11 April 2024

File Ref: OIAPR-1274023063-25639

[redacted]

Tēnā koe [redacted]

Request for information 2024-029

I refer to your request for information dated 29 February 2024, which was received by Greater Wellington Regional Council (Greater Wellington) on 29 February 2024. You have requested the following:

"*I'd like to submit a LGOIMA request for information regarding introducing payWave onto buses and other forms of public transport in Wellington.*

Specifically, any correspondence or documents relating to: plans GWRC had to implement payWave before a national ticketing system was announced, if there are back up plans to implement payWave if the national ticketing system is significantly delayed or scrapped by central government, any correspondence with snapper services limited or ICM mobility group about the merits of payWave, and any business cases on the merits of payWave on public transport."

Greater Wellington's response follows:

Background:

The Snapper ticketing solution is a fully service-based arrangement implemented by Greater Wellington as an interim measure on the Wellington Region public transport network , pending the advent of a ticketing solution that could be adopted nationally (now known as the National Ticketing Solution, or NTS).

A national ticketing approach has been a feature of New Zealand Transport Agency – Waka Kotahi (NZTA) expectations for several years, and regional investment in ticketing solutions has been conditioned by this. Following a procurement process and contracting with a ticketing solution provider, NTS was announced by NZTA in late 2022.

Before that date, Greater Wellington had agreed with NZTA to extend the Snapper system to the Wellington rail network in its established form (i.e. without 'payWave' capability). This extension was partly a response to the global pandemic (to reduce physical cash and ticket handling on board trains), but also in line with a longstanding Council intent to retire the paper-based ticketing system. Snapper was extended to the whole rail network in 2022 as a transitional phase anticipating NTS, allowing customers to become familiar with electronic ticketing and providing significantly improved travel data for planning purposes.

As we believe your request relates to any decisions Greater Wellington had to implement PayWave pre-NTS, we have not included any documentation related to the NTS procurement or contract process.

We could not find correspondence that discussed implementing PayWave pre-NTS. Although the contactless Airport Express was established several years after work for the national ticketing solution had begun, we have included some correspondence found which discussed the Airport Express contactless payment and have included this in **Attachment 1.**

We do not have correspondence related to, "back up plans to implement payWave if the national ticketing system is significantly delayed or scrapped" therefore we are refusing this part of your request under section 17(g) of the Local Government Official Information and Meetings Act 1987 (the Act) , that the information requested is not held by Greater Wellington and we have no grounds for believing that the information is either:

(i) held by another local authority, department, or Minister of the Crown or organisation Or

(ii) Connected more closely with the functions of another local authority, or a department or Minister of the Crown or organisation.

Please see **Attachment 1** for all relevant correspondence that we found related to your request. Contact information in this attachment has been withheld under section 7(2)(a) of the Act in order to protect the privacy of natural persons, including that of deceased natural persons.

Please see **Attachment 2** for two documents from Snapper Services Limited related to the merits of PayWave. This attachment includes commercial information regarding budgetary pricing which has been withheld under section 7(2)(b)(ii) of the Act in order to protect information where the making available of the information would be likely to unreasonably prejudice the commercial position of the person who supplied or who is the subject of the information.

Please see **Attachment 3** for the NTS Business Case. This attachment includes commercially sensitive information regarding the implementation of NTS which has not been released previously under the Act or to Radio NZ and therefore has been withheld under section 7(2)(b)(ii) of the Act in order to

protect information where the making available of the information would be likely to unreasonably prejudice the commercial position of the person who supplied or who is the subject of the information.

We have considered whether the public interest in the requested information outweighs Greater Wellington's need to withhold this information. As a result, we do not consider that the public interest outweighs Greater Wellington's reason for withholding parts of the document under the grounds identified above.

If you have any concerns with the decision(s) referred to in this letter, you have the right to request an investigation and review by the Ombudsman under section 27(3) of the Local Government Official Information and Meetings Act 1987.

Please note that it is our policy to proactively release our responses to official information requests where possible. Our response to your request will be published shortly on Greater Wellington's website with your personal information removed.

Nāku iti noa, nā

Samantha Gain
Kaiwhakahaere Matua Waka-ā-atea | Group Manager Metlink

From: Alard Russell
To: Michael Freeman
Subject: FW: Contactless/EMV ticketing on Unit 20 AX
Date: Wednesday, 20 April 2022 10:10:00 am

Closing the circle …

From: Alard Russell
Sent: Tuesday, 19 April 2022 9:17 pm
To: Nicki Lau Young <Nicki.LauYoung@gw.govt.nz>; Kerry Waddell [redacted]@snapper.co.nz>
Cc: Tim Shackleton <Tim.Shackleton@gw.govt.nz>
Subject: Contactless/EMV ticketing on Unit 20 AX

Hi Nicki and [redacted]

Following some concerns raised today over the press release for the Airport Service and the spectre of 'Snapper EMV' please note that the Stuff text I have found says:

Wellington's airport service will return by July after the capital has been without an airport bus since the country went into its first nationwide Covid-19 lockdown in March 2020.

The service will operate on the Metlink network, and will have Snapper ticketing, credit and debit payments by eftpos – a feature not previously available on airport buses – real-time information and a dedicated fleet of ten new zero-emissions electric buses.

This is probably not the clearest phraseology given Waka Kotahi sensitivities to any suggestion of GW developing EMV capability on Snapper. I discussed it with Michael and he has provided a detailed statement of the Airport Service ticketing solution which I have tweaked into the following.

- The Contactless Solution for the Airport service is a separate system from the Snapper Electronic ticketing system on board
- The contactless solution was part of the minimum specification in the RFP, as market research indicated it was required for MVP
- Mana Coach Services contracted Snapper to provide a solution which is smart phone based and takes payment from debit/credit cards and cards stored in phone wallets, it is not eftpos
- The solution does not connect to the BDC and is therefore not part of the Snapper IBTS ticketing system or its data feed
- The solution will provide financial and patronage data to GW as required in the RFP and as part of the license agreement with the airport
- While this solution does take EMV cards, it is not an integrated solution, but a bespoke discrete solution provided for the operator by Snapper so that the operator can conform to the requirements of the RFP

Payment methods are :

- Contactless via smart device, and Snapper BDC Cash or Snapper Card tapped on validator
- EFTPOS is not supported

I hope that is sufficiently clear to defuse any query that might arise.

Cheers
Alard

From: David Lewry
To: David Boyd; Emmet McElhatton
Subject: FW: GWRC NTS Transition approach - management summary ** for your review please**
Date: Wednesday, 17 March 2021 12:29:37 pm
Attachments: GWRC Transition approach Management Summary DRAFT v0.1 170321.docx
Importance: High

Sorry chaps – sent that before I wrote anything on it.
I'll forward on the stuff that came from AT via NTS. The NTS comms seem to be variously with Tim and Alard at the moment and internal co-ordination is lacking. So hopefully Friday morning will give us the chance to sort that out.
Cheers
David

From: David Lewry
Sent: Wednesday, 17 March 2021 12:27 PM
To: Boyd, David (GWRC) <David.Boyd@gw.govt.nz>; Emmet McElhatton <Emmet.McElhatton@gw.govt.nz>
Subject: FW: GWRC NTS Transition approach - management summary ** for your review please**
Importance: High

From: David Lewry
Sent: Wednesday, 17 March 2021 11:51 AM
To: Wilce, Dawn <Dawn.Wilce@gw.govt.nz>; Parfitt, Bonnie <bonnie.parfitt@gw.govt.nz>; Alard Russell <Alard.Russell@gw.govt.nz>
Subject: GWRC NTS Transition approach - management summary ** for your review please**
Importance: High

Dear all,
I've assembled the attached document in response to the NTS request for our high level transition approach, in readiness for the BAFO process. It follows the recent workshop and the updated transition document NTS produced subsequent to that.
You will have seen the AT equivalent, which with a few caveats basically expects Options 2 or 4 (dual capability or old and new together) for rail and ferry, and Option 5 rapid replacement) for bus.
Our table is a bit less black and white, as I believe that although our situation is simpler in places it is more complex in others. A lot depends on whether we have a Snapper pilot running on rail, and also on the potential for an Option 2 lead-in for bus (i.e. the ability for Snapper to provide EMV transactions to the NTS central system). The latter would de-risk both our physical and customer transitions by allowing them to take place over a longer period and with more and smaller phases, despite not being viewed favourably by NTS. It would though be at our cost, and has no adverse cost impact on BAFO; if anything it provides greater flexibility and less intensity to the NTS rapid replacement scenarios, so could save money there (although any savings wouldn't accrue to us).
You will see that I have also added a list of assumptions, some of which will also have a place in later transition plans but all of which affect our transition outlook and therefore the confidence with which we can adopt certain approaches or recommendations. If you think they are out of place here we can remove them, but I think they provide a background for our approach to the table. I'm sure the NTS team would prefer a simple list of phases against chosen transition options, but I simply don't think the process is mature enough yet for us to be able to make those calls unconditionally.

I understand from the note Ben Fernandez provided to Alard that the NTS team wanted responses by the end of today (17th) to go into BAFO planning. I'm sure a day or two won't be the end of the world but if you can revoew as soon as possible it would help. I'm assuming you will want to pass the document across once we're happy with it Tim.
In the meantime I'll leave the planned session on Friday morning in the calendars, in case we want to discuss it together.
Thanks

David

5.5.2 High level phasing and technical approach

Phase 1 – Rail Pilot	Transition approach
Single rail line	<u>Scenario 1</u> Assuming that no Snapper pilot is in place or it has been completed and withdrawn, an initial NTS rail pilot implementation would be appropriate on the Johnsonville line (8 stations, part of Wellington station and c35-40 validators). Other 'single' rail lines are less suitable for a pilot implementation due partly to the scale (number of stations and devices), and the potential for transfer of customers at common stations between lines. • **Technical transition approach would be so-called 'greenfields' installation**, even though it could potentially be re-using some generic infrastructure (e.g. validator plinths and power supplies). <u>Scenario 2</u> If a Snapper pilot is in place on the Johnsonville rail line, the option of dual readers for Snapper and NTS media is sub-optimal, since it would require additional device installations to facilitate Option 4 (dual readers for old and new media) - rather than replacing existing devices in the same locations utilising the same generic infrastructure. Unless carefully managed it could also lead to customer confusion. It would be preferable to terminate the pilot and replace devices, assuming the existing paper-based ticketing solution is maintained in place for a parallel transition period, to be decided by GWRC. • **Technical transition approach would therefore be a variant of Option 5 (replacement of old devices with new).**

	<u>Scenario 3</u> If a Snapper pilot is in place on the Johnsonville rail line, and an arrangement has been made for bus that enables Option 2 (legacy device accepts new media), there is potential for Option 2 also to be applied to a rail pilot on the Johnsonville Line. • **Technical transition approach would therefore be Option 2.**
Phase 2 – Rail implementation	**Transition approach**
Remaining rail lines	The remaining rail network would be available for phased implementation of NTS devices, on the assumption that the existing paper-based ticketing solution is maintained in place for a parallel transition period, to be decided by GWRC. Line-by-line introduction of NTS is potentially possible but would not necessarily provide any advantage, although does not affect the technical considerations apart from ensuring all devices can be available from a defined date (which should be possible). • **Technical transition approach is therefore so-called 'greenfields' installation.**
Phase 3 – Bus	**Transition approach**
Pilot	Rather than a specific route, it is proposed that a pilot implementation should be based on a small depot, with dedicated vehicles and drivers. This approach was used in the deployment of Snapper IBTS, using the Wairarapa depot (8 buses) and services as the pilot, and it is suggested this would be appropriate for NTS. If an airport bus service has been established by the time of NTS implementation, using dedicated vehicles, then it is possible it would be suitable for an alternative (or additional) bus implementation pilot.

	• **Technical transition approach would therefore be Option 5 (rapid replacement).** **However, if an arrangement has been made that enables Option 2 (legacy device accepts new fare media) rapid replacement could potentially be de-risked by being spread over a longer period.**
Remaining bus network	GWRC recommends that the remaining bus network is phased logically on the basis operator/depot/ geographic operational unit. **Whether or not an arrangement has been made that enables Option 2 (legacy device accepts new fare media), there is no realistic alternative to Option 5 (rapid replacement) for legacy device replacement by NTS devices**, again n**oting that rapid replacement could be potentially be de-risked by being spread over a longer period if an Option 2 capability was in place..**
Phase 4 – Ferry	**Transition approach**
On-board	There is no existing on-board ticketing infrastructure to replace. • **Technical transition approach is therefore so-called 'greenfields' installation**

From: Nicki Lau Young
To: Steven Bruce; David Lewry; Emmet McElhatton
Cc: Siobhan McMahon
Subject: RE: Benefit mapping for Snapper
Date: Tuesday, 5 October 2021 1:49:20 pm
Attachments: image001.png

That's very useful David - I agree with Steve, a good summary.
In terms of your response to: "Can you have integrated fares without account-based ticketing? " How can we understand the constraints in the complexity of fare rules that can be supported on a card-based system and how this might impact our fares policy development? Are the constraints likely to actually be features that Greater Wellington might want? In other words, I'm keen to understand whether there is likely to be any real substantial difference in terms of the likely fare policy we may wanted to implement between Snapper without ABT and NTS?
Ngā mihi
Nicki

Nicki Lau Young
Kaitohutohu Matua | Project Director – NTS
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From: Steven Bruce <Steven.Bruce@gw.govt.nz>
Sent: Tuesday, 5 October 2021 1:25 PM
To: David Lewry <David.Lewry@gw.govt.nz>; Nicki Lau Young <Nicki.LauYoung@gw.govt.nz>; Emmet McElhatton <Emmet.McElhatton@gw.govt.nz>
Cc: Siobhan McMahon <Siobhan.McMahon@gw.govt.nz>
Subject: RE: Benefit mapping for Snapper
Thanks David. You have explained things really well.
You have provided some good insight into why NTS has been developed in the way it has. If you apply a technology lens then it is easy to understand why you would want an NTS to be "simpler and more flexible to operate and maintain, and changes can be made quickly across the whole network." But if you apply a customer lens, I would expect a key element of the value proposition is being able to know the fare/s charged as you travel and to have visibility of your remaining balance. You mention this feature isn't currently available. I'm curious to know if it isn't possible or rather just more difficult to provide this functionality through the NTS? I'm definitely keen to discuss further when we catch up tomorrow.
Nga mihi.
Steve

From: David Lewry <David.Lewry@gw.govt.nz>
Sent: Tuesday, 5 October 2021 12:35 pm
To: Nicki Lau Young <Nicki.LauYoung@gw.govt.nz>; Emmet McElhatton <Emmet.McElhatton@gw.govt.nz>; Steven Bruce <Steven.Bruce@gw.govt.nz>
Cc: Siobhan McMahon <Siobhan.McMahon@gw.govt.nz>

Subject: RE: Benefit mapping for Snapper

As discussed earlier on the ticketing terminology Nicki – for clarification:

Integrated fares – is entirely to do with fare policy (and generally referring to the ability to travel from a to b using any combination of mode and/or route, and to pay the published fare from a to b. Without integration, you would progressively rack up additional fares if you changed mode and/or route (although you may benefit from some transfer discounts, which are sometimes used as a bit of a basic instrument to assist 'integration').

'Open loop' refers to the capability of the ticketing solution to accept non-scheme payments (i.e. real money to and from the external banking system). Card-based schemes like Snapper and AT HOP are 'closed loop' in that the money value loaded onto cards as travel credits stays within the scheme and can only be 'spent' on travel within that ticketing solution. For instance, you couldn't use credit on your Snapper card on HOP in Auckland. The 'float' (money stored as credit but not 'spent' on fares) is owned and administered by the scheme itself (either transport authority (as with AT HOP), ticketing service provider (as with us and Snapper) or a commercial operator.

In practical terms, **open loop and 'EMV'** can be thought of as the same thing. This is because the way to open loop payment is via the use of contactless bank-issued debit or credit cards and the international acceptance and security criteria for those are set collaboratively by the major payment schemes (credit card issuers). EMV stands for Europay/Mastercard/Visa which together cover most of the western world, but other major schemes (American Express, Union Pay International etc.) also comply. Bank card payment didn't come to public transport until the advent of contactless or 'pay-wave' technology, largely because there is neither the time for any other type of transaction (involving swiping or inserting a card, and PIN entry), or (usually) the knowledge of the price of exactly what you're about to buy when you board a bus or train.

'Account-based (ticketing) system' is the way most newer generation ticketing systems are constructed. It's best explained by mentioning card-based systems first. Card (or 'smartcard')-based systems use the card itself, and the interaction between the card and the ticketing device, to store and calculate fare amounts and credit balances. When you present a Snapper card to a validator, the validator (securely) reads the information on the card, carries out one or more actions (a validation, fare calculation, reconciliation of an 'IOU', addition of a pending top-up, a balance update or the addition to or removal from a 'hotlist' or 'deny' list), during the time it takes for the tag-on or tag-off (generally around half a second). This means the customer has instant up-to-date information about the status of their travel and balance etc., but it requires the ticketing devices to 'know' all of the information about routes, stops, fares, peak and off-peak times etc., as well as keeping a list of blocked cards, pending actions etc. Also to have that information updated every time anything changes. Snapper does this as a continual incremental process (i.e. only updating what's actually changed) using the mobile comms network; AT HOP does it (on bus) by the bus devices being updated by wi-fi when the bus returns to the depot. That means updates can be hours out of date (so a blocked card may still be usable for some time for example). It's also the reason why if you've topped up your HOP balance on line (i.e. not directly at a kiosk with the card physically present), the top-up may not be available if the card is used 'too soon' afterwards.

An account-based system (often called 'ABT') removes the system from distributed devices 'intelligence' to a single central back office, so the ticketing devices don't have to have all of the route and fare information stored and maintained in them. They do have to have action lists and things like knowledge of blocked cards etc. though. Instead of the balance and travel history being maintained on the customer's card, it is held in a central account and the 'card' is purely a token which links the customer to the account information. The account may also hold things

like concession entitlements.
When a customer tags on or tags off, the ticketing device provides only the simple transaction information to the back office. It can then 'aggregate' these transactions by reconstructing trips over a period (usually a day), and calculating the fare owing based on rules derived from the fare policy. The system then charges the customer's account (which may for instance, be linked to a chosen bank account, or be directly held as a 'transit' account balance they need to top up).
The advantages of this approach are that it is simpler and more flexible to operate and maintain, and changes can be made quickly across the whole network. The disadvantages from a customer point of view are that it generally isn't possible to know the fare(s) charged as you travel, and things which rely on information held on a card (such as visibility of a remaining balance), aren't available.
Note that an account 'token' may be whatever the scheme defines it to be and provides the security environment for – it could actually be a Snapper card (Snapper's Ridebank account-based system works that way). NTS mandates the account token to be an EMV standard card (or a virtual EMV card – i.e. a mobile wallet storing a bank card), which means the ticketing devices can only 'read' EMV. That means that the NTS Transit card (for people who don't have or don't wish to use a bank card and will maintain a Transit account) is also an EMV standard card. This in turn prevents the ticketing system to have any other information held on the NTS Transit card, that could help with the things like balance visibility. Most ticketing schemes provide EMV capability while retaining the ability to support a scheme card with conventional capabilities to get around this problem, and that's probably one of the most contentious areas of NTS for some customer groups.

Can you have integrated fares without account-based ticketing?

Yes, you can (Auckland does, and so do many other ticketing schemes). However, there are more likely to be constraints in the complexity of fare rules you can support on a card-based system, which may mean that edge cases have to be simplified in fare policy. ABT makes the management of integrated fares easier and more flexible, but still of course subject to the constraints on visibility of travel history etc. at the time of travelling.
Sorry, that's a bit of an essay but it's a big area, and fundamentally affects most other things including customer experience, operational management, revenue protection etc. I can provide more maybe face-to-face if required.
David

From: Nicki Lau Young <Nicki.LauYoung@gw.govt.nz>
Sent: Tuesday, 5 October 2021 8:22 AM
To: David Lewry <David.Lewry@gw.govt.nz>; Emmet McElhatton <Emmet.McElhatton@gw.govt.nz>
Cc: Steven Bruce <Steven.Bruce@gw.govt.nz>
Subject: RE: Benefit mapping for Snapper

Hi David
One quick question which I am unsure of from your table – what is the capability needed from Snapper to implement integrated fares – do you need an open loop account system to do this or could it be implemented now if the current Snapper capability was extended across the rail network?
Ngā mihi
Nicki

Nicki Lau Young
Kaitohutohu Matua | Project Director – NTS
Metlink
M 021 847 385

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From: David Lewry <David.Lewry@gw.govt.nz>
Sent: Monday, 4 October 2021 3:30 PM
To: Nicki Lau Young <Nicki.LauYoung@gw.govt.nz>; Emmet McElhatton <Emmet.McElhatton@gw.govt.nz>
Subject: RE: Benefit mapping for Snapper

Hello Nicki/Emmet,

I've had a think about this and produced the attached table as a basis for review/discussion. The ticketing options along the top are designed to show progressive capability enhancements (both logically and temporally), and I've added NTS at the end for comparison purposes.

Looking at it like this is quite interesting as it's notable that account-based ticketing is a significant contributor to meeting a range of strategic (business) outcomes, with EMV payment capability focused more on customer-related ones. How those directly or indirectly affect patronage benefits maybe needs further thought.

I've used one to three ✓ marks to denote the extent to which the options support the outcomes. We could probably use traffic light colours if preferred, but I think the ticks give a bit more clue as to the level of support.

Anyway, perhaps you could briefly review/comment, and also identify further strategic objectives that we should add in – I'm by no means suggesting I've got them all!

Thanks

David

From: Nicki Lau Young <Nicki.LauYoung@gw.govt.nz>
Sent: Friday, 1 October 2021 3:06 PM
To: David Lewry <David.Lewry@gw.govt.nz>
Subject: Benefit mapping for Snapper - as discussed this morning- I just forgot to press send!

Hi David – the benefit mapping is along the lines of:

Why can't Metlink wait…….

Describe/map the direct benefits that Metlink will get from a) an electronic ticketing system (no EMV/open loop) b) with EMC/open loop

- No EMV/open loop: better customer experience, cashless for Covid environment in rail, enact integrated fare policy (to meet customer expectations), access to ticketing data for network design/efficiency/planning and customer response, revenue protection (reduce leakage)
- EMV/open loop: increase patronage for occasional users

Describe/map the indirect benefits – e.g., where electronic ticketing enables other products (as per table I sent)

- No EMV/open loop:
- EMV/open loop

Ngā mihi
Nicki
Nicki Lau Young

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From: Nicki Lau Young
Sent: Friday, 1 October 2021 8:28 AM
To: David Lewry <David.Lewry@gw.govt.nz>
Cc: Emmet McElhatton <Emmet.McElhatton@gw.govt.nz>
Subject: FW: Strategic initiatives - alignment to NTS

Emmet – David's going to give the table a go too!

From: Nicki Lau Young
Sent: Thursday, 30 September 2021 2:02 PM
To: Emmet McElhatton <Emmet.McElhatton@gw.govt.nz>
Subject: Strategic initiatives - alignment to NTS

Hi Emmet

It was great to chat this morning – thanks for your time. As discussed, it would be great if you could help identify the strategic initiatives we have planned that will be/could be affected by a delay to NTS and whether Snapper extended across rail either in a) current form b) with EMV or c) with open account loop could enable these initiatives to go ahead in the time planned.

Thanks again

N

Strategic initiative	Electronic ticketing (along with integrated fares) technology **is required**	Electronic ticketing (along with integrated fares) technology **is preferably required** (a work-around is available)	Electronic ticketing plus EMV technology **is required**	Electronic ticketing plus EMV technology **is preferably required** (work-around is available)	Electronic ticketing plus EMV plus open loop technology **is required**	Electronic ticketing plus EMV plus open loop technology **is preferably required** (a work-around is available)
e.g., Park and Ride	Yes (integrated fares required)					

Ngā mihi
Nicki

Nicki Lau Young
Kaitohutohu Matua | Project Director – NTS
Metlink

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From: Alard Russell
To: Michael Freeman
Subject: RE: Contactless on Unit 20 AX
Date: Tuesday, 19 April 2022 8:15:00 pm

Thanks Michael,

That's a really helpful response and should help put the worries to bed.

Alard

From: Michael Freeman <Michael.Freeman@gw.govt.nz>
Sent: Tuesday, 19 April 2022 5:39 pm
To: Alard Russell <Alard.Russell@gw.govt.nz>
Subject: Contactless on Unit 20 AX

Alard

Following on from our discussion I can confirm:

- The Contactless Solution for the Airport service is a separate system from the Snapper Electronic ticketing system on board
- The contactless solution was part of the minimum specification in the RFP, as market research indicated it was required for MVP
- Mana Coach Services contracted Snapper to provide a solution
- The solution is smart phone based and takes payment from debit/credit cards and cards stored in phone wallets, it is not eftpos
- The solutions does not connect to the BDC
- The solution will provide data to GW as required as part of the license with the airport
- While this solution does take EMV cards, it is not an integrated solution, but a bespoke discrete solution provided for the operator by Snapper so that the operator can conform to the requirements of the RFP

Payment methods are :

- Contactless, Snapper BDC Cash, Snapper Card
- EFTPOS is not supported

I hope that is the detail you require.

Ngā mihi Michael

Michael Freeman (he/him)
Kaitohutohu| Business Development Specialist
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5.5.1 Transition approach conditions and assumptions

In order to maintain control, facilitate effective planning and minimise risk to business and customer interests before and during the phased transition process, GWRC requires that a number of conditions are met or assumptions validated. Although not directly related to TSP responsibilities associated with the procurement BAFO process, the do influence the choice of transition options and will influence the development, timing and potential flexibility of transition plans.

The transition approach outlined in the high level phasing and technical approach below is based on the following:

- That transition planning can be entered into in good faith, as a consequence of the NTS Timeline and regional phasing being established and adhered to;
- That a detailed plan for all aspects of GWRC transition planning and implementation is developed and agreed between all involved parties including TOs;
- That GWRC retains overall sovereignty over the approval and authorisation of stages of transition implementation, in the context of complementary/supporting activities and dependencies;
- That all relevant aspects of the NTS ticketing service offering from TTP are established and proven prior to them being deployed for any aspect of transition;
- That all relevant aspects of NTS interface/interaction with GWRC business and customer channel systems (such as bus RTI, and with concession authorities) are complete, tested and can be demonstrated;
- That the capability of the TSP/TTP to successfully manage all aspects of the rapid replacement process for bus, under time constraint, is proven - ideally through a comparable bus implementation with another region;
- That all necessary training has been provided and is complete for all stakeholders prior to the start of any pilot or implementation phase;
- That no customers are 'left behind', or are obliged to adopt a fare payment method not of their choice (i.e. all NTS customer payment options, including Transit Card availability, are available in readiness for the first implementation);
- That successive transition phases are not initiated until the previous phase is established and accepted;
- That an Option 2 arrangement (legacy device accepts new media) has been possible, it would potentially de-risk a 'rapid replacement' bus transition in particular. It is assumed that the development implications for this would be GWRC's and that consequently those for the NTS TSP and therefore for BAFO would not result in additional costs (and may reduce costs as a result of lower intensity replacement programmes);
- That for rail, that the existing paper-based ticketing solution is maintained in place for a parallel transition period, to be decided by GWRC.

From: David Lewry
To: Alice Brennan
Subject: FW: Snapper Road Map to EMV
Date: Friday, 22 March 2024 9:55:22 am
Attachments: image001.png
Snapper EMV Roadmap.pptx

As discussed Alice – other one to follow.

David

From: [redacted]@snapper.co.nz>
Sent: Thursday, February 4, 2021 3:07 PM
To: David Lewry <David.Lewry@gw.govt.nz>
Subject: FW: Snapper Road Map to EMV

Hi David

For your background information.

Regards
[redacted]

Messaging that went with the power point pre-Xmas…..

"Whilst fully conscious that we are fast approaching the Christmas break I wanted to update you on progress Snapper has made towards having an EMV path available to GWRC in 2021. It had been indicated that our Roadmap would include EMV development. In our on-going work and relationship with TMoney (Sth Korea) and ICM company asscociates, LittlePay, we have been bringing together a workable path for EMV functionality.

I attach a slide pack that walks you through the EMV path at a high level. At this point I wanted you to at least have information at hand going into the break and look to a time/date in the New Year to talk through the material, solution and how this could add yet another piece to the transition plan to NTS."

Regards and thanks for the opportunities to date to develop our partnership.

[redacted] | PT Manager

[redacted]

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Level 12, Aon Centre, 1 Willis Street, Wellington 6011

cidimage001.png@01D64E21.06890A60

SNAPPER

ARE YOU COMPARING APPLES WITH APPLES?

ACCOUNT-BASED TICKETING AND ACCEPTING EMV CARDS IN TRANSIT ARE NOT EXACTLY THE SAME

INTRODUCTION

Over the last few years the transit industry has been flooded with new terms such as EMV, contactless, first tap risk, open-loop and account-based ticketing. In fact, many people would consider these terms to all reference the same thing. That's not necessarily the case.

An organisation who shares this view is APSCA, Asia's industry association for payments and identity, with which Snapper has had a long association. A recent APSCA[1] newsletter raised several questions for it's members to consider. One of them in particular caught our attention: **"Account-based ticketing and accepting EMV cards in transit are not exactly the same."** We approached APSCA Chairman Greg Pote[2] to ask if we could use this topic as a basis for a feature article, to expand further into the key definitions and provide examples where these differences are evident in transit implementations today.

This article therefore seeks to define the key terms that are being used to describe either account-based ticketing or EMV implementations that are being used in relation to account-based ticketing.

With this frame of reference in place, we have then categorised the most common anecdotes and observations in reference to this topic, into three main statements outlined below.

The relevance of this exercise is to help support the role of the Transport Authority or Operator in their quest to:

- Improve the customer experience
- Reduce the cost of fare collection
- Improve fare policy flexibility
- Simplify technology integration.

With these goals in mind[3] it is important to have a considered view of the technology options available, so that the final choice meets the majority of requirements and doesn't exclude significant customer segments.

KEY STATEMENTS TO CONSIDER

1. **You can have an account-based system with or without EMV.**
2. **You can have an account-based system with or without a closed-loop card.**
3. **You can operate an account-based system either online or offline.**

11 ESSENTIAL TERMS FOR ACCOUNT-BASED SYSTEMS IN PUBLIC TRANSPORT

1. **ACCOUNT-BASED** is a fare-collection system where the proof of entitlement to travel, and any records of travel are held in a back-office and not necessarily on any physical media held by the passenger. Account-based can operate in both an online and offline world using risk-managed revenue protection techniques as appropriate.

2. **CARD-BASED** where the funds, proof of entitlement to travel and any primary records of travel are held directly on the card. All equipment in a card-based system must be able to perform fare calculations and update travel records directly to the card each time it is presented.

3. **OPEN-LOOP** refers to a payment source (could be a card, mobile wallet, QR code) that is widely accepted by multiple merchants. The issuer and the acquirer can be different. Visa and Mastercard are both considered to be open-loop cards. WeChat Pay in China is also considered to be open-loop as it is so widely accepted.

4. **CLOSED-LOOP** is a payment card from a single issuer (Transport Authority or Operator), where funds are pre-loaded onto that card. The card can only be used to pay for products and services at merchants recruited by the same payment card scheme.

5. **EMV** stands for Europay, Mastercard, and Visa, the three companies that originally created the standard. The standard is now managed by EMVCo, a consortium with control split equally among Visa, MasterCard, JCB, American Express, China UnionPay, and Discover. Only contactless EMV (cEMV) is applicable to transit systems, as opposed to contact EMV.

6. **CONTACTLESS** refers to a contactless card which has a chip embedded that can communicate with a payment terminal or transit equipment, via NFC. Contactless is not exclusive to EMV, for example MIFARETM is also a form of contactless. It is important to understand whether the reference to contactless is for an open-loop or closed-loop card.

7. **ONLINE** refers to a fare collection system where the fare calculation and revenue protection takes place in the back office in real time. This requires a network connection such as ethernet, Wi-Fi, 3G or 4G.

8. **OFFLINE** refers to a fare collection system where the fare media authentication and revenue protection does not rely upon a real time communication network. The authorisation occurs locally (gates/readers) and relies on the application of lists to that equipment.

9. **FIRST** tap/Ride risk in an account-based environment, is when customers are presenting their own fare media that is not pre-registered with the Transit Authority, so there is a risk that they will not have the funds to pay when the transactions are billed to the account. The amount of risk is dependent on the highest value fare that could be taken in the maximum amount of time before payment is billed and a new list is applied to block the fare media from the system.

10. **PRE-PAY** refers to the ability to pre-load funds onto a card, account or token to travel.

11. **POST-PAY** refers to the ability to travel first and pay after. EMV compliant systems are typically post-pay, which is where the first tap risk becomes important. However account-based systems could be pre-pay, post-pay or have both options available for the passenger.

STATEMENT ONE

You can have an account-based system with or without EMV.

EMV is only one of a potential variety of payment methods possible in an account-based system. The most likely reason for the blurred lines between what is account-based and what is EMV is due to the frequent retelling of the most high profile case study for EMV: Transport for London (TFL).

Whether you are in the UK, Singapore or Montreal, TFL is the example that everyone references. What is not widely understood, is that the EMV capability, along with its account-based back-office, is a stand-alone system to the existing Oyster back-office. This means there is no fare integration between the two systems. To counter this, TFL has developed a new back-office to pass Oyster tap data, so that weekly fare capping can be applied to Oyster PAYG customers. However with approximately 12 million Oyster cards in circulation, the costs of migrating to a single account-based solution is disproportionate to the additional benefits.

In this sense, if you are starting from a greenfields position, developing an account based system with a range of payment sources and fare media, is infinitely easier than if you develop a stand-alone EMV solution as a bolt-on to an existing card-based system.

TRANSPORT FOR LONDON (TFL)

Share of total journeys by payment type
As at June 2017

WHY IS BOLT-ON EMV A DIFFICULT BUSINESS CASE?

- **EMV IS FULL FARE ONLY**
  Paying a full adult fare is acceptable for infrequent travellers, single journeys and tourists, but not ideal for regular commuters who purchase season passes, or people with concession passes such as children, students, elderly or people with disabilities. Capping rules (usage based fares) can be applied and may or may not require registration. This goes some way to accommodate more frequent travellers who prefer to use their bank-card over the closed-loop card option.

- **EMV IS AN ADDITIONAL COST CENTRE**
  One of the key outcomes for an account-based system is to reduce the cost of fare collection, however that is dependent on the level of adoption. If EMV is being run in parallel to a card-based system, you are carrying an increased cost structure, without reducing your existing cost structure.

- **EMV IS PREFERRED BY A SUBSET OF PASSENGERS**
  Anecdotes from several cities which are using EMV show that an adoption rate of up to 20% is the most realistic target of total transport journeys. For example EMV is used in 22% of all journeys at TFL. Similar expectations are expressed in recent articles on EMV acceptance at Transport for New South Wales[4] and Translink, Canada[5] where it is stated that EMV is for a distinct subset of customers and not designed to replace existing smartcard usage.

- **EMV HAS INCREASED RISK**
  In a card-based system funds are pre-paid onto the card. Moving a portion of transactions to a 'pay later' model introduces a risk where the funds may be declined. In many schemes, risk-sharing models have been established between the issuing banks and the Transport Authority, particularly around the first tap or first ride risk. The business case to introduce EMV would depend on the appetite for this risk.

The early motivation for TFL to introduce EMV was for cost reduction purposes, with a view to phasing out the Oyster card over time. However Oyster still represents the majority of all journeys in London, and a recent article[6] has claimed that Oyster are issuing 700,000 Oyster cards every month. For London, and for any other cities who are using an EMV as a stand-alone account-based model, the pathway to a full account-based system is a difficult problem to solve.

If you are adding EMV as an additional payment channel to an existing system, make sure your business case stacks up. For example, you may not necessarily wish to push people away from low cost channels such as auto-load to EMV.

Bolt-on EMV, as opposed to a full system refresh, would seem to make the most sense in major global cities with very large tourist markets such as London.

Mark Streeting[7]
Partner LEK Consulting

STATEMENT TWO

You can have an account-based system with or without a closed-loop card.

An account-based system differs from traditional card-based schemes, because the business rules and fare calculation are managed in the back-office and the fare is calculated and billed after the travel is complete. This means that the fare-media used to tap in and out of the system is nothing more than a unique identifier for the customer that is linked to their account.

It seems that many public transport authorities and operators have bundled the closed-loop card and the card-based system together, and rejected the idea of using a closed-loop card as a fare media option in an account-based system. It is important to understand that there is a place for multiple fare media types such as closed-loop cards, mobile wallets, BLE, QR codes and open-loop cards in an account-based system.

The closed-loop card is still the most effective and high performing fare-media to use in transit. The friction has always been around getting funds, concessions and products onto these cards. This is one of the problems that an account-based system solves. If all the fare logic is moved off the equipment and into the back-office, it means that the card is no longer the master of all data. Instead, customers can have access to all the modern digital tools that they expect to use to purchase and manage transport products such as online and smartphones.

The transaction is as fast as your communications network allows. For those operating in an offline environment, those transactions can still be available from several times per day to once a day.

THREE REASONS WHY YOU SHOULD KEEP YOUR CLOSED-LOOP CARD

This is by no means an exhaustive list, but a good place to start with an internal discussion on what fare media or tokens to include in an account-based system.

1. How many active users do you already have?

In some cities there are millions of active smartcard (closed-loop) users. Those people have 'muscle memory' using their card and are the ones who are unlikely to switch to new methods without a significant incentive. These cards are also good for continued re-use, while attracting new users with new tokens. The cost of managing a complete swap-out of a legacy card base for a new one is likely to be significant.

2. What percentage of your customer base has a discounted product or concession?

Can you segment your active customer base between pay-as-you-go fares and discounted fares? If so, you will start to have a view on the potential of customers likely to switch from an existing closed-loop card to an alternate method such as EMV. EMV is full fare (including usage based capping), with no method to write to the card to verify a unique concession or discounted product on inspection. In this scenario, there is little incentive for these customers to switch.

3. How important is your brand?

The closed-loop smartcard is often synonymous with whatever city is it used in. If brand is important, then a bank-issued open-loop card may not be the best option. A co-branded bank card would still provide the branding, however that shifts the business case away from attracting tourists and infrequent users as they are unlikely to have those co-branded cards.

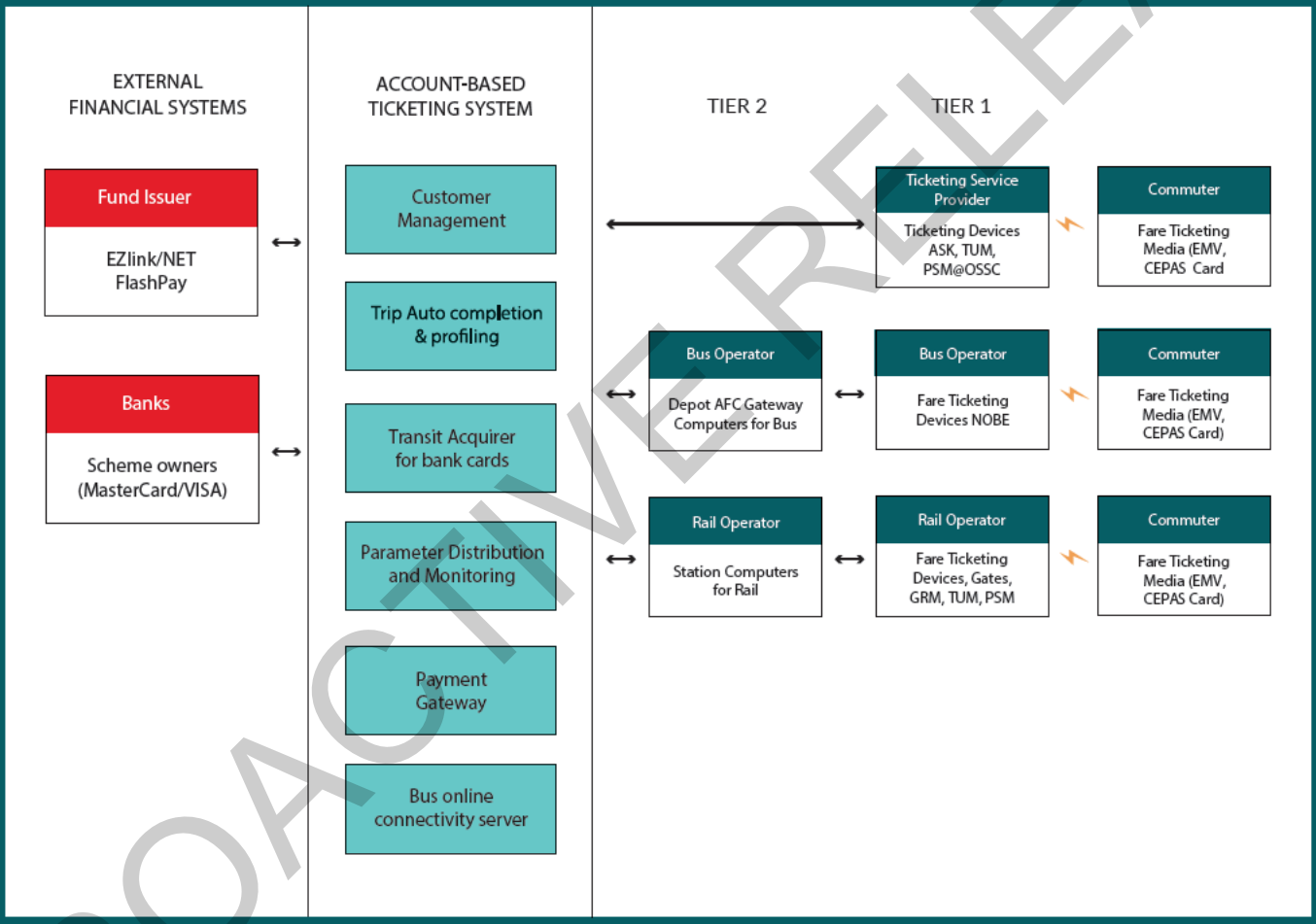
In most cases you will need to offer customers a closed-loop card. This can be based on traditional transport smartcard technology or white-label or co-branded EMV technology. Using a closed-loop card means that you can offer full price and concession seasons/passes and can provide cards to customers unable or unwilling to use bank-issued cards. It also means that you can apply some useful in-built media personalisation – such as final expiry date or concession class – that simplifies reader processing.

Chris Querée[8]
Independent Transport Consultant

CASE STUDY | SINGAPORE

In 2017, the Land Transport Authority (LTA) of Singapore, commenced a large scale EMV payment trial on the public transport network. Silvester Prakasam, Senior Advisor for the Fare System at the LTA gave an update to the attendees at the APSCA Transport Payments South Asia forum in India.

The LTA is now pursuing a transformation to a full account-based solution, consisting of a hybrid system architecture, including both open-loop and closed-loop fare media acceptance.



The objectives of the project are to move the fare logic from the front-end to the back-end, and to introduce access for many other forms of fare-media such as QR codes, mobile and BLE for example. They also like the benefits of being able to introduce additional features such as loyalty and discounts more easily.

STATEMENT THREE

You can operate an account-based system either online or offline

In an ideal world we would all have access to real-time communications however there are very few examples of public transport networks that are all operating online, usually there is a mixture of modes operating through a cellular network vs others that are authorising transactions locally at the reader or validation equipment and reconciling after.

Card-based ticketing transaction authorizations are "local" – whether in a bus validator, transit gate or an adjacent station computer – and so in practice occur offline. Early thinking about account-based ticketing models assumed that transactions would have to occur online otherwise the risk of fraud would be too great. According to this thinking account-based for bus transport systems was never going to be possible. But an EMV authorisation could not be completed any faster than a retail payment at a point-of-sale (i.e. a few seconds) and certainly not within the 500ms required by most public transport systems. Instead account-based ticketing is all about risk management, which means the downloading and application of lists to devices to enable the same "local" transactions that occur in card-based ticketing. So the online versus offline discussion is not as relevant as it may appear at first sight. It's all about systematically assessing and reducing risk through a range of tools and technologies.

One additional concern relating to online or offline is the change in customer experience. In a card-based system, the customer can present their card to a terminal or vending machine and have an accurate balance because the card is the master source of data. The trade-off with moving to an account-based model, is that the customer will have better access to those transactions (online or from their phone), but the up-to-date balance might not be available for minutes, hours or up to a day.

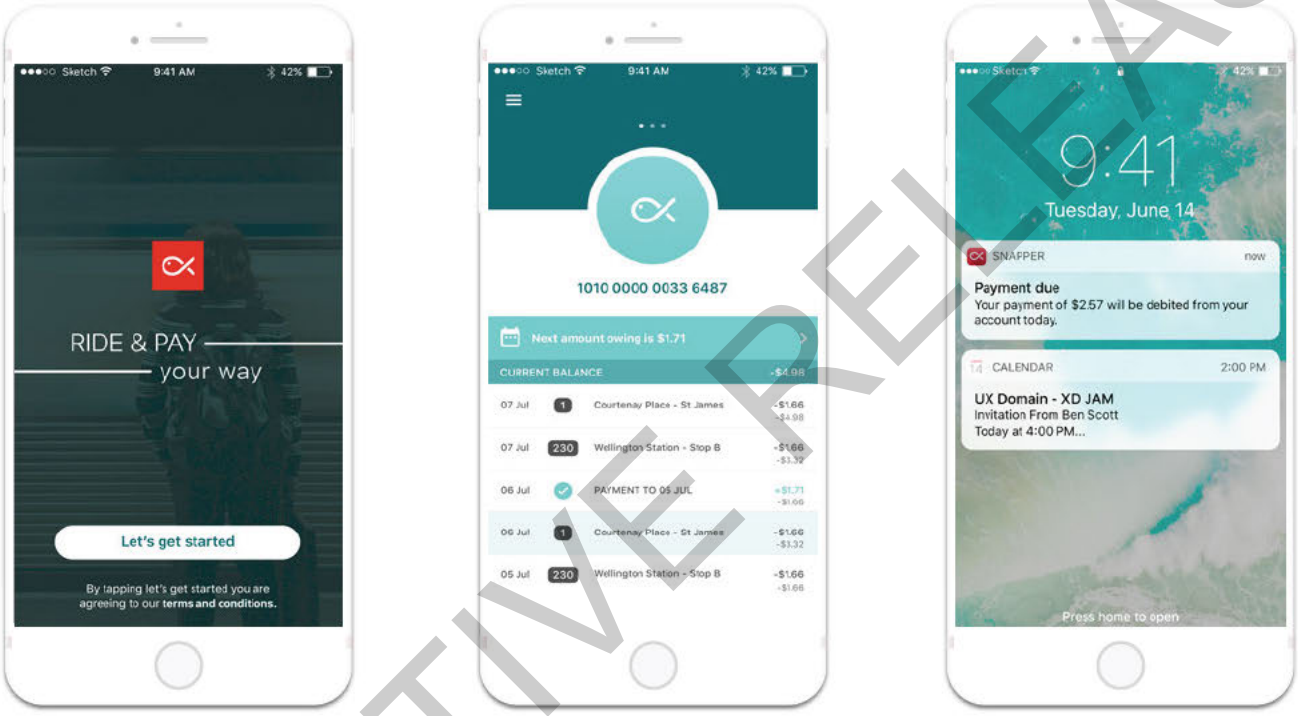
The time lag depends on the frequency with which the transactions are communicated from the devices. The ideal would be real-time, however if the transactions are hourly, or a couple of times per day, then it is about managing customer expectations to see that data.

