOTATION

To:Russell J.Smith
Principal
Tel: +61 467993272

PO Box 416 | Maroochydore | Qld 4558
email:russell.smith@chinadvisory.com.au
Date:2019-4-12

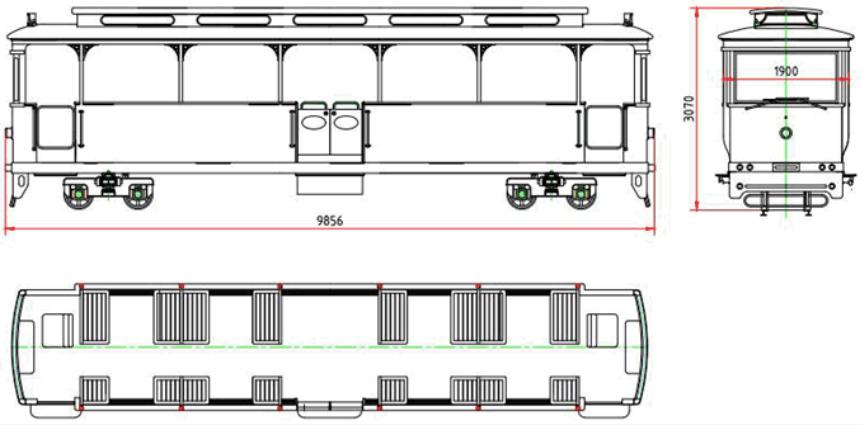
seat configuration	Rows,laterally across the passenger internal space
principal dimensions	9900*2360*3034mm
maximum axle load	5 tonnes
maximum operatioal speed	15km/hr(speed limited)
BPLRV Configuration	bi-directional,driving from both ends
track gauge	610mm +10mm (24inch)
floor height,above rail(tare condition)	720mm
maximum grade(starting and stopping,all conditions)	3%(1 in 33)
minimum horizontal and vertical curve radii	vertical:50m convex and concave horizontal:20m
acceleration rates	Maximum acceleration fully loaded: 1.24 m/s2
maximum roll back distance on 3% grade	**<500 mm**
maximum deceleration rates in each brakin mode (fully loaded condition)	Service:1.29m/s2 Emergency:2.8m/s2
type of wheel	casting wheel
maximum Jerk rate	0.8m/s3
centre of gravity limit	**<=1000 mm above rail**
flooring co-efficient of friction	1.093 at dry condition 0.718 at wet condition
CCTV storage capacity	1.000GB for 10 days(minimum 30day storage)
Data logger storage capacity	1GB for 30 days
duration of emergency lighting	30 Mins
number of spare cables,relay contacts and equipmnt outputs(future requirements)	10%
Drive Power:	Lithium Battery pack (DC576V 100A)
quotation price:(FOB SHANGHAI/NINGBO)	USD132,900.00


9900
2060
3034
2650
609,6-5
1760
2360
800
450
900
880
580
580
400
1411
450
借(通)用件登记
描 图
描 校
旧底图总号
底图总号
签 字
日 期
设 计
审 核
批准
图号
20190108
材料
杭州俊士铁路设备有限公司
数量
重量
比例
1:36
共 张
第 张

Zhejiang Tianyou Quotation

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

TYD-6L-26B 铛铛车参数

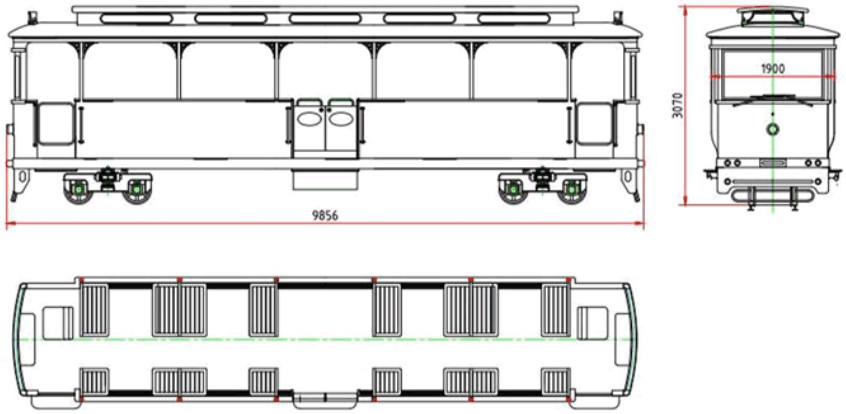


归属	项　目	参　数	备　注
车辆参数	轨距	610mm	
	外形尺寸	9.9m*2.14m*3.1m	
	游客坐席区最低内空（mm）	1800	进入口
	坐席（布置方式未确认）	26 席（实木）	荷载 30 人
	驾驶席	2 席（站姿）	双向司控台
运行性能	最高时速	15km/h	
	限制坡度	35‰	
	最大加速度	1.24m/s²	
	限制曲线半径	20m	
	紧急制动减速度	2.4m/s²	
	行车照明	疝气大灯（近/远）	
走行系统	驱动电机	15kw*2=30kw	
	电源（锂电池）	DC72v 1000AH	磷酸铁锂电池组
	工作制动	再生制动	电机馈电制动
	紧急制动	气液钳盘制动	失效制动
结构	地板	车船地板革	
	车门	金属	
	驾驶座	2 套	
	照明	复古 LED 灯	
安全措施	脚踏式铃铛		行车声音警告
	视频监控		司机位监控车厢
	后视镜	4 套	
	雨刮器	4 套	
轮椅	轮椅升降平台	电动（隐藏式）	300KG