For an account-based system operating offline, the frequency of transmission of transactions to the back-office, together with the subsequent updating of lists in card readers, is key to managing risk.

Online or offline shouldn't really be a factor – realistically, you need to assume it is all offline.

Michael Walters[9]
Founder – LittlePay,
Independent Consultant

Snapper Services Ltd in Wellington, New Zealand operates the ticketing system for a bus network that is offline. The transactions are currently uploaded once per day when the vehicles return to depot. For the Snapper RideBank™[10] account-based trial, where the existing Snapper closed-loop smartcard is used as a token for travel, there were some concerns about the delays in customer transactions. However the combination of risk management techniques, use of notifications direct to mobile and other features, have helped to manage this and it hasn't been raised as an issue from trial users to date.



Screenshots from the new account-based Snapper iOS app

QUESTIONS TO CONSIDER FOR AN OFFLINE SYSTEM

- How frequent are transactions communicated from vehicle equipment and gates to the back office?
- Are all transport modes communicating in the same time frames or are there significant variations?
- What is your risk appetite? Could you implement rules for black-listing cards to minimize the risk of non-payment?
- What is your roadmap for communications upgrades? Can you start with some modes and others later?

CONCLUSION

When evaluating the merits or challenges of a new generation ticketing system, verify the terminology. Is it an account-based system where the Transport Authority holds the back-office and manages the payment sources that can be connected to it, or is it a bolt-on EMV solution?

Account-based systems in transit are still in the early phase of adoption, and the data is currently limited to support outcomes such as reduced costs of fare collection. A lot of the outcomes are dependent on the model chosen, and this paper has explored common misconceptions about what an account-based vs EMV system is and isn't capable of.

One thing consistent across every public transport system across the world is that no single fare-media and payment method will suit everyone. The key is to provide choice, and if that choice can be built upon a single platform that is open and flexible enough to connect to a variety of payment sources and fare media, as well as new technologies that are still emerging, then even better.

SOME OF THE KEY QUESTIONS POSED WHEN EVALUATING THIS MODEL

- Do you know your fare risk profile, and how it could be improved?
- How important is it to retain brand identity with the customer?
- Is your long-term roadmap to have a multi-modal transport network that is connected by a single back-office?
- Do you have enough ticketing payment options to cater for a range of customer segments from the regular commuter, concession holder, unbanked, anonymous and infrequent user?
- What will the incentive be for existing customers to switch to new methods?

As much as EMV is a very convenient way for accessing and paying for public transport, operators need to keep in mind that not all passengers will have an EMV card. To be inclusive and adhere to the principle of public transport – to provide transportation to (all) public, a more inclusive and convenient option should always be available to everyone – children, the elderly, the unbanked, etc.

Andy Yip[11]
General Manager, Octopus International Business

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https://www.linkedin.com/in/gregpote/

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8 Chris Querée
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10 https://services.snapper.co.nz/new-digital-channel-smartcard-users/

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ISO TR 20526 Account-based ticketing state-of-the-art report

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SNAPPER

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Snapper on Rail

Who is Snapper?

Snapper is a Wellington-based company that uniquely delivers a world-class automated fare collection (AFC) system as a service. It is unique in that almost all regional authorities around the world procure and operate their own AFC systems, whereas Greater Wellington Regional Council have the benefit of fully outsourcing their bus fare collection to Snapper, who are experts in their field.

Snapper's AFC system leverages a world-class settlement and clearing system that is provide by T-Money, a South Korean company whose primary role is to provide the integrated AFC system for the city of Seoul and other regions in Korea. Snapper has built upon and adapted the T-Money system to deliver a customised and fit for purpose AFC system for the Wellington public transport environment.

What has been requested?

GWRC have proposed the extension of Snapper's AFC system to support electronic fare collection on the Wellington Rail network and provide an excellent customer experience.

What does this entail?

Snapper and T-Money's AFC system does not have an outdoor Rail capability that is 'out of the box' which meets GWRC's requirements for the Wellington Rail network. Snapper and T-Money will need to adapt the existing system to support Wellington's Rail environment. Extending Snapper's AFC system to support fare collection on Rail is a complex project that involves significant changes to software, hardware and operational processes, specifically:

- Designing and developing a completely new technology stack, including firmware, that supports current validator models to operate in standalone mode, as well as GWRC fare policy including Rail replacement bus services. In the bus environment, validators rely on a Bus Driver Console to receive configuration and fare data and send out transaction and event data.
- Designing and developing a completely new remote monitoring capability for the standalone validators. In the bus environment, validators that experience issues can be triaged by Operator drivers and maintenance personnel.
- Designing and developing bespoke hardware that will encase Snapper validators to ensure they are weatherproof and vandal proof, support accessibility, enable the successful read of a Snapper card, and to be fit for purpose for GWRC's desired customer experience. In the bus environment, validators are fixed to bus poles and are not exposed to an outdoor environment.
- Adapting and developing Snapper's existing bus revenue protection application to allow revenue protection officers to check Snapper cards for a valid Rail trip. In the bus environment revenue protection confirms that the passenger is on the correct trip.

- Developing a new Reporting Portal and reports specific for a Rail Operator (Transdev).
- Updating GWRC's Reporting Portal and TOTO feed to support Rail transactions and revenue protection data.
- Extending equipment monitoring, repair and maintenance services to include Rail hardware distributed across the Wellington Region.
- Updating customer service channels (Call Centre, Service Sites, Website, Mobile) to service Rail passengers using the Snapper card to pay for their rail fares.
- Updating card reload channels (Retail, Mobile, Website and Kiosk) to support Rail transactions.
- Updating training material and providing train-the-trainer services for Revenue Inspection.

What does this mean for Snapper?

Snapper's vision is to create excellent experiences in public transport that accelerate the journey to a sustainable world.

Snapper is a passionate local company that wants to see Wellingtonians benefit from a world-class AFC system. Snapper believes that we are uniquely positioned to deliver a successful project in a relatively short time frame, because:

- Snapper has over 10 years' experience in running an AFC system in Wellington;
- The AFC system is flexible enough that it can be extended to support Rail fare collection;
- The Snapper team are specialists in providing AFC system technology and operations; and
- (most importantly), The Snapper team (and our family and friends) are all users of Wellington's public transport network.

Snapper's desire is to continue to be GWRC's AFC system provider of choice beyond the current interim contract arrangements.

What are the benefits to GWRC?

- Accelerating the removal of cash from Wellington Rail and therefore reducing the risk of zero fare collection in the case of another lockdown as a result of the COVID-19 pandemic.

- Step-change improvement in the Wellington Rail fare payment customer experience (which is still cash based), to the equivalent of what is on Wellington Bus.

- Reduce the effective cost per transaction of fare collection.

- Reduce the risk of further delays to the expected implementation date of the NTS (understood to be currently planned for 2024).

- Improve fare collection through effective use of revenue protection.

- Ease the way forward for the introduction of further fare collection enhancements such as SuperGold, Corporate Ridebank and EMV as alternate ways for customers to pay.

- Improve the data collected on travel usage, enabling GWRC to better understand travel patterns and improve forward planning, as well as improving SuperGold concession reporting to NZTA.

- Provide a path to an integrated Public transport network, initially between Bus and Rail, but ultimately to include Ferry and Park and Ride with little additional development and risk.

Snapper Roadmap: EMV Support

DECEMBER 2020

Context

EMV support is a long-term trend in the Transport Ticketing market

- The Transport Ticketing industry has been advocating for the support of bank-issued credit and debit cards for many years, driven by Visa and Mastercard.
- Bank-issued credit and debit cards conform to the Europay Mastercard Visa (EMV) standard. The contactless variant of this standard is commonly referred to as contactless EMV, Open Loop, or by the trademarks Tap & Go (Mastercard) and Paywave (Visa).
- Contactless EMV has been adopted as a standard by most banks globally, along with smartphone ecosystem participants (e.g. Apple and Google)
- The primary driver for the adoption of EMV in public transport is to reduce the use of cash on public transport services, intended for occasional users such as tourists.
- EMV co-exists with purpose-developed smartcard ticketing systems designed for the payment of transport fares for a variety of customer types. There are no known EMV-only transport ticketing implementations globally. EMV has been deployed in some markets, notably London where it has achieved 35% share of all transactions.
- Deployment of EMV systems has historically required the replacement of existing ticketing devices, however devices deployed in the past two to three years may be capable of upgrades to support EMV.

Benefits of EMV

Customers expect to pay with bank cards and smartphones

- Reduced use of cash
  - Occasional users can use their bank-issued card or phone instead of a single purpose transport smartcard
- Support for mobile wallets “out of the box”
  - As soon as EMV support is delivered, customers can use Apple Pay or Google Pay to pay for their fare. Smartphones and smartwatches are supported immediately
- Note: EMV does not typically reduce the cost of fare collection as it requires integration with payments infrastructure and attracts bank fees e.g. the cost of fare collection for TfL increased from ca. 9% to 10% following the introduction of EMV support

Snapper's roadmap includes EMV support

Snapper devices are EMV capable and can be upgraded via integration with proven third-parties

- The existing Snapper devices deployed on the Metlink bus network, and those planned for the Rail network, are EMV Level 1 certified.
  - This means that the hardware can support EMV compliant payment instruments including bank-issued cards and smartphone wallets.
- In order to provide a complete fare-collection service, these devices need to be upgraded and certified against EMV Level 2 and Level 3. Third-party services are now available that make this a predictable and proven process.
- To achieve Level 2 certification, an EMV compliant payment kernel need to be deployed in the devices. This will be achieved by deploying an EMV specific Security Access Module (SAM) and updating the device firmware
  - Snapper's device partner, T-Money, has confirmed that it is feasible to update the device firmware to support an off-the-shelf SAM that supports EMV
- To achieve Level 3 certification, an EMV transaction generated from the device needs to be processed successfully by an EMV-compliant payment gateway, and Visa/Mastercard need to individually certify that the transaction meets their criteria.
  - Snapper has confirmed that it can integrate its proposed solution with Littlepay, an experienced transport-specific payment services provider (PSP) with proven Visa/Mastercard certifications.

Timing considerations

Incremental upgrade is time efficient

The initial development and certification phase is in the range of nine months

- Four months to develop and certify a Level Two compliant solution
- Three months to develop and certify a Level Three compliant solution
- Four months for integration with RideBank and other customer support tools (in parallel with Level Three solution)

A three-month proof of concept on a specific bus service is proposed prior to deployment across the network.

Budgetary pricing

Incremental upgrade is cost efficient

The budgetary price for development of the solution is less than [redacted] (one-off)

This includes all costs to achieve certification, and the initial Proof of Concept deployed on 10-15 vehicles

The budgetary price to upgrade all devices across the Metlink bus and rail network is [redacted] (one-off)

The budgetary price for ongoing operation of the solution is ca. [redacted] per annum plus a bank fee in the range of 4.5% of every fare processed.

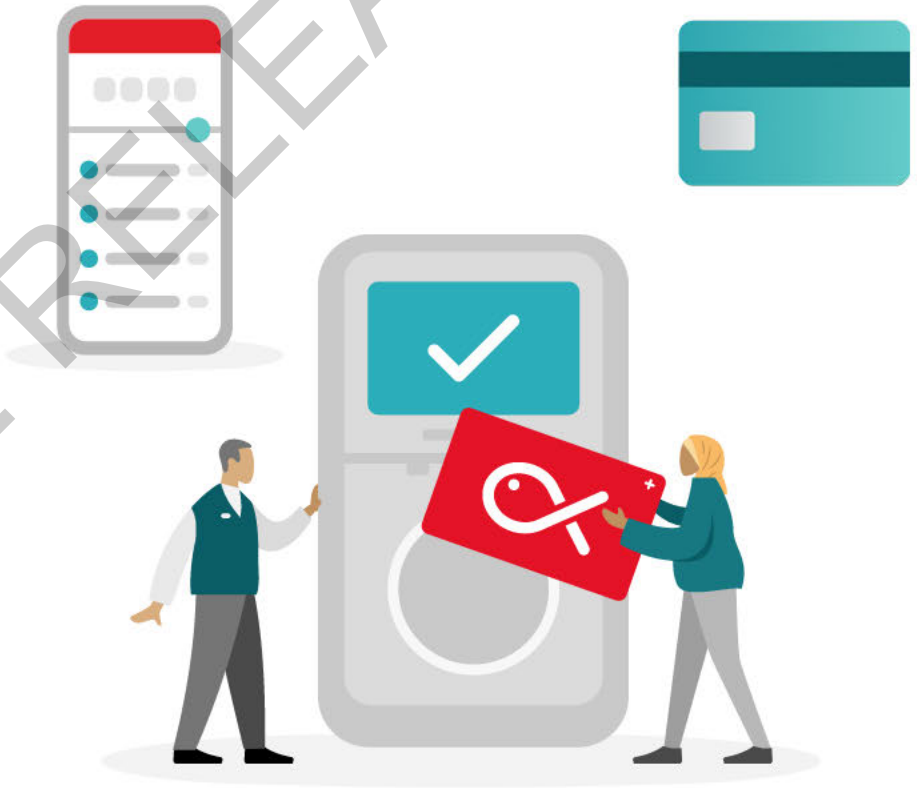
Bank fees include interchange and scheme fees

- At 10% adoption rate of EMV, the bank fees will be ca. [redacted] per annum

Snapper's offering provides unique benefit

Cost-efficient, low risk, fast to market and flexible

- Maximise ROI of existing Snapper devices
  - Low cost with no device replacement required
  - Opportunity for third-party sponsorship
- Incremental upgrade for existing system with proven partners
  - In market in 2021, low risk development and deployment
- Maximum flexibility with National Ticketing System
  - All options remain on the table, including full replacement.
  - New options created to leverage transaction processing scale economies from NTS partners.
  - GWRC is in full control of timing.
- Meet expectations of existing Snapper users who seek even more convenience.
- Opportunity to experiment with fare policy (e.g. capping) in advance of NTS to understand what new policies are most effective.



Discussion and next steps

Are there no-regrets next steps that align with National Ticketing System ?

- Given the current installed base of devices on-bus, and the current plans for Wellington Rail, is it a no-regrets activity to proceed with Level 2 and Level 3 compliance activities?
  - These provide an EMV capable system that can be integrated into the National Ticketing System in due course
  - The fully loaded cost (supply, installation and backward compatibility) of replacing an existing Snapper device with a NTS device would need to be less than [redacted] device for an alternative to be more cost-effective.
  - How would this be used during the NTS business case phase? Does it provide a base case for comparison?
- Given the unsolicited interest from sponsors (eg Mastercard), is it a no-regrets activity for Snapper to approach potential sponsors to flesh out their appetite for a sponsorship proposal to minimise the financial commitment?
- When is the right time for GWRC to engage with NTS participants to determine if economies of scale exist for transaction processing, in order to reduce bank fees?

National Ticketing Solution

DETAILED BUSINESS CASE

ITERATION 6

Based on BAFO prices from Preferred Ticketing Supplier, updated counterfactual and transition costs, recommendations from the external Peer Review, and feedback from economic and stakeholder review.

August 2022

COMMERCIAL IN CONFIDENCE

WAKA KOTAHI NZ TRANSPORT AGENCY · Greater Wellington Te Pane Matua Taiao · Environment Canterbury Regional Council · AT · Regional Consortium

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1 Executive Summary

1.1 A compelling case for change

Increasing the use of travel by public transport will help shape a more accessible, safe, and sustainable transport system

The National Ticketing Solution (NTS) is an enabler for change. A flexible, modern ticketing system will make it easier for people to pay for public transport anywhere in the country and make it easier to support national concessions such as SuperGold and Community Connect. Increased access and convenience will encourage more people to use public transport more often, and ultimately contribute to reducing New Zealand's carbon emissions and improving safety and congestion on our roads. Public Transport Authorities (PTAs) will gain a digitally-enabled system providing customers with more choice, transparency, and simplicity. A deeper understanding of customer journeys will mean improved network operations and fleet management and more targeted investment.

The NTS is a partnership between PTAs and Waka Kotahi. The PTA partners comprise Auckland Transport (AT), Greater Wellington Regional Council (GW), Environment Canterbury (ECan), and the Regional Consortium (RC) comprising the smaller regional councils across New Zealand.

Modern ticketing solutions use bank-issued debit or credit cards or virtual cards on mobile devices.

Customers will be able to pay using their own contactless bank-issued debit or credit card (or virtual card). Tagging onto a service as people do today is their 'authority to travel', replacing a ticket. Software in the back office will aggregate each customer's journeys over a travel day, calculate the lowest fare, and charge the card overnight.

Because fares are applied after travel, corrections can be made before the customer is charged, such as where there are disruptions, delays, or other account adjustments. Similarly, customers can access their account and make corrections such as when they have forgotten to tag-off.

Those without a debit or credit card, including children, will be provided with a pre-paid Transit Card much like they use today, but where deductions for travel will be done in the back office against their account. Use of cash on-board buses, trains and ferries will be at the discretion of each PTA.

Right now, we have an opportunity to align investment nationally in a proven, world-class, public transport ticketing system

Auckland aside, the current systems are not integrated, some are antiquated or at the end of their technological or economic life and some are interim or need substantial change. In all cases, customers must pay before travelling, which ties up millions of dollars on prepaid smart cards or travel passes. Most systems cannot support fare policies such as daily fare caps or multiple concessions that would provide customers with a guaranteed lowest fare. Nor can they

provide comprehensive, uniform data about how customers travel across New Zealand. A modern account-based solution would provide customers with convenience and payment choice, making it easier to access public transport; would enable national transit policies such as the proposed Community Connect card; and provide a possible platform for future point-to-point transport payment requirements such as park and ride, road tolling and congestion charging.

All current ticketing system contracts end within the next five years. National ticketing has been considered for more than ten years, with systems and contracts being intentionally aligned to enable the NTS to be fully in place by the end of 2025/26.

Partner PTAs share strong working relationships and are working together for better outcomes. This is important because New Zealand cities are small by global standards and most lack the scale to afford a modern ticketing solution like the NTS. Customers are using contactless debit and credit cards for retail payments and expect the same for public transport. Investment in digital systems is required to meet current and future customer and business needs but implementation takes time, so we need to get started.

Improved outcomes for New Zealand are at the heart of the NTS

A modern ticketing and payments solution supports a range of outcomes.

Improved customer experience – convenience, ease of use, integration, and lowest fare guarantee, remove immediate barriers to using public transport. There is no need to buy, carry and top up a transit card or find cash, no queuing to get tickets or prepaying to travel. People can use the same card or device on any bus, train, or ferry across the country and, with daily or weekly fare capping, are charged the lowest possible fare.

Supports mode shift – people can simply tag onto a bus, train or ferry using bank-issued cards or mobile devices they already have. This reduces barriers to using public transport, particularly for new and infrequent users and visitors. Providing easier ways to pay and the ability to easily change fares to drive demand works alongside other investment activity to support mode shift and reduce emissions.

Better insight and flexibility – better data about public transport usage enables continual improvements to network design, scheduling, and fares, and provides more flexibility to act on insight to support easy, cost-effective changes to public transport networks and services. Better data helps support regional fare policies and makes it easier to apply local and national between PTA partners, e.g. Te Huia Auckland/Hamilton train.

Value for money – collective buying of hardware for New Zealand supports flexibility of the bus fleet between regions and equalises ticketing capability across the country for the benefit of all New Zealanders. Costs of fare collection, which includes reducing fare evasion, can be managed on a New Zealand-wide basis.

Digitally-enabled system – makes it easier to integrate with new digital technologies, can be integrated with existing systems where sensible, and potentially integrated with third parties to provide wider services.

Supports health and safety – supports rapid change during disruption (e.g. Covid-19) such as providing a level of contract tracing for registered customers and facilitating the elimination of cash. Not having cash on-board helps to reduce the spread of viruses and supports the safety of drivers, allowing them to better focus on customers' needs.

Contributes to national and regional policies – these include the Government Policy Statement on Land Transport, New Zealand Disability Strategy, Emission Reduction Plan, New Zealand Digital Strategy, and regional public transport plans.

1.2 Alternative Options

The options considered ranged from free public transport (implying no ticketing), upgrading existing systems, or procuring either new regional solutions or a single, national, solution. Whether procuring a regional or national option, the ticketing and payment solution options comprise closed loop, open loop, account-based, and a hybrid (account-based and open loop).

Of these, a single, national hybrid solution achieves the most value for New Zealand as a whole. The realistic alternative is a Regional Upgrade scenario. This is the alternative path most likely to be taken by PTA partners if the NTS does not proceed and provides the most accurate estimate of alternative costs and benefits. Under this option, AT would continue with HOP and upgrade to account-based and open-loop capability; GW would implement Snapper on rail and ferry (currently being trialled), and introduce integrated ticketing and EMV functionality; ECan would join RC and introduce the Bee Card with the addition of mobile payments; and the Bee Card system would continue to end-of-life.

The counterfactual – Do Nothing – comprises the minimum investment to maintain each of the current ticketing operations apart from ECan which is assumed to join RC's Bee Card system.

The NTS comprises a single, national procurement for a national account-based and open-loop hybrid solution implemented on a staged basis starting with ECan, followed by GW, AT, and RC.

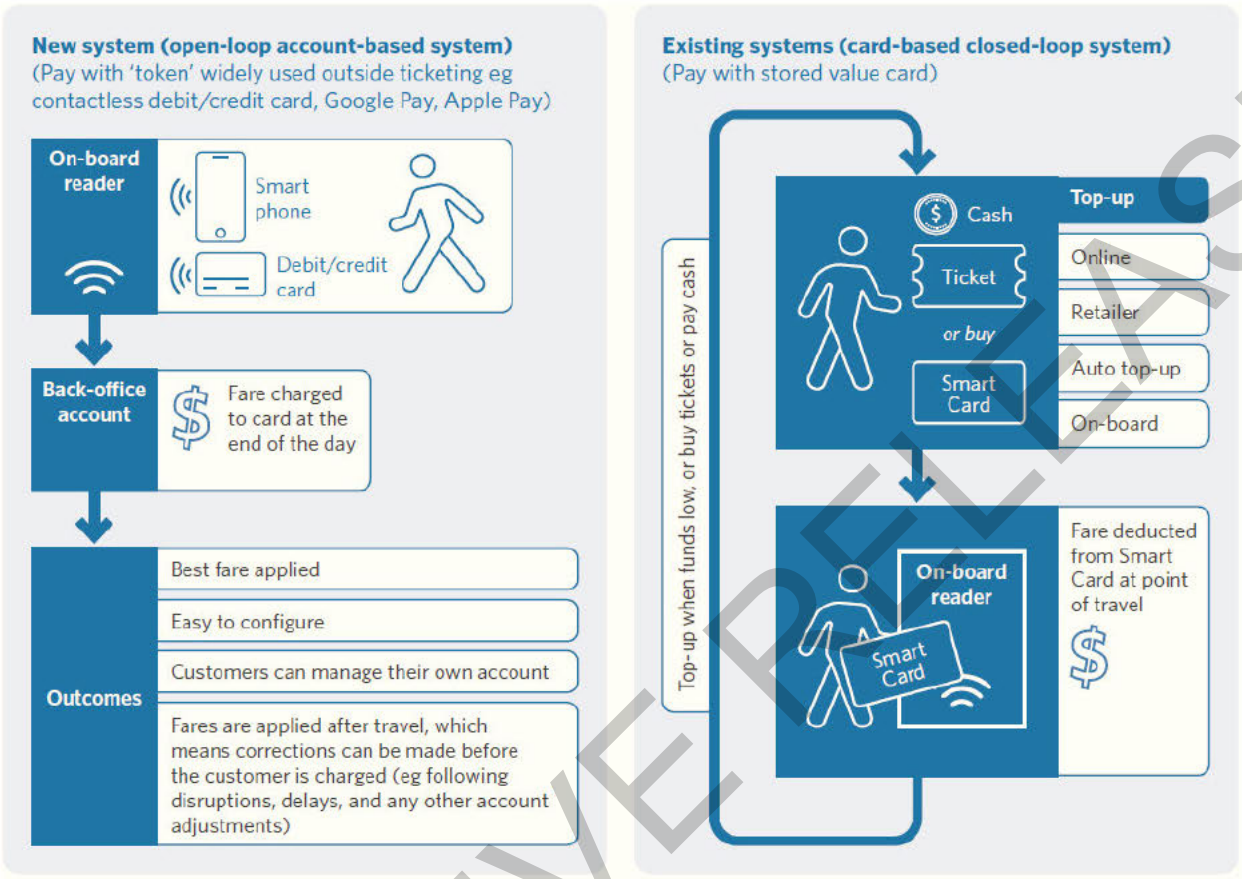
The difference between an open-loop account-based hybrid system and a closed-loop card-based system is illustrated below.

The advantages[1] of a hybrid system include:

- Broadens customer benefits such as enabling concessions by registering bank-issued cards and ensuring customers pay the lowest possible fare
- Highest customer convenience (and, in turn, improved patronage)
- Supports all fare models
- Easy to introduce new technologies
- Lowest cost of ownership
- PTA partners are not liable for card related fraud and security.

[1] The advantages and disadvantages of closed loop, open loop, account-based, and hybrid solutions are set out in Figure 42 in Appendix 5.

Figure 1 Differences between an open loop account-based hybrid and a closed loop system



Note that account-based and hybrid solutions charge a user's account in the back office for each trip throughout the day, aggregates and applies concessions at the end of the day, and charges the user's bank-issued card overnight.

A single ticketing solution for all public transport trips throughout New Zealand

The NTS components being purchased are summarised below.

Figure 2 Components of the NTS

- Software licences and support to access electronic ticketing software from a global ticketing solution provider.
- Integration with a variety of financial service providers, including a Merchant Acquirer, Transit Card Programme Manager and Retail Network Manager to support Transit Card issue and top-up.
- Customer facing hardware in the form of gate-lines, validators, inspection devices, bus driver consoles ("front office"), with PTAs, TTP and the ticketing service provider functioning as "one national team".
- A supplier-operated central back office to collect taps, construct journeys, charge customers, and provide information.
- Interfaces and processes to support regional operations.

The outputs will include:

- a shared services operation within Waka Kotahi to manage all contractual relationships between Waka Kotahi and each supplier, and between Waka Kotahi and each partner PTA (underpinned by a Participation Agreement) working as one national team where resources, skills, knowledge, and experience are shared
- equivalent or improved data quality to support and improve network operations and improved data consistency to support national policy development
- systems to support a consistent public transport ticketing and payment experience across the country.

The NTS opens new functionality not available in today's systems or under most of the alternative options

Figure 3 Comparison of the NTS, Do Minimum counterfactual alternative reveals the key advantages of the NTS.

Features available across New Zealand	NTS	Regional Upgrade	Do Nothing	Comments
Payment by contactless debit/credit card or token	✓	-	×	Only AT customers will have full featured contactless; GW plans to develop the functionality
Payment from mobile device	✓	-	-	AT and GW customers using contactless can use a mobile device to tap in/out
Pay after travel	✓	-	×	AT and GW customers using contactless can pay after travel
Correct journeys before being charged	✓	×	×	AT and GW may have this feature for contactless card users, not existing users
Offer national concessions	✓	×	×	National concessions would need to be configured in all three systems
Consistent national data	✓	×	×	At least three separate sources of travel data
Ability to quickly deploy new products and fare changes	✓	-	×	Significant effort required to introduce new products and fares changes

The NTS opens opportunities for national initiatives and innovation

The NTS provides opportunities to integrate with other transport areas. For example, the NTS could:

- Support a wider Transport Broker model with a core customer focus
- Support a wider Mobility as a Service deployment
- Link payments for first and last mile trips into wider journeys
- Incentivise mode shift through linking fares pricing to future congestion charging regimes
- Offer more dynamic fares than today to balance public transport capacity and service.

1.3 Benefits and costs

A hybrid ticketing solution brings considerable benefits

Benefits accrue to customers and business operations, and for government policy development and delivery. These are summarised below.

Figure 4 Key benefits of an account-based solution

Customer benefits	Operational benefits	Government policy benefits

• Convenience
• Payment choice
• Lowest fare guarantee
• Nationally consistent customer experience
• Improved accessibilityfor both local customers and visitors
	• Detailed travel data including start and end points of journeys, transfers, and journey patterns
	• Ability to quickly introduce/change fare products and policies
	• Reduce cash on board
	• Revenue protection
	• Easier adoption of new technologies
	• Patronage growth and flow on effects through mode shift such as decongestion and reduced vehicle costs for customers.
		• Simplified deployment of government policy – supporting national concessions
		• Significant improvements in data collection and information
		• Ability to implement changes easily and quickly
		• Support for national emergencies
		• Enables seamless transition for other transport operators
		• National efficiency with:
		  ○ a single procurement
		  ○ one development path.

Several of these benefits can be monetised to provide an estimate of some of the economic impact of introducing an NTS. The key benefit is increased patronage, which lead to decongestion benefits from fewer private vehicles and public transport user benefits from not using a vehicle, such as reduced petrol and maintenance costs, reduced parking charges, etc. Offsetting these benefits is the value of customers time (VoT) incurred topping up their transit card. This value of time reduces when customers are able to use their bank-issued card or virtual card (Visa, Mastercard) which requires no time to top up. These benefits are summarised below:

Benefit	Do Nothing $ millions	Regional Upgrade $ millions	NTS $ millions	NTS vs Do Nothing $ millions	NTS vs Regional Upgrade $ millions
Decongestion benefits	-	233	384	384	151
PT User Benefit	-	305	561	561	256
VoT topping up	(99)	(67)	(28)	71	39
Total Estimated Monetised Benefit (PV)	**(99)**	**471**	**917**	1,016	446
Benefit cost ratio (BCR)				2.0	1.7

The qualitative and monetised benefits identified above demonstrate the significant value provided from the NTS compare with the Do Nothing and the Regional Upgrade scenarios.

While the NTS has some one-off costs to successfully implement a nationwide contactless system, the ongoing operating costs of the NTS are similar to the Regional Upgrade alternative

The whole of life cost of the NTS[2] is estimated to be $257.5 million (PV) higher than the Regional Upgrade alternative. This is primarily due to the one-off costs of investment required to enable Waka Kotahi to implement this nationwide contactless system, mainly as a result of:

- Higher transition costs of $189 million (PV) – one-off costs that enable all regions to accept the NTS, rather than evolving existing systems.
- Higher costs during the transition years from 2022/23 to 2025/26. This includes "double run" costs in these earlier years as the NTS ramps up its delivery team in parallel to PTAs running existing services. This results in higher operating costs.

The higher costs are offset by the higher incremental benefits compared with the Regional Upgrade of $446 million (PV).

Once implemented, the steady-state operating costs are similar for both the NTS and Regional Upgrade at $47 million and $49 million (PV) respectively in 2030/31.

Comparison of the whole of life costs is summarised below.

Table 1 Whole of life cost comparison between the NTS, Regional Upgrade option and Do Nothing counterfactual (nominal costs over 14 years)

Non-discounted over 14 years	Do Nothing $millions	Regional Upgrade $millions	NTS $millions	Differences – Regional Upgrade & NTS $millions
Operating Expenditure				
Ticketing solution provider costs (TSP)				
Shared service organisation				
Financial services costs (MA, RNM, TCPM)				
PTA ticketing solution costs				
			994.7	
Capital Expenditure				
Back-office costs (incl. design, build, test)				
PTA equipment (TSP)				
Financial services costs (MA, RNM, TCPM)				
Shared service organisation				
			138.9	
Risk cost adjustments	-	-		
Transition costs			204.0	
Total cost over 14 years (non-discounted)				

[2] The Economic Case is defined in Secion 4.1

Present value over 14 years	Do Nothing $millions	Regional Upgrade $millions	NTS $millions	Differences – Regional Upgrade & NTS $millions
Present value of costs	**611.3**	**858.4**	**1,115.9**	257.5
***Less* Present value of benefits**	**(99.4)**	**471.5**	**916.6**	445.1
Net present cost/(benefit)	**710.7**	**386.9**	**199.3**	(187.6)
Benefit Cost Ratio (BCR)				1.7

The NTS will provide value for money

While the NTS will cost more than current systems do today, it will bring significant customer and operational benefits and increased value to all New Zealand. Nationally-consistent new ways to pay gives effect to national policy initiatives and provides opportunities for future innovation. This is not possible with any other alternative.

Value for money can be measured in several ways:

Economy – the NTS will provide an account-based, open loop hybrid ticketing solution to all New Zealand regions including those that would not otherwise have the resources to fund and support this type of solution

Efficiency – a single shared service function, Transport Ticketing and Payments (TTP) operated within Waka Kotahi, will enable a consistent and efficient use of partners' resources across New Zealand.

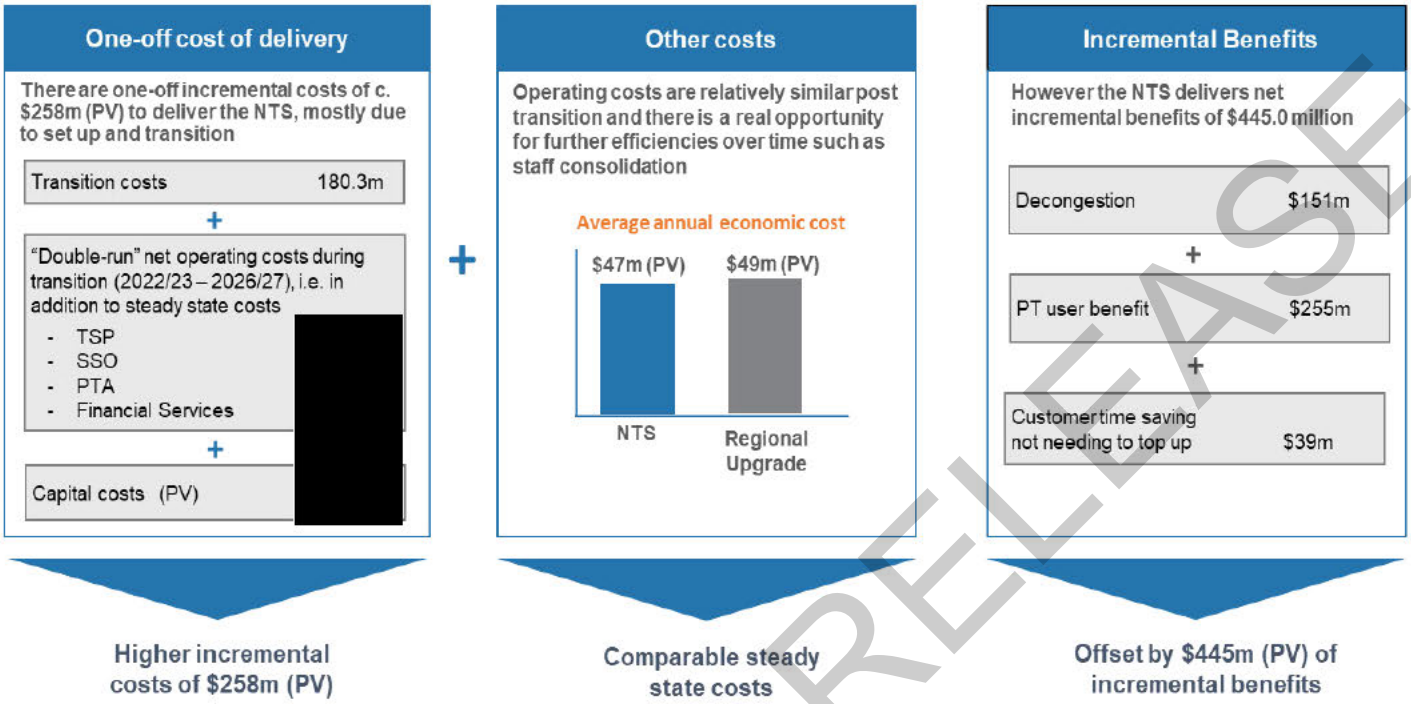
Effectiveness – delivery from a single, multi-tenanted platform using a proven global solution.

Equity – the same system across New Zealand to improve accessibility and convenience for all customers, contributing to increased mode shift.

The NTS provides $916.6 million (PV)[3] of benefits (of which $445 million is incremental to the Regional Upgrade option). This more than offsets the transition costs of delivering the NTS illustrated in the following diagram.

[3] PV - Present value at 4% discount over 14 years

Figure 5 Cost benefit summary



1.4 Financial projections and funding

Funding is to be met through the National Land Transport Fund (NLTF)

At this stage and subject to prioritisation and approval from the Waka Kotahi Board, proposed funding of the NTS would see capital and operating costs fully funded from the NLTF and the remaining local PTA partners' costs funded at their normal funding assistance rates (FAR).

Figure 6 Proposed funding allocation for the NTS

Cost type	Cost description	Funding from NLTF
Capital	Includes software and licences, equipment (both back office and front office), compliance and certification, design build & test, Merchant Acquirer setup, Transit Card Programme Manager setup, Retail Manager setup, and TTP setup.	100%
Operating	Includes Ticketing Provider costs, Merchant Acquirer costs, Programme Manager costs, Retail Network costs, TTP support costs.	100%
Other	Includes local transition costs, phase out of existing systems, local networks, local ticketing solution costs.	Normal FAR (51% assumed at this point)

This is a different funding model to the usual Waka Kotahi co-funding approach and will:

- simplify the commercial relationship between Waka Kotahi and the PTAs
- enable the PTA partners to receive full fare revenue while centralising revenue collection and all operating costs, including bank fees, through TTP
- avoid any potential duplication of investment

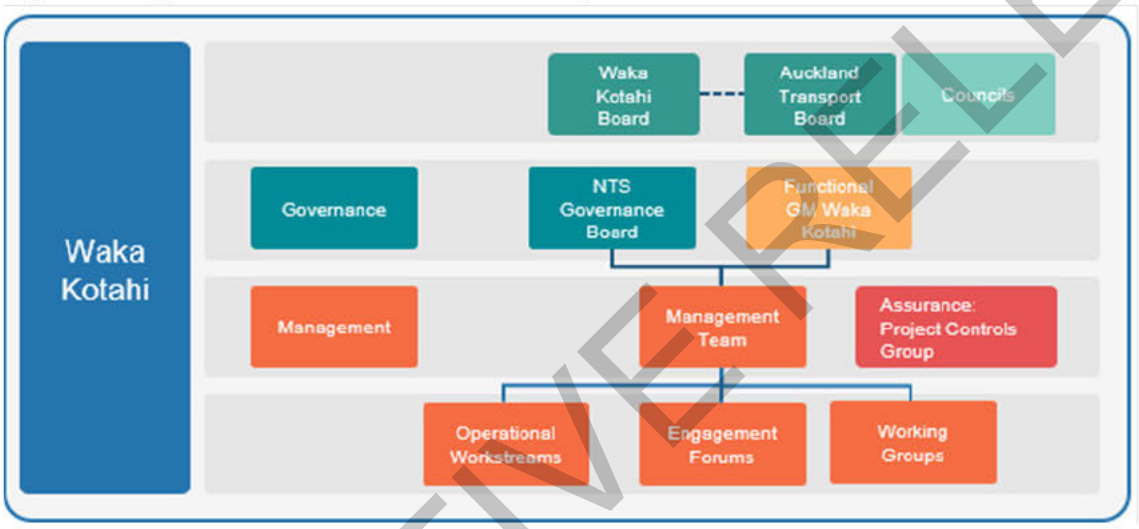
- enable more efficient hardware purchasing so hardware can be moved between regions easily
- manage ticketing costs nationally to strengthen supplier procurement bargaining power.

1.5 Contractual arrangements and implementation

Delivery of the NTS will be governed by a participant group and managed through TTP

The governance structure will comprise a Joint NTS Governance Board that is representative and skills-based incorporating Waka Kotahi, customers, partnering, digital and PTA partners. It will have a national view, manage risk and value, and focus on achieving NTS outcomes.

Figure 7 NTS governance structure and relationships



TTP is being established and will operate as the shared service organisation - the 'glue' connecting ticketing suppliers to regional PTA partners.

The TTP team will be accountable to the joint NTS Governance Board for implementation and ongoing operations. The management of shared services is a critical function within the NTS. Identifying key roles and implementation arrangements will be essential to ensure the NTS can be introduced efficiently with minimum disruption in each region, and to ensure benefits are realised and risks managed.

A work plan has been prepared that sets out the processes and responsibilities for TTP establishment and PTA transition. In summary, this includes the following:

1) Establish TTP as a business unit within Waka Kotahi. TTP will provide the shared services functions of the NTS and stand up the capability - realisation, resourcing, facilities, systems, etc.
2) NTS design including:
    - build and implementation of core ticketing platform
    - Financial Services - Merchant Acquirer establishment
    - Financial Services - Program Manager establishment
    - Financial Services - Retailer Network Manager establishment
    - Program Office (for planning and oversight of the multi-year transition program)

3) ECan Bus Solution Implementation – supplier side
4) ECan Bus Solution Implementation – ECan side

Repeats 3 and 4 above for GW, AT and for each member of the Regional Consortium

Each PTA partner will determine their most cost-effective, practical, transition technology option in conjunction with TTP and the ticketing service provider, including possible infrastructure re-use.

Planning for change management, benefits realisation and risk management will be facilitated by TTP. Partners will be responsible for their change management planning for transition supported by the 'one national team' approach.

Implementation and transition to business as usual will involve two phases

Phase 1 – Establishment involves establishing the NTS service, TTP, and the on-boarding transition process. Implementation would involve four activity streams:

(i) supplier programmes workstream
(ii) TTP workstream
(iii) Partner workstream
(iv) Governance workstream.

Contracting arrangements are expected to be completed by mid-2022.

Phase 2 – On-boarding involves transitioning each of the PTAs on a staged basis.

The provisional go-live date for each participant is:

ECan	July 2023
GW	March 2024
AT	November 2024
RC	February 2025

Business as usual will involve activities such as system/services support, and support for software releases and improvements.

Risks can be mitigated through strong governance and project management

Large projects with multiple partners always pose risks. Effective and agile NTS governance and management arrangements are vital for effective risk mitigation. Full project controls have been in place throughout the procurement process. As the NTS moves from procurement to programme delivery, the same disciplined approach with strong controls and programme risk management is being established during early 2022.

There are four key risk areas:

Customer risk

- Risk of a poor experience during transition
- Failure of the system or a breach of security/privacy

Strong systems and controls including cyber security measures and effective public communications will be critical in mitigating customer risks.

Partner risks

- Lack of political will and capability to collectively deliver for NZ
- Misalignment and timing of contracts and regional plans
- Slow collective decision making
- Limited capability and capacity to deliver

Strong and effective governance based on the joint NTS Governance Board that is skills based and widely representative, Participation Agreements with all partner PTAs, and strong culture of trust, co-operation and collaboration will be important mitigation factors.

Supplier risks

- Technology tie in for 14 years
- Capability to deliver over a long-time horizon

The ticketing supplier is very experienced having implemented ticketing and payment solutions for more than 10 years including London, New York, Sydney and South East Queensland (Brisbane).

Funding risks

- Unaffordability, inability to agree funding arrangements and delays in meeting planned transition staging timeframes.
- Participation Agreements between Waka Kotahi and PTA partners will clarify funding, roles, and responsibilities.

Factors that indicate success

Open loop contactless ticketing has been operating in London since 2012 and many other large international cities have adopted an account-based, open loop approach or are in the process of doing so, such as South East Queensland which has a similar scale, geographic size and demographic to New Zealand.

- Choosing a proven solution deployed in other locations minimises the technology risk.
- Appointing a global supplier with many successful deployments minimises the implementation risk.
- PTAs are already providing ticketing in various forms today, and leveraging existing experience, developing a strong internal capability within Waka Kotahi, and working as one national team minimises the transition risk and ongoing operational risk.
- Strong regional and central government partnerships ensure the necessary co-operation to make things happen for New Zealand.
- Phasing deployments starting with ECan through to GW, AT and RC manages the complexity and embeds learning along the way.

2 Introduction and background

2.1 Purpose of the business case

This Detailed Business Case sets out the case for investment in a next generation, single, national, public transport ticketing and payment solution that will transform the customer experience and create a flexible, modern, fit-for-purpose system.

The NTS will provide improved digital capabilities to meet the needs of Greater Wellington Regional Council (GW), Auckland Transport (AT), Environment Canterbury (ECan), and the Regional Consortium (RC)[4]. A national public transport payment system could support other government transport initiatives such as SuperGold, a proposed Community Connect card (being trialled in Auckland) and Total Mobility, and, potentially, future point-to-point transport initiatives that require an account-based payments system such as park-and-ride, road tolling, and congestion charging.

A digitally enabled system will provide a deeper understanding about customer journeys and support better evidence-based decision making for investments. Optimising public transport services, along with an improved customer experience, will create more flexible and attractive public transport networks to support mode shift.

2.1.1 Preparation in parallel with procurement

The development of the detailed business case is being prepared in a series of iterations in parallel with, and informed by, the procurement process. A national ticketing solution is uncommon – the Netherlands, for example, has a national approach but a very different public transport system that operates nationally and regionally; and, while there are a variety of examples of modern account-based, open-loop public transport ticketing solutions elsewhere in the world, none match New Zealand's requirements, although the required features can be seen in the ticketing solutions in several major cities.

Therefore, the approach taken by the National Ticketing Programme was to refine the solution through the procurement process, which, in turn, informed this business case with more robust information from the market than could be obtained from other jurisdictions.

This non-standard business case approach in parallel with procurement has several advantages:

- Ensures global market information is obtained for a solution that has not been previously delivered in New Zealand.
- Demonstrates the strength of interest and capability from the market to supply a solution in New Zealand.

[4] The Regional Consortium is a consortium of all of the other regions around New Zealand that provide public transport, and comprises Northland Regional Council; Waikato Regional Council; Bay of Plenty Regional Council; Taranaki Regional Council; Hawkes Bay Regional Council; Horizons Regional Council (Manawatu-Whanganui); Nelson City Council; Otago Regional Council; and Invercargill City Council.

- Reduces timeframes compared with sequential waterfall approaches, which is particularly important for ECan to replace its end-of-life system, devices and equipment, and to replace GWs paper tickets on trains.
- Robust cost benefit analysis could not be prepared without the detailed market information obtained through procurement.

Procurement has involved a Market Sounding, Registration of Interest (ROI), Request for Proposal (RFP), and a best and final offer (BAFO) process for the ticketing solution, alongside a Request for Tender (RFT) process to secure the related financial services. This is explained in the Commercial Case.

This Iteration 5 version has been updated to reflect the preferred ticketing supplier's price at the BAFO stage of the procurement process and current contract negotiations are unlikely to see a material change. This version has been updated for cost estimates from partner PTAs relating to the alternative option to upgrade their regional solutions and to their costs to transition to the NTS.

2.1.2 Best practice guidance

This business case follows best practise as set out in the Better Business Case (BBC) five case model introduced by The Treasury and adopted by all government agencies, and the Investment Decision-Making Framework and business case guidance issued by Waka Kotahi for preparation of business cases that require funding from the National Land Transport Fund. The decision-making processes and gateways for the NTS project are tailored to meet the needs of Regional Council participants as Public Transport Authorities, and Waka Kotahi.

The five-case model has the following structure:

- The **strategic case** ascertains that the investment proposal is supported by a compelling case for change. It confirms the proposal's strategic context and fit.
- The **economic case** seeks to optimise value for money. The preferred option and implementation scenarios are identified from a 'long list' of alternatives.
- The **financial case** confirms that the investment is affordable and can be funded.
- The **commercial case** tests market interest in supplying a single solution to meet New Zealand's needs both nationally and regionally.
- The **management case** tests that the project is achievable in terms of risks and availability of resources.

2.2 Intended Audience

The audience for this document is the partners in the NTS solution, namely:

- Greater Wellington Regional Council (GW)
- Auckland Transport (AT)
- Environment Canterbury (ECan)
- Regional Consortium (RC)
- Waka Kotahi NZTA (Waka Kotahi).

2.3 Background

Since the mid-2000s, Waka Kotahi has co-invested National Land Transport Fund (NLTF) monies in the procurement and implementation of electronic ticketing systems for public transport. As a result, Auckland Transport, Environment Canterbury, and Greater Wellington Regional Council procured and implemented electronic ticketing systems.

In late 2013, a consortium of nine councils known as the Regional Consortium (RC) began working together to procure a shared ticketing system to support the delivery of integrated ticketing and fares in each of their regions. To support this joined-up investment and procurement approach and support a nationally coordinated approach to regional ticketing systems, the Waka Kotahi Board agreed[5] in 2015 to a targeted enhanced funding assistance rate (FAR) of 65% to meet the capital costs of a shared ticketing system. This was conditional on the RC working collaboratively with Auckland Transport (AT), Greater Wellington Regional Council (GW), and Environment Canterbury (ECAN) on a nationally coordinated approach to ticketing services, In January 2016, Waka Kotahi, AT, GW, ECAN, and the RC agreed to establish a programme to provide the governance support for the development of the NTS.

The NTS is founded on the premise that a New Zealand-wide approach to transport ticketing, achieved through the co-ordinated participation of all regions, will deliver best value for money from national and regional investment at an acceptable level of risk to all parties, a consistent customer experience across all regions, and improve public transport attractiveness. This is expected to be achieved through economies of scale, avoiding duplication of investment, and providing a modern, high-quality ticketing and payment solution unlikely to be affordable and manageable on a regional basis.

Investment and procurement cycles of regional councils (as PTAs) for the replacement or acquisition of ticketing solutions were not aligned, and PTA requirements (particularly in terms of fares and fare products) were not consistently defined. Fully aligning investment and procurement cycles was not a practical proposition; rather, the PTAs required a solution where features could be flexibly deployed to enable them to tailor their fares and products to meet local customer needs and allow the implementation process to be practically phased. To support this process, interim solutions were implemented for RC (Regional Integrated Ticketing Solution - RITS) and GW (Snapper).

A multi-party funding agreement consistent with Waka Kotahi's funding approval was agreed in late 2016 whereby GW would lead the work jointly funded with Waka Kotahi while the RC procured and implemented RITS, an interim, closed loop, solution, to better align procurement cycles until the national ticketing solution could be procured and implemented.

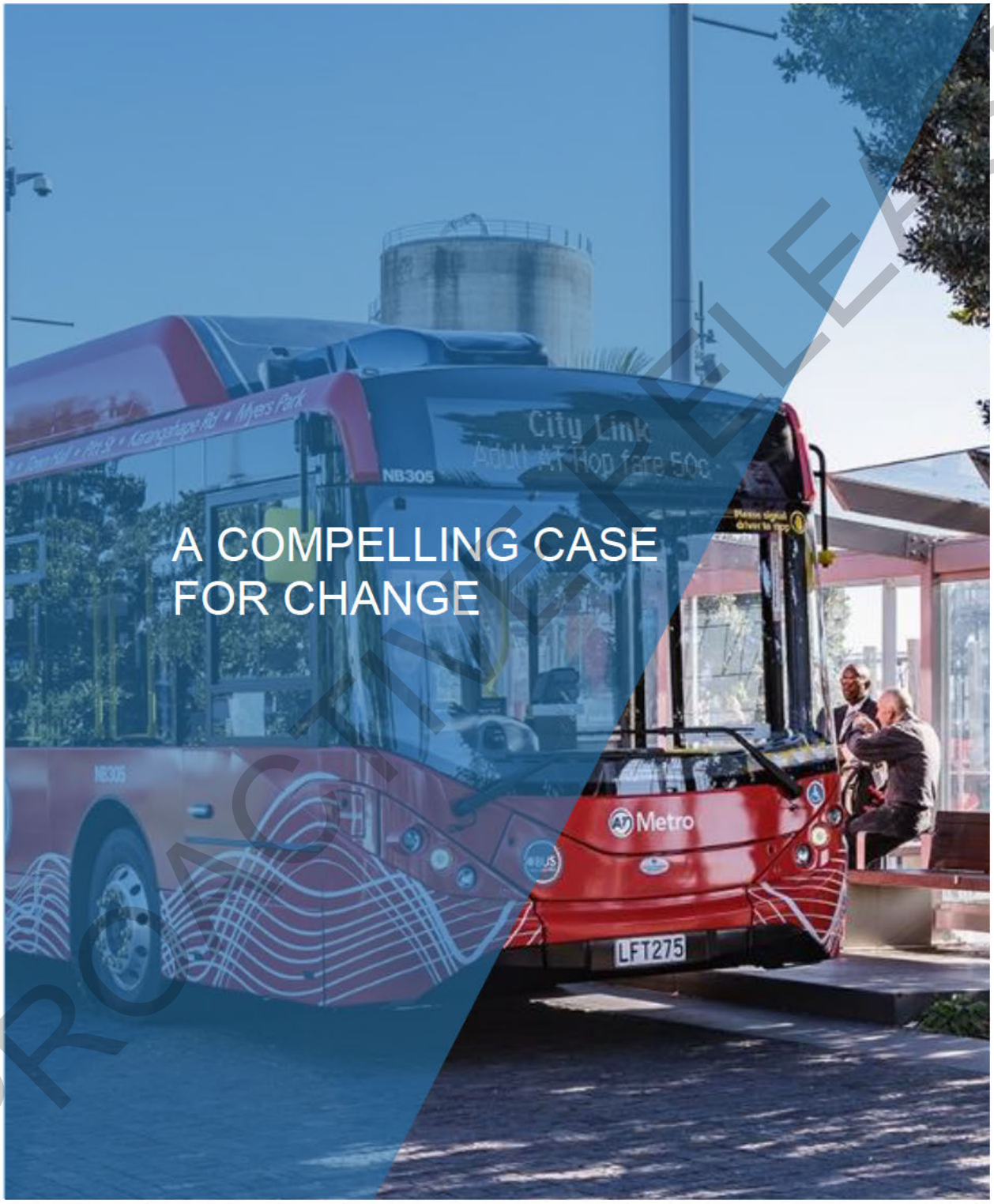
Project NEXT was established in April 2018 to deliver the procurement phase of this next generation ticketing solution and the related financial services for AT, GW, ECan, and RC.

[5] Refer to Waka Kotahi NZTA Board minutes 30 October 2015.

2.4 Baseline Requirements

In developing the strategy for the NTS, several baseline requirements are taken as a given for the purposes of this Detailed Business Case. These are:

- A collaborative approach will be taken between the partnering PTAs.
- There will be a single procurement for the partnering PTAs.
- The procurement will source a 'solution' not a system.
- Commonality of the outcomes required, and alignment of operational processes creates the opportunity to deliver a new, centralised capability.
- Investment cycles for ticketing systems across transport authorities have been aligned by way of interim solutions and approaches where required.



A COMPELLING CASE FOR CHANGE

3 Strategic Case – the case for change

3.1 Key Messages

Current ticketing and payment systems vary considerably in capability and customer experience region-by-region across New Zealand. There is no consistent approach with, for example, Auckland Transport's HOP system providing integrated ticketing and comprehensive data while Wellington's rail network still uses paper tickets and lacks the data to fine-tune the network and help guide targeted investment.

Regional councils are at different stages of investment and interim bus ticketing solutions have been put in place to better align investment across regions in expectation that a national solution will be introduced. The first priorities for NTS implementation are ECan and GW.

Internationally, closed loop systems with stored value cards have been superseded by account-based ticketing solutions. These provide wider accessibility for users, more flexibility for both customers and operators, significantly better data for efficient network management, and provide a digitally-enabled system that can accommodate future technology developments.

Customers want to easily be able to pay for public transport like they pay for other goods and services and expect digital payment channels to help streamline their journeys.

70% - 80% of customers currently have the technology and can be convinced to use a contactless debit/credit card or virtual card on a mobile device.

A single, national, solution that is account-based, open loop, and multi-tenanted aligns with the Government Policy Statement on Land Transport, the New Zealand Disability Strategy, and Regional Public Transport Plans, aligns with New Zealand's Digital Strategy, and would enable deployment of government policy initiatives such as the Community Connect card.

3.2 Purpose of the Strategic Case

This Strategic Case sets out the case for change to a single, national public transport ticketing and payment solution for New Zealand.

It describes the investment logic in the context of:

- the New Zealand regional public transport landscape including fit with the national and regional direction for public transport
- international experience
- key strategic risks and mitigations.

3.3 National ticketing landscape

3.3.1 National ticketing participants and their current ticketing systems

Auckland Transport (AT)

AT HOP is New Zealand's largest public transport smart card ticketing system and covers bus, train, and ferry services. This card-based, tag-on/tag-off, closed loop ticketing system was implemented in 2012/13 and is the only scheme in New Zealand that provides integrated journeys across buses, trains, and ferries, allowing both purse and period-based fare products. AT HOP is supplied by Thales/Octopus and has had an extensive development path. Prior to completion of the extended contract in 2026, AT will join the NTS in a transition that is expected to involve parallel operation of both solutions for a limited period.

Greater Wellington Regional Council (GW)

Ticketing for GW's bus network is provided by Snapper Services Ltd, under an interim arrangement supporting Public Transport Operating Model (PTOM) contracting agreements and zone-based fares. Snapper is a card-based tag-on/tag-off closed loop ticketing system providing both purse and period-based fare products.

Ticketing for GW's rail network has remained essentially unchanged for many decades. Customers use period or multi-trip tickets purchased at stations or retail outlets or pay cash on board trains to ticketing staff.

An in-house ticketing management system is used. GW urgently requires a single, multi-modal integrated fares and ticketing solution, with rail being the most pressing need. It is currently trialling Snapper on rail.

Environment Canterbury (ECan)

ECan's bus network uses a smartcard-based ticketing system supplied by INIT, implemented in 2010. This is a tag-on only system, providing a purse capability for fare payment. It supports a 3-zone fare structure and in-zone bus-to-bus and bus-to-ferry transfers using paper ticket receipts. The solution is at end-of-life and urgently needs replacement with a single, multi-modal integrated fares and ticketing solution as soon as possible.

Regional Consortium (RC)

The Regional Consortium has completed a phased transition to a collectively procured interim bus ticketing solution, which replaced obsolete systems and supports PTOM contracting agreements. The Regional Interim Ticketing Solution (RITS) is a card-based, tag-on/tag,-off closed loop ticketing system provided by INIT and implemented across the nine participating regional authorities during 2018 – 2020. It is contracted to be in place for a term of three years from completion of implementation, with provision for two possible extensions of one year, with transition to the national ticketing solution on or before the contract term expires.

Waka Kotahi New Zealand Transport Agency (Waka Kotahi)

Waka Kotahi's strategy aims to support and enhance the use of public transport, walking and cycling. In delivering the strategy, Waka Kotahi's objectives are to achieve best value for money in NLTF expenditure (s.25 LTMA), optimisation of investment nationally, and optimisation of existing investment.

Waka Kotahi is guided by the Government Policy Statement on Land Transport 2021 which prioritises safety, better travel options, improving freight connections and climate change. To deliver these priorities, Waka Kotahi has made key strategic investment shifts including a modal shift in urban areas from roads to public transport and active modes.

3.3.2 Patronage and Scale of Operations

For the year ended 30 June 2020, there were more than 138 million public transport trips throughout New Zealand; down from 168 million trips in 2018/19 because of Covid – a drop of 20% across all regions. Covid continued to significantly impact patronage in 2020/21 and 2021/22, and GW, for example, is currently operating at 70% of pre-Covid patronage.

Auckland accounts for about 60% of all public transport trips and fleet size in New Zealand. For the rest of New Zealand, Wellington accounts for 24% of the passenger trips, Canterbury about 8% and the other regions (Regional Consortium) about 9%. The scale of operation of public transport is summarised below.

Table 2 Patronage

Authority	Patronage[6] (Million passenger trips)							Farebox
	2019/20		2020/21		2021/22 Projection		Trips per capita pa	Revenue 2020/21
AT	82.3	59%	64.0	53%	86.9	58%	63	$176.6m
GW	33.0	24%	33.1	27%	34.2	23%	76	$103.6m
ECan	11.2	8%	10.4	9%	13.1	9%	23	$22.3m
RC	12.3	9%	11.1	20%	14.3	10%	9	$23.4m
Total	**138.8**	**100%**	**120.9**	**100%**	**148.5**	**100%**	**38**	**$325.9m**

For comparison, South East Queensland has a single PTA, TransLink, which is in the process of deploying an account-based, open-loop solution for Brisbane and the regional towns across a similar geographic spread to New Zealand. Brisbane has patronage of 188.5 million trips per annum across bus, rail, light rail, and ferries with 52 trips per capita.

[6] *Data sourced from Regional Councils and Waka Kotahi*

Table 3 Scale of operations

Authority	Bus Fleet		Bus Operators		Bus routes	Rail Stations		Ferry Terminals	
AT	1,340	50%	11	27%	197	40	45%	14	64%
GW	466	20%	4	10%	106	48	55%	4	18%
ECan	305	10%	3	8%	67	0	0%	2	9%
RC	489	20%	22	55%	294	0	0%	2	9%
Total	**2,600**	**100%**	**40**	**100%**	**664**	**88**	**100%**	**22**	**100%**

The smaller regions comprising the Regional Consortium individually lack the scale of public transport services that would justify the cost of a modern, integrated ticketing solution typically being implemented in large cities globally. The following table illustrates this lack of scale by setting out population, patronage, and trips per capita per annum. These regions typically have population spread across a city and several smaller towns, adding to the difficulty of providing cost effective public transport services.

Table 4 Illustration of the small scale of regional operations

Region	Population	Patronage	Trips per capita pa	Farebox revenue
Northland	91,230	329,242	3.6	$0.6m
Waikato	458,202	4,085,467	8.9	$6.4m
Bay of Plenty	308,499	2,688,602	8.7	$4.4m
Hawkes Bay	170,448	645,297	3.8	$1.3m
Taranaki	118,215	649,874	5.5	$1.2m
Horizons	238,797	1,282,198	5.4	$1.6m
Nelson	53,082	420,690	7.9	$0.8m
Otago	177,219	4,013,504	22.6	$6.8m
Invercargill	54,873	182,627	3.3	$0.3m
Total	**1,670,565**	**17,297,501**	**8.6**	**$23.4m**

3.3.3 Projected growth – patronage forecasts

While the reduced patronage impact of Covid-19 is expected to continue well into 2022/23, it is not expected to materially impact total patronage projections over the longer term, with patronage growth expected to reach pre-Covid projections by the end of 2025/26.

The combined annual public transport patronage for Auckland is forecast to grow significantly with a predicted 16% recovery in 2022/23, and a further 13% in 2023/25, with average ongoing growth of about 4% annually. For the other regions, recovery is starting with a predicted 6% – 7% recovery in 2022/23, with predicted annual growth thereafter of about 3 – 4% annually.

3.4 Common challenges and the need for investment

The NTS will address the following challenges:

Misalignment of procurement cycles – To align procurement cycles, interim solutions for GW and RC have been implemented to allow time for a national solution to be procured and implemented. AT's contract for its HOP integrated ticketing solution extends through to 2026.

Transitioning to a national solution – Requires consideration of each PTA partners current operations, any specific regional requirements, and the extent to which any existing capability can be re-used. For example, this could include re-using hardware such as gatelines at Auckland stations but replacing card reader devices on buses.

Bus only vs. mixed modes – Auckland and Wellington have bus, rail and ferry services requiring integrated ticketing while the other partner PTAs are limited to buses (and several ferry services in Christchurch and Tauranga) and may require less sophistication for managing fare structures from the ticketing solution.

Scale for procurement and operation – Auckland aside, individual regions lack sufficient scale to support an integrated fares and ticketing solution on a standalone basis. At a national level, New Zealand's scale is equivalent to that of a city such as Sydney or Melbourne, but with significantly more complexity due to the individual requirements of each region.

Inadequate data – PTAs require the richer data provided by modern account-based ticketing systems to better optimise network design, scheduling and fares policy. Richer data enables improved quantification of passenger flows and travel behaviour, better estimation and management of demand, and supports operators to optimise their fleets and become more cost effective. At a national level, access to rich data supports strategic planning, transport demand modelling, and government transport policy development. For example, National transit policies such as the proposed Community Connect card (being trialled in Auckland) cannot be implemented without a national, account-based payment system.

Revenue protection – The introduction of PTOM and gross contracts shares the responsibility for fare revenue between PTAs (regional councils) and bus, rail, and ferry operators because the financial incentive mechanism is intended to share changes in fare revenue. Combined with the introduction of a national ticketing solution, processes for effective deterrence and enforcement of fare evasion will need to change. All PTOM contracts include measures to minimise fare evasion. Such measures reflect the actions expected of both parties and the circumstances and risks in the region. Access to the data from the NTS will substantially improve the ability to address these points.

Systems need replacement **–** All regional public transport ticketing and payment systems require replacement over the next five years. Both ECan and GW Rail require replacement systems urgently. Interim solutions have been implemented for the Regional Consortium and GW buses to align investment cycles until a national solution can be implemented. AT's contract for its HOP integrated ticketing solution extends to 2025/26 by which time a new system will need to be implemented.

3.5 Defining the problems and the benefits of investment

3.5.1 Investment Logic Map (ILM)

Facilitated investment logic workshops were held in July and August 2016 attended by senior managers from Waka Kotahi, AT, GW, ECan and RC.

These workshops developed the investment logic maps by identifying and agreeing:

- Key problems with current public transport ticketing across the regions
- Key benefits of investment to resolve these problems
- Strategic responses required to achieve the benefits
- KPIs to measure achievement.

The agreed ILM sets the direction for the type of solution required.

3.5.2 Problem definition

Three key problems were identified from continuing with the current regional approach. These are described below. The Investment Logic Map (ILM) and discussion is set out in Appendix 1.

Problem 1 45%	Outdated fare collection systems are a significant barrier to adopting modern fare policy and customer-centric business models

Current fare payment systems are a mix of cash and stored value smart cards (i.e. closed loop transit payment cards) that:

- Lack the convenience customers expect from modern banking and retail payment systems
- Require labour intensive revenue management, incur high operating costs, and struggle to support sophisticated fare structures.

Customers experienced with modern banking systems expect ease of use and convenience, are familiar with mobile banking and using bank-issued cards with NFC (such as Visa payWave) for retail payments and have similar expectations for public transport.

Without such capability, it remains difficult to provide a high-quality user experience that can attract people away from use of private vehicles, increase patronage, and reduce the current reliance on subsidies.

The COVID-19 pandemic has identified the need for NFC card and token-based electronic access to public transport services to provide a level of contract tracing for users of public transport, and to eliminate cash to help avoid virus transmission. This further reinforces user expectations for payment with existing bank-issued cards.

Problem 2 35%	Lack of journey information is sustaining suboptimal transport networks

While some systems such as AT HOP provide rich information, some PTAs currently lack sufficient journey information to effectively target customer segments and optimise public transport services. This lack of information may include:

- Where passengers get on and off a service (trip information)
- What services passengers connect with (journey information)
- What type of passengers use a service – school student, tertiary student, on-peak commuter, off-peak commuter, elderly, disabled, etc.
- When these passengers travel.

This lack of information means some PTAs cannot refine the delivery of public transport services across their regions such as network design and improvements and more efficient fleet management, cannot support cross-regional integrated fares and ticketing, nor make sound social policy decisions about funding support for the aged, disabled, students, etc. As a result, public transport networks remain suboptimal.

Problem 3 20%	Disparate needs, priorities and investments are inhibiting the timely delivery of integrated ticketing

It is hard to deliver efficient customer-centric public transport across 12 regions (and multiple ticketing systems).

Regions have significant demographic and geographic size differences, and differing modes (bus, train, and ferry), policies and systems, differing levels of process maturity, capability and capacity, differing levels of complexity for integrating legacy systems with any new proposed solution, and differing investment lifecycles.

Apart from Auckland, PTAs lack the scale advantages and investment capability of major international cities to independently procure, implement and operate a cost-effective integrated ticketing system. Also, this smaller regional scale does not present a commercially attractive opportunity for suppliers to deliver an affordable modern ticketing solution.

Multiple investors and decision-making complexity are barriers to timely delivery of a best value for money, single, integrated ticketing solution for all.

3.5.3 Benefit identification

Four key benefits[7] were identified from a national approach to resolving these key problems.

Benefit 1 35%	Enhanced customer experience that substantially reduces the barriers to travel

A national ticketing solution would provide all customers with a consistent and reliable ticketing experience throughout New Zealand that is easy to access, intuitive, efficient, and convenient to use. As such, a modern national solution would:

- Provide universal access to public transport where customers can take public transport anywhere in New Zealand and be charged and pay in the same way.
- Make adoption easy as there would be no need to purchase a card or top up before travelling.
- Guarantee each customer the lowest price for all travel undertaken each day.

[7] Refer to the Economic case and Appendix 8 for a more detailed discussion of benefits.

- Increase payment choice by using a contactless debit or credit card or a digital contactless (virtual) card on a mobile device.
- Enable customer self-service benefits from managing their own and their family's transport accounts anywhere in New Zealand including tracking spend and correcting their journeys if they forget to tag-off.
- Provide customers with better information and let customers control the information they receive.
- Achieve better customer service.

Benefit 2 30%	An affordable and efficient public transport network that delivers operational efficiencies and strategic information

For PTAs, a modern, national solution will provide operational efficiencies, including:

- New features and functions that would provide a material change in functionality for a marginal increase in investment. For example, an account-based solution would allow PTAs to make changes to their fares policy more easily and cost-effectively, including special fares for specific events or price adjustments for service delays and disruptions,
- Enhanced data that is complete, accurate and consistent would improve reporting, support refinement of network design and operations including fleet management, and help inform strategic and operational decision-making,
- More streamlined revenue collection and improved revenue protection, especially in Wellington where there are ungated stations.
- Improved resource efficiency through easier and less resource intensive management of the ticketing system with resources able to be shared and/or redeployed in different ways.
- Integration with third parties to provide wider services such as apps to plan, book and pay for a journey or manage park and ride services.

For government, a modern, national solution would:

- Enable easier implementation, monitoring and review of national policies such as SuperGold.
- Improve procurement and contracting efficiency when compared with several regional solutions.
- Enable New Zealand-wide collateral and branding which should reduce costs.

Benefit 3 20%	Efficient, least cost, regional and national investment

Investment in a modern, single, national ticketing solution would achieve value-for-money for ratepayers, taxpayers, and users into the future by providing increased convenience, access and a guaranteed lowest fare price for customers while supporting improved public transport operations that includes enabling shared services, minimising duplication, and supporting regional and national policy initiatives.

Such investment would establish the base for future development and innovation because it could potentially enable transport accounts for all transport payments. This could include future

payment integration with third party transport providers and potentially payment for services such as park and ride, road tolls, and congestion charges.

Benefit 4 10%	Improved public and government confidence in ticketing investment

A modern, national solution would reduce barriers to using public transport and make it a more attractive travel choice because of the convenience and ease of access without the need for a transit card, topping up, or carrying cash. Reducing barriers to access should result in improved customer satisfaction and better balanced and informed public discussion about achieving mode shift.

Enabling mode shift plans, such as Let's Get Wellington Moving (LGWM) and the Auckland Transport Alignment Project (ATAP), and achieving mode shift targets would require increased patronage, reduced private vehicle journeys, reduced congestion, and a subsequent contribution towards climate change targets through decarbonisation of the transport network.

By providing the means to implement central or local government policies, an accounts-based payment system would enable targeted deployment of new social policy initiatives like the Community Connect card.

3.5.4 Three strategic responses

The ILM workshops identified three strategic responses to deliver these benefits of investment.

Expand innovation opportunities and capabilities to create more flexible public transport networks attractive to every New Zealander.
Wider adoption of integrated contemporary technology to provide fit for purpose information that enables evidence-based decision making.
Improve governance robustness and decision making 'stickability' that achieves national consistency and regional flexibility and a best value for money solution, by collectively agreeing and making sound, long-lasting decisions.

Meeting these strategic responses will lead to:

- A consistent, high-quality customer experience for all elements of ticketing.
- Quality ticketing data to make better decisions relating to public transport strategy and investment at both a national and regional level.
- Best value-for-money taxpayer investment in regional ticketing system(s), i.e. by minimising duplication and enabling partners to share services and cost effectively accommodate changes.
- Appropriately managed taxpayer investment risks (i.e. ensuring procurement, implementation and operation of the ticketing solution meets statutory, regulatory and industry compliance requirements).
- Better delivery of national public transport and social policy initiatives such as Super Gold and Community Connect cards.
- Rapid changes in the event of disruption (such as COVID-19) by enabling effective, rapid support for regional and national responses (including social tracing for all those

with registered cards), and to enable options for fare products and prices, for on-going travel, and for revenue stream protection.
- Potential to add wider transport related applications such as park-and-ride and road tolling.

3.5.5 Key service objectives

Taking account of the key strategic responses, the following service objectives were agreed to define the outcomes that a national ticketing solution is to achieve. These objectives would address the problem statements and, when achieved, would result in the high-level benefits identified in the ILM.

The key objectives are for a single, national ticketing solution to:

- Maximise value for money at national and regional levels.
- Reduce barriers to the use of public transport.
- Always provide a consistent and reliable customer experience.
- Provide choice of fare payment methods.
- Enable customer interaction through a range of communication channels.
- Minimise requirements for cash use and handling, while recognising the different needs of those accessing public transport.
- Enable operational configuration changes quickly, easily, and cost-effectively at a local level.
- Minimise operational support and management impact for partners.
- Enable full support of revenue protection obligations and activities.
- Integrate with partner's existing systems.
- Minimise implementation and transition impacts.
- Accommodate new technologies and emerging trends including mobile apps that could lead to solutions such as Mobility as a Service (MaaS) and further innovation.
- Support whole of government initiatives such as PTOM.

3.6 Strategic alignment

The service objectives described above for a single, national, ticketing solution strongly align with the Government Policy Statement on Land Transport, the objectives and targets in the National Land Transport Plan and the Regional Public Transport Plans of regional councils operating as partners in the NTS.

3.6.1 Government Policy Statement on Land Transport

The Government Policy Statement on Land Transport 2021 (the GPS) identifies five key outcomes – inclusive access, healthy and safe people, economic prosperity, environmental sustainability, and resilience and security, and that investment in land transport will be guided by four strategic priorities – safety, better travel options, improving freight connections, and climate change.

The table below summarises the specific contributions from the NTS towards these strategic priorities.

Figure 8 National land transport priorities directly contributed to by the NTS

GPS outcome	NTS contribution
Better travel options: Providing people with better travel options to access places for earning, learning, and participating in society Improve people's transport choices in getting to places where they live, work and play, and to make sure our cities and towns have transport networks that are fit for purpose and fit for the future. **Short to medium term results (by 2031)** • Improved access to social and economic opportunities. • Public transport and active modes that are more available and/or accessible. • Increased share of travel by public transport and active modes. • Reduced greenhouse gas emissions. • Reduced air and noise pollution.	A modern ticketing and payment solution, i.e. account-based and open loop, would: • Make it easy and convenient to access public transport anywhere in New Zealand and pay in the same way with a bank-issued debit/credit card or virtual card on a mobile device. There would be no need, for example, to purchase a ticket, pay by cash, or top up before travelling. Transit cards, SuperGold and single tickets would also be options for some people. • Guarantee the lowest fare option each day for every customer's journeys. • Enable customer self-service benefits from managing their own and their family's transport accounts anywhere in New Zealand. • Receive better information because customers can control the information they receive. • Provide better information about passengers' trips that informs continual improvements to network design and operations. • Convenience and ease of use makes public transport more accessible and a more viable alternative to private vehicles, leading to increased patronage and mode share and, in turn, reduced GHG and air/noise pollution. • Improved business information from a modern ticketing solution underpins ongoing refinement of network design and operations, which then delivers better customer service and makes public transport an increasingly viable travel option.
Safety: Developing a transport system where no-one is killed or seriously injured Develop a transport system that advances New Zealand's vision that no-one is killed or seriously injured while travelling. New Zealand roads will be made substantially safer. **Short to medium term results (by 2031)** Reduced number of deaths and serious injuries. A safer land transport network.	More people travelling by public transport with its higher safety record would contribute to a safer land transport network and reduced numbers of deaths and serious injuries.
Climate change: Transforming a low carbon transport system that supports emissions reductions aligned with national	More people travelling by public transport, which is becoming increasingly electrified, would contribute to fewer private vehicles and

commitments, while improving safety and inclusive access. Support the rapid transition to a low carbon transport system and contribute to a resilient transport sector that reduces harmful emissions, giving effect to the emissions budgets to be released in 2021. **Short to medium term results (by 2031)** • Reduced greenhouse gas emissions • Reduced air and noise pollution • Improved resilience of the transport system.	consequently reduced emissions and air/noise pollution.
Improving freight connections: Improving freight connections to support economic activity. Well-designed transport corridors with efficient, reliable, and resilient connections will support productive economic activity. **Short to medium term results (by 2031)** • Freight routes that are more reliable • Freight routes that are more resilient • Reduced greenhouse gas emissions • Reduced air and noise pollution.	More people travelling by public transport would contribute to fewer private vehicles and consequently reduced congestion resulting in freight routes that are more reliable and efficient.

A modern NTS would improve access to public transport across modes with better travel options by:

- Providing choice for customers to access and pay for public transport by being able to tag on and off trains, buses, and ferries with Visa or MasterCard (debit or credit card), mobile payment, or a transit card. Using Visa and MasterCard (either a physical card or virtual card on a mobile device) requires no queuing to top up transit cards and no need for cash on-board or a ticket office/retailer to purchase tickets.
- Maintaining the concession record against a debit/credit card in the back office so that fare concessions, including SuperGold, are automatically calculated (for those registered and eligible) in accordance with local and national fare policies ensuring the lowest fare.

While not a condition precedent for the introduction of government public transport and social policy priorities, an NTS would greatly simplify their deployment. For example, by providing a payment platform for national transport concession initiatives such as SuperGold, an NTS provides a nationally consistent customer experience and significant improvements in data collection and information, such as actual rather than estimated SuperGold use, and data for budgeting and policy development.

The GPS also references, and is consistent with, the New Zealand Disability Strategy, especially in relation to access.

3.6.2 New Zealand Disability Strategy

The vision for the New Zealand Disability Strategy is:

> *"New Zealand is a non-disabling society – a place where disabled people have an equal opportunity to achieve their goals and aspirations, and all of New Zealand works together to make this happen."*

Non-disabling is about removing the barriers in society that disable people with impairments.

The strategy sets out eight outcomes[8] that will contribute towards achieving the vision. *Outcome 5: Accessibility* includes being able to get from one place to another easily and safely, feeling safe taking public transport to get around, and being treated well when doing so, with information and communications that are easy to access using appropriate formats and languages.

An NTS will require accessible features determined with feedback from the disabled community and SuperGold users, and apply best practice. This includes use of audible and visual messaging at readers, gates, and ticket machines; tones to identify platform validators, help points or other hardware; positioning of hardware; accessible websites and phone apps with suitable text size and contrast for ease of screen reading, etc.

3.6.3 New Zealand Government's Digital Transformation Strategy

The government's recent consultation paper "Creating a Digital Strategy for Aotearoa" is about how New Zealand keeps pace with changes in digital technologies and how these are used in our economy and across our communities. The vision and goals of the digital strategy are based around Mahi Tika (Trust), Mahi Tahi (Inclusion), and Mahi Ake (Growth). *"The Digital Strategy will set the tone for what is a resilient, sustainable, low emissions, and future-proofed Aotearoa New Zealand."* It talks about wanting New Zealand to be *"an early adopter and world leader in the digital economy".*

An important part of the success of the strategy is for all significant government services to be available digitally, but that it is important to ensure that those at most risk of being digitally excluded – people who are older, Māori, Pacific, disabled, live in low socio-economic communities or are underemployed – or do not want to access government services digitally, can access them non-digitally. While an NTS would contribute to the provision of digital government services, the challenges will be to ensure inclusion for those who are digitally excluded, especially those solely reliant on public transport.

The strategy highlights the importance of trust and how digital technologies are created, used, and governed. For an NTS, it will be essential to ensure the digital services and technologies consumers use are adequately protected and the personal information of New Zealanders is utilised in ways that they expect and in line with the Privacy Act 2020.

[8] New Zealand Disability Strategy 2016 – 2026, page 22, sets out the eight outcomes: 1. Education, 2. Employment and economic security, 3. Health and well-being, 4. Rights protection and justice, 5. Accessibility, 6. Attitudes, 7. Choice and control, and 8. Leadership.

3.6.4 Regional public transport plans and regional land transport plans

Each regional public transport plan (RPTP) is consistent with the GPS in a way that is relevant for that region's population, demographic, and geographic characteristics.

Auckland's RPTP's outlook states that *"transport technology has continued to evolve rapidly, in tandem with our customer's expectations. More powerful analytical tools, with richer data, are improving AT's ability to plan. 'Big data', the power of the smartphone and new operating models mean that, in time, delivery of public transport services may be different from what we experience now as traditional bus, train or ferry services. AT will also be able to identify more localised information and provide services that better reflect the needs of individual communities. Looking further out, these same technologies are driving us towards a synthesis of transport services with the evolution of the Mobility as a Service (MaaS) model raising the prospect of seamless journeys across multiple modes, enhancing the customer experience".*

The overall vision of Greater Wellington's Regional Land Transport Plan 2021 is *"a connected region with safe, accessible and liveable places - where people can easily, safely and sustainably access the things that matter to them".* The NTS would provide greater convenience, ease of use, and access to public transport, leading to increased patronage and contributing to the key headline measure of *a 40% mode shift from private vehicles to public transport and active modes by 2030.*

An NTS would contribute to achieving these visions by providing convenience, ease of access and payment choice and lowest fare price guarantees. Accessing buses, trains and ferries using a bank-issued debit/credit card or virtual card on a mobile device:

- speeds up boarding – tag on with an existing debit/credit card or virtual card without having to find cash or top-up a prepaid transit card.
- removes customers' anxiety about not having cash or sufficient prepaid balance on a transit card.
- provides payment choices for customers, and makes use of public transport easier and more convenient.
- guarantees customers are charged the lowest possible daily charge for their journeys through their travel account at the end of each day.

Customer satisfaction is a key measure that PTAs monitor regularly. Providing payment choices for customers, reducing payment anxiety, increasing convenience by not needing additional cards, not needing to top-up or carry cash, and being able to manage their travel account on-line contributes to a better experience using public transport and improved customer satisfaction.

Satisfied customers are likely to travel more by public transport and recommend using public transport to family and friends, resulting in increasing patronage, farebox recovery, and mode shift, which are KPIs in every region's RPTP.

Appendix 2 summarises the key outcomes and priorities for the regions and where an NTS would contribute.

3.6.5 Emissions Reduction Plan

The consultation discussion document "Transitioning to a low-emissions and climate-resilient future"[9] includes discussion about the need for behaviour change and empowering action *"as a net-zero future depends on individuals, households and organisations changing their behaviour".*

It further states that *"in the short term, we can lower emissions by encouraging New Zealanders to make choices and new actions – for example, using the car less, taking public transport, native tree planting and walking and cycling (active travel)".*

Transport is New Zealand's second-largest source of greenhouse gas emissions, responsible for 43 per cent of total domestic CO2 emissions. The Climate Change Commission (the Commission) recommends reducing transport emissions by 13 per cent by 2030 and 41 per cent by 2035 (compared to 2019). To do this, the Commission recommends the Government focuses on three areas to reduce emissions from the transport system, the first being:

> *"Reducing reliance on cars and supporting people to walk, cycle and use public transport".*[10]

The target for this focus area is to:

> *"Reduce vehicle km travelled (VKT) by 20% by 2035, by providing better travel options, particularly in the largest cities."*

The recommended steps to achieve this include:

- Provide New Zealanders with better travel choices by implementing already agreed mode shift plans in our largest cities, in partnership with local government.
- Support New Zealanders to use public transport, walk and cycle by making significant improvements to public transport services nationwide, and investing in walking, cycling and shared mobility. This includes assessment of mass transport in Auckland, Wellington, and Christchurch.
- Make public transport cheaper – reduce public transport fares to make it more competitive with cars and to lower the cost barrier for low-income people along with convenience and accessibility.
- Engage with the public to build support for active and shared travel.

By improving the reach, frequency and quality of public transport, the Commission noted that

> *"Encouraging the uptake of public transport, walking, and cycling and managing demand on the transport network offers significant benefits beyond reducing emissions. This includes improved travel choice and accessibility, better health and safety, and less congestion.*

[9] Ministry for the Environment. 2021. *Te hau mārohi ki anamata | Transitioning to a low-emissions and climate-resilient future: Have your say and shape the emissions reduction plan.*

[10] The other two areas recommended by the Commission to reduce transport emissions are by rapidly adopting low-emission vehicles and fuels, and beginning work now to decarbonise heavy transport and freight.

Well-integrated networks of public transport services can significantly increase levels of access between communities, and are vital for connecting employers to labour markets, and individuals to social and economic opportunities.

Public transport can provide the backbone for our cities to grow in a way that avoids emissions from new development.

We also need to provide better travel choices in New Zealand's regions and rural areas, including by public transport. Too many parts of regional New Zealand are only accessible by private vehicle."

In the first emissions budget period of 2022 -2025, the key actions include establishing the planning and funding principles for a national public transport network, progressing Auckland light rail and Let's Get Wellington Moving initiatives, working on a mass rapid transit network for Greater Christchurch, investigating the potential of a mobility as a service platform to encourage the uptake of low-emissions modes, and delivering national integrated ticketing.

The NTS will be an enabler in achieving improved accessibility, convenience and ease of use of public transport, the establishment of Mobility as a Service platforms, and to deliver national integrated ticketing.

3.7 International trends

3.7.1 Automated fares and ticketing started with closed loop systems

International trends in automated fare collection started in 1997 with Hong Kong's deployment of their "Octopus" contactless card. This was followed by deployment in Singapore, and then London's Oyster card in 2003. All new implementations thereafter (including Auckland's HOP from 2012/13 and Wellington's Snapper) were focused on smart cards providing an electronic purse of money (stored value).

These contactless smartcards interact with a series of on-board devices to identify the entitlement of the person to travel, calculate the fare required for a specific journey, and undertake the payment process for the relevant fare, using information stored on the card. The card is the source of truth in respect of the customer. Typically, these Closed Loop Ticketing solutions are proprietary causing 'vendor lock-in'. Since all ticketing logic resides in each ticketing validator, software and configuration management of card reading devices, including changes to fare policies and concessions, is a costly and lengthy process, and any errors often impact many customers. These systems represent the majority of automated fare collection systems around the world.

3.7.2 International moves to account-based and open loop ticketing

The advent of good 3G and 4G communications from bus and train to the back office has allowed a move internationally away from closed loop, card-centric approaches[11]. Account-

[11] Page 5 ALCO Consulting Paper for GW – High Level Advice on GW Proposed IFT Scheme April 2015.

based ticketing shifts customers' financial information and fare calculation away from the card to a user's transit account and/or bank debit/credit card account. Account-based ticketing enables:

- Rich information to be gathered by transport network operators on the nature and precise location of system users.
- Easier and more flexible management of operational changes to fares and networks (amending routes, stops, etc.).
- Easier and faster introduction of new products and fare policies which can be initiated at the back office and require no changes to customer cards.
- Avoidance of requirements to generate and distribute extensive fare and customer data to all ticketing devices.
- Lower cost fare media as the cards or other token device (such as smartphones) do not need to be as smart. The cards or other devices simply need to identify the holder, and do not need information written back to them.
- Lower cost reader technology as processing is done at the back office rather than on each reading device, and in the event of a failed connection, can store passenger trip information until the connection is restored.
- Easier change management from old to new systems.
- Easier introduction of new technology over time.
- The ability to integrate with other payment applications for point-to-point transactions such as national fare concessions, park-and-ride, road tolling, and congestion charging.

Supporting the growing introduction of account-based systems has been the fact that banking systems have made significant advances in contactless card and supporting technologies. Applying these gains in contactless technology to transit ticketing is a natural progression[12]. Open loop systems are those that accept branded, "open standard," EMV[13] cards or virtual cards on smart phone devices to integrate with the account-based system. The application of open loop systems to public transport networks enables:

- Greater customer convenience because their existing Visa or MasterCard, or the virtual card on their smart phone/device, can be used to "pay as you go" for transit without the need to research how to access the system or acquire and top-up a stored value card. This convenience has seen increases in patronage as customers can simply turn up, tap, and travel, improving overall accessibility to public transport. Refer to section 4.5.4.1 for further discussion about the evidence for increased patronage.
- Lower cost for transport operators as cards and reader equipment are based on open standards and are commercially available off-the-shelf compared with proprietary closed loop equipment.

[12] Contactless Payments and Open-Loop Ticketing, p.1, L.E.K. & MasterCard, 2016.

[13] Europay, MasterCard and Visa standard

3.7.3 Global snapshot - others are introducing account-based, open loop or hybrid solutions

Cities around the world have been introducing open loop and/or account-based ticketing systems since London in 2013 (introduced alongside the Oyster Card), Chicago in 2014, Philadelphia, Portland and Boston in 2016 and Sydney in 2017, amongst others.

Several of these implementations have parallels with the New Zealand NTS. For example, from 2020, South-east Queensland began introducing account-based ticketing and open loop (EMV) including mobile payments (iPhone, Android), a multi-tenanted solution, and has a large geographic area, a similar patronage profile with one large region (Brisbane) and several smaller regions, and a similar population. These examples including how each are relevant for a New Zealand NTS are set out in Appendix 3.

3.8 Public Transport Payment and Technology Adoption Outlook

Successful adoption of open loop ticketing payments is dependent on a high proportion of bank-issued contactless bank cards in use in the retail environment. New Zealand is now in this position and most customers are ready for open loop to be the transit payment of choice. Covid-19 has seen a significant increase in contactless use by retail customers – up from 68% pre-Covid to 88% in September 2020.

99.4%[14] (3rd in the world) of New Zealand residents have bank accounts, 93.8%[8] (3rd in the world) are in possession of a debit card, and 83.23%[8] (4th in the world) use electronic payments when making payments. The use of cash is the lowest in the world; two-thirds of New Zealanders do not carry cash, and only 6% use cash as their preferred way to pay[15]. New Zealand has the highest transactions per capita per annum for debit and credit card transactions and the lowest total cash as a percentage of GDP at 2.1%. Banks' withdrawal of cheques as a payment option in the first half of 2021 has further encouraged debit and credit card use.

The limiting factor to further growth is card companies and banks charging high merchant service fees (MSFs) for contactless transactions. This has resulted in small independent retail merchants refusing to accept contactless transactions, resulting in retail card use in New Zealand still predominantly based on EFTPOS swipe/insertable cards which incur no or low fees for retailers. ANZ report that, before Covid, the split of ANZ merchant-processed debit transactions in a face-to-face retail environment was 20 percent contactless and 80 percent EFTPOS. At end-June 2020, that split increased to 30/70. In August 2020, banks significantly reduced MSFs from an average of 1.1% and 1.5% for debit and credit cards respectively by about half, with ANZ at 0.7% and Westpac at 0.6% for debit cards. This should see increasing use of contactless retail transactions as more retailers provide the capability.

Overall, the pace of electronic change in New Zealand is one of the highest in the world due to fast adoption and a high preference for electronic payments. It is anticipated that the uptake of public transport fare payment using contactless bank-issued cards or mobile payment wallets

[14] MBIE Retail Payments Systems Issues Paper December 2016
[15] MasterCard research presented June 2017

would rapidly reach high levels following introduction of an account-based and open loop ticketing and payment solution.