Appendix 1

Translation of Zhejiang Tianyou Quotation

TYD-6L-26B Brake Parameters



Return to	Item	Parameters	Remarks
Vehicle Parameters	Gauge	610mm	
	Dimensions	9.9m x 2.14m x 3.1m	
	Minimum space for visitors (mm)	1800	Entrance / Exit
	Entrance Seats (unarranged layout)	26 seats (solid wood)	Load 30 persons
	Driver seats	2 seats (standing position)	Bi-directional driving stations
Operational Performance	Top Speed	15 km/h	
	Slope Limit	35%	
	Maximum acceleration	1.24 m / s^2	
	Turning Circle Limit	20m	
	Emergency brake deceleration	2.4 m / s^2	
	Driving Illumination	Xenon Headlights (near / far)	
Travelling Systems	Motor	15 kw x 2 = 30kw	
	Power supply (lithium battery)	DC 72V 1000AH	Lithium Ion Battery Pack
	Working brake	Regenerative Brake	Motor driven brake
	Emergency Brake	Gas-liquid calliper brake	For brake fail
Structure	Floor	Car and boat floor leather	
	Doors	Metal	
	Drivers Seats	2 sets	
	Lighting	Heritage LED lights	
Safety Measures	Pedal Bells		Underway sound warnings
	Video Surveillance		Driver's position monitoring
	Rearview mirrors	4 sets	
	Rain wipers	4 sets	
Wheelchair	Wheelchair lifting platform	Electric (hidden)	300kg

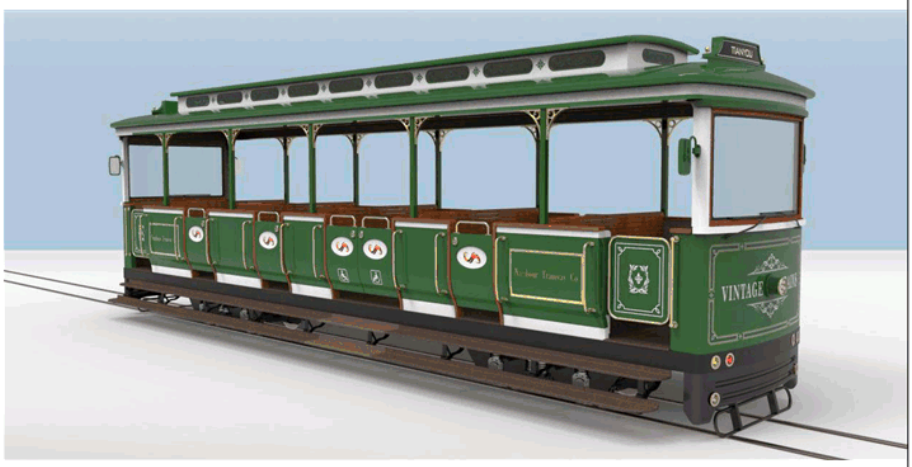
Note: a. Before design and manufacture, the owner should provide the following design specifications Table 3 and Table 4 data (specifications and standards):

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

升降

侧面效果图一

侧面效果图(轮椅升降侧)



效果图

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

注：

a. 设计前业主应提供以下设计规格书表 3 及表 4 资料（规范与标准）：

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

BPLRV 项目报价单

一、 联系方式： **报价日期 :2019-3-31**

客户公司：	China Advisory Services	报价公司：	浙江天佑铁路设备科技有限公司
接 收 人：	Russell J. Smith	发 件 人：	徐新建
电 话：	+61 467993272	电 话：	18957112329
传 真：		传 真：	0570-8077898
邮 箱：	russell.smith@chinadvisory.com.au	邮 箱：	404112060@qq.com

二、报价主题: BPLRV

尊敬的客户：

非常感谢阁下对 我司 的关注及支持，作为国内知名景区慢行轨道交通系统供应商，我们很高兴将阁下所需产品的信息及报价提供给您，并深感荣幸！

序号	项目	型号	单价（usd）	备注
1	BPLRV	TYD-6L-26B	$162000	参数见附件

付款方式： 车辆部分合同签订后支付合同款的 40%为定金，生产完成后在厂家场地内组织试运行验收合格后支付余款后提货；

货 期：收到您的订单和首款后 3-4 个月。

浙江天佑铁路设备科技有限公司

浙江天佑铁路设备科技有限公司 www.vintage-trains.com

Translation

Dear Customer:

Thank you very much for your attention and support to our company. As a well-known scenic, sightseeing train / tram system supplier in China, we are very happy to provide you with the information and quotation of your desired products, and I am very honored!

No.	Item	Model	Unit Price (USD)	Remarks
1	BPLRV	TYD-6L-26B	$162000	parameters see attachment

Payment method: 40% of the payment of the contract payment after the contract is signed, is the deposit. After the production is completed, the company will organize the trial operation and acceptance after the production is completed, and then pay the balance after the payment;

Delivery Period: 3-4 months after receiving your order and the first payment.

Zhejiang Tianyou Railway Equipment Technology Co., Ltd.

Nambour Tramway

Review Documents

CONTENTS

Technical Note

ARUP

9 Maud Street
Maroochydore QLD 4558
www.arup.com

d +61 7 3226 2723

Project title	Nambour Tramway Review	Job number	267519-00
cc		File reference	
Prepared by	Joe Haines Joe Haines, Martin Donohoe	Date	30 April 2019
Subject	Review of GHD design and estimate and comparison with Council estimate		

1 Executive Summary

The review of the GHD design and estimate has highlighted the following that will need to be investigated

1.1 Safety

The proposed Howard Street cross section is very narrow for a busy arterial road which will include a mix of tram, trucks, busses, cars, cyclists, and pedestrians. There is an increased risk of injury to pedestrians and cyclists and for vehicle to vehicle and tram collisions. A swept path analysis should be undertaken to determine pinch points as part of the detailed design phase.

As the Road Authority, SCC needs to understand its liability for crash and injury costs. The route includes uncontrolled right turns increasing the risk of turn conflict and collision. These turn conflicts could be mitigated through additional delineation which will need to be investigated at detailed design.

The buffer stop at the Howard Street terminus will be a hazard to motorists. Risk mitigation for its protection should be considered as part of detail design phase including potential additional costs to address.

1.2 Operation

The tram stop at William Street will impact sight distance for eastbound Howard Street traffic entering the roundabout to William Street. It could take up to two minutes for the tram to stop, drop off passengers and clear the intersection. If all traffic is stopped there will be significant delays especially for traffic trying to access and exit the Nambour Plaza. It is recommended that this stop is removed or relocated to a mid-block section to ensure non-worsening of existing sightlines and improve pedestrian safety.

The tram phase at Currie Street, Ann/Sydney St intersections will cause significant delays during peak hour. This phase could be 30-45 seconds and impact traffic distribution through the

town which will impact the existing road network and businesses. Traffic modelling should be undertaken to understand these impacts. TMR and Translink will also need to be consulted about the reduction in the Currie Street intersection level of service and delays to busses respectively.

1.3 Cost

There does not appear to be enough costs allowed for the tram signalling system at the SCC intersections. There is also no discussion on how and who will operate the signalling system. No costs have been included for the commissioning of the tramway. The signalling system needs to be investigated further as part of the detailed design phase.

There are no costs allowed for repairing the existing track. The track has not been maintained since 2003 so it is likely that significant lengths will need to be replaced. It is recommended that the condition of the track be investigated during the detailed design stage.

The Mill Street indented parking could require significant service relocations. The stability of the adjacent retaining wall will also need to be confirmed under increased traffic surcharge. It is noted that the DBYD services appear incomplete.

The GHD estimate is considered to be robust for the scope of works at this concept design stage. The Council estimate has lower traffic management costs and less contingency.

The 35% contingency may not be sufficient to cover a worst case scenario of service relocation, signalling system, and track replacement costs previously discussed

2 Rail review

- The rail is mentioned to be a mixture of worn 60lb / yard rail and newer 41kg / m rail that has not been fully specified. This raises several interesting issues – how close are these profiles particularly at the gauge corner and radius. Ideally the profiles need to be overlaid and a decision made on their compatibility.
- There is no mention of a wheel rail interface report nor that the wheels of the new battery powered light rail vehicle would have to be machined correctly to interact correctly with these rails.
- The wear limits both for the new / old rail and the vehicle wheels would need to be determined. No mention of who will undertake this.
- The cost estimate does not include for replacement of defective rail track. The rails could be corroded, and the track formation damaged by water ingress.

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3 Design Review by road element

3.1 Mill Street / Mill Lane Roundabout

- Detail design will confirm whether the single car park directly east of the roundabout can be retained.
- Removal of traffic island to the east of the roundabout may cause confusion through lack of delineation on approach and departure but painted chevron item will mitigate.
- It is noted that Mill Lane pedestrian crossing has been removed from the design.

3.2 Mill Street mid-block

- Cross section is very narrow – 3m lanes with no shoulder adjacent to on street parking. Austroads does allow absolute minimum of lane with width of 3m on low speed road with low truck volumes. An assessment of truck / bus volumes should be undertaken to confirm suitability of cross section. The configuration allows for minimal clearance for passing vehicles and no on road cycle facility. The indented parking does not allow buffer zone for car door opening onto footpath.
- Confirm building retaining wall will withstand extra load from on street car parking coming closer
- Several uncontrolled right turn tram conflict points including access to the multi-story car park, off street business car parking, and the bottle shop drive through. Detailed design will need to mitigate these conflict points through delineation and signage.

3.3 Mill Street / Currie St Intersection

- Confirm level of service impact of a 30 to 45 second all stop tram phase at peak time during detailed design phase
- Is there sufficient space for 14.5m bus / 19m semi to make the through movement with the tram? Left turn movement from Currie Street to Howard Street cannot occur when Tram operating. Phasing would need to be checked during detailed design phase

3.4 Howard Street mid-block between Currie Street and Queen Street

- Cross section is very narrow. Lane widths are less than 3.4m which does not comply with AGRD Part 3 Table 4.3 for this type of arterial and traffic mix
- As noted loading bay is non-compliant width and could be converted to car parking as part of the detailed design
- One uncontrolled right turn access point to business parking. Investigate delineation as mitigating treatment during detailed design phase

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3.5 Howard Street / Queen Street Intersection

- No comment

3.6 Howard Street mid-block between Queen Street and Ann Street

- One uncontrolled right turn access point to business parking. Investigate delineation as mitigating treatment during detailed design phase

3.7 Howard Street / Ann/ Sydney Street Intersection

- Cross section is very narrow. Lane widths less than 3.4m which does not comply with AGRD Part 3 Table 4.3 for this type of arterial and traffic mix
- Long signal box. Impact of 30-45 second all stop tram phase will be confirmed in detailed design phase.

3.8 Howard Street mid-block between Sydney and William Street

- Uncontrolled right turns into and out of Big W Garden Shop loading bays. Investigate delineation as mitigating treatment during detailed design phase
- Uncontrolled right turns into and out of public car park. Investigate delineation as mitigating treatment during detailed design phase.

3.9 Howard Street / William Street Roundabout

- Relocation of pram ramps will require relocation of drainage pits and inlet. There is a risk of service impact
- 4m width between kerb lines on roundabout approach does not meet Austroads minimum of 5.5m but is only for a short length but could cause delay if breakdown occurs. This low risk is considered acceptable
- Parked tram will significantly reduce sight distance from Howard Street to William Street requiring tram signals to be red while stopped to drop off passengers and then progress through the intersection. The Nambour Plaza access can be very busy during peak periods. The impact of a 2-minute tram phase will be confirmed at detailed design phase. It is recommended that this stop is removed or relocated to a mid-block section to ensure non-worsening of existing sightlines and improve pedestrian safety.

3.10 Howard Street mid-block William Street to Terminus

- Several uncontrolled right turn accesses. Investigate delineation as mitigating treatment during detailed design phase.
- A break in the chevrons will be required to allow the right turn out from Smith Street

- Access to TMI tractor business needs to be confirmed at detailed design phase.
- Detailed design phase to investigate DDA compliance issues with pram ramps
- Detailed design phase to investigate how tram buffer will be integrated into the road environment as it will be a hazard to motorists

4 GHD Cost Estimate Review

4.1 MRS02 – Provision for Traffic

- Undertake construction at night.
- Lane / road closures required for
  - Tram way road marking
  - All islands and medians
  - Indented parking at Mill Street
- Pedestrian traffic control required for construction of pedestrian ramps and installation of signals
- 15% of construction cost – in the right ball park but price will be very dependent on TMR / SCC restrictions on road closures and detours at night

4.2 MRS03 – Drainage

- Add removal of existing drainage pits and install 2 new drainage pits for revised pedestrian crossing at William Street – additional $25k

4.3 MRS04 – General Earthworks

- Clear and grub item includes tree removal and preparation for tram tracks in temp car park
- Excavation for tracks in car park may require significantly more excavation than shown as there is a 0.5m height difference between road level– would this excavation be included in workshop construction contract?
- Excavation is influenced by amount pavement reconstruction (see Section 3.4). 304m3 allows for excavation of tram tracks but what about excavation for pavement reconstruction for indented parking and traffic islands.