Research about public transport customer preference in New Zealand also indicates there is an inherent expectation for customer self-service using personal devices for information, account management, payment and purchasing. It also indicates that the quality of this experience is expected to be high. Allied to this is an acknowledged willingness to embrace technology into mainstream customer activity in New Zealand; therefore, a ticketing solution will need to be capable of servicing these channels to the highest standards.

The NTS solution concepts anticipate that most partners will minimise and, in due course, eliminate cash use for public transport fare payment, especially as a result of Covid. However, cash usage currently remains a core customer expectation.

3.9 Customer insights

Customer insights have been drawn from a range of research over the last three years. This included work undertaken by; (i) the GRETS procurement team in February 2017 (set out in Decision Paper D9) on customer experience requirements; (ii) Colmar Brunton in September 2017 – Understanding Public Transport Cash Payers; (iii) Waka Kotahi NZTA in the February and May 2019 Accessibility Workshops; (iv) PwC in April and May 2019 – Project NEXT Customer Experience Research report, the Project NEXT Ticketing Solution RFP Input: Customer Experience Input Report, and the National Ticketing Research undertaken by GravitasOPG for Waka Kotahi in 2021. These are referenced in Appendix 4.

These customer insights have been used to help identify and develop the business requirements for a solution that will best meet customer experience needs. In summary, these survey findings reveal the following:

Importance of education – both during transition and to ensure a good experience - no one wants to be publicly embarrassed because the system is not easy to understand and use

During transition – There is an amount of anxiety for customers to learn new ways to pay and customers like to know in advance what they need to do. Not being able to clearly understand how to use a certain option will be a barrier to adoption, because people 'just won't try'.

Unconscious vs. self-aware experience – While frequent travellers are often on autopilot with little awareness of the travel experience until a disruption occurs, infrequent travellers, first timers, and those with accessibility needs have anxiety over how to navigate public transport and know what to do and when, including successfully tagging on/off.

Transit cards have strong appeal – because of the familiarity and benefits of current HOP and Snapper closed loop systems, people showed preference for what is familiar, but added they would feel more secure with a central account rather than all information and money being stored on the card itself.

Unclear value proposition for use of smart cards and QR codes – being clear on the value proposition of a smart ticket is essential for customers to see it as a genuine option, e.g. how would free public transport work for special events using the event ticket so no need to carry

two tickets. Participants thought a smart ticket could be good for tourists or infrequent travellers for purchase of travel in advance and agreed that it would be useful as part of an event ticket or for groups such as schools or sports teams travelling together.

Tagging on/off is a moment that matters – the tag on experience should be simple and completely self-explanatory and customers want the reader to deliver simple yet helpful audio/visual messages to know that they've done it right. If the card is denied, people want to have information on what to do, and want to know that they can 'sort out' issues easily. Tag off has the extra concern that they will be charged extra, which they will have to rectify themselves.

Low perceived effort in using bank cards because of the convenience of contactless bank-issued cards such as Visa's PayWave, not having to carry many cards, and the added environmental sustainability of using an existing card to reduce paper tickets and new additional plastic cards. However**,** there are concerns about:

- how much their bank card would be charged if they forget to tag off
- being on a Deny List could prove a significant issue even though the chance is extremely low. The expectation is to take no more than a day to get off a deny list and ideally immediately following a call to a contact centre or after making a minimum account payment.
- security, privacy, and identity when required to present a card to a revenue inspector. It is essential that all customers can recognise inspectors and know what inspectors will do and what information they will see.
- risk of personal safety and security at stations when presenting bank cards in public places including security risks of PayWave from fraudulent access such as skimming.

A key "non-negotiable" for customers is the underlying expectation of best value fares, i.e. that fares are affordable, and they will be automatically charged the minimum cost of their journey across modes per day. Cost and convenience are key motivators for customers when deciding to use public transport.

Other important factors were about nationwide consistency:

1. One transit card for the country - with fares calculated automatically based on location of tag on/tag off
2. Consistency in branding to ensure all services are easily identified and navigated.

The recent National Ticketing Research undertaken by GravitasOPG is particularly insightful about how public transport users currently make payments and how they feel about the proposed NTS. The findings reveal that:

- **Currently – 90% of current customers already use contactless smartcards or SuperGold to pay for public transport**

  Overall, more than four out of five customers use a smart card and a quarter use cash although use varies considerably by region. The main centres of Auckland, Wellington, Christchurch, and Dunedin/Queenstown have high use of closed loop smart cards.

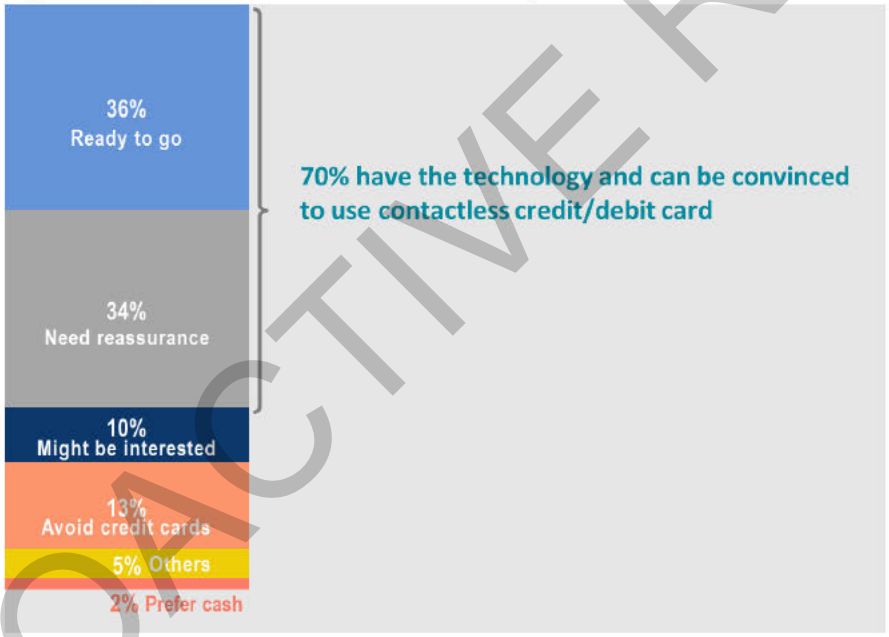
Table 5 Current use of cash and smart cards

	Smart-card use	Cash use
Northland	66%	55%
Auckland	**93%**	**12%**
Bay of Plenty	59%	29%
Waikato	68%	41%
Manawatu, Whanganui, Taranaki	45%	54%
Hawkes Bay	2%	73%
Wellington	**84%**	**25%**
Canterbury	**90%**	**31%**
Otago	**83%**	**20%**
Rest of South Island	47%	59%

Note that payment types are not mutually exclusive

Based on survey responses, the likely initial uptake of the NTS using bank issued cards (or virtual cards) is summarised below with 36% ready to go and another 34% that would switch with some reassurance.

Figure 9 Proportion of current customers likely to use their bank-issued debit or credit card.



- **81% are likely to use a card-based payment for public transport in another region**
- **For the future – 89% prefer contactless payments when given the new options.**

3.10 Public transport ticketing and payment priorities

3.10.1 Urgency for GW and ECan

Until a national ticketing and payment solution is introduced, GW is still operating paper tickets across its rail network and cannot implement integrated fares and ticketing and the associated fare policies originally planned for 2017/18 in its Long Term Plan. Delays mean GW is forgoing certain cost reductions post 2020 under its contractual commitment with the Wellington

commuter rail provider, and issues such as significant revenue leakage remain until paper tickets on trains are replaced with an account-based payment system.

ECan's current closed loop system is at end-of-life with devices and equipment wearing out and a lack of information to refine network services due to its tag-on only system. A new solution is required for 2022/23.

3.10.2 Open loop to increase public transport use in Auckland

By implementing EMV-based open loop technology, AT expect the increased customer convenience to bring a significant lift in use of public transport across Auckland, particularly people new to public transport and occasional users, while reducing the cost of issuing AT HOP transit cards.

AT's review of customer needs[16] revealed that 51% of customers (May 2016) had a strong desire to use a debit or credit card for travel and 73% (February 2017) have a contactless debit or credit card. 65% of customers wanted to be able to use their mobile phone to pay for public transport. Customers saw the key benefits being convenience and time savings.

Moving to an account-based, open loop solution would meet these customer requirements and could speed up adoption of third-party products because including public transport widens the scope for everyday users.

3.10.3 Account-based imperative politically urgent

An account-based solution meets regional and national requirements to improve public transport accessibility while enabling broader policy initiatives to integrate public transport payments with other services such as park and ride and road tolling.

3.10.4 Sustainable capability essential

Rapidly changing technology and customers' expectations are driving demand for easier access and joined up transport and related services. Achieving this requires sustainable technology, infrastructure, and organisational capability and capacity.

3.11 Risks and constraints

There are several key strategic risk and limitations with a single, national ticketing solution.

Market lock-in with one supplier nationally could mean potentially missed opportunities of "technology competition leap-frogging" that can be achieved through two or more systems, and could limit future ability to adapt and respond to new and/or disruptive technologies.

Building a system that is narrowly focused and locked down to specific products and services rather than enabling new products and services in the future could limit the ability of partners to best meet changing circumstances and customer demands. Finding the 'goldilocks zone' will be a challenge as the solution will need to balance a range of factors such as costs, effective

[16] Future of AT HOP Research, May 2016

delivery of core functions, and multiple user organisations with specific, local requirements, and the flexibility to add new products and services in the future.

One central, account-based system poses wider and more significant digital risks than the current regional closed loop solutions. This could range from the extreme situation of a sustained cyber-attack on the centralised system which could potentially shut down ticketing operations nationally rather than regionally; contracted suppliers storing personal data offshore in a jurisdiction which exposes the NTS and customers to privacy risks; through to inadvertent security and privacy gaps because of complex data sharing between many participants.

Higher than expected total costs of ownership could place an NTS at risk of being unaffordable. This depends on several factors such as the value central government places on the benefits of a centralised accounts-based payment platform, and the amount that regions, especially Auckland, Wellington, and Christchurch, must fund from ratepayers.

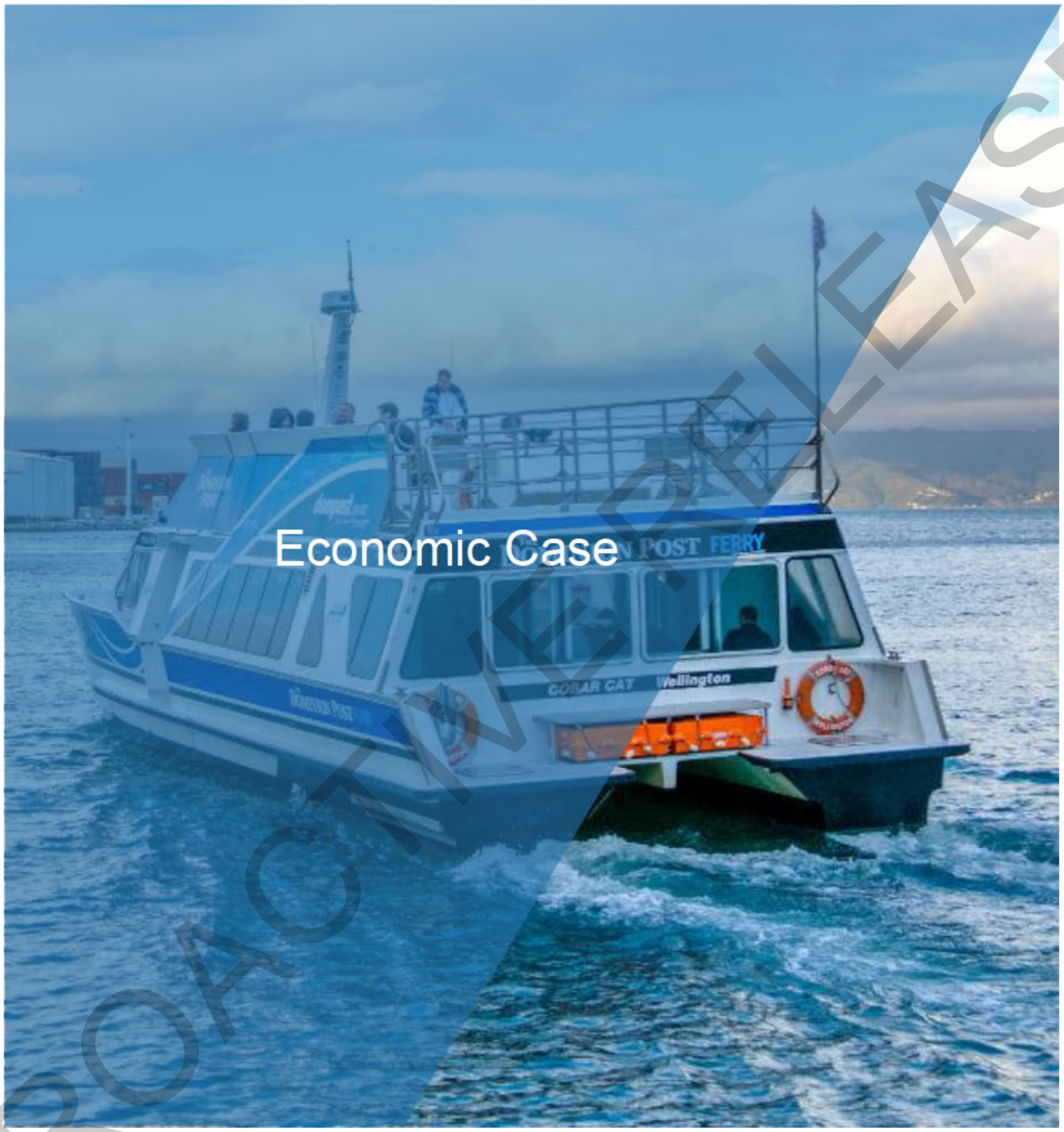
The impact of Covid-19 could adversely affect timeframes and costs. Global delays in completing other projects around the work could affect suppliers' resource capacity and capability, and delays in production and shipping of equipment together with price rises could impact affordability.

There are ways to mitigate the effect of these risks. Open architecture helps to limit the effect of single supplier lock-in. This is managed in other national systems, and it may be possible to keep the solution 'evergreen' through termination for convenience of separable portions of the system and, within capability, capacity, and budget constraints, to run cloud-based services that are regularly updated.

The complexity of integrated fares and ticketing systems that introduce public-facing technology across multiple public transport networks and providers means that a range of commercial, implementation and operational risks will need to be managed. These risks are listed below, and their impacts, mitigation and allocation are described in the Financial, Commercial and Management Cases.

i. The decision-making process across multiple investors is slow.
ii. One or more of the larger participants withdraws their participation in an NTS solution in preference of extending their current solution.
iii. There is insufficient capability and/or capacity to deliver to expected quality and timeframes.
iv. National benefits of investment prove difficult to quantify, measure and realise and regional benefits are less than expected, for example:
    a. COVID results in workplace changes that lead to lower ongoing patronage
    b. Customers do not embrace open loop capability to the extent predicted.
v. Integration between the different suppliers is not managed by the preferred supplier within expected boundaries and timeframes resulting in delays, rework, and additional costs.

vi. A major technical failure during transition could result in significant delays and additional costs. Technical failure after ‘go-live’ causing widespread cancellation of services would result in loss of revenue and reputational risk.



4 Economic Case – Exploring the Preferred Way Forward

4.1 Key Messages

Cost benefit analysis focuses on two options – (i) the NTS implemented on a staged basis for ECan, GW, AT, and RC; and (ii) a Regional Upgrade that continues with upgrades or replaces current regional solutions, and compares these with a Do Nothing counterfactual.

The NTS is the preferred option.

The NTS is an account-based ticketing system with open loop payment functionality, a multi-tenanted platform, a shared services operating model, open standards, effective revenue protection, and standardised fare policies across New Zealand albeit with some flexibility for regional policy variation.

The NTS will enable all PTAs to benefit from a world-class solution that would be financially unattainable for most.

Reduced costs of fare collection and customer convenience have been catalysts for introducing open-loop and/or account-based solutions in cities like London and New York, and currently across South East Queensland. Using existing bank-issued cards and avoiding the need to purchase a transit card, find cash, queue to purchase tickets or load value is a boon for all users, especially casual users and tourists.

A national account-based solution enables the implementation of national policies, provides capability such as Covid tracing and tracking, and regional benefits such as easier changes to fare policies and products and information to support network and operational improvements and efficiencies.

[redacted]

The present value of costs and benefits of the options and the incremental difference between the NTS and Regional Upgrade options are:

	Do Nothing	Regional Upgrade	NTS	Regional vs NTS
Present value of costs (at 4% over 14 years)	611.3	858.4	1,115.9	257.5
Less Present value of benefits	(99.4)	471.5	916.6	445.1
Net present cost/(benefit)	710.7	386.9	199.3	(187.6)
BCR of incremental difference between the NTS and Regional Upgrade options				1.7

4.2 Process for economic assessment

The purpose of this economic case is to summarise the identification and shortlisting of ticketing options (set out in Appendix 5), and to evaluate the shortlisted options by applying two types of assessment:

- quantitative assessment which involves cost benefit analysis of each option
- qualitative assessment against the benefits of investment in an NTS.

The shortlisted options comprise:

i. NTS

ii. Regional Upgrade (previously referred to as Do Minimum Plus)

These options are compared against a Do Nothing counterfactual (status quo).

The cost benefit analysis compares the benefits and costs of delivering a ticketing solution over the 14 year evaluation period under each of these scenarios.

The economic assessment sets out the following:

- Descriptions of each option solution and service concepts
- Cost benefit analysis of each option including:
  - Benefits, both monetised and non-monetised
  - Costs including key assumptions
  - Cost benefit comparison
  - Sensitivity analysis
- Multi-criteria evaluation
- Results and conclusions
- Investment prioritisation rating.

The assessment follows a structured approach consistent with guidance from Waka Kotahi's Investment Decision Making Framework including the Benefits Management Framework and business case guidance, appropriately tailored to reflect the nature and timeframes of an account-based, ticketing and payment solution and integrated fares.

The costs and benefits under the Economic Case differ slightly from the costs and benefits for the Financial Case. The economic case excludes inflation and applies a real discount rate. The financial case is based on nominal dollars and includes inflation.

Cost information for the NTS cannot be readily determined without going through a procurement process and the evaluation has been informed by the preferred supplier's information and costs from the BAFO stage of procurement. Cost information for the Regional Upgrade and Do Nothing options has been provided by AT, GW, ECan and RC along with estimates from their current providers where required.

Calculations are based on NZ dollars (Base year – 2022/23) with a mid-year discount rate of 4% to calculate the present value (PV) of costs and benefits, and the resulting net present

value. The discount rate of 4% is the rate currently recommended in the Waka Kotahi business case assessment guidelines.

The evaluation period is 14 years from 2022/23 to 2035/36 to reflect the expected lifespan of an account-based and open loop hybrid ticketing and payment solution *from the time of the first meaningful live production use for the last of GW, AT and ECan to implement the NTS (irrespective of the staging sequence).*

Because the NTS is implemented on a staged basis over the fixed evaluation period, the implementation and transition costs for the first four years will comprise a mix of NTS and legacy system costs. This is appropriate *because the objective is to determine and compare the economic costs and benefits of providing ticketing over the evaluation period under each scenario.*

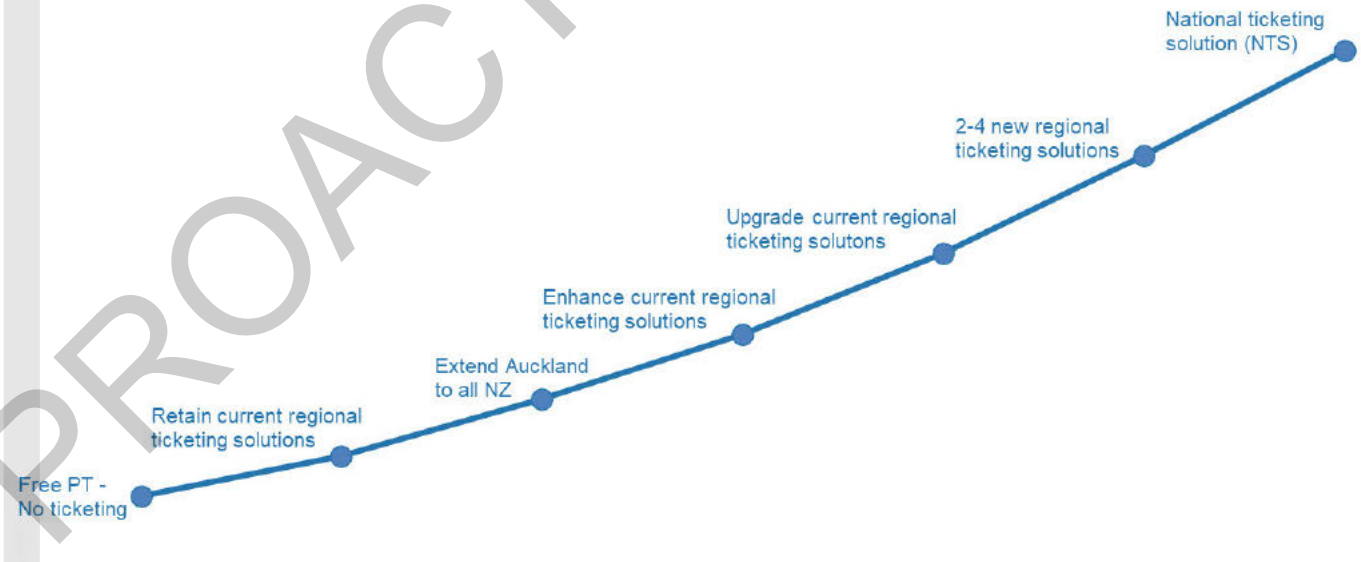
4.3 Alternative ticketing solutions

4.3.1 Overall options

A ticketing solution is an essential part of providing public transport. It provides two key functions – a payment system that enables users to purchase tickets to travel on public transport, and an information system that identifies, for example, where and how many people got on and off at specific stops and stations by type of traveller, such as those paying full fare and those eligible for concessions.

Options for ticketing and payments range from no ticketing and free travel for all through to a single national system, as illustrated below.

Figure 10 The continuum of ticketing options from free public transport/no ticketing to an NTS



Each option is briefly summarised below and discussed in Appendix 5. For an option to be shortlisted for detailed analysis, it must meet three key criteria:

i. Financial expectations – the option will not result in substantial extra initial or ongoing costs, or cost more than another similar option
ii. Customer expectations – the option will deliver on changing customer service levels and current and future expectations
iii. PTA expectations – the option that PTAs would consider as a viable alternative.

Free public transport for all across New Zealand would be unaffordable, costing in the order of $385 million per annum. Also, overseas jurisdictions that introduced free travel generally found that the public transport network declined over time and there was little change in the use of private vehicles. This option does meet the financial expectations test and was not shortlisted.

Retaining existing solutions for the next 10 years is the Do Nothing option which, although not a sustainable option, would provide a current cost counterfactual for comparison of the preferred options.

Extending Auckland's HOP system to all New Zealand was considered and assessed by NineSquared[17] during the development of the earlier Indicative Business Case. NineSquared concluded that, from a financial perspective, the comparator model outcomes indicate a new account-based solution should be procured early rather than firstly transitioning to the AT HOP system and jointly procuring an account-based ticketing system in 2026. Based on this assessment, the option fails the financial test and does not meet the expectations of all PTAs.

Enhancing current regional solutions would require each PTA to extend their existing closed loop platforms for the next 10 years, with only minimum investment improvements approved and any implementation projects and operations managed locally. This is a variation to the upgrade option below and fails the test of PTA expectations.

Upgrading current regional solutions over the next 10 years – the Regional Upgrade option – would result in three or four separate ticketing systems for NZ and, apart from Auckland, functionality will be more limited than the NTS with:

- AT entering a new contract with Thales prior to the current contract ending in 2026 and adding account-based and open loop functionality.
- GW would extend the current Snapper closed loop bus system to the rail network and harbour ferry, provide integrated ticketing, and potentially add EMV payment capability.
- ECan would procure a new closed loop ticketing solution which is assumed to be a similar cost to ECan joining RC's Bee Card system
- RC would extend their current contract and maintain the existing features and functionality of the Bee Card system until it is next re-procured.

This is the pathway GW and AT have been following and would ramp up if the NTS did not proceed. It is likely to meet financial, customer and PTA expectations and has been shortlisted.

Two to four new regional solutions involve procuring new solutions for each region with each PTA designing and executing a procurement strategy with a business case in line with their own

[17] NineSquared is a specialist economic consulting and commercial advisory firm based in Australia specialising in the fields of transport, resources and regulatory economics, policy development and analysis, and advising on commercial arrangements between government and the private sector.

needs, funding and timeframes for the delivery of their solution. Investment would be aligned to regional long term plans and requirements, with implementation and operations managed locally. One variation of the option was considered previously and comprised GW, ECan and RC developing an account-based and open loop solution while AT continued with HOP. This option fails the financial test and was not shortlisted.

The NTS would provide a single, national, multi-tenanted, hybrid solution (account-based and open loop) providing significant national capability not available under any other option, and would involve one procurement cost rather than the multiple procurement processes of the other options. This solution is likely to meet financial, customer and PTA expectations and has been shortlisted. The NTS is described in detail in section 4.4 below.

4.3.2 Options to be further evaluated

Three options were taken forward to the Economic Case for evaluation:

i. NTS
ii. Regional Upgrade
iii. Do Nothing.

4.4 Description of options - NTS, Regional Upgrade, and the Do Nothing counterfactual

4.4.1 Description of the NTS

Key requirements

Ticketing solutions comprise a range of component parts which need to be brought together to form a cohesive and integrated whole. The conceptual design of the NTS involved defining the components that would achieve the best solution for New Zealand. These components include ticketing and payments, concept of operations, supporting systems, extensibility, and revenue protection. The detailed analysis of each component forming the NTS is set out in Appendix 6.

The requirements for the preferred NTS take account of the integrated ticketing requirements for GW, AT, ECan and RC, and customer feedback. The solution comprises:

An account-based ticketing and payment system with open loop functionality which provides the highest customer convenience (which should see increased patronage), support for all fare models, and is easy to adapt to new technologies - key outcomes already proven in other jurisdictions.

A centralised, shared-services operating model whereby a single operating entity will provide a range of common contractual, operational, procurement, compliance, and management services for all PTA partners, and operate in conjunction with these partners as "one national team".

Support systems based on:

A "standards" based approach using open standards (where these exist) across all components of the system.

Openness obtained through the use of APIs that are published and based on open API standards.

Security mechanisms across all open interfaces.

Revenue protection on buses, trains and ferries that require tag-on/tag-off for all trips on all modes, revenue protection "inspection" capability on all modes, and applying legislative powers to support enforcement of revenue protection.

Optimised support of regional fare policies whereby the NTS supports fare policies within a standardised range. While regions need to control setting of fare policy to ensure they maintain their patronage and revenue targets, the wide variety of fares, fare structures, concessions and products applied across regions means there is a substantial opportunity to standardise and simplify fare policy while still giving regions the flexibility and control they require, with further potential for regional customisation when a defined threshold is met. Opportunities for standardisation are set out in Appendix 6.

Reporting capability sufficient to meet 'fit for purpose' financial, operating and PTOM performance requirements.

The aim is for the NTS to align with customers' expectations from day one by offering:

- User-friendly and convenient cashless and contactless payment that is intuitive, easy to use and speeds up the journey.
- A flexible range of low-effort options for participation (pay-as-you-go and account-based) to suit a variety of current and future customer needs and preferences.
- A flexible range of channels (mobile, online, retail) to provide customer information and for account management that allows customers easy access to manage their funds.
- Financial incentives (such as discounts and concessions) that encourage and reward participation.

The NTS requirements, particularly around data capture and reporting, will support:

- Intercity train services – Te Huia (Hamilton to Auckland) and the Capital Connection (Palmerston North to Wellington), as well as intercity bus services in the future.
- Modern connected public transport network design and operations.
- Integrated transit app development.
- Future innovation that could include opportunities for related services such as ride-sharing and the development of concepts such as MaaS and Smart Cities.

NTS ticketing service concept

The ticketing service concept for an account-based ticketing solution with open-loop payment functionality, shared services, and scheme management are described below:

Account Based Ticketing with Open Loop payment functionality

- Customers use open-loop EMV fare media (including mobile payments) to interact with the ticketing service on all travel modes.
- Customers may choose to use a prepaid transit card or a post-paid, bank-issued contactless payment card18 (CPC), either of which may be a physical card or virtual card on a mobile device.

[18] Examples of bank-issued cards are Visa and Mastercard.

- The prepaid transit card can only be used for travel on public transport, may be branded, and can be used for travel with any PTA.
- Customers travel on services provided by one or more Public Transport Operators (PTOs) that are identified to the customer as belonging to a PTA's Ticketing Scheme.
- Customer services are accessed through PTAs. (Note that PTOs do not provide ticketing customer services other than during travel.)
- Customers may choose to register a Transit Account to access fare concessions, ticketing customer services, and travel products and features.
- Ticket vending machines (TVMs) and/or a retail network could provide single use tickets for those without a pre-paid transit card or bank-issued CPC.
- Cash on board buses could remain an option for some PTAs, either during transition or for a fixed period (say 5 years), or on a permanent basis.
- A period of transition is expected to enable customers to move from a closed loop, prepaid card solution to the new account-based solution. In most cases transition will mean rapid replacement of on-board devices over a short period or as a phased series of replacements depending on fleet size.

Shared Services

A shared services operation to facilitate or provide the functional requirements for the successful delivery of the NTS will be established within Waka Kotahi. The shared services function will work in collaboration with PTAs to manage the operation of the ticketing services. The intention is for each PTA to retain its autonomy in key areas subject to the constraints of the New Zealand-wide, multiparty, governance, operating, commercial and contracting framework of the NTS. The shared services operation is described further in the Commercial Case (contractual agreements) and Management Case (implementation and operation).

Scheme management

The preferred management option for the NTS is that:

- The TSP will:
  - manage a single ticketing solution serving multiple PTA partners, PTOs providing exempt services, and the relationship with acquiring banks
  - work closely with the shared services functions provided by Waka Kotahi together with PTAs as one national team.
- The TSP manages the centralised automated fare collection (AFC) system that processes services and third party-provided transit card services for all aspects of ticketing transactions, payments processing and operational services on behalf of all partners.
- The solution will provide a multi-tenanted, single system for all PTA partners across bus, train, and ferry travel modes.
- The solution will be extensible whereby the NTS design, architecture and implementation can be readily extended to incorporate new operating entities and possibly new business functions such as other transport related services that could be serviced by and managed through a national Transport Account, such as road tolling, congestion charging, and park and ride. (Refer to 'Extensibility' in Appendix 6.)

4.4.2 Description of the Regional Upgrade option

The Regional Upgrade describes an alternative option to the NTS whereby each region either continues with, significantly upgrades, or replaces its current system. For the purposes of this DBC, this scenario assumes that:

- AT would upgrade its HOP system to provide an account-based, open loop hybrid system from its current ticketing provider, Thales. This would provide largely the same functionality as the NTS. Customers could choose to use their bank-issued debit or credit card (physical or virtual) to interact with the ticketing service on all travel modes or use a HOP card (prepaid transit card), either of which may be a physical card or virtual card on a mobile device. Customers could then choose to register a Transit Account to access fare concessions, ticketing customer services, and travel products and features. Existing ticket vending machines (TVMs) and retail network would remain for HOP cards. Cash on board could remain an option.
- GW would introduce Snapper on rail across the Wellington region, provide integrated fares and ticketing across modes (bus, train, and ferry), and may introduce EMV capability (open loop) that would enable tag-on and off using a bank issued card (either physical or virtual).
- ECan would replace its Metrocard system with a tag-on, tag-off closed loop system with mobile payments. For the purposes of this business case it is assumed to join RC's RITS (Bee Card) system which is assumed to be a comparable cost basis for implementing a separate system.
- RC would extend the contract to continue with its RITS (Bee Card) closed loop system until it reached end-of-life.

There would be three to four separate systems across New Zealand with no integration between them (apart from Bee Card inter-regional use) and no national capability.

4.4.3 Description of the Do-Nothing counterfactual

The Do-Nothing counterfactual provides a baseline cost against which the NTS and Regional Upgrade options can be assessed. It describes the continuation of the current regional ticketing systems and assumes only those costs necessary to realistically maintain these systems. This would see AT continuing with HOP integrated ticketing and fares, GW continuing with Snapper and paper tickets, and RC continuing with its Bee card closed loop solution.

The exception is ECan because its current Metrocard system is at end-of-life (physically, economically, and technically) and requires urgent replacement. For the purposes of this DBC, a proxy for the costs of a replacement system is to assume that ECan joins RITS and introduces the Bee Card in Christchurch and Timaru.

This counterfactual scenario would result in three separate systems across New Zealand with no integration between them to allow regional travel (apart from Bee Card inter-regional use), no consistent national information, and no ability to implement national policy initiatives.

4.5 Benefits and costs

This section identifies the qualitative and quantitative benefits and costs of each ticketing scenario – the NTS, Regional Upgrade and Do Nothing – over the 14 year evaluation period.

The results are summarised in the table below and detailed further in the following sections.

Table 6 Overview of the economic assessment

	Do Nothing	Regional Upgrade	NTS
Reference	*Section 4.5.3*	*Section 4.5.2*	*Section 4.5.1*
Analysis period	14 years	14 years	14 years
Nominal whole of life benefits (non-discounted)			
Decongestion benefits	-	327.9m	521.2m
PT user benefits	-	428.7m	761.4m
Customer convenience improvement	-131.6m	-86.4m	-35.9m
Whole of life benefits (nominal $ millions)	**-131.6m**	**670.2m**	**1.246.7m**
Present value (discounted) whole of life benefits	***-99.4m***	***471.5m***	***916.6m***
Nominal whole of life costs (non-discounted)			
Capital Costs (nominal $ millions over 14 years)	[redacted]	[redacted]	$138.9m
Operating costs including 'legacy phase out' (nominal $ millions over 14 years)	[redacted]	[redacted]	$994.7m
Risk, transition and legacy phase out costs (nominal $ millions over 14 years)	[redacted]	[redacted]	$204.5m
Whole of life operating costs including risk, transition and legacy phase out (nominal $ millions)	**$784.2m**	**1,090.7m**	**$1,338.1m**
Present value (discounted) whole of life costs	***$611.3m***	***$858.4m***	***$1,115.9m***

4.5.1 Benefits and Costs of the NTS

Introduction

The NTS provides a single national solution (as described in section 4.4.1 above). The costs and benefits reflect the structure, implementation and operation necessary to deliver the solution for all partners. Total costs and benefits are summarised below.

Table 7 Summary of costs and benefits of the NTS scenario

	Reference	NTS
Cost benefit analysis (PV)		
Present value of benefits	*Section 4.5.1.4*	$916.6m
Present value of costs	*Section 4.5.1.5*	$1,115.9m
Net present cost		**-$199.3m**

PTA partner transition to the NTS is expected to follow a staged approach determined by priority and urgency of PTA requirements. For the purposes of the DBC, the expected sequence of implementation is assumed to be:

Figure 11 Assumed implementation/transition dates

PTA	NTS Implementation dates[19]
Shared services operation (SSO)	July 2022
ECan (bus and ferry)	July 2023
GW (bus, train, and ferry)	March 2024
AT (bus, train, and ferry)	November 2024
RC (bus and ferry)	February 2025

As noted previously in section 4.2, the timeframe for the benefits and costs will reflect 10 years of operation from the first meaningful live production use for the last of GW, ECan and AT. Allowing for an unforeseen delay of 6 – 12 months, the evaluation period would be 14 years from 2022/23 to 2035/36.

NTS benefits

The identification and assessment of non-monetised economic benefits from the NTS fall within three main groupings that, together with monetised benefits, align with the ILM outcomes set out in the Strategic Case (section 3.5) as follows:

ILM Outcome	Weighting	Economic benefit grouping
Enhanced customer experience that substantially reduces the barriers to travel	35%	Customer benefits
An affordable and efficient public transport network that delivers operational efficiencies and strategic information	30%	Operational benefits
Efficient, least cost, regional and national investment	20%	Monetised benefits – incremental NPV and BCR
Improved public and government confidence in ticketing investment	10%	Policy and innovation benefits

Non-monetised (qualitative) benefits

The NTS provides substantial qualitative benefits that cannot be easily monetised because of the lack of international research data and the obscuring effect of concurrent changes, such as to fare policies or externalities. Nevertheless the NTS would provide significant value for customers, public transport operations, government policy development and implementation, and as a basis for innovation. These benefits are discussed below and listed along with applicable measures in Appendix 7.

Customer benefits

[19] Dates when NTS will start operating and costs will begin to be incurred

The following customer benefits strongly support the ILM outcome of an enhanced customer experience that reduces barriers to travel.

Convenience – being able to use your bank-issued card (or virtual card on a mobile device) removes a barrier to access and provides a strong additional incentive to use PT, because:

- Customers save time and cost by avoiding the need to acquire a transit card (although they may need to register their bank-issued card if eligible to receive concessions)
- There is a high penetration of bank-issued contactless cards across New Zealand and increasing use of mobile devices (phones/watches) for making payments
- Account-based means no searching for a kiosk or retailer and queuing to top up smart-cards; no need for cash on-board or a ticket office/retailer to purchase tickets; and no need to understand the local ticketing system when travelling between regions
- Customers can turn up, 'tap' and travel, paying for transit as and when they use it without having funds tied up on a stored-value smartcard or worrying about whether they have sufficient funds to complete their journey
- It is intuitive to use – the process of tagging on is just like making a contactless payment but with the extra step of also needing to tag off
- It enables spontaneous and casual use of public transport
- It is easy and convenient for tourists who do not need to obtain a transit card.

While the aggregate time and cost savings for customers from these benefits are substantial, they are difficult to fully quantify. However, customer time savings from not needing to top up transit cards has been quantified (refer to section 4.5.1.4 Monetised benefits).

Payment choice is provided through the options of using Visa or MasterCard (debit or credit card), mobile payment, or a transit card to tag on and off. Multiple payment options provide:

- The opportunity to remove cash on-board, which, if able to be adopted, would eliminate labour-intensive cash handling, reduce costs, and reduce the potential spread of viruses
- Flexibility for different types of users such as students, commuters, elderly, disabled, casual, and tourists.

Confidence of always receiving the lowest fare option because aggregated journey information is processed at the end of the day when all concessions can be applied, which:

- Removes the need for multiple and confusing ticketing products
- Ensures those on low incomes can readily access the lowest fare option without having to "pay in advance" for a concession ticket such as a 10-trip multi-ticket
- Enables eligibility for a concession to be held at the account level and easily changed when required
- Provides access to fare concessions (for those registered and eligible) in accordance with local and national fare policies
- Enables national policies such as free off-peak public transport for older persons, for example, via a contactless SuperGold card or mobile phone app.

Better information with notifications provided through integrated media, which enables:

- More information for customers (number of seats available, bus full, etc.)
- Integration with third parties to provide wider services such as customer apps
- Future innovation for the provision of related services and products.

Improved accessibility for those with disabilities through account-based eligibility for concessions and easier to use on-board devices.

A nationally consistent customer experience whereby customers can readily access public transport in the same way wherever it is provided in New Zealand.

Patronage growth as a result of the improved ticketing experience for customers has been cited in major cities around the world, such as London. These are difficult to attribute solely to account-based and/or open-loop ticketing as other changes are often implemented at the same time. Refer to the discussion on patronage growth in Section 4.5.1.4.

Flow on effects from making public transport more attractive and increasing patronage through improved convenience and access provides health benefits through increased active mode travel (mainly walking between home and the bus stop or station), and helps to reduce private vehicle use which, in turn, contributes to less congestion, improved safety, and better environmental outcomes such as reduced carbon emissions, especially as the proportion of electric vehicles in the public transport fleet increases.

Operational benefits

The following operational benefits strongly support the ILM outcome that delivers operational efficiencies and strategic information.

Rich data enables improved network and fleet management such as improvements to network design to reflect customer demand profiles, and improvements to fleet efficiency by, for example, allocation of the most appropriate vehicle type and size to each route by demand profile.

Ability to quickly introduce new products and policies, respond to special events and unforeseen disruption to improve network (and wider transport) resilience.

Reducing cash on board (if implemented) has a wide range of benefits, especially for transport operators and drivers, including:

- Drivers are safer through no longer being a target for cash theft
- Preventing the health impacts of handling cash and paper tickets (such as the spread of Covid and other viruses)
- No cash handling costs (which can be as high as 25% of the total ticketing cost of a traditional system) because there is no driver and administration staff time required to handle cash, no consumable paper tickets, and no impact on the environment
- Reduces the manual effort required to provide data for contract compliance monitoring under PTOM
- Reduces dwell time on buses because open loop functionality and minimising on-board cash means that, depending on the type of bus used, buses load faster and/or higher

capacity buses can be used. This should increase peak efficiency and reduce journey times, thereby saving customers' time and reducing vehicle fuel use and emissions.

Revenue protection is improved. International experience indicates that revenue losses, especially with paper tickets and cash on-board, are in the order of 10% - 20%. Loss of revenue, especially with paper tickets, occurs by deliberate fraud and by mistake. For example, passengers find ways to avoid paying for a ticket such as moving to avoid a conductor or reusing a poorly checked ticket, travel further than entitled by their ticket, or the conductor undercharges, or by inadvertent error, whereby the conductor fails to check all tickets, or issue a ticket on a very full train. Contactless cards are easier and faster to check using handheld devices ensuring there are fewer instances of revenue leakage. Similarly, card readers on gates make it harder, although not impossible, to access the platform and avoid paying a fare.

Government and regional policy benefits

The following policy benefits support all of the ILM outcomes and, in particular, improved public and government confidence in ticketing investment and more efficient public transport networks through operational efficiencies and strategic information.

Simplified deployment of government policy can be achieved with a back-office account-based payment platform, such as enabling the Community Connect card, which is a more focused policy initiative than could be achieved when the SuperGold national transport concession was introduced. Also, there may be potential in the future to facilitate regional and national point-to-point transport charging initiatives such as road tolling, park and ride, and congestion charging.[20]

Significant improvements in data collection and information - an NTS would provide complete and accurate national information that is not currently available to support policy development and budgeting; for example, data for local government reimbursement of the SuperGold concession would be based on actual rather than estimated usage.

Ability to quickly implement changes - A modern, account-based ticketing solution would provide the ability to easily and quickly implement changes or new capability such as ticketing requirements on the introduction of new public transport initiatives such as avoiding the need for another fee engine for light rail.

Support for national emergencies such as Covid tracking and tracing is achievable with an account-based solution, and it reduces the need to support paper tickets and cash handling. Encouraging registration is important so that the system can identify where an individual has used the public transport service. Contact tracing teams obtain richer data that can enable faster contact tracing, which could mean more localised lockdowns, reducing the economic impact and enabling faster recovery. Even non-registered customers using a bank-issued card could theoretically be traced via the banking system. Clear, auditable processes would be required in all cases. While it is possible to trace a registered closed loop card with the current

[20] New initiatives related to point-to-point charging would require separate development and business case analysis and no costs or benefits have been quantified in this DBC.

systems, unregistered cards and cash cannot be traced. Also, the ability to make rapid changes to fares provides operational flexibility as regions move in and out of lockdown.

Enables seamless transition - an account-based system could be used by other transport operators in the future such as the Ministry of Education's rural school bus service, and would provide rich data including tracking usage, and Covid tracing. Creating an account for a school-aged student enables that account to be seamlessly carried through to tertiary concessions and progress to regular workforce commuting, as public transport becomes a long established, easy to use transport mode, especially for the urban 15 to 25 year age group.

National efficiency is achieved as the investment cost for ongoing enhancements of the ticketing system only requires one development path, all features are provided nationally so that everyone gets the benefits, and the ticketing supplier is incentivised to be based in New Zealand, improving responsiveness of support; all of which are big benefits for smaller regions.

Monetised NTS economic benefits

The NTS is expected to be able to achieve all the benefits identified above and deliver the overall benefits from investment identified in the Strategic Case (set out in section 3.5). Most cities that have introduced account-based ticketing and open loop functionality cite benefits from reduced costs of fare collection, increased patronage, improved revenue protection, and customer time savings. The specific benefits that can be quantified comprise the impacts from a small, initial increase in patronage and the time savings for customers not needing to top up transit cards. These are summarised below and explained further in Appendix 7.

Patronage growth

The international evidence suggests the introduction of account-based and open loop ticketing and payments will result in increased patronage. However, these typically describe patronage and farebox revenue before and after the introduction of ticketing changes, without taking account of other changes made in parallel, such as fare policies, service levels, service quality, communications and marketing initiatives, or significant externalities such as increases in oil prices, interest rates, parking charges, etc. Attributing the impact of each of these drivers on patronage is difficult and has generally not been attempted.

Fare setting, for example, is a key factor in the rate of adoption of open loop (and consequential uptake in patronage). For example, where contactless payments are only accepted in place of a single ride ticket or at a premium to other ticketing options (e.g. Chicago), adoption has been low. Where smarter daily or weekly fare calculations have made the open loop offering the same price as, or in some cases cheaper than, other ticketing, adoption has been high as experienced by Transport for London (TfL). TfL's initial pilot stages were limited to a "retail-like" flat-fare contactless payment option, only available on buses. However, in 2014, when TfL expanded use across its entire network, introducing daily and weekly capping and fare parity, adoption grew rapidly.