4.4 Pavements - MRS08, MRS30

- Approximately 2500m2 of asphalt surfacing Not clear where the resurfacing is nominated but assume around new tram track in Mill Street (300m2), William Street Tram Stop

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(230m2) Terminus (278m2), island reconfiguration (50m2), indented parking (83m)2? On this basis 2500m2 is conservative - could reduce quantity to 1000m2 of surfacing

- Pavement reconstruction areas need to be clarified. Assume reconstruction would be adjacent to new tram tracks (270m2), indented parking (100m2) and under traffic islands (50m2) (420m2 total). The estimate includes 110m3 of working platform and @ 200mm deep this equates to 550m2 of pavement reconstruction, but only 75m2 of asphalt base course has been allowed for. Need to understand pavement reconstruction, if asphalt base course is increased to match the working platform area then AC20 needs to be increased to 275T ($82k) to match working platform area. This change would increase estimate by $80k

4.5 MRS14 - Road Furniture

- Not clear on scope of sign and road furniture removal and re-erection?

4.6 MRS45 – Road Surface Delineation

- Rates and quantities reasonable

4.7 MRS93 – Traffic signals

- Not clear on tram signals and signage required for intersections. Assume cantilevered signs required to achieve sightlines
- Is a separate signalling system required or is it connected to STREAMS – should allow risk item if not fully scoped. Will signalling system require detector loops and conduit?

4.8 Miscellaneous

- Rail replacement cost – the actual cost of rail repairs or replacement is highly dependent on the total quantity of rail to be worked on. The fixed costs of having staff mobile to site with equipment often means that the cost of replacing 1m only of rail under those conditions would be comparable to the value of rail in a large rail replacement project. Further details are required to correctly benchmark this question e.g. is the contractor (and materials / tools) located close to Nambour, do they work on comparable systems etc as otherwise per metre costs can be misleading. It is expected that for simple short sections of track (with minimal complications) could exceed $1,000/m for 10m track depending on the complexity.
- There are no costs included for commissioning of the tramway – these could be substantial.

4.9 Principals Obligations

- Unclear how much consultation with service authorities has occurred. This could be a big risk item

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4.10 Contingency

- 35% contingency is considered appropriate for the level of design especially considering risks around services and signalling. It is uncertain whether there is enough contingency to cover the risk of significant track replacements.

5 SCC Estimate Review

5.1 Summary comparison with GHD Estimate

Table 1 provides a high-level comparison with the GHD estimate. As can be seen construction costs are very similar. The main difference occurs in Principals obligations where GHD have included design development costs and SCC have not.

Table 1 Summary comparison

Item	GHD $k	SCC $k	Difference $k	Comment
Construction costs	1,669	1,616	53	SCC estimate includes streetscaping of $200k which was not allowed for in GHDs estimate To assist with estimate comparison $170k of SCC service relocations have been extracted from constructions costs and placed in principal's obligations
Principals obligations	628	293	335	SCC estimate does not include • design development costs • unplanned risk contingency, contractor insurance costs • SCC internal costs are $17k lower
Contingency	643	607	36	SCC contingency is slightly less
Totals	2,940	2,516	424	

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5.2 Detailed comparison with GHD Construction Estimate

Table 2 provides a detailed comparison of the construction estimates.

Table 2 Construction estimate comparison

Item	GHD $k	SCC $k	Difference $k	Comment
Provision for traffic	250	117	133	SCC estimate considered to be on the low side
Drainage	72	84	-12	SCC estimate includes additional removal of reinforced footings – not clear on scope of this item
Earthworks	78	62	16	SCC subgrade testing is $15k cheaper
Pavements	58	58	0	
Road Furniture	40	26	14	Road furniture scope is not well defined
Site Facilities	50	32	18	Difficult to estimate but not a significant difference
Pavement Marking	221	221	0	
As Cons	20	10	10	SCC could underestimate electrical as con requirements
Enviro and Erosion Sed	31	8	23	GHD could be on high side as little sediment will be generated and environmental impact will be minimal
Signals	150	153	-3	
Lighting	25	20	5	
Miscellaneous	658	640	18	SCC not allowed for demolishing of existing trackwork ($13k), track SCC have placed fencing and detector loops in other items.
Streetscaping	0	200	-200	Streetscaping was not allowed for in the GHD estimate

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5.3 Estimate Discussion

The headline differences between the estimates are summarised as follows

- Construction costs for both estimates are very similar. Traffic management is the only significant difference. SCC estimate of $140k would appear low. It is likely that traffic management will need to be set up and removed every night. Based on 12-week programme the SCC figure would equate to $2,300/night. Assuming 4-person crew with a ute and a truck @ $500 / hour for night works would be $4,000 a night shift. GHD estimate would appear to be closer to expectation.
- SCC estimate does not include design development costs
- SCC implementation costs are significantly lower. It is assumed SCC have a better understanding of their construction administration costs

The SCC estimate is slightly less than the GHD but if design development costs are added they are very similar.

6 Recommendations

There remain key risks that require further investigation and suitable allowances for mitigation treatments. SCC should undertake the following

- Understand liability around injuries caused by the tram. Confirm whether a design exception is required for narrow cross section on Howard Street and / or consider further removal of on street parking and remove dual lane intersection approaches to provide a more forgiving road environment.
- Under take traffic modelling to confirm traffic delays and consult with TMR regarding delays at Currie Street
- Consult with existing business owners to discuss potential traffic disruption and loss of on street parking
- Consult with Translink regarding non-compliant bus bays
- Investigate high risk items including services relocation, tram signalling system and track replacement

DOCUMENT CHECKING (not mandatory for File Note)

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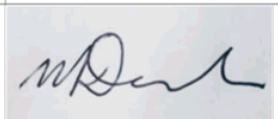
Signature			

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Project title	Nambour Tramway Review	Job number	267519
cc		File reference	
Prepared by	Joe Haines Joe Haines, Martin Donohoe	Date	30 April 2019
Subject	CA Review		

1 Executive Summary

The CA design is not significantly different to the GHD design and therefore inherits the same issues identified in the GHD review with the following exceptions.

The CA design relocates the William Street intersection tram stop to the southern side saving four car parks, but it requires significant work to the William St kerb line, including drainage work which is not allowed for in the estimate, and an increase in the risk of service relocations which are also not allowed for in the CA estimate.

The alternative design does not address the sight distance issue from Howard to William Street caused by the tram stop and pedestrian safety issues. If the vehicle approaches are all red while the tram stops to drop off / pick up passengers and proceeds through the roundabout, there will be considerable traffic delays. Again, it is recommended this stop is removed or relocated to a mid-block section.

The terminus location reduces the potential conflict between pedestrians and vehicles, as well as a buffer stop in the middle of the road. Council owns this land for drainage purposes. Comment from Council's drainage team is that it is a stormwater overland flow path. The platform is currently shown on the plans as concrete and would need to be changed to an elevated structure to allow overland flow to pass through unimpeded. There are also access easements on the parcel which would need to be considered and resolved if the proposed structure impedes access.

The CA estimate has a non-standard work breakdown structure and specification and basis of payment is not included. It is not clear on what basis the contractors have supplied their rates. The $500k saving in construction costs are primarily made up of thermoplastic line marking, line marking removal, and track work costs.

The CA estimate is not considered to have enough contingency. A standard contingency for a concept design is between 30-50%. The estimate does not include an allowance for service relocation costs, these costs could exceed $150,000. As with the GHD estimate it does not include costs for repairing defective rail and track, although a small amount has been allowed for testing the existing rail. If 100m of track needs to be replaced could cost between $50,000 to $100,000

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depending on the complexity of the location. Again, the signalling costs are under estimated. Tram signals at each of the 6 intersections could cost $120,000 to install and signalling system costs need to be added.

2 General comments on CA Design Changes

2.1 Relocation of tram stop at William Street intersection

- The relocation of the platform to the southern side and the associated kerb line relocation of William Street increases the risk of unforeseen services alterations; subgrade / pavement and drainage costs. The relocation does not improve sight distance from Howard to William St requiring a very long tram phase.
- What design vehicle can achieve the left turn from William Street onto Howard Street – it looks very tight
- Likely that carpark on southern side of footpath will be lost
- It is noted that the CA estimate includes a Translink style shelter at the William Street and Aldi terminus platforms. The William Street shelter may cause issues with bus sway and will also be a hazard to traffic. The platform width makes it unlikely that a standard shelter will fit. A bespoke shelter could be required. The costs and practicality of providing a shelter need to be investigated at detailed design stage.

2.2 Relocation of terminus

- The relocated terminus does provide a safer stopping point and a buffer is not required in the middle of the roadway.
- Tramway crossing of footpath will require alterations to services.The footpath will need to be lowered and reconstructed to achieve DDA compliance to cross tram tracks.
- Do pedestrians have right of way or does the tram when it crosses the footpath?
- Terminus at Aldi will require purchase of Lot 1 SP266387. This does not appear in the costings

3 Estimate review

3.1 Detailed estimate review

1 - Preliminary	• No comment
2 - Clearing Earthworks and Demolition	• Quantities difficult to confirm

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3 – Roadworks, track works, and drainage pavement	• It is difficult to confirm how pavement quantities have been derived
4 - Protective treatments	• No comment
5 - Landscaping and vegetation works	• No scope – how was it priced
6 - Signage line marking and signals	• Alteration to existing signals at Currie Street are $50k. Signalling of the six SCC intersections are $50k combined – why such a discrepancy
7 – Miscellaneous	• Only 2 detector loops – there should be many more for each SCC intersection
8 – Old Ambulance Section	• No allowance for drainage works but at least 4 new pits required with connecting pipework
9 – Off Street Aldi Platform	• Signalling of SCC intersections is repeated

- The work breakdown structure is not standard. The specification and basis of payment has not been provided. It is therefore unclear how accurate the quantities are and how the contractor's rates have been derived. The GHD and SCC estimate is based on TMR work breakdown structure and specifications.

3.2 Contingency

- The CA estimate includes $310k contingency or about 18% of the construction costs. This is considered too low for a concept estimate. It is noted that the re-issue of the Covey estimate reduced contingency by $70k.

3.3 GST

- The estimate includes GST which is not applicable to government works.

3.4 Services

- The CA estimate make no allowance for services relocation (except a single Telstra pit). Services costs could be significant at Mill Street (see GHD review for details) and at the footpath crossing

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3.5 Land for terminus

- Whilst Council own the land they could be costs associated with renegotiation of easement which will need to be determined at detailed design stage

3.6 Comparison with GHD estimate

The GHD construction cost is $500k higher than the CA construction estimate. It is difficult to compare the estimates as they are based on a different work breakdown structure. There is $160k differences in line marking costs. The rates for thermoplastic paint for the tramway markings and removal of existing markings are significantly lower in the CA estimate. The other significant difference is the cost of laying the new track; GHD estimate is significantly higher. It is estimated that new track could cost between $500 - $1,000/m.

3.7 Discussion

The GHD estimate is considered the more robust estimate. It includes

- A robust work breakdown structure, basis of payment and take off
- an appropriate contingency for the stage of design
- allowance for service relocation

It is unclear on what basis the contractors were providing rates to Covey Associates.

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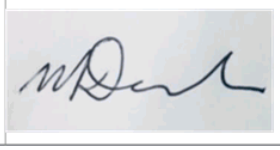
Signature			

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Project title	Nambour Tramway Review	Job number	267519-00
cc		File reference	
Prepared by	Joe Haines Martin Donohoe	Date	30 April 2019
Subject	Tram Co Operation and Maintenance Cost Review		

1 Tram Co Cashflow Forecast

The updated Tram Co cashflow forecast (attached for reference) details forecasted revenue and operational and maintenance expenditure. This technical note reviews the operational and maintenance costs which are detailed as shown in Table 1.