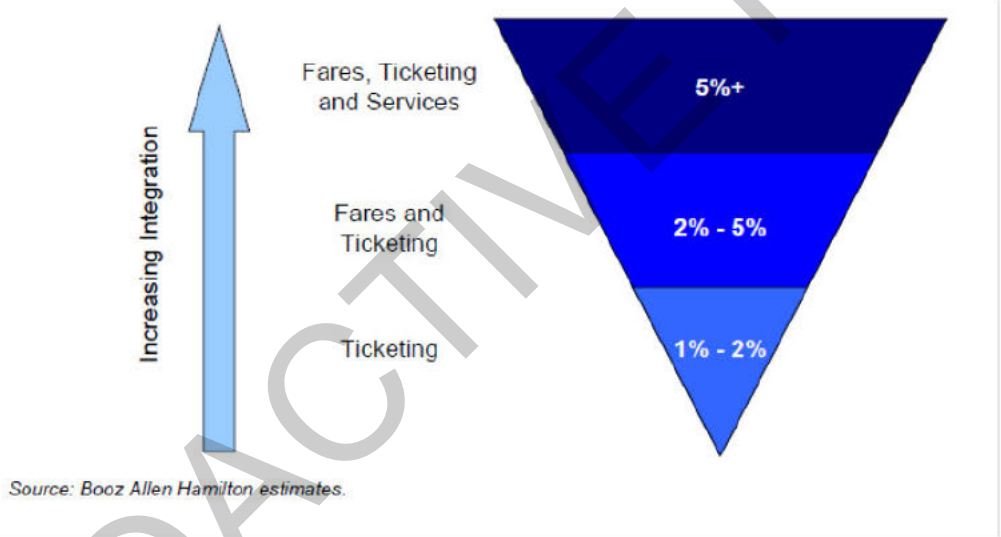
Two Booz Allen studies provide useful insight into the potential impact on patronage. The first looks at the effect of introducing integrated ticketing. Integrated ticketing, while already implemented in Auckland, would be fully enabled by an NTS, and significantly increase customer benefits for GW and ECan. Booz Allen noted that although there is a body of international evidence to suggest integration will have a positive impact on demand for public

transport, most of this evidence is compromised because integration was accompanied by significant fare level changes, as indeed was the case in Auckland when HOP was introduced.

Booz Allen modelled the impact of integration in South East Queensland when it rolled out 'seamless' public transport ticketing and fares policies in 2004. This saw patronage increases of 9.7% in 2004/05 and 11.6% in 2005/06. While there were other externalities such as increases in oil prices and interest rates which would have favoured public transport at the expense of private vehicles, integrated ticketing was a driver of increased demand. Booz Allen identified three internal drivers responsible for the patronage increases – fares and ticketing, service quality, and marketing and communications campaigns. They concluded that integrated ticketing contributed approximately 5% to patronage growth in 2004/05 and more than 3% in 2005/06.

The second study considered the effects of fares and ticketing integration in Auckland based on the Auckland Public Transport model. This indicated that integrated ticketing and fares would lead to a one-off increase in patronage of 2% in the first year and could grow to 5% in year 10 because of the far higher level of service integration by then. Booz Allen's conclusion is best summarised in the diagram below.

Figure 12 Potential patronage uplift due to ticketing integration



Source: Booz Allen Hamilton estimates.

L.E.K.[21] state that: "*Acceptance of contactless payments is likely to drive additional usage of transit networks, because it:*

- Adds an additional way for customers to pay for and access transit, increasing the addressable pool of customers by further reducing ticketing as a barrier to transit use
- Generates time savings and convenience for customers, relative to smart cards and other ticketing media.

[21] Contactless Payments and Open-Loop Ticketing, M. Streeting and D. Howe

Considering the time savings delivered by contactless payments due to the removal of the requirement to acquire and top up cards, additional patronage of approximately 1% could be expected for a system migrating from closed-loop to open-loop automated fare collection."

Given this evidence together with the experience of the NTS subject matter experts, a reasonable NTS assumption is a conservative increase in patronage in the range of 1.5% to 2.5% in the first year only and retained thereafter. This is set out in Appendix 8.

Decongestion benefits

The economic impact of an increase in patronage is a reduction of people travelling by private vehicle and a reduction in congestion, especially at peak times. The monetised benefit is based on applying the weighted average peak and off-peak benefits values (specific for each region) to the patronage increase for that region. Benefit values are set out in the Waka Kotahi Monetised Benefits and Costs Manual (MBCM) and incorporate a range of factors including road user travel time, crash and VOC savings, environmental benefits, and the benefits of the improved public transport services for existing and additional public transport customers.

The decongestion benefits for each region are set out in the table below.

Table 8 Summary of decongestion benefits for each PTA

Decongestion benefits	Nominal benefit $ millions
AT	369.4
GW	135.3
ECan	9.6
RC	6.8
Total decongestion benefits	**521.2**
Present value	***383.6***

PT user benefits

PT user benefits measures the aggregated benefits to users from switching to public transport. The aggregated benefits comprise the decrease in vehicle operating costs (cost of petrol, maintenance, etc.), a reduction in parking charges, and, in some cases, a decrease in travel time. PT user benefits have been calculated in the MBCM (SP.10)[22] based on an average journey length to create regional values for peak and off-peak use. This benefit has been applied only to new PT users. The overall benefits are set out in the table below:

Figure 13 Summary of PT User Benefits

PT User Benefits	Nominal benefit $ millions
AT	482.9
GW	188.9
ECan	46.3
RC	43.3
Total PT user benefits	**761.4**
Present value	***561.3***

[22] While there are restrictions on the use of special procedures (SP10), the Waka Kotahi investment team agreed that the SP10 data was relevant and there was no other practical data that could be reasonably applied.

The assumptions are set out in Appendix 8..

Value of time topping up transit cards

The current closed loop systems – HOP, Snapper, Metrocard and Bee Card – require customers to top-up their stored value cards. Depending on the system, this can be done on-line, via a ticket vending machine or kiosk, or at a retailer. Topping up takes time and effort by the customer.

With an open loop system, where customers can use their bank-issued debit or credit card (or virtual card) to tag-on and off, there is no need to top-up. The customer survey by Gravitas, (refer to section 3.9 and Figure 9), indicated 70% to 80% of customers are likely to use their bank-issued card which significantly reduces the number of transit cards in use and the disbenefit of topping up. The monetised value of this reduction in the need to top up amounts to about $71 million (PV). This is summarised in the table below.

Table 9 Estimated reduction in time incurred topping up transit cards

Estimated cost of time spent topping-up	Do-Nothing $ millions	NTS $ millions	Reduction in top up time $ millions
AT	-75.8	-23.2	52.6
GW	-23.3	-6.6	16.7
ECan	-15.6	-2.3	13.3
RC	-16.9	-3.8	13.1
Total reduction in top up time	**-131.6**	**-35.9**	**95.7**
Present value of the reduction in top up time	***-99.4***	***-28.3***	***71.1***

Monetisation of the value of time topping-up assumes that:

- 75% of customers will use their bank-issued card (physical or virtual). This reflects GW's estimate and the Gravitas customer research which suggested about 70% - 80% would use their bank-issued card.
- For those using transit cards, 58% would top up using mobile devises (Android or IOS), 21% would use a retailer, and 21% would use a kiosk.
- It takes, on average, 4 minutes to top up via a retailer or kiosk and about 30 seconds using a mobile device, with the weighted average time to top up being about 2 minutes.
- There is approximately a 50:50 mix of commuting vs. non-work use of public transport and the value of customer time is estimated at a weighted average of $11.69 per hour. Refer to Appendix 8 Table 36 (Source: MBCM Table 14).

Summary of economic benefits

In total, the economic benefits comprise small decongestion benefits from increased patronage and reduced use of private motor vehicles, and the reduced disbenefit (time saving) for customers using their bank-issued debit or credit card and no longer needing to top up.

Table 10 Summary of monetised economic benefits

Benefit	Explanation of economic benefit calculation	Economic benefit range (present value) $ millions
Decongestion benefits	A patronage increase of between approximately 1.5% and 2.5% results in a small reduction in congestion.	$307m – $460m Mid-point benefit **$383.6m**

Benefit	Explanation of economic benefit calculation	Economic benefit range (present value) $ millions
PT User Benefit	**The benefits of decreased vehicle costs and parking charges and, in some cases, time saving.**	$449m – $673m Mid-point benefit **$561.3m**
Time incurred to top up	A high proportion is customers using their bank issued debit or credit card no longer need to top up, resulting in a lower cost of $28.3m, and an incremental saving of $71.1m compared with the Do Nothing scenario.	$(23)m – $(34)m Mid-point benefit **$(28.3)m**
	Total Estimated Monetised Benefit (PV)	**$733m – $1,099m** **Mid-point benefit** **$916.6m**

NTS Costs

Basis of economic cost estimates

A total cost of ownership (TCO) model was developed to provide a detailed cost estimate for the NTS. This incorporates pricing information based on the following key assumptions and limitations.

- Costs are based on real dollars, i.e. exclude inflation.
- The present value of costs is based on a discount rate of 4% over an evaluation period of 14 years.
- The TCO model uses inputs from the following sources:
- Ticketing BAFO23 pricing response
- Financial services providers responses from the RFT procurement process
- Project team assumptions – inputs provided by relevant subject matter experts (SMEs).
- Transition costs comprise the costs incurred by PTAs for local transition and integration to the NTS and the ticketing service provider's costs of transitioning each PTA to the NTS.
- No charging arrangements are assessed in the TCO model. The TCO model only calculates the total cost of ownership of the NTS, and the direct costs incurred by each party in the NTS. It does not calculate the charges from the third-party providers to the shared services operation (SSO), or charges from the SSO to PTAs.
- Interest and financing costs are excluded – the TCO model does not calculate interest income on cash balances or the financing costs of funding any potential cash deficits.
- One-off and fixed costs are not scaled by the number of PTAs, i.e. are assumed to be constant regardless of the number of partners in the NTS.
- Constant economies of scale for variable costs – the TCO model assumes that as more PTAs come onto the NTS, there is no change in the per unit cost of any variable costs, i.e. there are no economies or diseconomies of scale.
- Uncertain ticketing solution phasing – The TCO model assumes dates when each PTA partner will join the NTS (refer to Figure 11 above). This phasing is not definitive. It will evolve as each partner assesses the ticketing solution and practical transition requirements.

[23] BAFO: Best and Final Offer by the ticketing service provider as part of the procurement process.

- Revenue is excluded – the TCO model does not include any revenue from ticket sales or PTA funding, except for use in sense checks.
- GST is not included in the TCO model.
- Merchant acquirer, program manager and retail network manager on-going costs assume that the steady-state (e.g. 2030) value is 100% scalable by the number of passenger trips.
- No costs in the TCO model have been escalated.
- There is potential duplication of costs due to unconfirmed outsourcing scope. A service catalogue will be prepared with the preferred supplier which should identify any duplication of costs between the TSP, SSO and PTAs.

Estimated total cost of ownership

The economic costs from the TCO model are summarised below. Refer to Appendix 9 for further details of the inputs relating to these costs.

Table 11 Full costs of the NTS including implementation and transition over 14 years (2021/22 to 2035/36)

Operating Cost	Operating Expenditure $ millions	% of total opex	% of total NTS
Ticketing provider costs	[redacted]	[redacted]	[redacted]
Includes annual support and licensing costs, prime contractor costs, outsourced technology services (ITO), back-office costs like asset tracking, financial processes, security, reporting, business continuity, issue management, release management, operations, etc.			
Front office maintenance	[redacted]	[redacted]	[redacted]
Maintenance costs on front office equipment			
Merchant acquirer (MA)	[redacted]	[redacted]	[redacted]
Ongoing operating costs for daily settlement including estimated fees for contactless transactions but excluding transit card fees.			
Program manager costs (TCPM)	[redacted]	[redacted]	[redacted]
Ongoing operating costs for the Transit Card Programme Manager, possibly charged based on an agreed metric such as the number of API calls.			
Retail network manager costs (RNM)	[redacted]	[redacted]	[redacted]
Ongoing retail network costs including maintaining and running the network and costs for transit card sales and top-ups.			
PTA ticketing solution costs	[redacted]	[redacted]	[redacted]
Support costs for PTAs to operate first line customer support, and costs for related TTP staff.			
Shared Service Organisation support costs	[redacted]	[redacted]	[redacted]
Ongoing costs of running the TTP team over 14 years.			
Total operating costs over 14 years (nominal)	[redacted]	[redacted]	[redacted]
Capital Expenditure	**Capital Expenditure $ millions**	**% of total capex**	**% of total NTS**
Software and licenses	[redacted]	[redacted]	[redacted]
Central ticketing system design & build costs.			
Equipment - back office	[redacted]	[redacted]	[redacted]

Equipment costs for central system, mobile app development, and web portals.			
Equipment - front office	[redacted]	[redacted]	[redacted]
Validators on buses, ferries, train gatelines, bus driver consoles, ticket vending machines, inspection devices, all including installation but excluding maintenance.			
Compliance and certification	[redacted]	[redacted]	[redacted]
Ticketing device certifications including PCI/DSS and related payment industry requirements.			
Design, build, test	[redacted]	[redacted]	[redacted]
Capital costs of design, build & test phases of programme.			
Merchant acquirer setup	[redacted]	[redacted]	[redacted]
No capex expected for Merchant Acquirer.			
Transit card programme manager setup	[redacted]	[redacted]	[redacted]
Setup of Transit Card Programme Manager (TCPM) system, including interfaces to central system.			
Retail network manager setup	[redacted]	[redacted]	[redacted]
Setup of national Retail network for Transit cards, including interfaces to TCPM and ticketing provider.			
Shared Service Organisation setup	[redacted]	[redacted]	1%
Capital cost estimate for TTP within Waka Kotahi.			
Total capital costs over 14 years (nominal)	**138.9**	[redacted]	[redacted]
Total capital and operating costs	**1,133.6**		

Risk adjustments	Risk Expenditure $ millions	% of total risk	% of total NTS
TSP non pricing risk adjustments	[redacted]	[redacted]	[redacted]
Risk-based cost adjustments have been included to account for variation in quality.			
Total risk adjustment costs	[redacted]	[redacted]	[redacted]

Transition	Transition costs $ millions	% of total transition	% of total NTS
PTA transition costs	[redacted]	[redacted]	[redacted]
PTA costs of transitioning from old system to new system. Excludes hardware replacement costs, but includes card transition costs, media and contact centre costs, operational support for transition and ambassadors to help customers.			
TSP transition costs	[redacted]	[redacted]	[redacted]
TSP costs of transitioning each of ECan, GW, AT and the RC to the new system.			
Total transition costs	**204.0**	**100%**	**16%**
Total cost of NTS system	**1,338.1**		**100%**
***Present value** (at 4% over 14 years)*	***1,115.9***		

[redacted]. Of the estimated $139 million of capital costs (nominal over 14 years), [redacted]

4.5.2 Benefits and costs of the Regional Upgrade option

Introduction

The Regional Upgrade option amalgamates the costs and benefits of each PTA's planned maintenance, upgrade, or replacement path for their current ticketing system (as described in section 4.4.2 above). Total costs and benefits are summarised below.

Table 12 Summary of costs and benefits of the Regional Upgrade scenario

	Reference	Regional Upgrade $ millions
Cost benefit analysis		
Present value of benefits	Section 4.5.2.3	$471.5m
Present value of costs	Section 4.5.2.4	$858.4m
Net present cost		**-$386.9m**

Both monetised and non-monetised benefits are expected from the enhancements and upgrades to current systems that PTA's have in progress or planned in the short to medium term. Benefits vary depending on the extent of the changes ranging from no change for RC through to significant change for AT.

For the purposes of the DBC, the expected sequence of implementation is assumed to be:

Figure 14 Assumed implementation/transition dates

PTA	Regional Upgrade Implementation dates[24]
AT (bus, train, and ferry)	July 2026
GW (bus, train, and ferry)	July 2022
ECan (bus and ferry)	July 2022
RC (bus and ferry)	July 2022

Non-monetised benefits

The upgrades assumed for AT and GW will provide additional benefits, but as noted under the NTS benefits discussion, (refer section 4.5.1.4), a lack of international research data and the obscuring effect of concurrent changes to other aspects of public transport, such as fare policies or externalities like increased fuel prices, mean benefits cannot be easily monetised. Nevertheless these improvements to ticketing provide significant value for customers, public transport operations, and regional policy development. These benefits are summarised below and are more fully explained under the NTS option.

[24] Dates when NTS will start operating and costs will begin to be incurred

Benefits expected for AT and GW

- Customer convenience - customers being able to use their own bank-issued card (or virtual card on a mobile device) removes a barrier to access and provides a strong additional incentive to use PT (assuming Snapper enables EMV-based open loop payment capability for GW).
- Payment choice - is provided through the options of using Visa or MasterCard (debit or credit card), mobile payment, or a transit card to tag on and off (assuming Snapper introduces EMV payment capability).
- Better information - with notifications provided through integrated media.
- Improved accessibility - for those with disabilities through account-based eligibility for concessions and easier to use on-board devices.
- Flow on effect - from making public transport more attractive and increasing patronage through improved convenience and access, which provides health benefits through increased active mode travel (mainly walking between home and the bus stop or station), and helps to reduce private vehicle use
- Opportunity to reduce cash on board – would enable a wide range of benefits, especially for transport operators and drivers, including driver safety, reduced administration time and cost, and reduced dwell time.
- Revenue protection that significantly reduces revenue leakage for GW through fraud and error from using paper tickets[25].

Additional benefits expected for AT

Best fare guarantee - because aggregated journey information is processed at the end of the day when all concessions can be applied

- Patronage growth - as a result of the improved ticketing experience for customers
- Improved data - enables improved network and fleet management such as improvements to network design to reflect customer demand profiles, and improvements to fleet efficiency
- Easier to introduce new fares and products - to respond to special events, and unforeseen disruption to improve network (and wider transport) resilience.

No additional benefits for ECan and RC

For RC and ECan, there will be no additional benefits under the Regional Upgrade option because RC will continue with RITS (Bee Card) and ECan is assumed to join RITS (which for the purposes of this DBC provides a reasonable cost estimate but no additional benefits).

Monetised benefits

Decongestion benefits

AT is assumed to achieve the same 2% increase in patronage (first year only) as the NTS. The start date is assumed to be at the end of the current contract at which point a new contract will be negotiated. Benefits are expected to accrue from 2026/27. The economic impact of an increase in patronage is a reduction of people travelling by private vehicle and a reduction in congestion, especially at peak times. The monetised benefit from this small improvement in decongestion, which is calculated by applying the weighted average peak and off-peak benefits

[25] Note that revenue protection is a financial revenue benefit to GW rather than an economic benefit.

values (specific for each region) to the patronage increase for that region. Benefit values are set out in the Waka Kotahi MBCM and incorporate a range of factors including road user travel time, crash and VOC savings, environmental benefits, and the benefits of the improved public transport services for existing and additional public transport customers.

The decongestion benefit is set out in the table below.

Table 13 Summary of decongestion benefits for each PTA

Decongestion benefits	Nominal benefit $ million
AT	327.9
GW	0
ECan	0
RC	0
Total (Nominal)	327.9
***Present value** (at 4% over 14 years)*	***233.5***

PT user benefits

As stated in the NTS benefits section above, aggregated benefits to users from switching to public transport include decreased vehicle operating costs (cost of petrol, maintenance, etc.), reduced parking charges, and, in some cases, decreased travel time. The overall benefits are set out in the table below, which shows that only AT achieves PT user benefits through its hybrid system that, like the NTS, is expected to achieve a 2% patronage increase.

Figure 15 Summary of PT User Benefits under the Regional Upgrade option

PT User Benefits	Nominal benefit $ million
AT	428.7
GW	0
ECan	0
RC	0
Total PT user benefits	**428.7**
***Present value** (at 4% over 14 years)*	***305.2***

The assumptions are set out in Appendix 8.

Value of time topping up transit cards

As stated in the NTS benefits section above, topping up takes time and effort by the customer. Auckland and Wellington will have open loop/EMV payment capability and customers using their debit or credit card will gain the time saving benefit of not needing to top up. This amounts to an estimated incremental present value of $32.3 million.

Table 14 Estimated reduction in top up time by customers

Estimated value of time spent topping-up	Do-Nothing $ million	Regional Upgrade $ million	Reduction in top up time $ million
AT	-75.8	-32.9	42.9
GW	-23.3	-21.0	2.3
ECan	-15.6	-15.6	0
RC	-16.9	-16.9	0
Total reduction in top up time	**-131.6**	**-86.4**	**45.2**
Present value of the reduction in top up time	***-99.4***	***-67.1***	***32.3***

Monetisation of the value of time topping-up assumes that:

- 75% of AT customers will use their bank-issued card (physical or virtual) as indicated in the GravitasOPG.
- GW's customer research and estimates for use of bank issued cards rather than Snapper suggested that only about 10% would use their bank-issued card.
- The remaining assumptions for the NTS also apply, i.e. for those using transit cards, 58% would top up using mobile devises (Android or IOS), 21% would use a retailer, and 21% would use a kiosk; top up times of 4 minutes at a retailer or kiosk and about 30 seconds using a mobile device; and approximately a 50:50 mix of commuting vs. non-work use of public transport with the value of customer time estimated at a weighted average of $11.69 per hour (Source: MBCM Table 14).

Summary of economic benefits

In total, the economic benefits comprise small decongestion benefits in Auckland from increased patronage and reduced use of private motor vehicles, and the time saving for customers in Auckland and Wellington using their bank-issued debit or credit card and no longer needing to top up.

Table 15 Summary of monetised economic benefits

Benefit	Explanation of economic benefit calculation	Monetised benefit range (PV)
Decongestion benefits	A patronage increase of between approximately 1.5% and 2.5% results in a small reduction in congestion.	$186m – $280m Mid-point benefit **$233.5m**
PT User Benefit	The benefits of decreased vehicle costs and parking charges and, in some cases, time saving.	$244m – $366m Mid-point benefit **$305.2m**
Time saving	A high proportion is customers using their bank issued debit or credit card no longer need to top up, resulting in a lower cost of $67.1m, and an incremental saving of $32.3m compared with the Do Nothing scenario.	$(54)m – $(80)m Mid-point benefit **$(67.1)m**
	Total Estimated Monetised Benefit (PV)	$376m – $566m Mid-point benefit **$471.6m**

Costs

The costs for the Regional Upgrade option include ticket and payment services, management, operational ticketing, revenue system support (reconciliation, reporting, etc.), card costs, equipment maintenance, extending current systems contracts where required, and replacing capital equipment such as on-board card readers that reach end-of-life. For each region these costs comprise:

- **AT** – extending the life of the HOP closed loop integrated ticketing solution for buses, rail and ferries and adding account-based and open loop capability including capital replacement of on-board card readers to enable these improvements.
- **GW** – continuing the closed loop ticketing system (Snapper) for buses and replacing paper tickets on rail and ferries with the Snapper system (and managing validation using on-board

electronic handheld ticket validators rather than gated stations), introducing integrated ticketing and adding EMV open loop capability.

- **ECan** – replacing the Metrocard system, which is physically and contractually at end-of-life, with a new closed-loop solution with mobile payment capability and, as a proxy for cost estimation purposes, is assumed to join RITS.
- **RC** – extending the contract to continue with RITS (Bee Card).

[redacted]

Table 16 Summary of estimated costs of the Regional Upgrade option

Estimated Regional Upgrade costs	Nominal cost (over 14 years) $ millions
Operating Expenditure	
Ticketing provider costs	[redacted]
Front office maintenance	[redacted]
Merchant acquirer (MA)	[redacted]
Program manager costs (TCPM)	[redacted]
Retail network manager costs (RNM)	[redacted]
PTA ticketing solution costs	[redacted]
SSO support costs	[redacted]
Total operating	[redacted]
Capital Expenditure	
Software and licenses	[redacted]
Equipment - back office	[redacted]
Equipment - front office	[redacted]
Compliance and certification	[redacted]
Design, build, test	[redacted]
Merchant acquirer setup	[redacted]
Transit card programme manager setup	[redacted]
Retail network manager setup	[redacted]
Total capital	[redacted]
Total capital and operating costs	**1,084.5**
Transition costs	**6.2**
Total estimated costs of the Regional Upgrade option	**1,090.7**
Present Value (at 4% over 14 years)	***858.4***

Regional Upgrade assumptions

Regional Upgrade costs have been estimated and provided by AT, GW, ECan and RC.

Different systems and contracting arrangements between PTAs mean that not all costs are directly comparable, but reasonably reflect the capital and operating costs of the Regional Upgrade as defined above.

Costs were identified from financial systems and information provided by current suppliers. Some costs have been attributed based on estimates of time where staff/teams provide services wider than ticketing. PTAs have made considerable effort to determine these costs as accurately as possible.

Variable costs that scale with increases in public transport use such as transaction fees and paper ticket consumables have been scaled in accordance with patronage projections. No other costs have been scaled.

Capital replacement and upgrade costs have been incorporated based on the estimated cost and timing provided by each PTA. These cost estimates are mainly based on current supplier estimates.

Interest and financing costs have been excluded. No assessment has been made as to the ability of PTAs to obtain funding approval for the Regional Upgrade costs.

All costs (and benefits) provided by PTAs exclude GST.

Limitations of the Regional Upgrade estimations

The Regional Upgrade costs have been prepared by each PTA and comprise a mix of actual costs, estimations of cost allocations, and estimates from suppliers.

Some costs have been attributed based on estimates of time where staff/teams provide services wider than ticketing.

Generally, financial systems have limited capability to identify costs by function where these functions, such as ticketing, are typically integrated with the wider costs of providing public transport. Within this constraint, each PTA partner has made considerable effort to determine these costs as accurately as possible.

The completeness and accuracy of current ticketing costs and the Regional Upgrade estimates have not been tested for accuracy and completeness.

The costs of the upgrades for AT's HOP and GW's Snapper are based on information provided by their current solution provider. Recent experience with the implementation of RITS and responses during the NTS procurement process indicate that costs are likely to be higher than suppliers' initial estimates. As such, these cost estimates have varying levels of confidence, and none have been independently reviewed. The risk is that these costs are understated. Unlike the NTS solution, the requirements have not been tested in the market through a procurement process or through detailed contract negotiation.

The Regional Upgrade assumes that transition can be managed within current staffing levels as part of business as usual which may understate the effort required. Also, government procurement rules would require business case and market procurement processes and these costs have not been included.

The Regional Upgrade does not consider the cost of providing national capability for the delivery of national policy initiatives, which could be substantial.

4.5.3 Benefits and costs of the Do Nothing counterfactual

The Do Nothing scenario amalgamates the costs and benefits of each PTA's ticketing operations to maintain the status quo (as described in section 4.4.3 above). It provides a current

cost baseline, or counterfactual, against which the NTS and Regional Upgrade options can be compared. Total costs and benefits are summarised below.

Table 17 Summary of costs and benefits of the Do Nothing scenario

	Reference	Do Nothing
Cost benefit analysis		
Present value of benefits	Section 4.5.3.1	-99.4m
Present value of costs	Section 4.5.3.2	611.3m
Net present cost		**-710.7m**

Benefits

There are no additional benefits assumed with the Do Nothing counterfactual. Rather, the Do Nothing option establishes the current baseline for the value of time that it takes customers to top up their closed loop, stored value cards – HOP, Snapper, Metrocard and Bee Card. The estimated customer value of time (VoT) is summarised in the following table:

Table 18 Estimated value of time incurred by customers to top up transit cards – HOP, Snapper, Metrocard and Bee Card over the estimation period (2022/23 to 2035/36)

	$ millions
AT	-75.8
GW	-23.3
ECAN	-15.6
RC	-16.9
Total reduction in top up time	**-131.6**
Present value of the reduction in top up time	***-99.4***

This assumes that the value of time spent topping up is calculated by the weighted average time (minutes) to top up multiplied by the weighted average value of time (based on the factors set out in the MBCM (refer to the assumptions in Section 4.5.1.3 above).

Refer to Appendix 8 for the assumptions supporting the projected value of time to top up.

Cost Assumptions

The Do Nothing costs have been estimated and provided by AT, GW, ECan and RC.

Different systems and contracting arrangements between PTAs mean that not all costs are directly comparable, but reasonably reflect the capital and operating costs of current ticketing and payment systems as defined above.

Costs were identified from financial systems and information from current suppliers. Some costs have been attributed based on estimates of time where staff/teams provide services wider than ticketing. Financial systems have limited capability to identify costs by function where these functions, such as ticketing, are typically integrated with the wider costs of providing public transport. Within this constraint, PTAs have made considerable effort to determine these costs as accurately as possible. The Do Nothing estimates have not been independently tested for accuracy and completeness.

Variable costs that scale with increases in public transport use such as transaction fees and paper ticket consumables have been scaled in accordance with patronage projections. No other costs have been scaled.

Capital replacement and upgrade costs have been incorporated based on the estimated cost and timing provided by each PTA.

Interest and financing costs have been excluded.

All costs (and benefits) provided by PTAs exclude GST.

Estimated costs

The estimated costs for the Do Nothing counterfactual are summarised in Table 19 below.

Table 19 Summary of estimated Do Nothing counterfactual costs ($ millions)

Estimated Do Nothing costs	Nominal cost (over 14 years) $ millions
Operating Expenditure	
Ticketing provider costs	
Front office maintenance	
Merchant acquirer (MA)	
Program manager costs (TCPM)	
Retail network manager costs (RNM)	
PTA ticketing solution costs	
SSO support costs	
Total operating	
Capital Expenditure	
Software and licenses	
Equipment - back office	
Equipment - front office	
Compliance and certification	
Design, build, test	
Merchant acquirer setup	
Transit card programme manager setup	
Retail network manager setup	
Total capital	
Total capital and operating costs	**778.0**
Risk adjustments	**-**
Transition costs	**6.2**
Total estimated costs of the Regional Upgrade option	**784.2**
Present Value	***611.3***

4.5.4 Comparison of estimated NTS, Regional Upgrade and Do Nothing costs and benefits

Cost comparison

Costs for the NTS and Regional Upgrade options are compared with the Do Nothing counterfactual to assess:

- The whole of life costs for each option, including the present values of costs and benefits
- The annual steady-state operating costs in 2030/31, i.e. after the options are fully implemented
- The sensitivity of each option to increases in cost (or a reduction in benefits).

Costs over the evaluation period (2022/23 to 2035/36) fall into two distinct sections:

i. Transition - covering the first four to five years - compares the capital costs and level of change required. The NTS involves all PTAs transitioning and integrating with the new system and is therefore expected to be the option with the highest transition costs.
ii. Steady state - covering the later nine to ten years - compares the annual operating costs across the options.

Whole of life costs

The capital and operating costs of the NTS and Regional Upgrade are similar as shown in Table 20 below, which indicates the key areas of difference between the whole of life costs of each option.

Table 20 Comparison of NTS, Regional Upgrade and Do Nothing costs showing the areas of key differences

Non-discounted over 14 years	Do Nothing $millions	Regional Upgrade $millions	NTS $millions	Differences – Regional Upgrade & NTS $millions
Operating Expenditure				
Ticketing solution provider costs (TSP)	[redacted]	[redacted]	[redacted]	[redacted]
Shared service organisation	[redacted]	[redacted]	[redacted]	[redacted]
Financial services costs (MA, RNM, TCPM)	[redacted]	[redacted]	[redacted]	[redacted]
PTA ticketing solution costs	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	994.7	[redacted]
Capital Expenditure				
Back-office costs (incl. design, build, test)	[redacted]	[redacted]	[redacted]	[redacted]
PTA equipment (TSP)	[redacted]	[redacted]	[redacted]	[redacted]
Financial services costs (MA, RNM, TCPM)	[redacted]	[redacted]	[redacted]	[redacted]
Shared service organisation	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	138.9	[redacted]
Total cost before risk and transition	[redacted]	[redacted]	[redacted]	[redacted]
Risk cost adjustments	[redacted]	[redacted]	[redacted]	[redacted]
Transition costs	[redacted]	[redacted]	204.0	[redacted]
Total cost over 14 years (non-discounted over 14 years)	**784.2**	**1,090.7**	**1,338.1**	253.6
Present value of costs (at 4% over 14 years)	**611.3**	**858.4**	**1,115.9**	257.5
***Less* Present value of benefits**	**(99.4)**	**471.5**	**916.6**	445.1
Net present cost/(benefit)	**710.7**	**386.9**	**199.3**	(187.6)
BCR				1.7

In summary:

- Total NTS operating costs are $257.5 million higher than the Regional Upgrade scenario due to higher costs in the transition years during which the NTS is bringing in staff / costs ahead of transition. After transition, i.e. from 2026/27, annual costs are similar between the NTS and Regional Upgrade scenarios.
- Capital costs of the NTS are lower than the Regional Upgrade mainly due to lower back office costs.
- NTS transition is a significant cost whereas the Regional Upgrade is assumed to manage implementation of upgrades within normal operations.

Steady state costs

Annual steady state operating costs for the NTS at 2030/31 (after all PTAs have transitioned) are estimated at $65 million (non-discounted). These compare with the estimated Regional Upgrade and Do Nothing steady state operating costs of about $68 million and $56 million respectively. The key areas of difference between these costs are set out in the table below. This shows that:

[redacted]

Table 21 Estimated comparison of steady state operating costs (nominal) in year 2030/31

Direct annual cost	Do Nothing		Regional Upgrade		NTS		Regional vs Do Nothing	NTS vs Do Nothing
	Nominal cost $ millions	% of total	Nominal cost $ millions	% of total	Nominal cost $ millions	% of total	$ millions	$ millions
TSP (including front office maintenance)	[redacted]							
SSO								
PTAs								
Program manager								
Merchant acquirer								
Retail network manager								
Total estimated costs (nominal) in 2030/31								
Net present costs 2030/31								

Overall, the present value of the costs and benefits of each option are compared in summary in the following table:

Table 22 Benefit cost analysis comparing the NTS and Regional Upgrade with the Do Nothing counterfactual

	Do Nothing $millions	Regional Upgrade $millions	NTS $millions	*Regional vs Do Nothing $millions*	*NTS vs Do Nothing $millions*	*NTS vs Regional $millions*
Benefits						
AT	-57.0	512.2	606.8	*569.2*	*663.8*	*94.6*
GW	-17.6	-15.8	235.6	*1.8*	*253.2*	*251.4*
ECan	-11.9	-11.9	40.4	*0*	*52.4*	*52.3*
RC	-12.9	-12.9	33.7	*0*	*46.7*	*46.6*
Total benefits	**-99.4**	**471.6**	**916.5**	***571.0***	***1016.0***	***444.9***
Costs						
AT	[redacted]					
GW						
ECan						
RC						
Waka Kotahi						
Total costs	**611.3**	**858.4**	**1115.9**	***247.1***	***504.6***	***257.6***
Net present cost	**-710.7**	**-386.8**	**-199.3**	***323.9***	***511.4***	***187.3***
Benefit cost ratio (BCR)				***2.3***	***2.0***	***1.7***

Sensitivity analysis

Sensitivity analysis identifies the impact of higher costs or lower benefits than anticipated in the cost benefit analysis, and to test the impact of changes in key assumptions. The following tests have been made to assess the impact on the net present cost and benefit cost ratios for each option:

- NTS cost increase +20%
- NTS and Regional Scenario cost increase +20%
- NTS and Regional Scenario benefits decrease -20%
- 3% and 6% Discount Rate
- 0%, 5%, and 10% increase in patronage associated with half price fares across all scenarios
- 1.5% and 2.5% increase patronage in Regional and NTS scenario
- 10% efficiency gain in PTA ongoing costs in NTS scenario (or applied similarly to SSO ongoing costs)

The changes with the most impact are:

- Cost increases
- Monetised benefit decreases
- Changes to patronage assumptions.

Table 23 below sets out the impacts on net present values and benefit cost ratios for these areas of higher sensitivity. The wider sensitivity results are included in Appendix 8.

Table 23 Net Cost Benefit Sensitivity Impacts

		Do Nothing $millions	Regional Upgrade $millions	NTS $millions	Regional vs Do Nothing $millions	NTS vs Do Nothing $millions	NTS vs Regional $millions
Costs	**Cost increase - NTS only at 20%**						
	Benefits	-99.4	471.6	916.6	571.0	1,016.0	445.0
	Costs	611.3	858.4	1,339.1	247.1	727.8	480.7
	Net present cost	**710.7**	**386.8**	**422.5**	**323.9**	**288.2**	**-35.7**
	BCR				**2.3**	**1.4**	**0.9**
	% change				*0%*	*-31%*	*-46%*
	Cost increase – NTS and Regional Upgrade at 20%						
	Benefits	-99.4	471.6	916.6	571.0	1,016.0	445.0
	Costs	611.3	1,030.1	1,339.1	418.8	727.8	309.0
	Net present cost	**710.7**	**558.5**	**422.5**	**152.2**	**288.2**	**136.0**
	BCR				**1.4**	**1.4**	**1.4**
	% change				*-41%*	*-31%*	*-17%*
	Cost increase – capex only increase of 20% across all options						
	Benefits	-99.4	471.6	916.6	571.0	1,016.0	445.0
	Costs	615.0	890.3	1,144.1	275.3	529.1	253.8
	Net present cost	**-714.4**	**-418.7**	**-227.5**	**295.7**	**486.9**	**191.2**
	BCR				**2.1**	**1.9**	**1.8**
	% change				*-10%*	*-5%*	*1%*
	Efficiency – 10% reduction in PTA costs in NTS scenario						
	Benefits	-99.4	471.5	916.6	571.0	1,016.0	445.1
	Costs	611.3	858.4	1,103.9	247.1	492.6	245.5
	Net present cost	**-710.7**	**-386.9**	**-187.3**	**323.9**	**523.4**	**199.6**
	BCR				**2.3**	**2.1**	**1.8**
	% change				*5%*	*2%*	*0%*
Benefits	**Benefits reduction – NTS only declining by 20%**						
	Benefits	-99.4	471.5	733.3	570.9	832.7	261.8
	Costs	611.3	858.4	1,115.9	247.1	504.6	257.5
	Net present cost	**710.7**	**386.8**	**382.6**	**323.8**	**328.1**	**4.3**
	BCR				**2.3**	**1.7**	**1.0**
	% change				*0%*	*-18%*	*-41%*
	Benefits reduction - NTS and Regional Upgrade declining by 20%						
	Benefits	-99.4	377.2	733.3	476.6	832.7	356.1
	Costs	611.3	858.4	1,115.9	247.1	504.6	257.5
	Net present cost	**710.7**	**481.2**	**382.6**	**229.5**	**328.1**	**98.6**
	BCR				**1.9**	**1.7**	**1.4**

	% change				*-17%*	*-18%*	*-20 %*
Fares and patronage	**Half price fares**						
	Benefits	-49.7	505.1	928.5	554.8	978.2	423.4
	Costs	611.3	858.4	1,076.6	247.1	465.3	218.2
	Net present cost	**-661.0**	**-353.3**	**-148.1**	**310.7**	**512.9**	**205.2**
	BCR				**2.2**	**2.1**	**1.9**
	% change				*-3%*	*4%*	*12%*
	Half price fares giving rise to 10% patronage increase						
	Benefits	-54.7	555.6	1,021.8	610.3	1,076.5	466.2
	Costs	630.1	887.0	1,085.0	256.9	454.9	198.0
	Net present cost	**-684.8**	**-331.4**	**-63.2**	**353.4**	**621.6**	**268.2**
	BCR				**2.4**	**2.4**	**2.4**
	% change				*3%*	*18%*	*36%*
	Patronage increase from 2% to 2.5%						
	Benefits	-99.4	606.1	1,152.7	705.5	1,252.1	546.6
	Costs	611.3	859.1	1,116.5	247.8	505.2	257.4
	Net present cost	**-710.7**	**-253.0**	**-36.2**	**457.7**	**746.9**	**289.2**
	BCR				**2.9**	**2.5**	**2.1**
	% change				*23%*	*23%*	*23%*
	Patronage decrease from 2% to 1.5%						
	Benefits	-99.4	336.9	680.4	436.3	779.8	343.5
	Costs	611.3	857.8	1,115.3	246.5	504.0	257.5
	Net present cost	**710.7**	**520.9**	**434.9**	**189.8**	**275.8**	**8.6**
	BCR				**1.8**	**1.5**	**1.3**
	% change				*-23%*	*-23%*	*-23%*
Discount rate	**Discount rate sensitivity at 3%**						
	Benefits	-106.3	513.7	987.2	620.0	1093.5	473.5
	Costs	648.5	908.5	1,164.3	260.0	515.8	255.8
	Net present cost	**754.8**	**-394.8**	**-177.1**	360.0	577.7	217.7
	BCR				2.4	2.1	1.9
	% change				*3%*	*5%*	*7%*
	Discount rate sensitivity at 6%						
	Benefits	-87.4	398.9	794.3	486.3	881.7	395.4
	Costs	546.6	771.0	1,030.5	224.4	483.9	259.5
	Net present cost	**634.0**	**-372.1**	**-236.2**	261.9	397.8	135.9
	BCR				2.2	1.8	1.5
	% change				*-6%*	*-10%*	*-12%*

Cost and benefit sensitivity

Across the range of sensitivity tests undertaken, an increase in costs of the NTS has the highest impact against the Do Nothing counterfactual with a 31% reduction in BCR. However, it is unlikely that cost increases would apply only to the NTS, and a 20% cost increase for the Regional Upgrade scenario has a greater impact, with a 41% reduction in BCR compared with the Do Nothing counterfactual.

A capex increase of 20% has much less impact overall (a 5% increase in BCR) because total capex is only 20% of whole of life costs, and mostly incurred during the first four years of the NTS.

Similarly, increasing the efficiency of PTA and/or shared services operations by 10% (and thereby reducing resource costs) by 10% has a minor impact (~5% improvement in BCR) because, again, each of these costs are about 20% percent of whole of life costs. However, a 10% efficiency gain for both would increase the BCR by about 10% to 12% which may be achievable over time as resources are shared nationally in a “one national team” approach.

A reduction in benefits of 20% has a similar effect on both the NTS and Regional scenarios with a reduction in BCR of about 18%. There is less impact from benefit reductions of 20% than cost increases of 20% because benefits amount to about half of the costs for both the NTS and Regional scenarios.

Half price fares

The short-term government Covid-19 recovery measure of half price fares was designed to encourage use of public transport. If made permanent, there would be little impact on the cost benefit results mainly because:

- it reduces the frequency of topping up transit cards (assuming card balance behaviour remains unchanged)
- the overall benefit of reduced time topping up transit cards represents only about 7% of the total monetised benefits of the NTS.

Patronage sensitivity

While fare reduction is a method of increasing patronage, it is patronage that has the most significant effect on the cost benefits results. For example, if the effect of half price fares was to increase patronage by 10%, the cost benefit impact would be a 36% improvement in the NTS BCR compared with the regional Upgrade. Although not a direct effect of the NTS, the improved customer convenience of the NTS in combination with reduced fares should easily achieve a 5% to 10% increase in patronage, based on international examples such as Transport for London.

Increasing the estimated patronage benefit from 2% to 2.5% has a significant impact for all options, increasing the BCR by 23% in all cases. This is because patronage is a key driver of benefits, particularly decongestion and PT user benefits described earlier – a 0.5% increase in patronage increases total benefits by about $236 million (PV) but has an insignificant increase in costs of less than $0.6 million (PV). A reduction in the patronage by 0.5% has the opposite effect – a 23% reduction in BCR.

4.6 Qualitative evaluation

4.6.1 Project objectives and criteria

Evaluation based solely on quantified costs and benefits only provides part of the picture. The solution should deliver the wider benefits expected from investment, many of which cannot easily be estimated in dollars. Multi-criteria analysis assesses how well the preferred solution is expected to deliver the wider benefits originally envisaged in the ILM workshops. Criteria were developed based around the four ILM benefits, and the evaluation criteria applied in the procurement evaluation process. These are described below.

Figure 16 Description of evaluation criteria

	Evaluation Criteria	Description
1	**Enhanced customer (PT user) experience**	
1.1	Improves customer convenience	Does the option ensure intuitive ease of use to obtain and pay for tickets?
1.2	Provides multiple ticketing and payment options	Will the option provide multiple payment alternatives that maximise convenience for the widest range of customers?
1.3	Encourages mode shift	Will the option make it easier for new customers to choose and use public transport as a mode?
1.4	Ensures a consistent customer experience	Will the option provide a consistent customer experience across New Zealand?
1.5	Improves access to public transport	Will the option provide improved or easier access to public transport, especially for those with disabilities including auditory capability and location of devices/ screens (e.g. for wheelchair access), etc.?
2	**Affordable, efficient, and effective PT networks**	
2.1	Whole-of-life cost is affordable	Is the expected whole of life cost within budget/funding expectations?
2.2	Solution represents value for money	Is the cost benefit positive, including consideration of the qualitative benefits?
2.3	Improves the quality of operational information	Will the option provide richer information to manage day-to-day operations?
2.4	Improves the quality of network design information	Will the option provide more insightful data to inform network and timetable design?
2.5	Improves the quality of management information	Will the option improve the quality of information for the development of strategic planning and local and national public transport policies?
2.6	Improves speed of fare policy changes	Will the option support rapid changes to scheduled fare products and prices such as fare products for special events
2.7	Supports rapid management of disruptions	Will the option support rapid management of disruptions including pandemic (Covid) tracking/ tracing information
3	**Improved public and government confidence in PT investments**	
3.1	Provides opportunities for innovation	Will the option expand opportunities for innovation and capability to create more flexible and attractive public transport networks?
3.2	Enables wider transport-related applications	Will the option enable wider transport-related applications such as park-and-ride and road tolling?
3.4	Allows/enables third party integration	Does the option enable integration with third parties to provide wider services?

3.5	Ensures technology is non-proprietary	Do the solution components comply with standards to ensure there is no proprietary lock-in?
3.6	Enables technology to be upgraded by component	Can each solution component be upgraded independently as technology develops?
4	**Expedited realisation of national and regional benefits**	
4.1	Aligns with national PT priorities	Does the option align with national PT priorities in the National Policy Statement on Land Transport, the Disability Strategy and the Ministry of Transport's Transport Outcomes Framework?
4.2	Aligns with regional PT priorities	Does the option align with regional PT priorities in each region's LTP, RPTP, etc?
4.3	Delivers suitable solution scope for all PTAs	Does the solution meet the detailed requirements specifications and scale affordably from small to large PT environments?
4.4	Ensures legal and commercial alignment	Can the solution be contracted in accordance with government procurement guidelines and be implemented in accordance with PTOM and other legislative requirements.
4.5	Ensures implementation within PTA's capacity and capability	Do PTAs have the capacity and capability for successful implementation and transition?
4.6	Ensures suppliers have sufficient capacity and capability	Do the suppliers in the New Zealand market have the capacity and capability for successful implementation/ transition?
4.7	Enables flexibility and control (including roadmap alignment) within capacity constraints	Is there sufficient supplier capacity to ensure roll out timeframes are met while being sufficiently dynamic to enable a change in sequencing of the roll out or parallel implementation?
4.8	Demonstrates long term commitment from supplier	Are suppliers committed and responsive to supporting the operation of the NTS (and PTAs) over the 14 year or more life of the solution?
5	**Risks**	
5.1	Cost risks are manageable	How certain are the costs?
5.2	Technology risks are manageable	How certain and proven is the technology solution?
5.3	Timeframe risks are manageable	Can the system be implemented in a reasonable timeframe? How long could the existing system be maintained, e.g. ECAN?
6	**Overall ranking**	
6.1	Overall assessment	How does the NTS rank against the counterfactual as a solution to the problems identified compared with the other options?

4.6.2 Scoring of qualitative evaluation using multicriteria analysis

Evaluating the benefits of investment in an NTS against the Regional Upgrade using a scoring approach enables the options to be ranked, albeit subjectively. Each partners Do Nothing and Regional Upgrade scenarios were separately scored in the table below and a "weighted average" score calculated overall. Although this was a collective, judgement-based assessment, there is a clear difference between the Do Nothing counterfactual and the Regional Upgrade and NTS scenarios.

Figure 17 Scoring of qualitative evaluation

Options:		Do Nothing				Regional Upgrade				NTS
Scoring categories (Score 0 – 4) 0 = Does not enable 1 = Enables a little 2 = Partly enables 3 = Mostly enables 4 = Fully enables		AT	GW	ECan	RC	AT	GW	ECan	RC	NTS
1	**Enhanced customer (PT user) experience**									
1.1	Improves customer convenience	2	0	2	0	4	3	2	0	4
1.2	Provides multiple ticketing and payment options	2	0	1	0	4	2	1	0	4
1.3	Encourages mode shift	2	0	1	0	3	2	1	0	3
1.4	Consistent customer experience	3	2	2	2	4	2	2	2	4
1.5	Improves access to public transport	2	0	1	0	4	2	1	0	4
2	**Affordable, efficient, and effective PT networks**									
2.1	Whole of life cost is affordable	3	3	3	3	3	3	3	3	3
2.2	Solution represents value for money	3	1	2	2	3	3	2	2	3
2.3	Improves the quality of operational information	2	0	1	0	2	3	1	0	3
2.4	Improves the quality of network design information	1	1	2	1	2	3	2	1	4
2.5	Improves the quality of management information	1	0	2	1	2	3	2	1	4
2.6	Improves speed of fare policy changes	0	0	0	0	3	3	0	0	3
2.7	Supports rapid management of disruptions	1	0	0	0	3	1	0	0	3
3	**Improved public and government confidence in PT investments**									
3.1	Provides opportunities for innovation	1	1	1	1	3	2	1	1	3
3.2	Enables wider transport-related applications	1	0	1	1	2	1	1	1	3
3.3	Allows/enables third party integration	2	1	1	1	3	3	1	1	3
3.4	Ensures technology is non proprietary	0	0	0	0	0	0	0	0	2
3.5	Enables technology to be upgraded by component	2	0	1	1	3	1	1	1	3
4	**Expedited realisation of national and regional benefits**									
4.1	Aligns with national PT priorities	2	1	1	1	2	2	1	1	4
4.2	Aligns with regional PT priorities	2	2	2	1	4	2	2	1	4
4.3	Solution scope and suitability (for all PTAs)	1	1	2	2	3	2	2	2	4
4.4	Legal and commercial alignment	1	1	1	1	1	1	1	1	3
4.5	PTA capacity and capability	3	2	2	2	3	2	2	2	3
4.6	Supplier capacity and capability	3	2	1	1	3	2	1	1	4
4.7	Flexibility and control (including roadmap alignment)	2	2	1	0	4	4	1	0	3
4.8	Supplier long term commitment	4	3	3	3	4	4	3	3	4
5	**Risks**									
5.1	Cost risk (High risk = 0 Low risk = 4)	2	2	2	2	3	3	2	2	2
5.2	Technology risk (High risk = 0 Low risk = 4)	2	4	4	4	2	2	4	4	2
5.3	Timeframe risk (High risk = 0 Low risk = 4)	1	2	1	4	2	3	2	4	1
6	**Overall ranking**									
6.1	**Overall assessment (Highest score is best)**	**52**	**31**	**42**	**32**	**80**	**63**	**42**	**32**	**90**
6.2	Weighting based on patronage (%)	**57%**	**23%**	**10%**	**10%**	**57%**	**23%**	**10%**	**10%**	**100%**
	Weighted average assessment	**44**				**67**				**90**

4.7 Key Economic Risks

The following key economic risks could delay or prevent the NTS from proceeding. The approach to mitigation will require effective communications and governance, excellent planning and management, and co-operation from all partners.

Key risks	Mitigation Approach
The high cost of an account-based open loop solution is considered unaffordable which could mean that: • The NTS cannot be funded • AT and/or GW withdraw support in favour of developing their current solutions.	• The proposed funding for the NTS sees the majority coming from the NLTF with PTAs funding transition and their front office costs (which would receive FAR funding at 51%). • AT and/or GW withdrawing in favour of developing their current systems would mean normal funding and procurement rules applying which would result in higher costs funded by each PTA and the additional cost of full market procurements and supporting business cases.
Transition costs for PTAs moving from their existing ticketing systems make the NTS unaffordable	• Senior level engagement between partners to ensure realistic and pragmatic transition plans. • Close management of agreed transition plans including oversight and assurance relating to key contractual obligations between suppliers and partners including TTP. • Consideration of NLTF funding to assist with PTA transition costs for the greater good.
National benefits for the NTS are not realised as differences between local and national outcomes cannot be resolved for the good of NZ	• Early engagement with PTA partners to establish the scope and parameters to underpin a national customer experience. • Senior level engagement between partners to ensure alignment on national outcomes. • Close working partnership between PTA partners and Waka Kotahi/TTP (and other stakeholders) to identify and resolve issues early.

4.8 Summary of the economic assessment

The following table summarises the results of the cost benefit analysis and evaluation of the benefits of investment.

Table 24 Summary of economic assessment

	Do Nothing	Regional Upgrade	NTS
Nominal whole of life costs (non-discounted)			
Analysis period	14 years	14 years	14 years
Capital Costs (nominal $ millions over 14 years)	[redacted]	[redacted]	$138.9m
Operating costs including 'legacy phase out' (nominal $ millions over 14 years)	[redacted]	[redacted]	$994.7m
Transition and risk costs (nominal $ millions over 14 years)	[redacted]	[redacted]	$204.5
Whole of life operating costs including risk, transition and legacy phase out (nominal $ millions)	**$784.2**	**1,090.7m**	**$1,338.1m**
Cost benefit analysis			
Present value of benefits (at 4% over 14 years)	-$57.0m	$471.5m	$916.6m
Present value of costs at 4% over 14 years	$611.3m	$858.4m	$1,115.9m
Net present cost at 4% over 14 years	**-$668.3m**	**-$386.9m**	**-$199.3m**
BCR of difference between NTS and Do Nothing			**2.0**
BCR of difference between NTS and Regional Upgrade			**1.7**

	Do Nothing	Regional Upgrade	NTS
Qualitative evaluation			
Enhanced customer (PT user) experience	8	14	19
Affordable, efficient and effective PT networks	9	16	23
Improved public and government confidence in PT investments	5	9	14
Expedited realisation of national and regional benefits	16	20	29
Risks	6	7	5
Total score	**44**	**67**	**90**

Overall, this analysis indicates that:

- The NTS has a higher whole-of-life cost (PV) compared with the Regional Upgrade – $1,115.9 million vs $858.4 million respectively.
- This is primarily due to the one-off cost of investment to enable a nationwide contactless system, specifically:
  - Higher transition costs of $198 million – these are one-off costs to enable all regions to implement the NTS
  - Higher costs during the transition years in the order of $90 million to $100 million – there are "double run" costs in the earlier years of the NTS business case (from 2022/23 through 2025/26) as the NTS ramps up the delivery team in parallel to running the existing services which results in higher operating costs.
- However once the scheme is implemented, the steady-state operating costs are similar for both the NTS and Regional Upgrade at $47 million and $49 million (PV) respectively in 2030/31.
- Both the Regional Upgrade and NTS provide significant benefits, but only the NTS provides significant national benefits.

Overall the NTS has the highest costs and the highest benefits resulting in the lowest Net Present Cost of $199 million compared with $387 million for the Regional Upgrade and $668 million for the Do Nothing counterfactual.

4.9 Investment Prioritisation Rating

To prioritise activities for inclusion in the 2021-24 National Land Transport Programme (NLTP), and to give effect to the strategic priorities set out in the Government Policy Statement on Land Transport, Waka Kotahi has developed the Investment Prioritisation Method (IPM).

The IPM comprises three factors, namely:

- GPS Alignment – alignment of the activity (e.g. the NTS) with a GPS strategic priority
- Scheduling – the criticality or interdependency of the activity with other programme activities or part of a network

- Efficiency – consideration of the expected return on investment and whole of life costs and benefits identified through cost benefit analysis.
- Improvement activities such as the NTS are assigned a priority order using each of the three prioritisation factors according to a scoring matrix. Public transport infrastructure and public transport services are activity classes prioritised as improvements.

Waka Kotahi has evaluated the NTS, which is summarised in the following table:

Figure 18 Investment Prioritisation Method Evaluation Summary

Factor	Rating	Reason
GPS Alignment	High	Better Travel Options – high criteria: *Improving connections to nationally significant tourism destinations/attractions.* A benefit of the NTS is that it will improve the ability of travellers to easily use public transport anywhere in the country, including to and from airports and nationally significant attractions. Alignment with strategic priorities of the Government Policy Statement on land transport (GPS) 2021 – high criteria *"The Minister expects Waka Kotahi will… more actively influence the way local government designs and delivers public transport services. This includes… prioritising the delivery of modern integrated ticketing systems in New Zealand's main centres…"* The National Ticketing System will address these expectations. As integrated ticketing is specifically mentioned as an expectation in the GPS, it would be appropriate to assume a High alignment.
Efficiency	Low	The efficiency factor looks at monetised impacts, generally using the benefit–cost ratio (BCR). For some activities, e.g. to replace a facility or technology at the end of its life, the present value (PV) of costs may be used where an asset is at end of life and is being replaced on a like-for-like basis. Overall the return on investment achieved by the NTS is based on its BCR of 2.0, which equates to an efficiency rating of Low.
Scheduling	High	The scheduling factor has two criteria: interdependency and criticality. The highest rating between these two criteria determines the scheduling rating. ECan and GW need to undertake this activity to deliver/prepare for remainder of programme/package where its implementation is to begin in 2021 or early 2024 NLTP, and therefore rate High. AT and RC need to undertake this activity to deliver/prepare for remainder of programme/package where its implementation is to begin in 2024 NLTP, and therefore rate Medium.
The result is an IPM ranking of 5.		

GPS Alignment

The NTS provides significant customer benefits and strongly contributes to national and regional policy direction:

- the NTS provides customer convenience and easier access by enabling payment using a bank-issued debit/credit card rather than requiring customers to carry cash or having sufficient funds on a stored value transit card (smart card). This will improve the ability of travellers to easily use public transport anywhere in the country, including to and from airports and nationally significant attractions.

- GPS 2021, paragraph 150, as stated in Figure 18 above, sets out the Minister's expectation s which includes delivery of a modern integrated ticketing system in the main centres. The NTS will address these expectations. As integrated ticketing is specifically mentioned as an expectation in the GPS, High alignment is appropriate.

These factors result in an overall GPS Alignment rating of High.

Scheduling

The criteria for a rating of High states: *"Need to undertake this activity to deliver/ prepare for remainder of programme/package where its implementation is to begin in 2021 or early 2024 NLTP."* The criteria for a rating of Medium states: *"Need to undertake this activity to deliver/ prepare for remainder of programme/package where its implementation is to begin in 2024 NLTP".*

The NTS programme comprises four key implementation phases that will begin with the 2021–24 NLTP with completion in the 2024–27 NLTP, and the scheduling rating is expected to change as the programme continues. The urgency and priority is for ECan and GW rail, both of which use ticketing systems that are outdated and inefficient. These will be followed by AT in 2025 by which time the HOP system will be at the end of its economic and technological life as will the Regional Consortium's RITS interim solution (Bee Card). The urgency for ECan and GW rail and the need to have these completed before AT can be transitioned results in a rating of High for the 2021-23 NLTP and Medium for the 2024-26 NLTP.

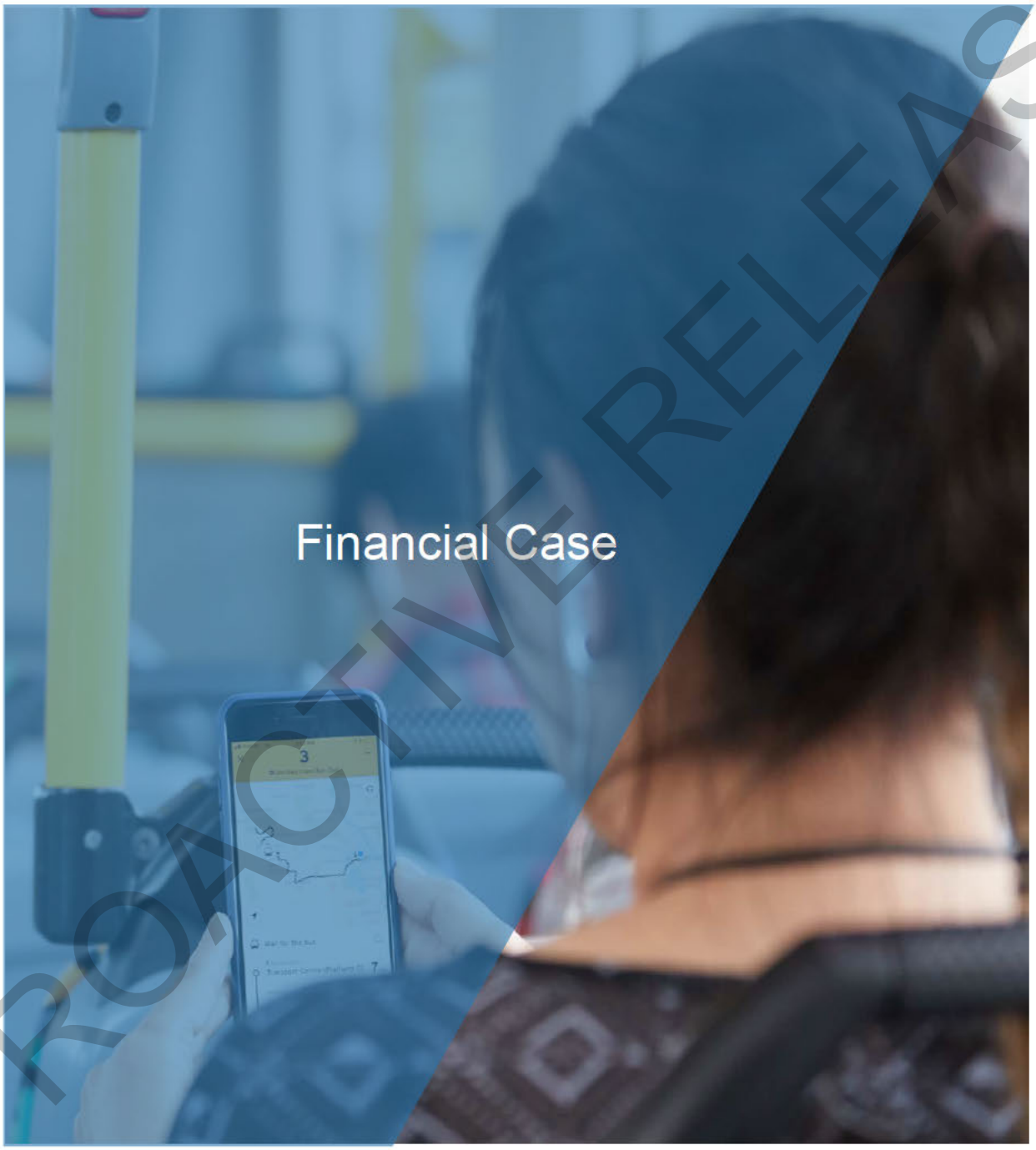
The High scheduling rating applies for ECAN and GW, and the delivery of supporting services. A Medium rating would be achieved by AT and RITS

Efficiency

The efficiency factor looks at monetised impacts, generally using the benefit–cost ratio (BCR). The BCR determines the efficiency rating as follows:

BCR	<1.0	1.0 – 2.9	3.0 – 5.9	6.0 – 9.9	>10
Efficiency Rating	Very low	Low	Medium	High	Very high

The NTS achieves a BCR of 2, which results in an efficiency rating of Low.



Financial Case

5 Financial Case

5.1 Key messages

Financial projections identify funding requirements for capital expenditure of about [redacted] mainly over the first four years as PTAs transition to the NTS, and steady state annual operating funding requirements of about $65 million (non-discounted).

Proposed funding arrangements would see capital, establishment, implementation, and operating costs relating to ticketing provider services and financial services being fully funded from the NLTF.

PTAs would fund maintenance of their front office equipment; frontline customer support; transition costs of moving to the NTS; and closure of their existing system; and receive their normal FAR funding for these costs.

Funding arrangements have not yet been agreed and approved by the Waka Kotahi board or with partner PTAs.

5.2 Purpose

The Financial Case sets out the projected financial costs and revenue benefits for the NTS as the preferred option and focuses on affordability and funding. It sets out the key financial assumptions, overall operating and capital costs, the projected costs and revenue, funding requirements and the funding model.

5.3 Financial assumptions and costs

The financial projections differ from the benefits and costs described previously in Section 4, Economic Case because:

- Costs and revenue are not discounted.
- Nominal cost and revenue totals cover the 14 year estimated whole-of-life of the solution unless otherwise stated.
- Inflation is included. This includes labour inflation of 3% per annum from 2022/23 through 2026/27.
- Staff indirect costs are included comprising a Waka Kotahi cost allocation for recruitment, training and other indirect costs.
- Cost risk adjustments for capital equipment are included to cover TSP indexation, foreign exchange risk and third party certification.
- The costs of operating legacy systems during the transition period are excluded as these are funded separately through PT Continuous Programmes.

Total capital and operating expenses and adjustments for risk, inflation and other costs are set out in the table below.

Table 25 Total estimated financial costs over 14 years

	Total nominal cost over 14 years
Capital expenditure	
Equipment - front office	[redacted]
Design, build, test	[redacted]
Merchant acquirer setup	[redacted]
Transit card programme manager setup	[redacted]
Retail network manager setup	[redacted]
Shared Service Organisation (SSO) setup	[redacted]
Subtotal capital expenditure	**138.9**
Operating costs	
Ticketing provider costs	[redacted]
Front office maintenance	[redacted]
Merchant acquirer (MA)	[redacted]
Program manager costs (TCPM)	[redacted]
Retail network manager costs (RNM)	[redacted]
PTA ticketing solution costs	[redacted]
SSO support costs	[redacted]
Subtotal operating costs	**839.5**
Transition costs	
TSP transition costs	[redacted]
PTA transition costs	[redacted]
Subtotal transition costs	**204.0**
Risk adjustments	
TSP pricing risk adjustments	[redacted]
TSP non-pricing risk adjustments	[redacted]
Subtotal risk adjustments	[redacted]
Adjustments for inflation	
TSP	[redacted]
Staff	[redacted]
Subtotal inflation adjustments	[redacted]
Adjustment for staff overheads	[redacted]
Total Cost of NTS	**1,295.5**

5.4 Revenue benefits

Revenue benefits

Revenue benefits reflect the estimated increase in each PTA's farebox revenue from increased patronage and improved revenue protection.

Increased patronage

Increased patronage results in additional farebox revenue accruing to a PTA and is based on the projected patronage (as described previously in section 4.5.1.4).

Table 26 Summary of revenue benefits for each PTA for increased patronage

Revenue from increased patronage	Nominal benefit $ millions
AT	83.0
GW	26.1
ECan	8.8
RC	8.8
Total revenue benefits *(nominal over 14 years)*	**126.7**

Revenue protection

Improving revenue security by addressing fare evasion on rail for GW would be achieved with a range of initiatives including tag-on/tag-off, electronic fare inspections on trains, and wider utilisation of legislative enforcement powers. Fare evasion is expected to drop from an estimated 15% to 3%. This amounts to additional annual fare revenue of about $6.6 million in 2024/25 and about $10.8 million by 2035/36. Based on a 12% reduction in fare evasion, GW could expect to recover revenue amounting to about $116 million (nominal over 14 years).

Summary of financial revenue benefits

In total, the financial revenue benefits to the PTAs amount to about $243 million and are included in the Financial Case.

Table 27 Total financial revenue benefits of the NTS

Benefit	Explanation of benefit calculation	$ benefit range for AT, GW, ECan, & RC $ millions
Patronage revenue	A patronage increase of between approximately 1.5% and 2.5% is assumed from ticket integration and lowering of barriers to travel for most users during the first full year of operation only, based on post-Covid patronage projections.	$101m – $152m Mid-point benefit **$126.7m**
Reduced fare evasion	GW expects to see rail revenue losses decrease from an estimated 15% to about 3% per annum. With integrated ticketing and high uptake of HOP across Auckland buses, trains, and ferries, introducing NTS is unlikely to provide further reduction in fare evasion and no benefits have been assumed.	$93m – $139m Mid-point benefit **$116.2m**
	Total Estimated Monetised Benefit	$194m – $291m Mid-point benefit **$242.9m**

5.5 Overall financial projections

The table below sets out the estimated (non-discounted) capital and operating expenditure and estimated increase in revenue over the expected 14 year life of the NTS.

Table 28 Financial revenue and expenditure projections

Table 28 shows:

- 90% of total capital expenditure is incurred during the first three years
- Steady state operations will begin from 2026/27 and, from this period onward, total annual operating costs will be about $65 million; about $10 million more than the current Do Nothing costs (refer to Table 21 in the Economic Case).

5.6 Funding requirements

Additional funding for the NTS will exclude the costs of operating the legacy systems of GW, AT and RC until each transition to the NTS, as these costs are already funded separately through PT Continuous Programmes.

Table 29 Estimated projection of financial costs and revenue

	22/23 $m	23/24 $m	24/25 $m	25/26 $m	26/27 $m	27/28 $m	28/29 $m	29/30 $m	30/31 $m	31/32 $m	32/33 $m	33/34 $m	34/35 $m	35/36 $m	Total $m
Capital expenditure															138.9
Operating expenditure															839.5
TSP risk adjustments															
Adjustments for inflation															
Adjustments for staff overheads															
Transition expenditure															204.0
Total nominal cost of solution															
Revenue															
Net expenditure															

Table 30 Estimated funding required

	22/23 $m	23/24 $m	24/25 $m	25/26 $m	26/27 $m	27/28 $m	28/29 $m	29/30 $m	30/31 $m	31/32 $m	32/33 $m	33/34 $m	34/35 $m	35/36 $m	Total $m
Estimated expenditure to be funded															1,295.5
Note that estimated legacy system expenditure during transition phases is already funded from PT Continuous Programmes:															
- AT															
- GW															
- ECan															
- RC															
Total from Continuous Programmes															
Total estimated funding required															

5.7 Funding arrangements

5.7.1 Funding model

The funding model describes who funds which costs of the NTS implementation, transition, and operation.

Waka Kotahi will provide the bulk of the funding for the implementation and ongoing operation of the NTS through funding allocated from the NLTF. The key funding principles are that:

- There is no intention for cross charging or pass-through invoicing – the funding model is premised on simplicity
- The annual planning and budgeting process is aligned to the NLTF
- PTA partners will be responsible for their local costs (including transition) via normal FAR arrangements
- There are a set of processes to manage spend within TTP including an agreed framework that TTP will operate within. Anything outside this will be subject to approvals.
- There will be constraints driven by the way engagement with suppliers is set up and managed.

The funding of costs under the funding model is summarised in the table below.

Figure 19 Summary of cost allocation under the assumed funding model

Costs	Capex	Opex
PTA local ticketing costs Staff, contact centres, local networks, phase out of existing systems, transition, local integration	Normal FAR	Normal FAR
Ticketing solution provider costs Hardware costs, design, build, test, implementation costs with supplier, Contracted 3rd party front & back-office costs	Fully funded by Waka Kotahi	Fully funded by Waka Kotahi
Financial services costs Payment gateways, merchant acquirers, retail networks	Fully funded by Waka Kotahi	Fully funded by Waka Kotahi
Shared services costs / TTP	Fully funded by Waka Kotahi	Fully funded by Waka Kotahi

Funding arrangements have not yet been agreed by the Waka Kotahi board or with PTA partners.

Although subject to change, a working assumption for funding has been applied in this business case as follows:

(i) Waka Kotahi will fully fund the following capital, establishment, and operating costs:
- software and licences
- equipment (both back office and front office)
- compliance and certification

- design build & test
- merchant acquirer setup and operating costs (if any)
- transit card setup and programme manager operating costs
- retail manager setup and retail network operating costs
- SSO setup and operating costs.

(ii) Participants will fund:

- maintenance of their front office equipment
- ticketing solution costs for frontline service customer support
- transition costs of moving to the NTS
- closure of their existing system.

(iii) Participants will receive their normal FAR for the costs that they will fund.

How this could apply to specific costs is illustrated in the example below.

Figure 20 Example of proposed funding allocation from the NLTF

Example cost	Funding allocation assumption
Merchant acquiring fees	100% from NLTF
Data communication networks	100% from NLTF for core NTS backbone Normal FAR for local networks
Support & maintenance for equipment	100% from NLTF for initial implementation. Normal FAR for equipment re-use and phase out of existing systems. Propose that future projects (e.g. light rail) fund the first 12 months of additional equipment at normal FAR.
Ongoing fare and scheduled system changes	TTP & Supplier elements 100% NLTF Local elements normal FAR
PTA internal change management	Normal FAR
Ongoing compliance and certification (e.g. PCI)	TTP & Supplier elements 100% NLTF Local elements normal FAR
Fleet changes	Re-assignment of small number of buses – included in base costs, centrally funded Significant changes – e.g. new operator – covered by project costs, normal FAR

This funding arrangement would ensure a seamless operating environment. Waka Kotahi would assume responsibility for the establishment and operation of the solution, funded from the National Land Transport Fund – Public Transport Service Account, offset by reduced payments to PTA partners for the subsidised operation of public transport. As a quid pro quo, the PTA partners will be saving the costs of running their current ticketing solutions to match this reduced funding.

This proposal would alleviate the need for complex funding and commercial arrangements between PTAs (i.e. shareholder percentage of the shared services organisation and percentage

share of turnover/operating costs on a per annum basis) and will also allow for easy transition should the PTA change (e.g. move from a Regional Council to a Territorial Council delivery model or vice versa).

PTA partners will also be responsible for their share of transition costs except where the burden is onerous due to national requirements in which case additional Waka Kotahi support beyond FAR may be sought.

While under this model Waka Kotahi will own, pay for, and operate the back-office functions of the ticketing solution, there remains a need for shared governance and absolute commitment from all PTA partners.

5.8 Funding Risks

The impact of the following financial risks could mean delay resulting in increased costs from further extending and upgrading current systems, especially for ECan and GW rail.

Figure 21 Key funding risks

Key Risk	Mitigation Approach
The NTS funding model cannot be agreed by Waka Kotahi and participant PTAs resulting in delay	• Document and socialise the new NTS funding model with: • Waka Kotahi Risk & Assurance Committee ahead of seeking Board approval • PTAs to present to their Board/Councils ahead of contract signature • Waka Kotahi I&F, Legal and Transport Services staff
Funding is not available to progress the NTS according to the desired implementation roadmap	• Securing funding for ECan and GW implementations through the Waka Kotahi Nationally Delivered Programmes for the next NLTP period 2021-24 • Securing funding for AT and RITS councils in the NLTP period 2024-26 • Close alignment of expected funding requirements post contract signature with Waka Kotahi NLTP & Treasury planning

6 Commercial Case

6.1 Key messages

A national ticketing solution involves a large scale, complex procurement due to multiple partners of varying scale, varying joining dates, and varying needs.

A procurement strategy appropriate for this level of scale and complexity has been undertaken involving a dual procurement process for the ticketing solution and for financial services.

An outcomes-based approach was applied to procurement of the ticketing solution where respondents determine the optimum means of delivering requirements, whereas financial services are more of a commodity-type service with the contract focusing on operational excellence and price certainty.

The final stage of procurement is to complete contract negotiations with the preferred supplier.

A Participation Agreement (Part 2) between all partners will set out the terms on which governance, funding, and provision of NTS services will occur. This is expected to be signed mid-2022.

Key risks are about affordability and funding, slow decision-making, withdrawal by one or more participants, and insufficient capacity and capability to deliver to timeframes and quality, especially as a result of COVID. These risks are manageable and mainly fall within the responsibility of Waka Kotahi and the joint NTS Governance Board.

6.2 Introduction

The Commercial Case assesses the procurement strategy and process, solution requirements, contractual arrangements, and risk allocation for:

- the procurement of the preferred option outlined in the economic case for the design, build and operation of an account-based, open loop, ticketing and payment solution delivered through a shared services operating model; and
- the structures and contracting approach over the term of the contract with the TSP.
- The approach set out in the Procurement Strategy26 has been designed to ensure value for money balanced across the partner PTAs, Waka Kotahi, and public transport users (customers).

[26] The Project NEXT Procurement Strategy dated 30 May 2018 was approved by the Waka Kotahi procurement team on 15 June 2018.

6.3 Procurement strategy

6.3.1 Purpose

The purpose of the Procurement Strategy is to clearly set out the procurement approach and rationale for procuring the NTS, to provide decision-makers with confidence that procurement has been well planned, and to provide clear guidance to those responsible for procuring the NTS. The procurement strategy assumed a single procurement of a solution, not a system, and a centralised, shared services operating model provided by Waka Kotahi.

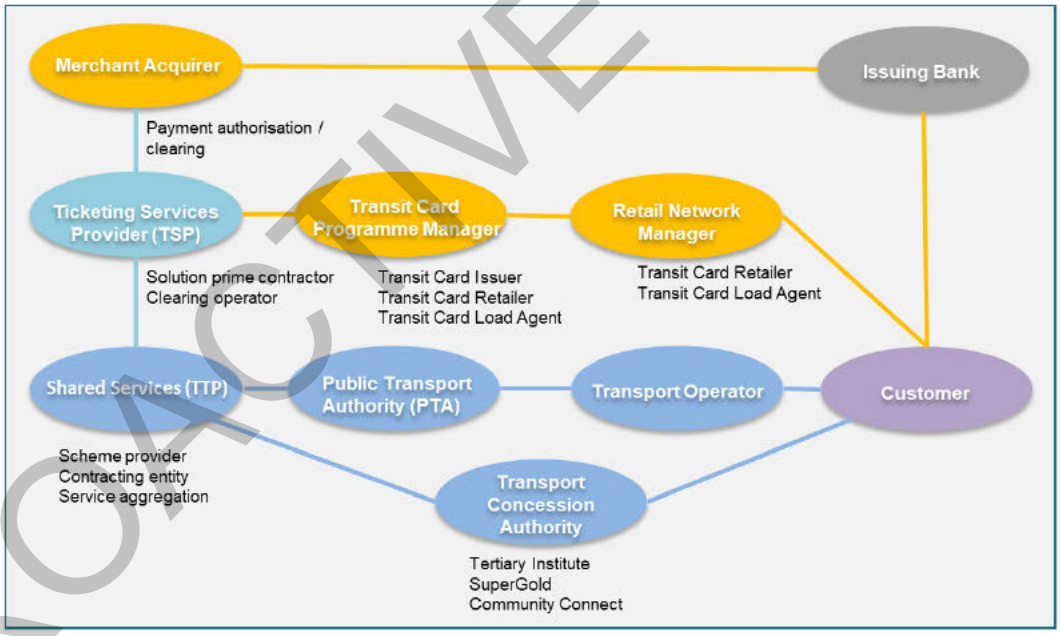
This Procurement Strategy has ensured a well-managed procurement process that followed best practice procurement principles and government procurement guidelines.

6.3.2 NTS is a large scale, complex procurement

A single, national ticketing solution is a large scale, complex procurement. This complexity arises from:

Involvement of many key organisations – the business objects model below illustrates the range of organisational entities involved in the NTS and the primary relationships.

Figure 22 Business object model



Multiple participants – partnering between 13 PTAs and Waka Kotahi.

'Project-specific' procurement – procurement for each PTA should not compromise its broader public transport strategy, and should be consistent with the Government Policy Statement on Land Transport, Regional Public Transport Plans, the New Zealand Disability Strategy, the New Zealand Government's Digital Transformation Strategy, other policy initiatives such as SuperGold, and Waka Kotahi's strategy and programmes.

Varying scale – PTAs range from AT and GW with a rail, bus, and ferry network with over 79 million and 38 million public transport trips respectively per year to smaller PTAs such as Northland with about 300,000 public transport trips per year.

Differing joining periods – PTAs will implement the NTS over a period of about three to four years as each PTA's existing or interim solution agreement ends. This period will be from 2022/23 when ECan begins implementation through to 2025 prior to the end of the extended term in AT's agreement with its current ticketing solution provider, although some smaller regions could join after 2025.

Specific needs of PTAs – Each participant has specific requirements. Examples include:

- AT requires appropriate economic treatment of its investment in its current infrastructure (although the DBC assumes a worst case where all infrastructure is replaced)
- GW has an implementation sequence which may require rail ahead of buses and ferries depending on the current rollout of Snapper on rail, and integrated ticketing is critical to realising GW's fare policy
- ECan has ageing equipment and devices with limited functionality such as tag-on only which are at end-of-life and, with its ticketing provider contract also coming to an end in 2023, urgently needs a replacement solution.

6.4 High level requirements

The description of the components and requirements of the NTS are set out in sections 4.4.1 of the Economic Case. In summary, this comprises:

The central ticketing solution – comprising the design, build, test and deployment of the core software and equipment that provides the heart of the central solution, including:

- ticketing solution supporting applications and components
- ticketing solution configuration services
- integration services and systems to the relevant PTA's systems
- equipment, including on-vehicle equipment, validators, control gates at railway stations (where applicable), etc. which will need to be designed/procured, installed, and deployed
- IT infrastructure and networks procurement, establishment, testing and deployment
- Where required, engineering design, risk assessment, specification and consenting (primarily for the rail solution e.g. gates, ticket vending machines, etc.)
- static ticketing device specification, procurement, and installation
- application and infrastructure software licence specification and procurement
- project management services.

Transition services - Including training services, transition management, card media transition, data and information transition, security testing and financial service compliance testing.

Service delivery - Including project management and service delivery establishment.

Operations services - Including IT support, maintenance and hosting, business process outsourced services, on-going configuration and management, ongoing financial services

compliance, ongoing security testing, application and equipment support and maintenance, asset management, reporting, incident and event management, and service delivery management.

Governance - Relationship management and governance of the project and ongoing operations.

The requirements for financial services comprise three components:

i. **Merchant Acquiring Services** - deals with the payment part of the transactions from the account associated with the card used to pay for a journey. This involves processing verification requests at the tag-on part of a passenger's journey and then processing, authorising, and settling the request for payment to be made from the passenger's card account.
ii. **Transit Card Program Manager Services** - produces and issues EMV-compliant transit cards and distributes these through the retail network. Passengers can pre-load their transit card and use it to pay for their journeys on public transport. The card cannot be used for any other purpose.
iii. **Transit Card Retailer Network Manager Services** - provides and manages the retail outlets where passengers can obtain, load, and top up their transit card. The retail network provider will need to have an ATM and/or POS (point of sale) terminal network to offer the top-up function. The POS terminal network will need to comply with and implement the New Zealand Transit Payment Guidelines.

Components 1 and 2 above include:

i. **Transition services -** to design, build, test, and integrate each Financial Services component with the ticketing solution
ii. **Implementation services -** such as project and service delivery management and governance
iii. **Operations services -** to ensure the ongoing provision of financial services, incident and event management, and reporting processes
iv. **Other financial services** - required for other possible related products and services such as park and ride.

These requirements comply with the New Zealand Transit Payments Guidelines which were developed prior to the issue of the Financial Services RFT and the appointment of the banking and associated service providers.

The Ticketing Solution RFP and Financial Services RFT required the financial services to be managed by the TSP as primary contractor.

To successfully operate the NTS, a shared service function is required to provide the co-ordination and contract management of services from the NTS suppliers to each of the partners. Waka Kotahi is responsible for delivering this shared service function, the nature of which will be described by the operating model. The operating model defines the relationships and approach to delivery of ticketing services in partnership with PTAs as "one national team".

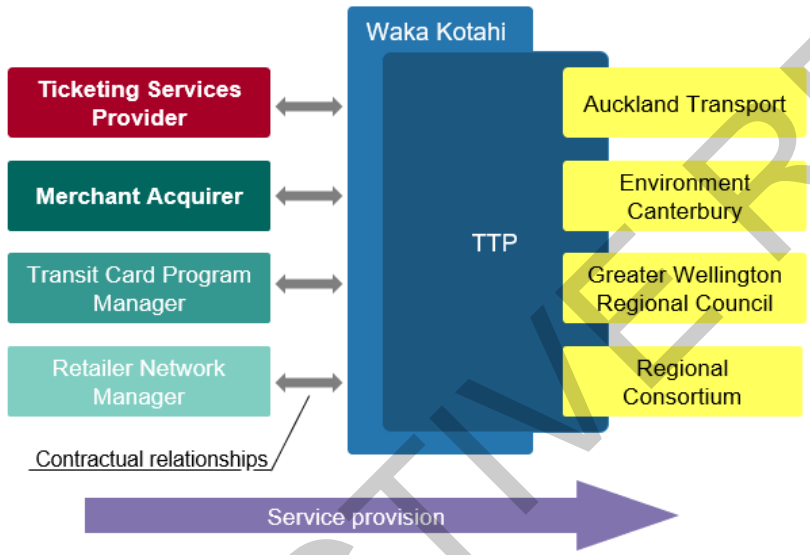
The requirements, roles and responsibilities to be managed through the operating model, including the scope of the shared service functions, will be determined in detail during contract negotiation with the preferred ticketing services supplier and the Participation Agreement between Waka Kotahi and PTAs.

6.5 Commercial operating model

6.5.1 NTS supplier and PTA relationships

The structure of the relationship between the suppliers, TTP and PTA partners is set out in the following diagram:

Figure 23 Relationship structure between suppliers, TTP and PTAs



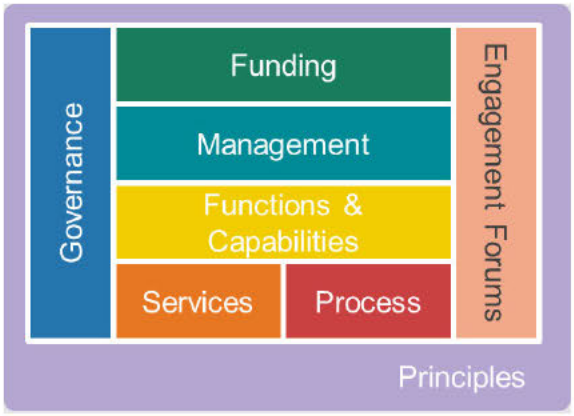
The purpose of TTP is to provide efficient service delivery, streamlining contact points with the TSP and FSPs. TTP will be:

- Accountable to the joint NTS Governance Board, governed by the Participation Agreement between Waka Kotahi and partner PTAs
- The contract holder with the TSP and FSPs, to provide services as agreed to all partners, including support and assurance
- A business unit within Waka Kotahi with dedicated roles across the functions which are subject to Waka Kotahi day-to-day management processes.

6.5.2 Purpose of the operating model

The operating model is the structure by which the NTS will deliver ticketing services. The model comprises eight elements: principles governance, funding, management, functions and capabilities, services, processes, and engagement forums as shown in the diagram below.

Figure 24 The seven components of the operating model



6.5.3 Operating model design principles

The key principles of the operating model reflect the objectives of the NTS including:

- To create an easier to use, more sustainable public transport system that enables and encourages growth in public transport patronage.
- To utilise economies of scale to procure and operate a nationwide NTS with Waka Kotahi as a single purchaser.
- To maximise the benefits of a single central solution while providing each PTA the flexibility it needs to meet its fare and product requirements.

Key principles underpinning the operating model include:

- The NTS Governance Board will be responsible for providing oversight and strategic leadership.
- Day-to-day management of the service will be a responsibility of TTP, working with PTA partners.
- TTP exists to make the NTS services available as efficiently and effectively as possible to the PTA partners
- Funding will generally be provided from the NLTF through Waka Kotahi.
- Design and process decisions will be made by the TTP and PTAs using the engagement forums as agreed.
- The NTS Governance Board will be convened as necessary to resolve escalated issues if the disputes process is unable to reach a solution.
- Waka Kotahi will be the sole party who contracts with each supplier (TSP and FSPs) under the relevant Master Service Agreement (MSA) for the benefit of all partners and itself. This reduces the number of third party service provider contracts and supports a multi-tenanted solution. Establishing the shared services operation as a business unit within Waka Kotahi will bring market credibility and enable comprehensive security of financing and funding arrangements.
- There will not be a “one size fits all” approach; some PTA partners may access a different range of services. To meet the needs of all partners, the NTS will offer multiple service delivery tiers. This provides each PTA with a range of fit for purpose services, produces lower cost options for smaller PTAs, ensures local/regional authorities meet their legislative requirements to ensure the efficient and effective use of their resources,

and supports Waka Kotahi's requirement to use NLTF revenue in a manner that seeks value for money.

- All PTA partners will be encouraged to transition to the NTS as early as possible. The aim is to deliver the benefits of the NTS as soon as possible and reduce the cost and risk during the early transition period, also improving the credibility of the NTS to third party service providers.

6.5.4 Components of the operating model

The components of the operating model are described below.

Governance – provides leadership while ensuring stakeholder views are reflected, decision making is transparent, and responsible parties are held to account. The governance structure will comprise a Joint NTS Governance Board that is representative and skills-based incorporating Waka Kotahi, customers, partnering, digital and PTAs. It will have a national view, manage risk and value, and focus on achieving NTS outcomes. Governance is described in the Management Case (section 7.6).

Funding model – describes who pays for what and how. Waka Kotahi will provide the bulk of the funding for the implementation and ongoing operation of the NTS through funding allocated from the NLTF. This is described in the Financial Case.

Management – will oversee the running of a service or project, ensuring the needs of stakeholders are met, and outcomes are achieved. Waka Kotahi will be responsible for managing the day-to-day operation of the NTS through the TTP, including:

- Day-to-day management flows
- Service/account management
- A collaboration framework for involvement of partners, enabling a one national team approach using appropriate tools and processes
- TTP acting as an assurance function of the NTS, providing assurance across supplier services and the end delivery of services to each partner.

Each partner will have a nominated Relationship Manager within TTP. There will be regular engagement between each Relationship Manager and partner PTA, and this will be supported by cross-organisational Engagement Forums. There will likely be different models of how relationship management will manifest across the different partners. Relationship managers would be:

- Responsible for monitoring service levels
- The initial point of contact for escalation of issues
- The key escalation points with suppliers
- Supporting the annual planning and budgeting process

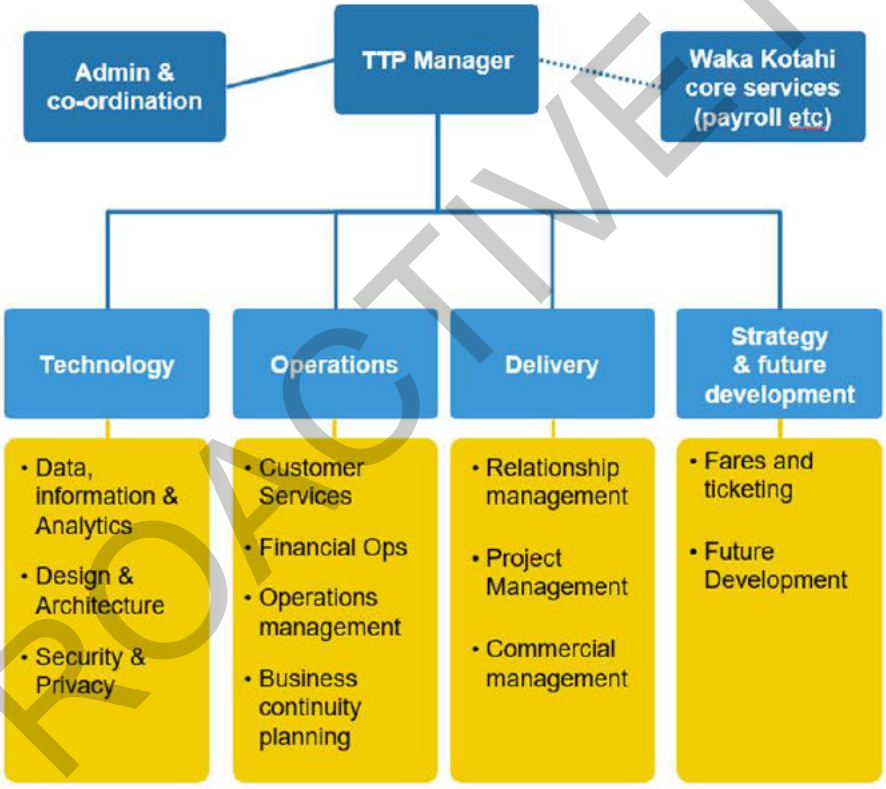
Escalation will be through the TTP management structure, with partners having recourse through the NTS Governance Board as part of the governance framework.

Functions and capabilities – consider and balance national and local capability in providing the NTS services. Although a key principle of the TTP model is to generate efficiency by centralising capability, this needs to be balanced with the need for local autonomy. Partners have different levels of existing capability and may wish to maintain, decrease, or increase their local capability. Such an assessment has been done with Auckland Transport and this approach is recommended for other partners.

Where capability exists within a PTA partner but is needed nationally, there may be potential to re-use that local capability rather than establish it within TTP. Different models are possible such as secondments and devolved service provision. Consideration of the capability with the TSP and partners determines the size and scope of TTP.