Table 1 Maintenance Costs

Item	Unit	Quantity	Rate	Annual Cost	Arup Comment
Operating				**Budget Estimate**	
Labour					
Manager	FTE	1	45000	45,000	The salary cost is considered very low. See Section 2 for discussion
Staff	FTE	0	0	-	
Utilities	Item			7,150	No comment
Rail Accreditation	Item			-	
Security				2,700	No Comment
Promotions				10,000	No comment

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		Operating Costs		**64,850**	
Maintenance					
Tram				8,000	There is no detail provided on how this number has been calculated. It is a very low estimate What about registration costs – is this vehicle subject to this? No mention of routine maintenance to maintain tram road worthiness It is not clear as to whether this is for parts only and that all labour is assumed to be free? How was this baselined on a bespoke tram vehicle supply contract? Typically trams use sand to modify the available friction and stop faster. Although the vehicle specification is extensive there is no mention of this. The specification is for a very complex vehicle – where are the costs for special tools and spares accounted for. There is only a single entry of Building fit-out tools, jacks = 10K. How will the wheels be turned as ruts appear – will the bogie be sent away or disassembled. No bogie jig is mentioned so it is assumed that this activity will be undertaken off site. This bogie is smaller than a regular tram

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					so special (costly) hold down arrangements could be needed.
Depots/Stations				1,000	As above there is no detail on how this value was derived. If any shelters have a glass component, then this will be a vandalization target. Who will clean the stations – volunteers?
Infrastructure				1,000	A very low figure given that the points machines will need maintenance particularly if they are travelled over by large road vehicles. The track is old so assuming that it won't need any replacement is ambitious. What about rail grinding if there was too much wheel squeal?
		Annual Maintenance Costs		**10,000**	
Current quote for periodic overhauls (included in capital costs)					
Tram	Overhaul every 10 years			73,133	Assuming the tram's batteries (main and auxiliary – according to the spec) will last 10 years should be confirmed. Such longevities are rare.
Buildings - repaint etc.	Every 10 years			25,000	
Future Cost of Periodic Overhauls (indexed at 3% CPI)					
Tram				98,285	
Buildings - repaint etc.				33,598	

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2 Operating Costs

Note 9 of the Tram Co forecast cashflow states in the assumptions that "*operating hours are factored around a workforce of 0.5 FTE worker*" which is inconsistent with the quantity included in the operational expenditure forecast which allows for one FTE.

The revenue forecast (Note 10) assumes that the tram will be running full time in the week and half days at the weekend. The manager will be responsible for all operational activities which include

- Customer service
- Management of reactive maintenance of tram, buildings, and infrastructure
- Planning for preventive maintenance of tram, buildings, and infrastructure
- Community consultation
- H&S and incident management

Considering the level of responsibility and operating times a 0.5 FTE is not considered sufficient. In reality at least two paid staff will be required to provide continuity during resignation, sickness, and annual leave. The manager will need to have current rail industry technical skills and excellent leadership skills. The salary is considered to be optimistic and there is a risk that a manager being paid this salary will find much better paid work in private industry. It is thought that at a minimum salary costs should be increased to $150k per annum.

The costs quoted do not include training costs of the volunteers. All personnel involved in the operation maintenance of the tram and infrastructure will need to achieve industry accreditation. These costs will impact the cost forecast and are likely to be ongoing as volunteers come and go. Bringing an external evaluator to the depot to conduct an accreditation would be expensive for this organisations funding.

3 Maintenance Costs

Maintenance costs can be estimated by predicting maintenance activities for each item.

3.1 Tram Maintenance

3.1.1 Routine / preventive tram maintenance

- Visual inspection as per the manufacturers handbook
- Reprofiling of wheels (complicated due to the fact that logically there is no underfloor wheel lathe for a fleet of one but this means removing the bogie and sending away intact to an organisation with a wheel lathe or disassembling it , extracting the axle's and machining them individually to be within the manufacturers tolerance)
- Axle maintenance
- Replace blown bulbs, fixtures and fittings due to wear and tear etc.
- Battery servicing and replacement (this depends on the charging regime and usage – if incorrect then the battery life can be very short)

- Servicing of electric motors, traction inverter and management unit, ventilation / cooling systems including replacement parts
- Lubrication of all moving parts
- Vehicle cleaning

3.1.2 Non-routine tram maintenance

- Repairs to tram following motor vehicle incident or impact with animals
- Decontamination of bogies (biological)
- Tram recovery following derailment
- Vandalism repairs / graffiti
- Painting of vehicle [refresh every 5 to 10 years]

3.2 Depots/Stations

- Replace fixtures and fittings
- Electrical testing of fixtures / tools etc (PAT Test)
- H and S equipment maintenance
- Replacement of specialist tools
- Maintenance of compressor (if present)
- Maintenance of wheelchair access platform

3.3 Infrastructure maintenance

- Line marking and signage renewals
- Track maintenance [cleaning and readjustment of points machines, rail repairs and track replacement etc]
- Signalling maintenance

4 Discussion on costs

The cost forecast states that a very conservative approach has been adopted for operation and maintenance costs. A preliminary review of operation and maintenance activities listed in Section 3 shows that the cost allowances in some areas are not realistic. The philosophy that volunteers will carry out most of the necessary tasks, while laudable, has led to an inherent belief that all tasks can be addressed by these individuals and therefore little incurrence of expenditure. As the LRV may not be a commercial off the shelf product (detailed bespoke procurement specification), it will contain a number of complex and unique systems that would require specialised trained staff. The absence of such staff locally would imply that fault finding and component repair may require returning items to the manufacturer(s) incurring substantial freight and repair costs.

4.1 Tram costs

It is recommended that Tram Co undertakes a thorough review of the tram operating and maintenance costs. It needs to confirm what maintenance will be undertaken by volunteers and

what maintenance will need to be undertaken by specialists (potentially subcontracted to outside organisations). For example, will Tram Co undertake periodic reprofiling of the tram wheels and tram axle maintenance? If so training and plant costs need to be included in the forecast, if not then these costs need to be added undertake this maintenance.

It is noted that the forecast includes a 10-year overhaul of the tram. However, the tram specification only requires the battery to last until Year 6. Either the specification needs to be amended or additional costs need to be included in year 7 to replace the battery.

A review of industry research highlights that trams of this type are frequently involved in crashes with other vehicles. The most serious of these are derailments and costs to recover the tram can exceed $100,000. Further investigation needs to be undertaken to determine the premium of the tram insurance policy for the tram (which Council will be providing) and the excess for each crash.

4.2 Depots

It is envisaged that most of the depot maintenance can be undertaken by volunteers. However, $10,000 over 10 years is too low and will not cover consumables.

4.3 Infrastructure maintenance

The costs for infrastructure maintenance will not cover line-marking, track, and signalling maintenance. These costs will be significantly higher than $10,000. Track maintenance will be significant especially since the track has not been maintained since it closed in 2003 and the current condition of the asset (non-visible portion) is unknown.

5 Operating and maintenance cost sensitivity

To understand the sensitivity of increased costs on the cashflow the operating and maintenance costs were updated in the spreadsheet as shown in Table 2. The changed values are shown in red.

Table 2 Increased operating costs

Item	Unit	Quantity	Rate	Annual Cost	Comment
Operating				**Budget Estimate**	
Labour					includes on-costs
Manager	FTE	1	150000	150,000	Increased to bare minimum
Staff	FTE	0	0	-	All staff volunteers
Utilities	Item			7,150	Power, water supply/sewerage, telecoms

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Rail Accreditation	Item			-	Nil for revenue <$250k. $6.5k for revenue>$250k
Security				2,700	2 nightly drive-by patrols incl lock up check $225.61 p/mth
Promotions				10,000	Facebook, twitter
			Operating Costs	**219,850**	
Maintenance					
Tram				8,000	This cost has not been increased but is considered a bare minimum
Depots/Stations				3,000	Increased $2,000 to cover consumables including tools and training costs
Infrastructure				12,500	Increased to cover track repairs and signalling maintenance
			Annual Maintenance Costs	**23,500**	
Current quote for periodic overhauls (included in capital costs)					
Tram	Overhaul every 10 years			73,133	
Buildings - repaint etc.	Every 10 years			25,000	
Future Cost of Periodic Overhauls					

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(indexed at 3% CPI)					
Tram				98,285	
Buildings - repaint etc.				33,598	

The amended cashflow is shown in Figure 1 and shows the impact of the proposed increases in maintenance and operating costs and its impact on the net annual surplus which is negative every year.

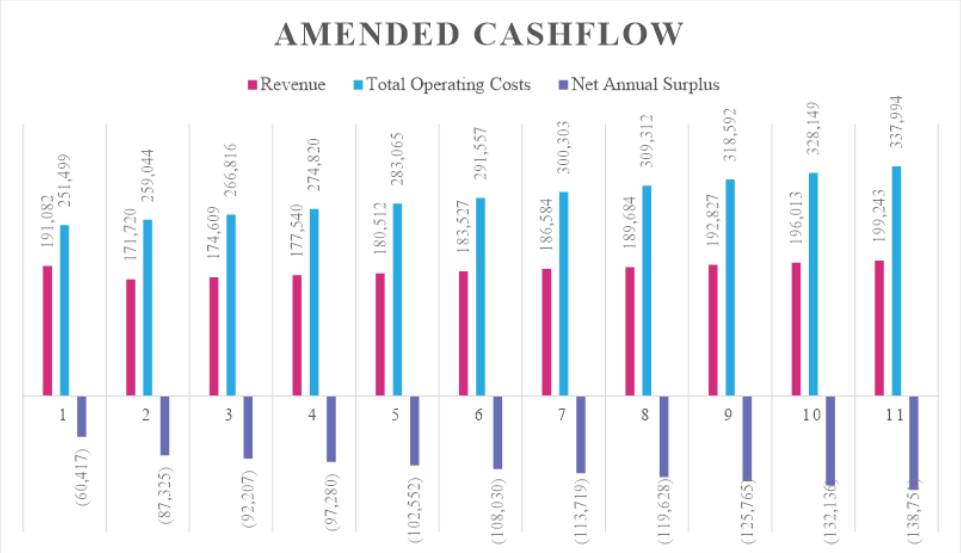

Figure 1 Amended Cashflow

Figure 2 shows the cumulative updated Closing Balance of the Operating Fund which has an increasing deficit year on year

Technical Note

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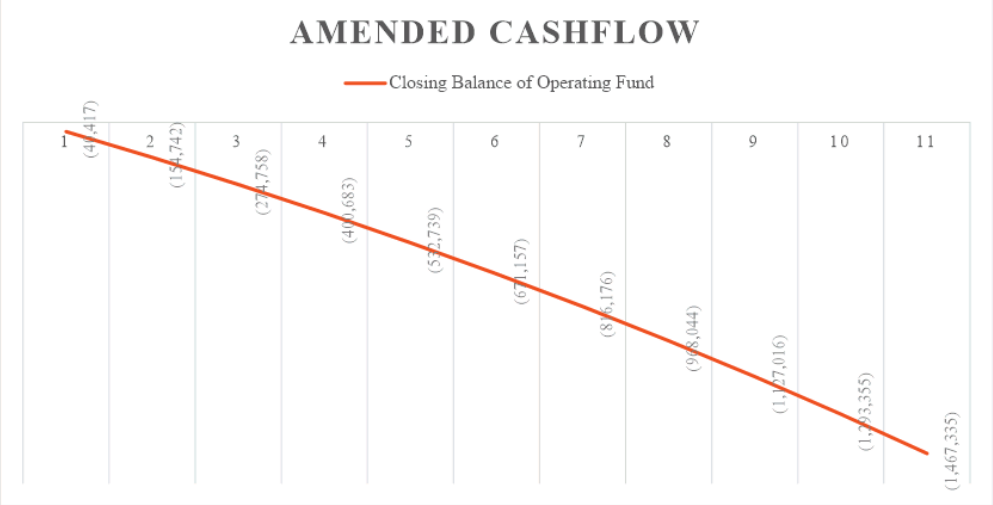

Figure 2 Updated Closing Balance of Operating Fund

6 Recommendations

Tram Co need to provide supporting documentation around salary cost. These costs appear very low. Any increase in these costs significantly affect the cashflow forecast.