The functions and capabilities that will be provided within the NTS have been mapped and grouped into four main areas: technical, operations, delivery, and strategy and future development. TTP will have enough knowledge and capability to prioritise, group requests and make recommendations as an "Intelligent Customer", not just a pass-through or assurance function. The TTP functions and capabilities are summarized in the following diagram:

Figure 25 TTP functions and capabilities



Services – that are provided through the NTS need to be defined and measurable through SLAs to ensure a consistent customer experience. This will be done through a service catalogue and service level agreements (SLAs). It is expected that:

- Service levels will be monitored and reported on by TTP and dashboards will be available to partners.
- TTP will be responsible to ensure service levels are back-to-back with TSP and FSPs.

- There will not be a punitive regime between TTP and partners for failure to meet service levels. These will be addressed through service management, the engagement forums, the disputes process, and governance.
- Consequences of failure to meet service levels by the TSP will be shared with partners.

The solution envisages Transport Service Operators and other commercial entities being able to access some services. These commercial arrangements are yet to be defined and will be managed via a future contractual model agreed with the TTP, with a defined set of services being provided.

Processes – will provide the step-by-step detail of how each service is delivered and the interactions between the TSP, TTP and partners. Policies and processes will be developed collaboratively between the SSO, TSP, FSPs and PTA partners during the design elaboration phase. Process manuals will be defined and maintained online. Examples include (but are not limited to) fault management, card surrender, refunds, data management, and security compliance.

Engagement forums – are a core part of the collaboration framework and are the means by which partners influence TTP. The forums will:

- Hold suppliers to account on operational performance (assurance)
- Monitor contract service levels and any continuous improvement
- Provide guidance/decisions on approach (as delegated)
- Provide visibility and assurance to Participants of continued service expected from TTP, and a path for escalation.

Forums will include TTP and partners and may include suppliers by invitation. It is expected that forums will evolve over time, including the creation and dissolution of forums, always have up-to-date terms of reference allowing issues to be raised in the correct group, and will primarily operate at the tactical level as a management activity.

6.5.5 Contracting principles and content

Ticketing Solution

A “partnering” model for the delivery of Ticketing Services will align the long-term strategic nature of the relationships, the specialist services required, and the need to solve problems in a collaborative manner to achieve optimal outcomes.

Aligning Waka Kotahi’s and partners’ expectations with the TSP’s solution, and accurately documenting those aligned expectations, will be critical to mitigating risk for both the supplier and partners. This collaborative approach will be used to develop appropriate contractual principles, terms and processes, and development of services schedules, while ensuring clear accountabilities and consequences for not providing the required services, deliverables, or standards.

Therefore, the contract with the TSP will have more of an outcomes-based focus than the agreement with the Financial Services Provider(s).

Ticketing services contract term

The contract term for the Ticketing Services Master Agreement (TSMA) proposed in the RFP will take account of the requirement to transition all partner PTA services on a staged basis over a period of three to five years. Therefore, consideration must be given to the length of contract term *remaining* after the last PTA is expected to join the NTS. The recommended term of the TSMA would be "*10 years from commencement of the contract signing for the last meaningful production use by ECan, GW and AT irrespective of sequence".*

Process for reviews

As the TSMA could continue for up to 19 or 20 years at the partners' discretion, it would include a process for reviews to occur at particular times. Commitments about the solution refresh would depend on what commitments are agreed as part of continuous improvement and upgrades during the term.

The recommended approach for conducting a review is that partners will review the TSMA prior to the expiry of the initial term in 2032, and again in 2036, and assess whether the national ticketing solution:

- satisfies the partners value for money requirements, including assessing the performance of the supplier against requirements, reviewing the supplier's technology performance and roadmap, and the total cost of using the NTS
- meets the current and future needs of communities, including customer satisfaction and the goals and objectives of customers compared to the supplier
- that the services being performed are efficient, effective, and appropriate for current and anticipated future circumstances, including potential improvements or changes that may be required.

As with any agreement, there would be nothing to stop partners performing their own review independently at any time.

Performance management

Performance management will be a key facet of the contracts for the Ticketing Solution. Typical supplier risk areas include:

- initial low pricing and limitations on what is "in-scope", with a view to driving profit through aggressive change management following appointment and creation of a "vendor lock-in" situation
- non-delivery against service levels, or focus on service levels which do not reflect the business outcomes
- complex decision making and approvals processes leading to project delays, for example, through an overly complex change management control process that gives the supplier the right to decline a reasonable request.

Such risk scenarios will be considered and addressed to achieve the correct balance of performance management tools and "partnering" behaviour. Focus will be on:

- clear definition of mandatory criteria
- service levels aligned to business outcomes not the activity or system
- technical performance aligned to customer experience and service efficiency.

A risk/reward model will be constructed which rewards positive behaviour that delivers additional value and outcomes (beyond a baseline), and which compensates for and discourages poor quality outcomes. Such a regime will normally be uneven (i.e. the downside of poor performance is significantly greater than the upside of good performance) which helps prevent a supplier "gaming" the contract.

Financial services

The contracts with each of the Financial Services provider(s) are for more of a commodity-type service with the emphasis on operational excellence and price certainty relatively lower risk and difficulty (compared to the Ticketing Solution). Collaboration and long-term partnering will be less of a driver for the parties, particularly for Component One of the Financial Services, compared to the relationship with the Ticketing Solution provider.

Consequently, a shorter contract term for the merchant acquiring services and settlement services would be appropriate to maintain competitiveness, while still allowing a Financial Services provider to adequately recoup its investment cost in establishing the relevant Financial Services component. A longer term for the programme manager services and retail network manager may be more appropriate to enable sufficient continuity.

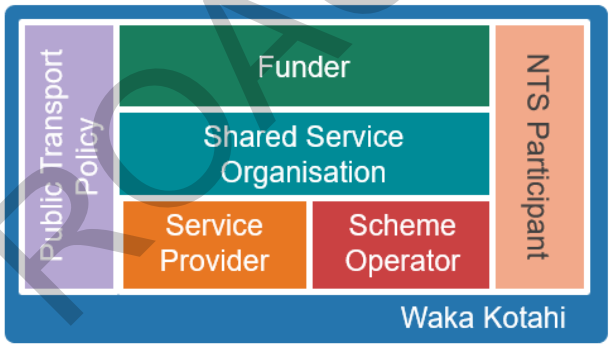
6.5.6 Waka Kotahi and PTA partnership roles

Waka Kotahi roles

Waka Kotahi is critical to the successful delivery and operation of the NTS, and has multiple roles. For Waka Kotahi internally and for its partners, clarity is needed over the different roles and what role Waka Kotahi is fulfilling at what point in time for different audiences.

A brief outline of each role is captured below. These are not intended to be a complete scope for each role but allow an understanding of the differences. There is an assumption that the reader has a clear understanding of the scope for the NTS: that it is providing the ticketing capabilities and supporting operational services to run the scheme.

Figure 26 Waka Kotahi roles



1. **Funder** - Waka Kotahi via the NLTF provides funding for public transport services in partnership with PTAs. The NTS does not change the role of Waka Kotahi as a funder and the NTS (and all its participants) will need to engage with Waka Kotahi as a funder in a similar way to that undertaken currently. The NTS will (through the DBC process)

endorse funding for the implementation project and the agreed operational funding principles for the NTS over its life.

2. **Public transport policy -** Waka Kotahi currently supports PT policy, facilitating the implementation of national policy and engaging with PTAs at a national and regional level. The NTS, and specifically TTP, will help facilitate the delivery of PT policy initiatives by providing insight and experience into wider trends and opportunities. And provide support, knowledge and specialist skills to Waka Kotahi's existing policy function.

3. **NTS participant -** Waka Kotahi will be an active participant within the NTS and may wish to consume services from the NTS via TTP, such as consuming and accessing data from the NTS, and utilising services for other solutions (road tolling etc).

4. **Shared services organisation –** TTP will be a separate business unit that will carry out the specific functions required of a shared service within the context of the NTS as defined under the NTS Operating Model. The key function of TTP will be to act as an assurance body to ensure that all of the key services required for the NTS are being provided in a timely fashion to the required quality.

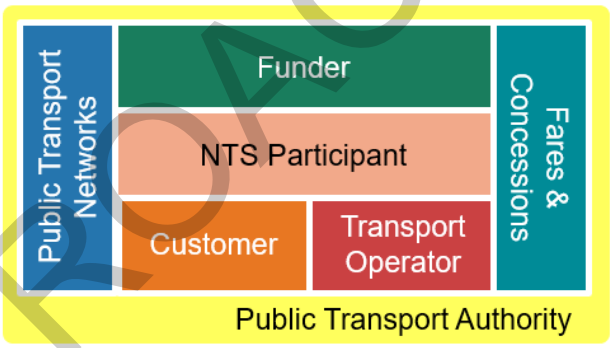
5. **Service provider -** Waka Kotahi may be a provider of services within its own right either to TTP and then onwards to the wider participants or to enable TTP to function.

6. **Scheme operator -** Waka Kotahi will be the body that (via TTP) defines, implements and manages the framework (including rules and obligations) that are required to participate as part of the NTS. Waka Kotahi will be accountable to third parties for the compliance of the overall NTS scheme and as such will require this framework to be adhered to by all participants.

PTA partner roles

The roles of the PTA partners is summarised in the following diagram:

Figure 27 PTA Roles



1. **Funder -** PTAs will continue to be a co-funder of Public Transport services, will continue to engage through the NLTF for future funding, and will supplement this with revenue from fare collection and local funding sources

2. **NTS Participant -** PTAs will be active participants of the NTS and will consume services as a participant. Primarily they will consume a set of services that enable fare revenue collection

3. **Public Transport Networks -** PTAs retain responsibility and accountability for the planning and implementation of their PT networks
4. **Fares and Concessions -** PTAs retain responsibility and accountability for the planning, implementation and strategy for the setting and management of their fares and concessions
5. **Customer -** PTAs retain responsibility for the customers that choose to use their services, will need to access data for customers that contact them regarding first line customer support, and will need to be cognisant of the wider implications of a national scheme when interacting with customers
6. **Transport Operators -** PTAs retain responsibility and accountability for the ongoing management and operations of Transport Operators in respect of the provision of services.

6.6 Partnership approach formalised through Participation Agreements

6.6.1 Background

To date, the arrangements between participants - Waka Kotahi and PTA partners - for the procurement for an NTS have been recorded in a Multi-Party Funding Agreement dated 27 July 2018 (MPFA) and a Participation Agreement (Part 1) dated 10 December 2020.

Part 1 (P1 Agreement) contemplated a separate agreement – Participation Agreement (Part 2) – that would outline the terms on which governance, funding, and provision of and access to the NTS will occur (among other things) and that Waka Kotahi would act as a scheme operator for the purpose of the NTS. In this role, Waka Kotahi would contract with and manage the NTS services providers to facilitate the provision of the NTS for the benefit of all partners including Waka Kotahi for itself.

6.6.2 Purpose

Participation Agreement Part 2 (P2 Agreement) is the formal commitment by partners to join the NTS. P2 will set out the basis on which the partners will work together to govern, plan for transition, establish, implement, operate, and allocate costs for a nationwide ticketing and payments solution that enables and processes payments for journeys on public transport and other authorised services.

6.6.3 Content

The P2 Agreement is a comprehensive agreement that sets out the conditions for the participation of Waka Kotahi and each PTA in the NTS. This includes:

- Context, intent, and relationship principles
- Objectives for the NTS
- Governance roles and processes
- Relationship to the Master Services Agreements

- Mutual obligations
- Services and performance standards
- Cost allocation and payment
- Intellectual property, information and data, confidentiality, privacy, and security
- Processes covering
  - the occurrence of a significant event
  - change management
  - audit and assurance
  - dispute resolution
  - liability and the process for claims
- Terms and conditions covering such things as insurance and termination.

6.6.4 Pre-requisite documentation

Each partner will have been provided the following documents as part of the process to execute the P2 Agreement:

1. Operating Model,
2. Ticketing Services Master Service Agreement (TSMSA)
3. Detailed Business Case,
4. Communications Protocol,
5. Funding principles (as approved by Waka Kotahi), and
6. An outline of the Service Catalogue that will apply to P2.

It is expected that partners will sign up to P2 Agreement in mid-2022.

6.7 Risk mitigation and allocation

Large scale procurement and integration projects involving multiple parties are complex and carry significant risks. Overseas experience has shown that ticketing solution procurement and implementation projects have been higher risk.

The key risks were described briefly in the Strategic Case and the impact, mitigation opportunities and allocation are summarised in the table below. The general principle is that all risks should be allocated, where possible, to the party best able to manage the risk, subject to value for money. Given the multiple parties involved, most have some responsibility for risk mitigation, with Waka Kotahi having a key mitigation role because, as the contracting party, they are responsible for contract management.

Risks are set out in more detail in Appendix 10.

Figure 28 Summary of risk implications and mitigation

Risk	*Impact*	*Mitigation*	*Allocation*
Cost Risks The overall cost of an NTS is high NTS lacks sufficient priority amongst other NLTF priorities to be funded The allocation of costs shared between government and the regional councils (partner PTAs) is difficult or cannot be agreed	→Likelihood = M →Consequence = H →NTS is delayed or does not proceed →Higher than anticipated whole of life costs and the extent to which costs can be funded 100% from the NLTF could result in the solution being seen as unaffordable for some or all parties. The impact could be delayed rollout of the NTS solution, one or more parties pulling out, or the NTS not proceeding.	The preferred supplier negotiation stage of procurement is expected to result in reduced cost due to: • identification of potential double counting of services between the TSP, SSO and PTAs • changes to requirements resulting in price reductions, e.g. a more off-the-shelf rather than customised solution. Fully funding (100%) the majority of costs from the NLTF would ensure affordability and attractiveness of the national solution for PTAs.	• Waka Kotahi
Multiple Participant Risks Decision-making process across multiple investors is slow One or more participants decide to delay or stop investment in the NTS solution and extend their current/interim solution because of cost, delays, or lack of contract agreement	→Likelihood = M →Consequence = M →Delay and increased costs →Delayed rollout of the NTS solution and increased whole of life costs. →Changes to the scheduled staging of implementation across PTAs resulting in delays and increased costs. →Delays cause one or more PTAs to seek alternative solutions or extend current solutions. →Reduced scale of the NTS may make the cost unaffordable for the remaining participants. →The preferred supplier may decide to withdraw as the smaller scale is unprofitable to deliver and operate.	Strong stakeholder governance and management to co-ordinate decision-making requirements and timeframes across all parties, and ensure all are supported and well equipped to make timely decisions Interim solutions were subject to ongoing support for transition to the NTS. Effective governance is in place to ensure NTS proceeds at pace to implementation.	MPGG
Operational Risks There is insufficient capability and /or capacity to deliver to expected quality and timeframes	→Likelihood = M →Consequence = M →Delays and increased costs. →The global impact of COVID-19 is expected to cause: • delays to implementations in other jurisdictions which will delay the start of the NTS; and/or • implementation to be staffed by a much less experienced and capable team with consequential impacts on quality and slower delivery; and/or	A pragmatic response may be required that considers: • Implementing a much more "off the shelf" solution • obtaining support from other jurisdictions to train and/or staff a stronger internal implementation team delaying implementation by 6 – 12 months to allow for product lead times, etc.	• • Waka Kotahi (TTP shared services)

	• delays in production and shipping of equipment. →Limited capacity and experience of PTA staff could impact quality and timeframes. →Similarly, the capability of TTP within Waka Kotahi has not been tested but includes experienced staff.		
Technology Risk Reputational damage because of a significant NTS operational failure. A failure could arise from a compliance breach and loss of private information, operational failure causing cancellation of services and loss of revenue, or transition issues that similarly cause cancellation of services and loss of revenue.	→Likelihood = M →Consequence = M →Lower patronage and revenue than predicted. →Lack of customer trust in used of public transport. →Mode shift targets not achieved and increased use of private vehicles. →Technology improvements are not readily achievable	High quality implementation Strong focus on a great customer experience from day one. Strong operational controls and compliance Effective contractual performance incentives Implement open systems wherever possible Include contractual requirements that enable upgrades to be applied when these are available for other jurisdictions.	• • Waka Kotahi
Digital Risk Data breaches result in system failure and/or loss of personal information	→Likelihood = M →Consequence = M →Disruption of services →Loss of revenue →Customer details exposed/lost →Reputational damage	The preferred supplier negotiation stage of procurement is expected to result in reduced cost due to: • identification of potential double counting of services between the TSP, SSO and PTAs • changes to requirements resulting in price reductions, e.g. a more off-the-shelf rather than customised solution. Fully funding (100%) the majority of costs from the NLTF would ensure affordability and attractiveness of the national solution for PTAs.	Waka Kotahi

Management Case

7 Management Case

7.1 Key messages

A conceptual roadmap setting out indicative go-live dates starting with ECan in July 2023 and ending with the Regional Consortium in February 2025 is a key assumption underpinning the DBC. These dates signal a rapid rollout that will require strong and effective governance, significant project management effort and resourcing, all working together as 'one national team'.

Shared services functions are critical to the success of the NTS and will be provided by Waka Kotahi as an internal business unit – Transport Ticketing and Payments (TTP).

The DBC assumes a high level workplan and clear responsibilities for implementation subject to detailed planning between TTP, partners and the ticketing services provider when contracted.

TTP will manage the contracts of the ticketing and financial services providers, provide programme management for the establishment and transition of partners to the NTS, and provide ongoing monitoring and assurance over performance.

Partners will need to determine the most cost-effective, practical, transition technology option in conjunction with the TSP and TTP including possible infrastructure re-use.

A strengthened governance structure is being put in place which is skills-based with wide representation. The TTP will operate under this governance structure.

7.2 Purpose

The Management Case sets out the planning, management, and governance arrangements for the successful delivery of the NTS. As contract negotiations are currently taking place, key assumptions have been applied about how implementation is expected to proceed. These assumptions include the shared services operating structure and roles, high level implementation approach, transition arrangements for each PTA, joint governance arrangements, and how project risks and the realisation of benefits will be monitored and managed.

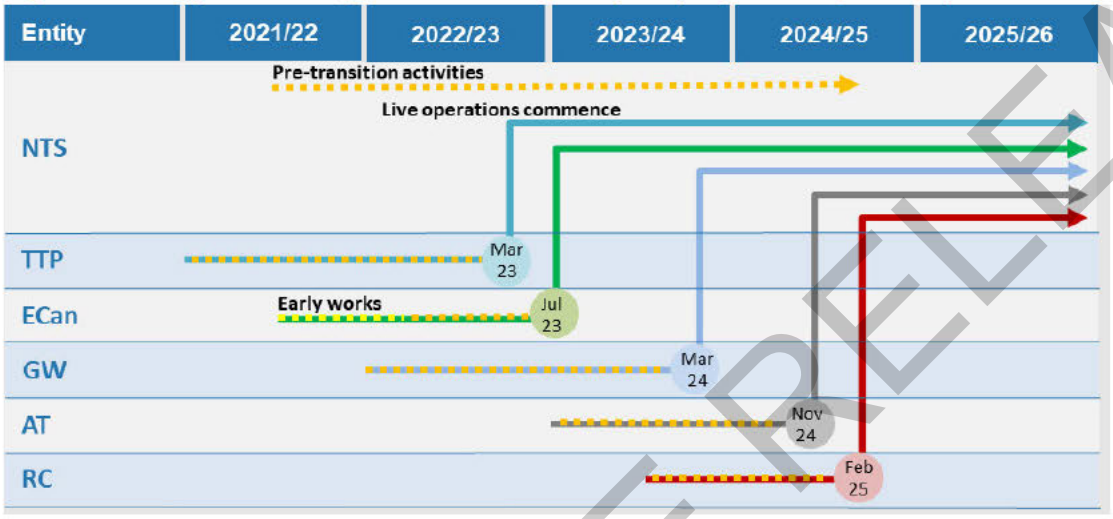
7.3 Programme delivery

7.3.1 Conceptual roadmap

The conceptual roadmap illustrated in the diagram below sets out the assumption for the priority order for implementation for each PTA. This is a key assumption that underpins the cost benefit analysis in the Economic Case and the financial projections and funding requirements in the Financial Case. This timing may change as TTP and PTAs work with the TSP to better understand and plan transition requirements.

ECan will be the first PTA to implement the NTS followed by GW with staged implementation across the rail and bus networks and the ferry service. AT's contract with its current provider extends until 2026 but the assumption is that the implementation will be sooner to gain the benefits of account-based and open loop capability. The Regional Consortium has recent experience in rolling out its interim ticketing solution, Bee Card, across nine PTAs and is likely to be the last group to transition.

Figure 29 Conceptual roadmap business case assumption (subject to negotiations)



7.3.2 Three programme workstreams

Three programme workstreams have been established and these are summarised in the following table:

Figure 30 Three programme workstreams summarising the activities to be developed and delivered

Procurement	Establishment	Implementation
Identify and secure the key NTS suppliers, providing the NTS Programme with a coherent set of negotiated contracts with suppliers for provision of NTS services over a 14-year period (including the implementation timeframe). Workstreams include the delivery of: • Completion of TSMSA to extent necessary for SoW 0 • Completion of SOW 0 • Completion of TSMSA and FSMSAs • Agreement on roadmap and relevant SoWs for the respective participants	Completion and signature of the agreement between all NTS participants that sets out how the partnership will work, and services from the suppliers consumed, enabling the implementation and operation of a functioning NTS. Workstreams include the delivery of: • Participation Agreement • Detailed Business Case • NTS Operating Model • Funding Model • Waka Kotahi Solution Assurance • Respective Council/Board approvals of the Participation Agreement and agreed artefacts	Commences at point of supplier contract and P2 Agreement signature. In the lead up to this requires development of the implementation plan and resourcing approach and strategy for the NTS programme. Includes the management of the Early Works (SoW 0) workstream. Workstreams include the development of: • Detailed implementation plans • Resourcing strategy and commencement • Budget agreement and management • Roles and responsibilities • Engagement approach • Initial buyside implementation activities (network provision, facilities, privacy impacts etc.

7.3.3 High level implementation programme plan

The implementation programme plan will be developed in conjunction with the contracted ticketing service provider. However, the programme plan is expected to include a series of separate projects as set out below (as a minimum).

Figure 31 Likely range of projects required under the design, build, and implement programme of work

Project	Responsibility
NTS Shared Service Organisation Entity Establishment (governance, legal, funding, etc.)	Waka Kotahi
NTS Shared Service Organisation Facilities Establishment (realisation, resourcing, facilities, systems, etc.)	TTP
NTS design	Ticketing Solution Supplier under a centralised contract with Waka Kotahi
NTS build and implementation of core ticketing platform	Ticketing Solution Supplier under a centralised contract with Waka Kotahi
NTS Financial Services, merchant acquirer establishment	Ticketing Solution Supplier and Merchant Acquirer under a centralised contract with Waka Kotahi
NTS Financial Services, program manager establishment	Ticketing Solution Supplier and Programme Manager under a centralised contract with Waka Kotahi
NTS Financial Services, retailer network manager establishment	Ticketing Solution Supplier and Retailer Network Manager under a centralised contract with Waka Kotahi
NTS Program Office (for planning and oversight of the multi-year transition program)	TTP
ECan Bus Solution Implementation supplier side ECan side (See PTA Implementation Scope below)	Ticketing Solution Supplier under a Centralised Project ECan
GW Rail Solution Implementation supplier side GW side (See PTA Implementation Scope below)	Ticketing Solution Supplier under a centralised contract with Waka Kotahi GW
Repeats per 9 and 10 above for GW Bus and then each PTA for each specific implementation project	Ticketing Solution Supplier under a Centralised Project and the PTA with respective scope of work as set out in PTA Implementation Scope

The programme and project management approach will be designed to optimise delivery by leveraging the experience of contracted organisations (TSP, financial services providers), together with experienced personnel within Waka Kotahi / TTP, and partners which all have previous implementation experience to create one national team.

7.3.4 Programme structure and resourcing

The NTS programme structure comprises two streams – procurement and establishment. Establishment involves six functional areas – PMO, Business Analysis, Communication and

Branding, Change Management and Stakeholder Engagement, Advisors and SMEs, and Technology. This programme structure currently sits across the TTP functions. The programme structure and roles are set out in Appendix 11.

As the NTS moves from the establishment and implementation programme to business as usual, capability will shift to deliver the functions under the TTP structure, which is set out in the following description of the shared services operation.

7.3.5 Operation of shared services is a critical role

Central to the implementation of the NTS is that Waka Kotahi will take the contractual and service provision lead by acting as the scheme operator. As previously explained in the Commercial Case, Waka Kotahi will establish the shared services operation (TTP) that will be required to facilitate operations for the successful delivery of the NTS.

TTP will operate under the governance structures agreed in the NTS Participation Agreement with PTAs. TTP will have four key functions: (i) technology, (ii) operations, (iii) delivery, and (iv) strategy and future development.

The key functions are expected to adjust over time to allow flexibility depending on the stage of the NTS programme. The structure of the four functional areas is intended to allow each to undertake their specific roles that contribute to the effective implementation and operation of the NTS as a whole. The TTP Manager carries the responsibility for provision of these services, a significant component of which will be providing assurance over the quality of the deliverables and of the performance of the TSP and other contracted entities. Each functional area provides input to allow the TTP Manager to provide a statement of overall assurance.

These responsibilities mean that during the implementation phase TTP will be primarily responsible for holding the suppliers to a delivery programme and consequent contractual performance. As the programme transitions into operations, the contractual management aspects will widen to include monitoring of suppliers' performance. This will involve specific assurance activities such as ensuring compliance with NTS policies and protocols, and holding the suppliers to account against agreed service performance levels.

The TTP Manager will be responsible for:

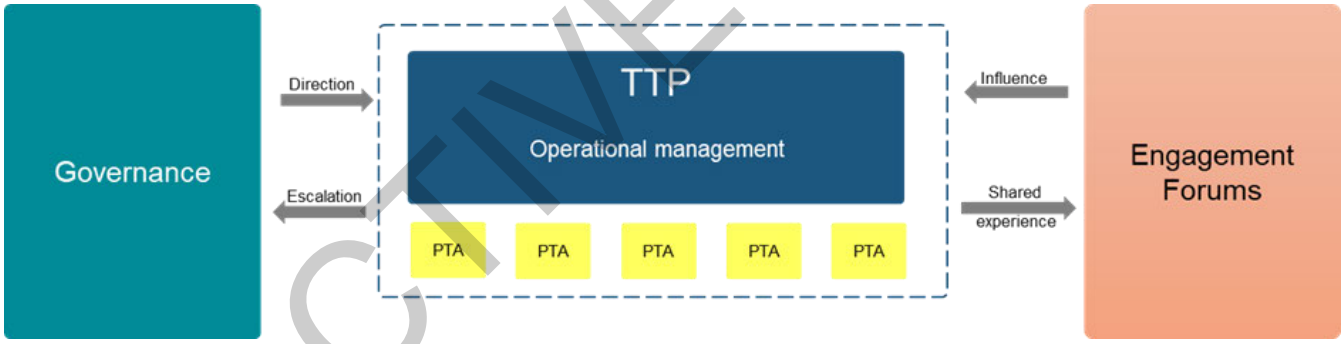
- contract management of NTS suppliers
- management of the TTP NTS service obligations
- providing assurance of the overall NTS to the governance structure
- delivery and change management of the NTS within the context of shared programme responsibilities with suppliers and partners
- stakeholder management and engagement
- assessment of needs, strategic direction and policy/legislative requirements to support the future NTS direction
- creation and management of an annual planning process, linked to the notified requirements from partners.

The role of management is to oversee the running of the NTS services or associated projects, ensuring the needs of stakeholders are met, and outcomes are delivered. The key management principles are that:

- Waka Kotahi will be responsible for managing the day-to-day operation of the NTS through the TTP team, including:
- Day-to-day management flows.
- Service/account management.
- Collaboration framework for involvement of partners, enabling parties to work together using appropriate tools and processes.
- TTP will act as an assurance function of the NTS – they will provide assurance across supplier services but also across the end-to-end delivery of services to the partners.
- TTP will not act as a "gatekeeper" between the Suppliers and PTAs; direct operational contact will be supported where appropriate to ensure efficient service delivery.
- Day-to-day operational management of the NTS will be carried out by TTP.
- The partners will influence and be engaged with the day-to-day activities through involvement in Engagement Forums.

The NTS Governance Board will provide direction and a means of dispute resolution but will not be involved in day-to-day operational management.

Figure 32 TTP management context



The TTP management function will:

- oversee the varied inputs that make up the components of TTP to ensure the smooth operations of the NTS
- manage the governance arrangements and ensure there is clear reporting, escalation of issues, and the annual planning and audit functions are clearly communicated, all of which is underpinned by the P2 Agreement.

Each PTA will have a nominated Relationship Manager within TTP. Relationship Managers will act as contact points and provide assurance across service delivery for the partners.

There will be regular engagement between each Relationship Manager and the PTA, and this will be supported by cross-organisational Engagement Forums.

There will likely be different models of how relationship management will manifest across the different PTAs.

7.4 Transition planning

7.4.1 Overall transition considerations

Implementation of the NTS for each partner involves a transition process from their current ticketing system. Transition will vary depending on a range of considerations such as the range of modes (bus, train, and ferry), fleet sizes, number of stations, wharves, etc., network complexity, integration of fares, geography, contracted operators, and assumptions about how customers will use the NTS, all of which impact the technical options for transition of EMV devices.

Customer assumptions include:

- More than 80% of New Zealanders possess a contactless payment card, popularly known as “payWave” and more than 70% of New Zealanders frequently pay with payWave
- Under 13 year olds are not eligible for a contactless payment card (CPC) by their bank and will be the main users of a Transit Card. Further assumptions are:
- Travel cost will be less as a result of a concession, requiring less frequent top up
- Many parents will top-up online on behalf of their child, often through an auto top-up arrangement
- More than 80% of New Zealanders have a smartphone, allowing for online top up of a Transit Card, as well as using the mobile wallet version of the Transit Card.

All of this results in significantly reduced demand for physical top-up options from that required by current ticketing systems. Nonetheless, the NTS includes a national Retailer Network Manager agreement that offers a choice of more than 3,000 retailers where sales and top-up of Transit Cards can be offered using existing POS terminals. As a result, the lead time and cost to add a retailer is low, removing a hurdle to quickly establish a new retailer where required to best meet customer demand.

Based on these considerations, partners will need to determine their most cost-effective, practical, transition technology option in conjunction with the TSP and TTP.

7.4.2 Technical transition options

A key transition task is to migrate from the current stored value card readers and cards to the new EMV card readers. The current environment has four closed-loop stored value solutions from four suppliers that will each transition across to the NTS. Because card technology and fare calculation methods will change, it will be important to minimise customer impact and ensure a smooth transition. There are potential technology options that could assist with migration from current closed-loop stored-value solutions to the NTS. Each partner’s preferred option will need to consider the TSP’s solution technology and the level of co-operation provided by their legacy supplier.

Five different technology options could be applied for transition from a partner’s legacy devices to the NTS EMV devices. These options are summarised in the following table:

Figure 33 Technical transition options for EMV devices

Option	Description	Main consideration	Respondent advice
Option 1	New device accepts legacy media	Legacy supplier must share IP and keys to emulate legacy during transition phase.	Money is better spent on customers than on short lived high risk technical solution.
Option 2	Legacy device accepts new media (EMV)	Legacy supplier must upgrade and continue support during transition phase	Potential for reuse costly equipment (Gate, TVM)
Option 3	Legacy media converted to token for new device	Accept risk of cloning during transition phase	Only for brief transition period (less than 3 months)
Option 4	Dual readers for old and new media	Sufficient footprint available during transition phase	Option for ECAN as currently no validators.
Option 5	Rapid replacement, phase out old media	Scale and impact on customer journeys	Up to 250 buses per night possible

There is no right option. Each partner has initially selected the option that best supports their situation, as follows:

Figure 34 Partner preferences for technical transition to EMV devices

Option	AT	GW	ECan	RC
1: New device, legacy media	Option	Option	Option	**Preferred**
2: Legacy device, new media	Option	Option	Not Required	Not Required
3: Legacy media tokenized	Option	Option	Not Required	Option
4: Dual readers	Not Required	Not Required	Option	Not Required
5: Rapid replacement	Not Required	Option	**Preferred**	Option

7.4.3 Specific transition elements requiring consideration and planning

Each PTA will need to consider the following elements to their approach:

Transition of card balances

Customers using "payWave" will benefit from the use of a card surrender process in which they hand in their existing travel card and receive the remaining balance as a credit in their nominated bank account. For efficiency it is worth considering whether this could be centrally handled by TTP, although specific arrangements may preclude this such as Snapper being the commercial entity that owns the float rather than GW.

Customers that choose a Transit Card could also use this option. They will then need to acquire a Transit Card, either as a physical card or as a virtual card in their smartphone mobile wallet. There are several options including online orders, retail purchases, and bulk orders for schools and SuperGold cardholders.

Timing and positioning of transit card introduction

As many customers already hold a valid contactless bank card, there is an opportunity for the NTS to introduce the concept of personal contactless card use *before* the introduction of the Transit Card. This is important to reduce the number of people opting for transit cards, which is what they are currently very familiar with.

Unbanked customers will require transit cards. This group includes school age children (under 13) that cannot get a contactless payment card. Consideration should be given to the requirements and options available, e.g. access to a smart phone for use of mobile wallets, costs of solutions and access options. The cost for both customers and the scheme as a whole will be reduced with every customer who chooses a mobile wallet virtual Transit Card, rather than a physical Transit Card.

Overall timing of transition

There are periods where public transport is less actively used such as where public holidays are "Mondayised", creating multiple 3 day weekends that are known for having a low demand for public transport. Other key low use periods include school holidays and the Christmas-New Year holiday period. These create windows of least customer inconvenience to execute the transition, regardless of the option chosen, because it is easier to free up vehicles for the installation preparation and for the final commissioning of the on-board equipment, and to give drivers the opportunity to familiarise themselves with the new solution before they have to support large numbers of customers that have a first experience with the NTS solution.

Phasing of transition

Each transition is expected to be phased as parts of the network are transitioned by mode and/or by subsection of the network. This approach is likely to apply to GW, ECan and AT, and potentially some members of the RC such as Bay of Plenty, Waikato, and Otago.

Preparation for the transition of acceptance devices

Preparation that includes reuse of cabling (if applicable) and pre-installation of wiring and cradles is essential to ensure smooth and efficient installation and commissioning of acceptance devices. For example, preparation for AT's gates and TVMs will focus on upgrades of the legacy readers for accepting of NTS fare media.

Customer messaging and communications

A nationally agreed communication style will be required that ensures the clear and consistent use of terms that are easy to understand and continue to be used for the lifetime of NTS. The Transit Card will require a clear branding that can be clearly distinguished in all customer communication. Key messages include national messaging about, for example, the use of contactless payment cards while transition specific communication will, for example, focus more on the timing of phasing, transit card cost, and fare product changes or promotional fares, if any. Benefits-oriented communications may focus on mobile benefits, capped fares and wider customer channel options, or targeted communications aimed to support specific locations or specific groups within a community such as university students or older people.

Transition fare strategy

For partners that utilise the Rapid Replacement transition approach, there may be a very limited transition period when the devices are changed out for the new devices. For other regions with

larger numbers of vehicles, multiple modes, and integrated fares, a longer transition period will be needed with transitional fares that minimise any negative impact (such as increased fares) on customers. For example, during the transition to the Bee Card, several larger regions (such as Otago and Waikato), offered lower transitional fares to customers which were gradually migrated back to the standard fares.

Customer channels

The customer channel options in the NTS will be much wider than current systems partly because of the different fare media options that come with different customer channel requirements. For example:

- customers that travel with contactless payment cards no longer require a top-up channel and often have sufficient insight in their travel costs from just the end-of-day payments they can find in their bank statements.
- customers that use the virtual Transit Card as part of a mobile wallet will not require anything else than the mobile app to check their account balance and top this up.
- the Retailer Network Manager with over 3,000 potential retailers across New Zealand (that only need their standard POS terminal to support the Transit Card) will offer great opportunities to fill gaps and even offer solutions close to railway stations, where normally Ticket Vending Machines or Ticket Kiosks would be required. This would mean that for Invercargill, for example, there will be a choice of 55 retailers across Southland to assign as Transit Card retailer outlets compared with the current single customer service centre with limited opening hours. In addition, transit card customers will have the choice to use the app, website, or call the customer contact centre.

The NTS will provide an opportunity for partners to no longer offer top-up and card sales on-board buses. Some early learning is available from Waikato when, in June 2020, they introduced the Bee Card as a replacement of the BUSIT card and stopped the option to offer card sales and top up in vehicles.

Impact on the customer contact centre

The Customer Contact Centre will be required to support customers that travel with their bank issued contactless payment card. Payment card data security, i.e. PCI DSS compliance requirements, will need careful consideration. Although an IVR solution will protect the customer contact agent from direct knowledge of sensitive cardholder data and for transactions topping up transit cards, contact centre agents will require initial and frequent repeat training to ensure they are aware of the specific PCI requirements that impact their activities. During transition itself, all Customer Contact Centre staff must have completed this training. The number of agents must cater for the expected ramp up in customer queries in the process towards transition, during transition, and the first period after transition.

Integration with financial, CRM, BI, and other operational systems

Integration with existing systems will require planning including assessment of reporting requirements, and the data required to populate other systems. This will impact financial, CRM, BI, and scheduling tools, and may impact the systems of train, bus, and ferry operators.

Changes to Total Mobility card issuance

Currently Total Mobility cards are either issued through card producer Placard as contracted through Waka Kotahi, except for AT and GW, who issue a HOP card and Snapper card respectively. AT and GW will need to consider their future approach to Total Mobility card issuance.

7.4.4 Infrastructure leverage

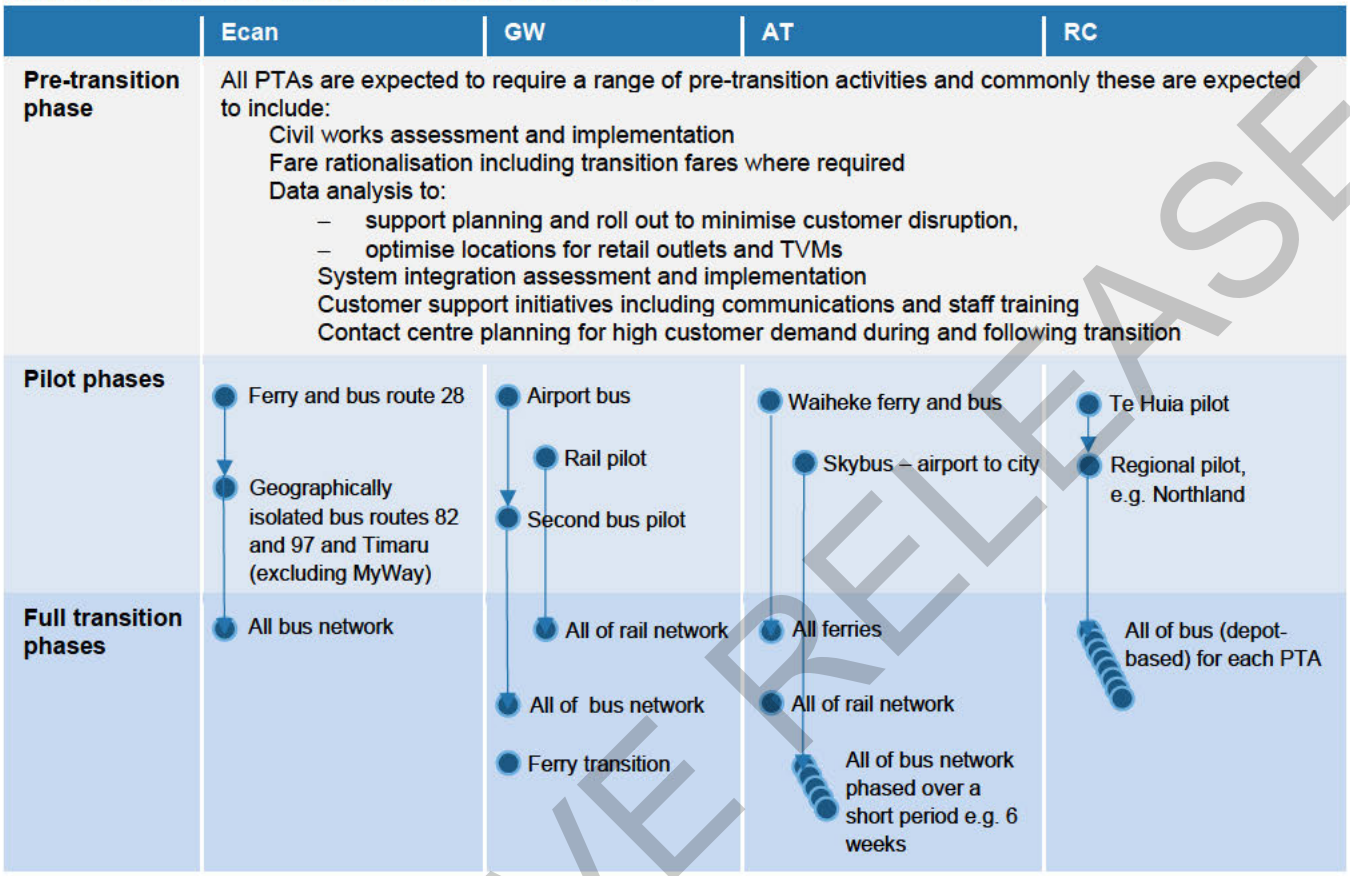
PTAs have significant investment in ticketing assets that in some cases may be re-usable in a new ticketing solution. Depending on age and the technology compatibility, there may be time, cost, and customer benefits from re-use. Examples include gates at platforms and wharves, acceptance devices on board vehicles (including existing wiring) and platforms, ticket vending machines, inspection devices, and retail and Customer Service Centre devices.

For the purposes of the business case, it is assumed that all acceptance devices will be replaced as a detailed assessment of re-use and the cost impact will be undertaken after contract negotiations have been completed.

7.4.5 PTA transition plans

Transition planning documents were prepared to support the procurement process for the ticketing solution and enable respondents to provide prices for implementation of the ticketing solution. The following diagram illustrates how the transition could apply to each partner. Actual transition plans will differ because pre-transition assessment activities such as civil works audits / assessments and data analysis identifying the transition sequence that minimises customer impacts have not yet been undertaken. Further explanation is included in Appendix 12.

Figure 35 Illustrative summary of transition for each PTA



7.5 Resourcing

Implementing a single national ticketing solution is complex and requires experienced and specialised resources. These resources are required to:

- Deliver the functions identified in the TTP functional structure set out in Figure 32
- Transition each PTA
- Operate the NTS in a way that integrates the operation of TTP with the day-to-day ticketing operations of each partner and the role of the TSP.

The current market environment will make resourcing a key challenge for the implementation of the NTS. New Zealand is still in the grip of Covid-19 and has a very tight labour market. Globally, there are other ticketing projects that are competing for experienced and specialist ticketing skills. This may limit the availability of the TSP to resource implementation with the ideal number of specialised and experienced personnel.

Partners must maintain business as usual with their legacy ticketing systems as they prepare for and transition to the NTS which means limited ability to release their skilled and experienced staff and/or backfilling.

Staged implementation and the well-established working relationships between PTAs will be key factors in successfully managing transition. A “One National Team” approach is a practical

way to manage the rollout with limited resources, as it allows the sharing of resources, knowledge, skills, and experience across partners. For example, as the rollout progresses it is expected that the ECan and TSP teams can bring their experience to the Wellington transition and both ECan and GW staff can support the AT and RC transitions. Some staff members from GW, AT or the RC could be seconded to ECan. This one national team approach is already evident in the contract negotiation process, with partners comfortable in allowing the project team to "take the lead" or to be represented by other partners.

Also, this is not the first time partners have implemented ticketing solutions. RC has recent experience with the roll out of RITS (Bee Card) and GW have very recently implemented the Snapper on rail pilot, while AT have been undertaking ongoing development of their HOP system since its introduction in 2012/13.

Overall, ensuring the right skills and experience are available at the right time will be critical to successful delivery which means meeting resource requirements will be a critical risk to the project and a key focus area for governance.

7.6 Programme governance

7.6.1 Background

NTS governance involves accountability and management of the overall programme structure and approach and ensuring integrated programme activities are managed, including effective management of risks and issues, escalation, communications, and stakeholder management.

A recommendation from the Gateway Review[27] is that the current governance arrangement is reviewed to ensure the partners are set for the delivery phase of the NTS. This review will be completed following completion of the Programme Management Plan, Resourcing Plan and P2 Agreement. The review will consider the effectiveness of the governance and management structure to support the eight elements of good governance recommended by the Office of the Auditor General[28].

While acknowledging that full project controls have been in place throughout the NTS procurement process, the Gateway Review further recommended that the NTS Project develop and implement the necessary project controls to effectively management the Project. A new programme for NTS delivery is being established using the same disciplined approach of the procurement process and approved by both the NTS Participation Group and the Waka Kotahi Internal Governance Group.