It is recommended that Council request Tram Co to provide a detailed operation and maintenance programme for the tram, depot and infrastructure. They also need to confirm in reasonable detail what maintenance will be undertaken by volunteers and what maintenance will be undertaken by external contractors. The current cashflow statement does not provide adequate detail on these costs to make an informed decision.

Council also need to investigate insurance policy for the tram. What will be the premium for this policy and what will be the excess for each crash? Will the policy cover derailment costs to recover the tram?

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
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Signature			

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Sunshine Coast COUNCIL

Nambour Tramway Cash Flow Forecasts

Purpose

This documents provides Commercial Analysis Unit's comments on Attachment N Op Ex Tramway Cash Flow Forecasts 9 April 2019.

Capital Expenditure - Tram

Nambour Tramway Company Ltd have quotes from a number of vendors for the purchase of a tram vehicle.

The United Kingdom supplier quoted prices over AUD$1 million and the Chinese companies quoted prices ranges US$132,900 to US$162,000.

Translation of the Chinese quotes to English was required and the translator identified that the Chinese manufacturers have struggled to comprehend the detailed specifications in the 60+ page document provided to them. Their attitude has been one of preferring to modify an existing comparable model.

Nambour Tramway Company Ltd should provide an assessment of how the quotes meets the technical, functional and performance requirement in the specifications in Attachment F – BT Consultants.pdf.

Nambour Tramway Company Ltd acknowledge there will be costs relating to manufacturer supervision, shipping, customs, GST and commissioning. To that end, it has retained the $600,000 budget allocation for the purchase.

As the sales prices will be in UK pounds or US dollars allowance should be made for foreign exchange movements.

Operating Revenues and Expenditure

Annual revenue is initially estimated at $191,000 with key sources being 33% merchandising, 30% daily ticketing, 16% annual passes and 15% advertising and sponsorship.

Ticketing revenue forecasts are based on a 25 seat tram operating six round trips between 8am - 5pm on weekdays, 3 round trips between 9am – 2:15pm on Saturdays and two round trips between 10:30am – 3:05pm on Sundays.

Initial ticket prices are set at $2 for adults and $1 for concession/child tickets with annual passes priced at $150.

Average utilisation is estimated at 57% across the year.

A 10% fall in revenue is assumed in the second year of operation with growth of 3% per annum continuing across years 3 to 11.

The key risk for operating revenue is shortfalls which may arise from lower than expected utilisation or lower than expected merchandise sales.

Annual expenditure is initially estimated at $133,000 with key sources being 34% labour, 28% merchandising, 13% insurance, 8% promotions and 8% maintenance.

Labour includes 1 FTE as a paid manager with the remainder of the workforce being volunteers.

Prepared by Commercial Analysis Unit

The key risk for operating expenditure is cost over runs which may arise from higher than expected staffing costs in the event that volunteer numbers are not achieved or sustained.

Sensitivity Analysis

Figure 1: Sensitivity to decreases in revenue

Key assumptions on merchandising sales, ticket sales and utilisation are subject to uncertainty. Financial risk arises where revenue is less than forecast. For example seasonality and holiday periods may impact utilisation resulting in shortfalls to year 1 revenue targets. Across the medium to longer term of the 11 year forecast period the operating fund is sensitive to decreases in initial revenue estimates:

- A 10% fall in initial revenue sees the operating fund balance flat line across all years
- A 15% fall in initial revenue sees the operating fund balance fall to zero in year 11
- A 30% fall in initial revenue sees the operating fund balance fall to zero in year 3.

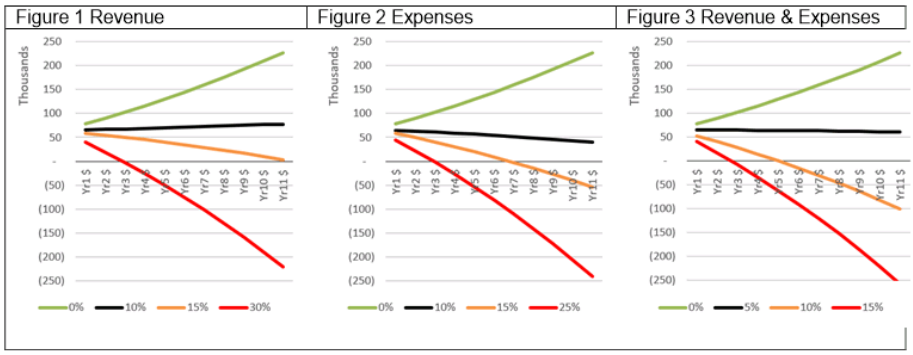

Figure 2: Sensitivity to increases in expenditure

Conversely financial risk arises where expenditure is more than forecast. Key assumptions on merchandising costs, labour, insurance, promotions and maintenance are subject to uncertainty across the 11 year forecast period. The operating fund is sensitive to increases in initial cost estimates:

- A 10% rise in initial costs sees the operating fund balance flat line across all years
- A 15% rise in initial costs sees the operating fund balance fall to zero in year 7
- A 25% rise in initial costs sees the operating fund balance fall to zero in year 3.

Figure 3: Sensitivity to decreases in revenue and increases in expenditure

The highest risk scenario would be a combination of the revenue falls and cost increases.

The operating fund is sensitive to decreases in initial revenue and increases in initial cost estimates:

- A 5% change sees the operating fund balance flat line across all years
- A 10% change sees the operating fund balance fall to zero in year 5

- A 15% change sees the operating fund balance fall to zero in year 3.

Conclusion

It would be prudent for Nambour Tramway Company Ltd to identify measures to mitigate adverse changes in revenue and expenditure. To ensure the operating fund balance is maintained at sustainable levels it is particularly important for the operation to achieve the forecast levels of utilisation, merchandise revenue and volunteer support.

5 NEXT MEETING

Nil

6 MEETING CLOSURE