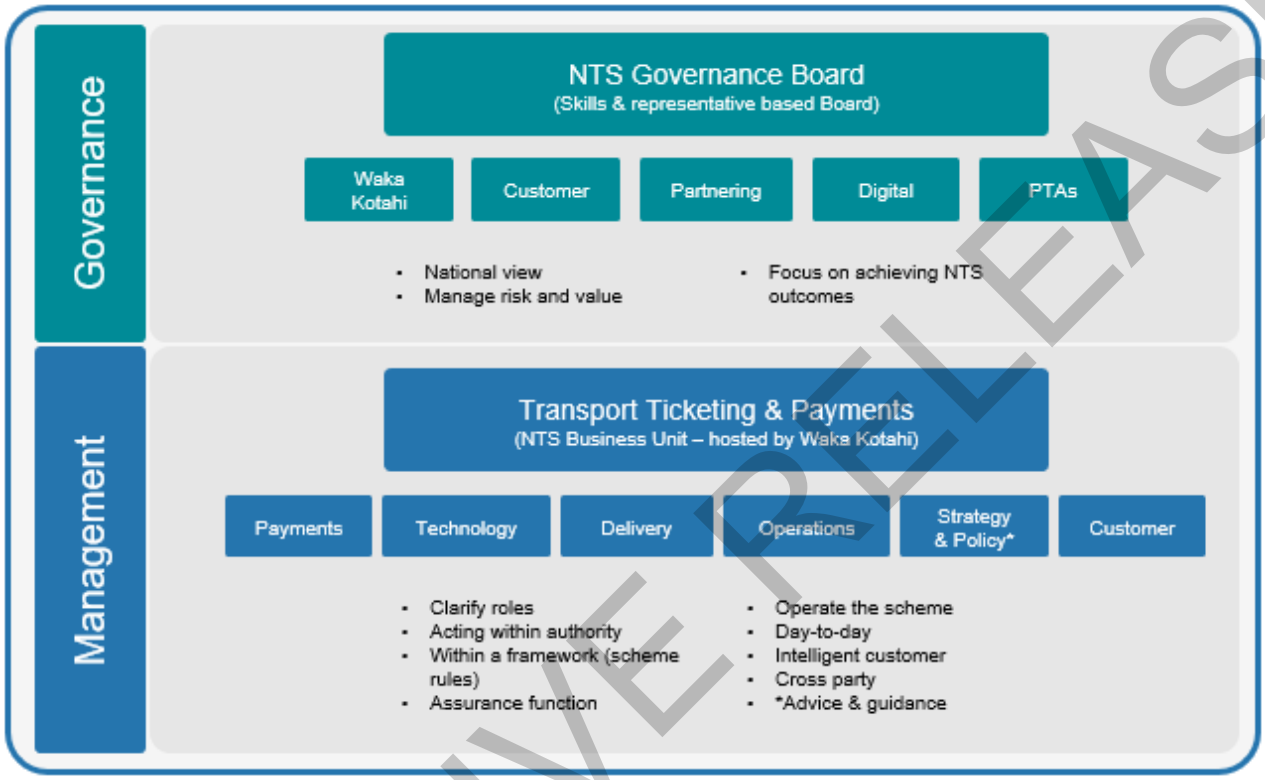
The national partnership approach set out in the P2 Agreement underpinning the NTS requires strong and effective governance to ensure all partners achieve a successful, timely transition that balances local scale and customer needs with national outcomes.

[27] In November 2021, The Treasury facilitated a Gateway Review 0-3 (Strategic Assessment / Investment Decision) of the NTS project.

[28] https://oag.parliament.nz/good-practice/governance/organisation

The transition from Procurement to Design, Build, and Implement will be established under a revised governance and operating model for the partner PTAs, illustrated below.

Figure 36 NTS Governance and management structure



7.6.2 NTS Governance Board

The scope of the NTS Governance Board is clearly articulated through its Terms of Reference (ToR), with a remit to encompass all strategic aspects of the NTS, ensuring the NTS is successfully embedded through to effective operation. The ToR will describe the board composition, purpose, scope of responsibilities, meeting arrangements (including setting the agenda, notification of meetings, quorum, replacement attendees etc) and decision-making, as well as stating what is out of scope (e.g. fare policy).

The P2 agreement sets out the protections for PTA sovereignty matters, i.e. each PTA's autonomy in relation to the NTS. The intention remains for each PTA to retain its autonomy in key areas; however, the New Zealand-wide, multi-party, governance, operating, commercial and contracting framework of the NTS creates new boundaries whereby:

- each partner will have to comply with the limitations in the agreed Operating Model and Communications Protocol
- a PTA may not have direct access to all rights available to Waka Kotahi under the MSA
- partners will still be able to manage disputes, however TTP as the shared services organisation, will be the sole provider, responsible for both the TSP as well as their subcontractors and FSPs.

The P2 agreement includes specific matters for review and consideration by the Board, especially dispute resolution (refer to Clause 22), with the principle being that the Board will be convened as necessary to resolve escalated issues if the disputes process is unable to reach a solution (refer Section 2.3 – Governance of the NTS).

Also, the NTS Governance Board is governing a national ticketing programme and has strategic oversight of the Waka Kotahi business unit, Transport Ticketing & Payments (TTP), and the TTP Management Team will need to be resourced adequately to support the NTS Governance Board.

The NTS Governance Board will comprise 10 members, appointed for three years (minimum). In addition to the two independent competency/skills-based board members and the independent Chair, seven additional NTS Governance Board members would comprise representatives from:

- AT – 2 members
- GWRC
- ECan
- Regional Consortium
- Waka Kotahi – 2 members

The NTS Governance Board must comprise at least two members with digital/technology experience. Consideration should be given as to whether to recruit members with the above skills internationally. The three independent (two plus Chair) NTS Governance Board members would be remunerated. All Waka Kotahi and Partner representatives must be appropriately skilled. The Regional Councils will continue to work together as represented by the Regional Consortium nominating their representative to the NTS Governance Board over time. Waka Kotahi will appoint the independent Chair. As is common practice, diversity of membership on this NTS Governance Board should be encouraged.

7.7 Planning for change, benefits realisation, and risk management

7.7.1 Change management planning

Change management planning will be a key aspect of the transition plan for each region. TTP will provide change management support as part of the project management for each regional implementation. Change management will be one of the outcomes from the development of the operations model.

The transition process will require change management planning by each partner to document the organisational changes required and how preparing for and sustaining the change will be managed. As such, detailed transition plans will include a change management plan that will identify the key areas that will change (and those that will not), and the expected impact of the changes.

Transition planning, change management and stakeholder engagement are specific functions within the ‘Delivery’ arm of TTP.

Partners have experience from the implementation of their current ticketing system; examples include RC's roll out of the RITS Bee Card and GW's recent Snapper on rail pilot.

7.7.2 Benefits management planning

Measuring, monitoring and managing benefits is a key aspect of determining success. At a high level, the benefits management process is part of the monitoring and reporting required in the P2 Agreement between partners with alignment to the NTS Governance Board's focus on achieving NTS outcomes.

The benefits management process will form part of the specific implementation and transition planning ahead of each partner's deployment. This will include the specific measures and targets appropriate for each partner so that the data required can be collected and reported. Operationally, TTP has been structured to include capability to monitor and report performance with specific functions for analysis and reporting, and performance management. This will support each partners own capability to monitor and manage the achievement of benefits and outcomes.

7.7.3 Risk management arrangements

The NTS programme applies the Waka Kotahi risk management framework which follows AS/NZS ISO 31000: 2009 Risk management – principles and guidelines. Waka Kotahi's risk management approach comprises five steps – establish context, risk identification, risk analysis, risk evaluation (likelihood and consequence) and risk response.

The risks with high likelihood and/or significant consequences are set out in Appendix 10.

7.7.4 Assurance and post-project/programme arrangements

The NTS programme includes a Gateway review process facilitated by The Treasury. A Gateway Review 0-3 (Strategic Assessment / Investment Decision was conducted in November 2021. This resulted in an Amber/Red rating which means *successful delivery is in doubt with major risks or issues apparent in several key areas*. This rating was mainly due to the complexity of needing all regions to adopt the NTS in order to realise the full benefits expected in the business. The follow up Gateway Review of the NTS is expected to occur in July 2022.

The DBC review process comprises an external Peer Review in March 2022 and an internal IQA review by Waka Kotahi in May 2022.

TTP have specific responsibility for development and maintenance of a quality plan and assurance plan with regular reporting requirements to the NTS Governance Board. This will include post project reviews. These will be critical following the first implementations to ensure lessons learned result in improvements to each successive transition.

END

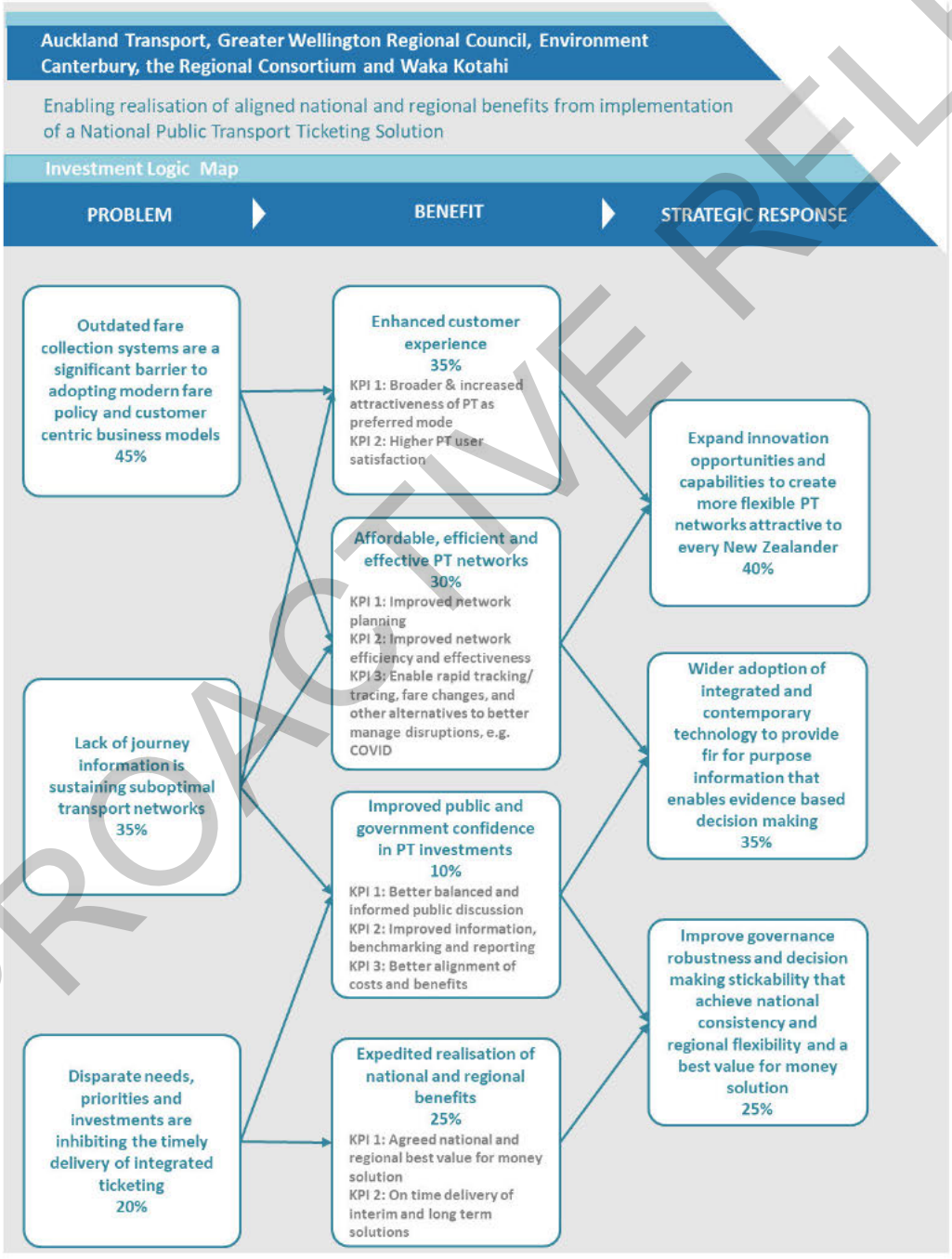
8 Appendices

Appendix 1- Investment Logic

Investment Logic Map

Investment Logic Mapping (ILM) workshops were conducted in July and August 2016 with senior representatives from Waka Kotahi, Greater Wellington Regional Council, Environment Canterbury, Auckland Transport, and the Regional Consortium. The workshops defined three broad problems, the key benefits accruing from resolving these problems and the appropriate strategic responses. These are set out in the following ILM map and discussed further in the following sections.

Figure 37 Investment Logic Map



1. Outdated fare-collection systems are a significant barrier to adopting modern fare policy and customer centric business models

Current fare payment systems are a mix of closed loop transit payment cards and cash (paper tickets). These systems require management of multiple revenue streams, have high operating costs, and do not readily support sophisticated fare structures. Customers are required to store money on their cards, which require regular 'top-up', or pay cash; both lack convenience because of the additional steps and time required to be ready to use public transport.

Technology for ticketing and fare systems has evolved based on smartcards and tokens (e.g. mobile phones) with NFC[29] capability developed originally by the banking sector. Customers experienced with modern banking systems expect ease of use and convenience, are familiar with making payments using mobile banking or their bank-issued cards with NFC (e.g. Visa payWave) and have similar expectations when using public transport.

However, adoption in public transport services has not kept pace. Cities such as Seoul, Washington DC, Boston, and New York are currently in various stages of implementing account-based and/or open loop technologies. Integrated ticketing with an account-based, open loop payment system provides significant customer convenience. For example, Transport for London reported a 40% increase in patronage over the first three years of introduction of their open loop system (alongside their closed loop Oyster card option which had almost no growth). This indicates customer preference for the convenience of using their existing bank-issued cards.

Lack of modern ticketing adds to the difficulty of providing a high-quality user experience to attract people away from private cars, attract use by domestic and international travellers, and to reduce the current reliance on subsidies and cross subsidisation of services.

Modern account-based, open loop systems provide much greater flexibility to more quickly change fare policies to improve network performance and incentivise patronage. For example, the change in fare structures to a full zone-based system in Wellington in mid-2018 took two years and significant effort by Metlink and the public transport operators to implement. An account-based solution would significantly reduce this time.

Currently it is difficult to provide special / one-off fares to support sports and cultural events or to provide compensation or adjusted fares for disruptions– something that is much easier and faster to enable with a modern ticketing system.

2. Lack of journey information is sustaining suboptimal transport networks

In 2016, only Auckland had integrated ticketing while still providing cash fares, and all other PTAs had a mix of smart (stored value) cards, paper tickets and cash on-board. As such, public transport planning was based on coarse assumptions – demographics, estimated coverage,

[29] Near-field communication (NFC) is a set of communication protocols or communication between two electronic devices over a distance of up to 4 cm.

counts at journey start, revenue levels, availability / full service policy, etc. with a large proportion of cash tickets.

The current mix of card systems – HOP, Snapper, Metrocard, Bee Card, and cash fares (using paper tickets) – continues to be suboptimal, because of incomplete information about:

- Where passengers get on and off a service (trip information)
- What services passengers connect with (journey information)
- What type of passengers use a service – school student, tertiary student, on-peak commuter, off-peak commuter, elderly, disabled, etc.
- When these passengers travel.

As the proportion of card use increases (and cash diminishes), the quality of information improves enabling PTAs to better optimise their PT networks. For example, in Wellington, Snapper accounts for 80% of all bus trip payments and over 90% of fare revenue. In contrast, Wellington's rail ticketing is paper based with limited information about the number of people travelling and where people are getting on and off. Christchurch's Metrocard provides discounted fares but is tag-on only, which means there is incomplete information about where users are ending their trip. COVID-19 has resulted in a temporary suspension of cash on-board during lockdowns and this may be a factor in removing cash on board completely.

However, until PTAs have integrated ticketing, they will be unable to fully optimise their public transport services across their regions to best meet the daily, weekly, and monthly needs of customers, or to optimise strategic asset management to better allocate and prioritise expenditure. Operationally, information about day-to-day usage enables the public transport network to be fine-tuned to ensure capacity is available to meet demand and to improve the efficiency of fleet management, which cannot be easily achieved with current ticketing systems.

This further extends to being able to optimise the wider transport network to better manage congestion, improve the road network for efficient freight flows, and to cost-effectively manage road construction and maintenance.

At a national level, insufficient information makes policy decisions more difficult, such as making sound social policy decisions about transport funding support for the low waged, aged, disabled, and students.

3. Disparate needs, priorities and investments are inhibiting the timely delivery of integrated ticketing

A range of factors were identified about the lack of integrated ticketing and why Auckland is the only region to achieve integrated ticketing. These factors included:

i. ***It is hard to deliver efficient, customer-centric public transport.*** In 2016, there were 16 ticketing systems across 12 regions and ILM participants were concerned that:

> investment at both regional and national levels was duplicated,
> operating costs and fare subsidies were higher than necessary and

taxpayers, ratepayers, and users were not receiving sufficient value for money.

Over the past four years the National Ticketing programme introduced an "interim" solution for the Regional Consortium (RITS) and extended the Snapper contract for Wellington resulting in four systems – HOP (Auckland), Snapper (Wellington), Metrocard (Canterbury), and Bee Card (RITS) – that reduces duplication and better aligns investment cycles.

ii. ***PTAs have insufficient scale and investment capability to independently implement and operate a cost-effective integrated ticketing system.*** In a global procurement environment, small PTAs are unlikely to elicit wide supplier interest in modern ticketing systems which limits their choices. Integrated ticketing enables a single ticket to be used for a public transport journey that involves transfers between services and/or modes (bus train and ferry). Integrated ticketing is important because it encourages people to use public transport by simplifying switching between transport modes and by increasing the efficiency of the services. Also, a modern, integrated ticketing solution enables fare policies that provide customer benefits such as a guaranteed lowest fare for a journey and caps on fares.

Providing an efficient public transport network requires frequent ridership information which is most easily achieved through tagging on and off, which means that even with free fares, some form of ticketing or alternative technology would be required to provide information.

iii. ***Each council has differing public transport requirements***. Demographics, geographical areas, modes (bus, train and ferry), policies and systems

iv. ***Councils are at different stages of investment*** with different lifecycles and risks of obsolescence.

v. ***Multiple investors and decision-making complexity are barriers to timely delivery of a best value for money, single integrated ticketing solution for all.*** PTAs have a history of independence and will have difficulty ceding some of their autonomy. Each investing PTA will want a voice in the decision-making process, which could slow decision-making, especially when considering consequences of compromise and trade-offs.

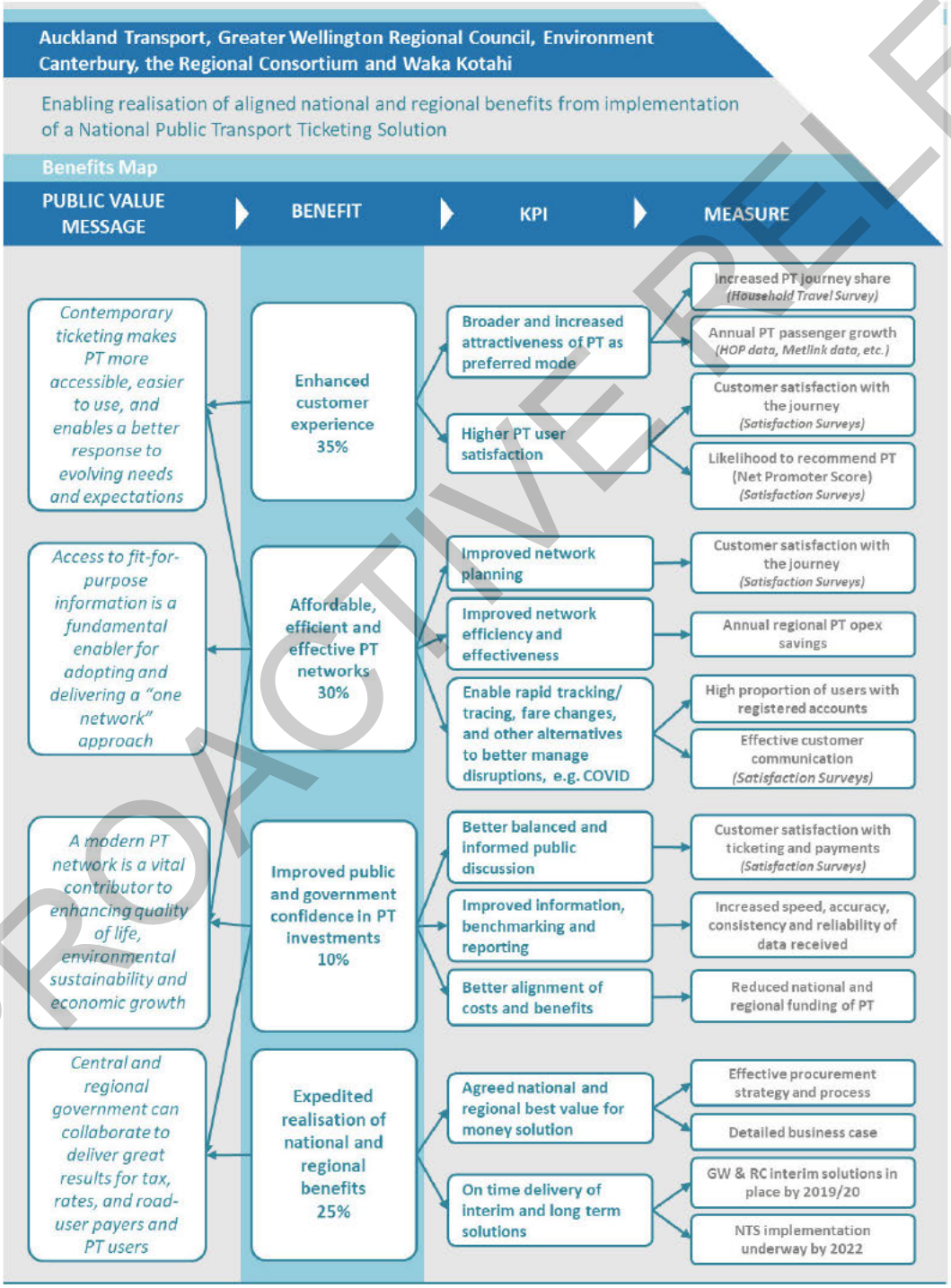
vi. ***Most PTAs lack complete journey information and cannot target customer segments and optimise public transport services.*** The lack of a customer-centric business model means that the focus of investment is on technology with the risk that the investment period will be too long to keep pace with changes in technology. (Refer to Problem 3 below.) Also, under PTOM, PTAs now need to run the ticketing and fare collection systems rather than the operators and will need to develop the capability and experience required. This means ongoing resource commitments for councils.

vii. ***Politicians have a fear of large IT projects because of previous high profile failures and cost overruns.*** Continuing high media attention keeps public transport issues high in the minds of the public which could heighten political fear of a large public transport IT project. Government investment in public transport requires efficient investment and this requires scale. For public transport ticketing, a national system would maximise scale.

The benefits of a national approach

Having defined the problems, the ILM workshop focused on the benefits gained from introducing a national ticketing system and the strategic response to enable the delivery of the national ticketing system. The benefits map is set out below and the following section summarises how these key benefits unfold, and the required strategic responses. When considering benefits, workshop participants envisaged a national solution using the most recent proven technology – an account based payment system with open loop.

Figure 38 Investment Logic Benefits Map



4. Enhanced customer experience

A national ticketing solution would provide all customers with a consistent and reliable ticketing experience throughout New Zealand that is easy to access, and intuitive, efficient and convenient to use. Customers would have a better experience, being able to board more quickly, easily transfer between services, and be able to choose the type of payment option that works best for them, such as a transit card, debit/credit card or an account-based token (smartphone) as technology advances.

More specifically, a modern national ticketing solution would:

Provide universal access to public transport – Customers can take public transport anywhere in New Zealand, be charged and pay in the same way everywhere, and only need to learn one ticketing system and it's the same way to travel by public transport everywhere.

Encourage easy adoption – There is no need to purchase a card or top up before travelling, which encourages public transport use amongst casual users and visitors. Contactless debit cards:

- may provide an alternative to cash for some low income and cash reliant people,
- reduce travel planning time as customers do not need to factor in the ticket purchasing element in travel planning
- enable easy transfer between services
- provide visitors with access to public transport immediately on arrival using their overseas card or mobile payment device.

Ensure the lowest cost option – Each day the best fare is automatically calculated for each customer's journeys. Customers can pay for journeys after they travel, which means they don't need to tie up money on a prepaid travel card. Registered SuperGold customers can apply their SuperGold concession to their own bank-issued card or mobile device which means they no longer need to prepay in case they travel in peak times, and they can visit friends and family in other parts of New Zealand and still get their SuperGold discount.

Increase payment choice – Customers can pay using their contactless debit or credit card or pay using a digital contactless card on their mobile device.

Enable self-service benefits – Customers can manage their transport account anywhere in New Zealand, manage their family's accounts together and control their child's spending, keep track of their own spending on travel in one place, and correct their own journeys if they forget to tag on or off.

Provide better information – Notifications allow customers to control what information they receive including notifications when something goes wrong or when their travel is disrupted, enabling customers to adjust their journey to avoid disruptions and saving time by not waiting for their public transport service.

Achieve better customer service – Reduced interaction with the driver allows the driver to focus on those that need the most help.

5. An affordable, efficient, and effective public transport network that delivers operational efficiencies and strategic information

For PTAs, a nationally coordinated approach to regional ticketing systems will provide operational efficiencies, including:

New features and functions – For a marginal increase in investment, there would be a material change in functionality. Modern account-based ticketing solutions would:

- allow Councils to implement changes to their fares policy easily and cost effectively,
- support easy and cost-effective changes to public transport networks and services,
- easily and cost-effectively be extended to support other transport-related payments, such as park and ride,
- accommodate changes within an agreed framework, thereby requiring minimal need for third party intervention to make changes,
- make it easier and safer to travel to big events, which, in turn, speeds up foot traffic and reduces pedestrian congestion at key entry or exit points.

Enhanced data – A modern single, national ticketing and payments solution would provide a richness of information based on data that is complete, accurate and consistent across New Zealand. This would:

- improve reporting including the ability to benchmark performance,
- improve the network design, timetables, and fare structures within the limitations of existing infrastructure and fleet composition,
- provide a sound basis for changes and additions to infrastructure and fleet to best meet customer demand,
- improve network and fleet management,
- help inform strategic and operational decision-making including:
  - integration with authority PT systems
  - improved planning of public transport services and investment
  - designing networks and services that are more efficient
  - delivering an improved customer experience
- allow for easier implementation, monitoring and review of national policies such as SuperGold Card services and enable the introduction of the proposed Community Connect card.

Revenue collection – Modern ticketing systems enable the fare collection process to be streamlined, especially if cash on board was discontinued. This should:

- lower the total cost of fare collection for PTAs,
- support regional fares policy and easily accommodate changes,
- support easier inter-regional travel for customers and support revenue apportionment between PTAs.

Revenue protection – Modern account-based solutions with NFC card readers enable hand held devices to check that customers have tagged on. This reduces fare evasion, especially on rail, and avoids the high cost of gating some or all stations. Establish or enhance the PT revenue protection regime

Managing service delays and disruptions – with modern account-based solutions, the operator can choose to not to charge customers for delays in services, and manage disasters and other events more effectively to prevent customers being overcharged.

Supporting contactless ticketing to pay on public transport helps support revenue collection on services should there be a resurgence of COVID-19.

Procurement efficiency and contracting – One centralised procurement and contract management process for the whole of New Zealand should reduce the overall price compared with multiple regional procurements because it should:

- create economies of scale,
- provide increased negotiating power for New Zealand
- support net and gross contracting models,
- extend to multi-modes and multiple operators, as well as supporting additional or replacement operators
- reduce the overall cost of ongoing contract management compared with several regional solutions.

Marketing and brand – A single, national solution enables New Zealand-wide collateral and branding which should reduce costs.

Resourcing efficiency – A modern, single, national solution would enable easier management of the ticketing system without being resource intensive, and enable resources to be shared and/or redeployed in different ways.

6. Efficient, least cost, regional and national investment

Investment in a modern, single, national ticketing solution would achieve value-for-money for ratepayers, taxpayers and users by:

- providing increased convenience, access and a guaranteed lowest fare price for customers,
- providing more accurate and richer information to enable improvements to public transport operations,
- minimising duplication, enabling PTAs to share services and meet statutory, regulatory and industry compliance requirements, and supporting regional and national policy initiatives,
- easily and cost effectively accommodating changes such as supporting other transport-related payments.

Such investment would establish the base for future development and innovation because it would enable transport accounts not just for ticketing but for all transport payments such as:

- future payment integration with third party transport providers e.g. taxis, e-scooters, etc.
- park and ride, i.e. supporting mode shift through combined parking and public transport journey fares,

- congestion charges for drivers who enter congested areas at peak times.

7. Improved government and public confidence in PT investments

A convenient, easy to use and reliable ticketing solution would reduce barriers to accessing public transport because customers would have a convenient, easy to use and reliable means of accessing public transport without the need for a transit card, topping up or having cash. Reducing barriers to access should result in improved customer satisfaction and better balanced and informed public discussion about achieving mode shift.

Enabling mode shift plans (LGWM, ATAP) and achieving mode shift targets would see:

- increased patronage on public transport and reduced private vehicle journeys,
- a contribution towards climate change targets through decarbonisation of the transport network, improved air quality and overall health benefits, and improved road safety (with less cars on the road),

Ticketing systems provide levers to implement new central or local government policies. An accounts-based payment system would enable new national concessions such as the proposed Community Connect card, and support existing national concessions such as SuperGold.

Strategic responses

The ILM workshop participants identified three key strategic responses.

8. Improve governance robustness and decision-making stickability that achieve national consistency and regional flexibility and a best value-for-money solution

Councils (as PTAs) will need to collectively sign up and deliver to a single roadmap that delivers on everyone's needs. To achieve this they need a governance process "with teeth" to get decision-making and approval at each individual council. This will mean all councils working together to agree and mobilise the roadmap, set up the programme and governance structure and align investment cycles.

9. Wider adoption of integrated and contemporary technology to provide fit-for-purpose information that enables evidence-based decision-making

Consistency of information for knowledge creation decision-making will require data definition and ongoing resource capability for collection, access and analysis – "real-time" and granular at the regional level and periodically aggregated at the national level.

10. Expand innovation opportunities and capabilities to create more flexible public transport networks attractive to every New Zealander and international travellers

A modern ticketing system will enable adoption of customer-centric business models and fare policy and increase the attractiveness of public transport.

Appendix 2 - Alignment with RLTPs

The national and regional policy hierarchy seeks to align Regional Land Transport Plans and Regional Public Transport Plans with the National Policy Statement on Land Transport.

Although regions are at differing levels of need and maturity with their public transport services, all have significant areas of commonality of objectives and KPIs for increasing patronage and farebox recovery, customer satisfaction and service reliability.

All PTAs include increased patronage in their KPIs. An NTS would provide greater customer convenience, ease of use, and access to public transport, leading to increased patronage which, for example, should contribute to Wellington's key headline measure of a 40% mode shift from private vehicles to public transport and active modes by 2030.

Farebox recovery ratio and cost per customer are key considerations for all PTAs. An NTS that reduces barriers to accessing public transport is expected to increase patronage and therefore farebox revenue.

Service reliability and punctuality (and knowing the likely journey time) are important considerations for customers using public transport.

Accessing buses, trains and ferries using a bank-issued debit/credit card or virtual card on a mobile device:

- speeds up boarding – no checking to find cash or topping up a prepaid transit card
- removes customers' anxiety about not having cash or sufficient prepaid balance on a transit card
- provides payment choices for customers, and makes use of public transport easier and more convenient
- guarantees customers are charged the lowest daily charge for their journeys.

Customer satisfaction is a key measure that PTAs monitor regularly. Providing payment choices for customers and reducing payment anxiety, increasing convenience by not having additional cards, not needing to top-up or carry cash and being able to manage their travel account on-line contributes to a better experience using public transport and improved customer satisfaction.

The key outcomes and priorities for the regions are summarised below.

RPTP objectives	Key measures
Auckland 1. *Expanding and enhancing rapid and frequent networks* 2. *Improving customer access to public transport* 3. *Improving Māori responsiveness.* 4. *Harnessing emerging technologies*, which includes: • Providing simpler and improved payment options for fares to make travel easier. • Using new transport modes generated by new digital technology to supplement and complement existing services, increasing access. • Ensuring we future proof for mobility-as-a-service models, which will change how people make travel choices.	**KPIs:** • Boardings per annum across all public transport modes (bus, train and ferry) • Proximity of the population to public transport services • AT HOP card and AT app use • Farebox recovery ratio and cost per customer • Service reliability and punctuality • Customer satisfaction • Increased public transport patronage.
Wellington 1. *Mode Shift* – Contribute to the regional target of a 40% increase in regional mode share from public transport and active modes by 2030, including delivery and implementation of Let's Get Wellington Moving and Wellington Regional Rail's Strategic Direction 2. *Decarbonise the Public Transport Vehicle Fleet* – Reduce public transport emissions by accelerating decarbonisation of the vehicle fleet 3. *Improve Customer Experience* – Continue to improve customer experience across all aspects of the network *4. Prioritise the safety and maintenance of the public transport network to encourage safe behaviours.*	**KPIs:** • 40% increase in mode shift to public transport by 2030 • 60% reduction in public transport emissions by 2030 • 35% reduction in transport generated carbon emissions for the Wellington region by 2027 • 40% reduction in Greater Wellington generated emissions by 2025, and carbon neutral by 2030 • Maintain a customer satisfaction rating of greater than 92% for the overall trip • 40% reduction in serious injuries on the public transport network by 2030

RPTP objectives	Key measures
Canterbury 1. The public transport system connects people to where they want to go and provides a timely, attractive and convenient alternative to private car travel. 2. The public transport system provides a high quality experience that retains existing customers, attracts new customers and achieves a high level of customer satisfaction. 3. Public transport funding is sustainable and supports system objectives while providing value to the community. 4. Public transport services that meet customer needs, benefit the wider community, and minimise environmental impacts are procured at a price that provides excellent value for money for customers and ratepayers.	**KPIs:** • Proportion of Greater Christchurch urban households that can access one or more key activity centre by public transport within 30 minutes. • Proportion of all peak-time trips to the central city made by public transport. • Number of car trips replaced by public transport trips per year. • Number of communities who receive financial support from Environment Canterbury to establish Community Vehicle Trusts. • Number of passenger trips per year in Greater Christchurch and Timaru. • Customer rating of service quality. • Proportion of Total Mobility customers satisfied with the system. • A safe public transport system. • Passenger rating of value for money. • Greenhouse gas emissions per passenger trip. • Overall ratepayer rating. • Proportion of public transport fleet that is zero emission.
Regional Consortium members **Northland** 1. An effective and efficient bus network in main centres 2. People have access to shared transport options 3. Reliable travel times and transport choice for communities servicing employment areas, retail and public services	**KPIs:** • Patronage growth • Mode share • Fare box revenue by time period • Service reliability and punctuality • Customer satisfaction for public transport users. • Disability access - proportion of services with disability access.
Waikato 1. Move towards a mass transit oriented network over time 2. Connect our region in partnership with others to better coordinate funding and service provision	**KPIs:** • Increased patronage per head of population • Increased provision of transport infrastructure • public transport services in planned growth areas

RPTP objectives	Key measures
3. Develop an accessible public transport system that improves end-to-end journey experiences to encourage travel behaviour change	• Increased public transport, walking and cycling travel to work mode share in Hamilton • Improved perception ratings across the region for public transport • Improved public transport journey time on key routes • Increased access to employment and education in rural communities • Increased provision of transport infrastructure and public transport services in rural communities • Increased public transport, walking and cycling travel to work mode share in rural communities • Increased access to community services • Increased level of investment targeting inclusive infrastructure in Hamilton and rural towns
Bay of Plenty Reliable and integrated public transport services that go where people want to go. Pursue improved accessibility for isolated communities and for mobility impaired persons where this can be delivered at reasonable cost. Fares, ticketing and information systems that attract and retain customers while covering a reasonable proportion of operating costs. A procurement system that enables efficient and effective delivery of public transport services High quality and accessible public transport infrastructure that supports safe and comfortable travel Reduce carbon intensity of transport to assist in meeting greenhouse gas targets	**KPIs:** • Customer Satisfaction • Fare Box Recovery • Patronage • Perception of Safety and Security - increase perceptions of safety and security above 2017 levels • Kilometres completed with electric buses
Hawkes Bay 1. To improve end-to-end journey experiences on the public transport system, including mode transfer 2. Partner with organisations and employers to increase public transport commuting and change perceptions of public transport. 3. Investigate innovative ways to provide better transport options in small towns and suburban areas, and to extend hours of operation.	**KPIs:** • Patronage • Farebox revenue • Service reliability and punctuality • Customer satisfaction • Complaints – number received and quality of resolution

RPTP objectives	Key measures
Taranaki 1. A core network of accessible, integrated and reliable public transport services that support Taranaki's communities. 2. Responsive services that connect people with where they want to go. 3. A convenient and reliable public transport system using modern vehicles 4. Effective and efficient allocation of public transport funding 5. A fares and ticketing system that attracts and retains customers 6. Follow all legislative requirements and Waka Kotahi guidelines to establish units that will be contracted to Council 7. A procurement system that supports the efficient delivery of public transport services 8. A system of monitoring and review that supports continuous improvement 9. Improved access for communities and groups whose needs are not met by the public transport system 10. Improved access for communities and groups who rely on public transport as their main means of transport 11. Advocate for a high standard of public transport infrastructure that supports service provision and enhances the customer experience 12. Simple, visible, and intuitive customer information and service	**KPIs:** • Total public transport boardings • Passenger km travelled Proportion of residents within 500 metres walk of a stop on the rapid and frequent service network • Patronage growth on all bus services • Service improvements delivered to schedule within agreed budgets • Customer satisfaction ratings for public transport services • Customer rating of public transport value for money • Reliability: late running and cancelled services • Punctuality: proportion of services "on time" (i.e. percentage of scheduled trips between 59 seconds before and 4 minutes and 59 seconds after the scheduled departure time at the selected points) • Proportion of services with disability access • Operating subsidy per passenger km • Farebox Recovery Ratio
Horizons 1. A reliable, integrated, accessible and sustainable public transport system 2. An effective procurement system that delivers the desired public transport services 3. A safe and accessible network of supporting infrastructure 4. Increasing patronage	**KPIs:** • Patronage • Customer surveys • Access improvement for residents in small centres and satellite towns • Bus operation service levels • Fare and ticketing system will be easy for public transport customers and operators to understand and use, affordable and competitive with private vehicle use.
Nelson Tasman Provide a regional integrated public transport network that:	**KPIs:** • Patronage • Farebox recovery

RPTP objectives	Key measures
1. Provides attractive, economic and viable transport choices for all sectors of the community 2. Reduces the reliance on private cars 3. Is sustainable and reduces carbon emissions.	• Public feedback and consultation • Comparison/benchmarking with other regions including assessment across the following attributes – coverage – whether the network links people to the places that they want to get to – convenience – whether services enable people to travel when they want to, swiftly and reliably. A key element in this is frequency, supported by bus priority – facilities – whether the supporting infrastructure and vehicles are comfortable and attractive – fares – whether the fare is intuitive and affordable – information – whether it is easy for new users to find, understand and use services – delivery framework – whether the institutional framework is appropriate.
Marlborough 1. Continue to provide a quality bus service in Blenheim that includes continual improvements and provision of convenient bus stops. 2. Continue to support the Total Mobility Scheme in the Marlborough District, and allow new operators to join the Total Mobility Scheme 3. Continue to support the SuperGold initiative including provision of convenient bus stop locations.	**KPIs:** • Patronage • 90% of passengers walking less than 500 metres to a bus stop • Extent of improvements to the bus network achieved • Extent of alternative funding

RPTP objectives	Key measures
Otago Southland 1. Contribute to carbon emission reduction and improved air quality through increased public transport mode share and sustainable fleet options. 2. Deliver an integrated Otago public transport network of infrastructure, services and land use that increases choice, improves network connectivity and contributes to social and economic prosperity. 3. Develop a public transport system that is adaptable. 4. Establish a public transport system that is safe, accessible, provides a high-quality experience that retains existing customers, attracts new customers and achieves high levels of satisfaction. 5. Deliver fares that are affordable for both users and communities.	**KPIs:** • Patronage - annual public transport boarding in Queenstown and Dunedin per capita • Overall passenger satisfaction with Wakatipu Public Transport system at annual survey exceeds 97% • Percentage of Dunedin bus-users who are satisfied with the trip overall exceeds 91% • Percentage of scheduled services delivered (reliability exceeds 95%) • Percentage of scheduled services on time (punctuality - to five minutes exceeds 95%) • Percentage of users who are satisfied with the provision of timetable and services information (baseline to be established) • Percentage of users who are satisfied with the overall service of the Total Mobility Scheme (baseline to be established)

Appendix 3 - Relevant international examples

The NTS procurement project (Project NEXT) team has kept a watch on developments and trends in other jurisdictions to provide information that could support decision making. This was supplemented by commissioning a report on trends and developments in ticketing – *Global Transit Ticketing and Fare Collection Report 2018.*

Globally a large number of projects have been established to run a procurement process in a similar way to Project NEXT, have selected a supplier and are in the process of implementing, or have gone live with a solution, and are offering their customers options that Project NEXT is also in the process of procuring. Five examples of projects with elements that are required for the NTS for New Zealand are described below.

Australia - South East Queensland

South East Queensland has had a closed loop card centric ticketing solution in Brisbane – the Go Card scheme – since 2008 which covered all public transport modes in Brisbane. From November 2012 customers have been able to use their Go Card for unlocking hire bikes. From 2020, open loop capability has been available on the Gold Coast light Rail, and a new Cubic account-based ticketing solution that accepts EMV Open Loop contactless bank cards is currently being introduced.

TransLink account-based ticketing and open loop
The Open Loop implementation uses tag-on and tag-off, as for the Go Card, and customers could continue to use their Go Card to smooth transition. Instead of functioning with stored value, the Go Card is used as a token for the account-based ticketing solution. New customers can also procure the Go Card as an account-based ticketing token in case they choose not to use their bank-issued card. This offers similar functionality as the Transit Card for the NTS.

Relevance for New Zealand
The following aspects are recognised as relevant for the NTS:

- EMV Open Loop and account-based ticketing introduction in 2020
- Support for mobile wallet (iPhone, Android)
- Multi-tenanted, with the addition of new regions across Queensland
- Large geographic area comparable to New Zealand
    - Distance Cairns to Gold Coast Airport is 1785km
    - Distance Whangarei to Invercargill is 1795km
- Similar spread in patronage with large patronage in one region (Brisbane), smaller patronage in other regions and rural services with varying mobile coverage.
    - Population of Queensland is 5.1 million of which 2.3 million in Brisbane
    - Population of New Zealand is 4.8 million of which 1.7 million in Auckland

Source information
https://www.itnews.com.au/news/qld-hands-go-card-upgrade-deal-to-cubic-494854

https://www.publications.qld.gov.au/dataset/translink-division-quarterly-reports/resource/a7fbca20-3083-4e1f-b677-11ab647c3c80

United Kingdom – Transport for London

Transport for London was one of the first European closed loop card centric ticketing implementations with the Oyster Card. This card was initially introduced in June 2003 and started with concessions for elderly people, then as Pay As You Go based on stored value on the card for all TfL services and transport modes. By June 2012 over 43 million Oyster cards were issued. However, this method and operation of fare collection was expensive, costing 14% of the total collected fares.

TfL Account-Based Ticketing and Open Loop

TfL was one of the first to recognise the opportunities of accepting open loop and started investigating this in 2008. Their motivation was mainly built around the following considerations:

- 60% of tourists coming to London did not have an Oyster card on them. While it's a massive benefit for these customers that they can use what's in their pocket, it also saves TfL from the logistics of issuing Oyster Cards for this group of travellers.
- TfL owns the top up retailer infrastructure and recognised the opportunity to reduce this cost substantially by reducing the need for top up.
- The Department for Transport offered to bear the cost for upgrading 34,000 existing Oyster readers if they would also implement the UK ticketing standard ITSO. This resulted in the first generation of the TriReader, so called as it supports 3 technologies:
  - Oyster Card (both on MIFARE Classic and MIFARE DESFire
  - ITSO Card as per the national standard (never actually implemented in London)
  - EMV Contactless (Open Loop) for American Express, MasterCard and Visa

As well as tourists, local users recognised the benefits of EMV Open Loop and 2/3 of users converted to contactless as their preferred method of payment after just one trial use, and another 16 percent did so within a month. This achieved a cost reduction with the cost of fare collection coming down to 9% (from an initial 14%) and TfL has a goal to end at a cost level of just 6%.

While TfL is both the single authority and operator in London, they more recently had to add several other authorities. As of 2016 TfL has added payment for river services (Thames Rivers Services and Circular Cruise), each with their own fare regimes.

TfL have now introduced Pay As You Go for train operators arriving in London. As a result, eleven train operating companies (TOC) with their own fare regimes are now included in the TfL scheme. Most recently Pay As You Go was extended to Potters Bar, Radlett and Brookman's Park National Rail stations in support of the Department for Transport's policy to extend smart ticketing around London.

Relevance for New Zealand

The following aspects are recognised as relevant for the NTS:

- EMV open loop ticketing (PAYG since 2014)
- Support for mobile wallet (iPhone, Android)
- Multi-tenanted

- Best fare promise
- Auto correct for missing tag-on/off
- Transit Payment Guidelines [30]developed with the payment industry.

Source information
https://www.mastercard.us/content/dam/mccom/en-us/documents/transport-for-london-case-study-april-2017.pdf

http://content.tfl.gov.uk/board-160203-item05-commissioners-report-v2.pdf

https://www.masstransitmag.com/technology/article/12277031/project-update-the-next-generation-of-fare-collection

United States – Portland Oregon

In 2017 Trimet in Oregon introduced an Account Based Ticketing Solution called Hop Fastpass. Customers with their Hop Fastpass can pay in multiple transit systems in the wider region, like TriMet and C-TRAN buses, Portland Streetcar, MAX Light Rail, WES Commuter Rail and C-TRAN the Vine rapid transit. The Hop Fastpass can be purchased as a card or can be downloaded as a virtual card in Apple Pay wallet, Google Pay wallet and Samsung Pay wallet. Next to the Hop Fastpass, customers can use their existing contactless payment card (including mobile wallet versions).

At the time of going live for Trimet, on average only 0.3% of the issued bank cards were capable of contactless EMV and therefore this fare media was not seen as potentially becoming dominant. Therefore only full adult fares are offered on EMV contactless. Customers that wish to benefit from capping and/or have concessions need to be registered and use the Hop Fastpass.

Tariffing in Trimet is based on “tag-on-only”; in other word, they apply a flat fare mechanism that does not require tag-on and tag-off. This requires more interaction with the driver or a selection mechanism that the traveller themselves needs to apply.

When Trimet ran the procurement, a lot of effort in the tender document focussed on Open API’s for the functionalities between the back office, the front end devices and the web portals. One of the aspects that Trimet worked on after the delivery of the ticketing solution was integration with other transport providers, Mobility as a Service (MaaS). The Open API’s were considered an important advantage, as well as the Account Based Ticketing approach. Trimet found that while the technical base was solid, the challenges were more around finding commercial and contractual agreements.

Relevance for New Zealand
The following aspects are recognised as relevant for the NTS:

- Virtual Transit Card
- EMV open loop and account-based ticketing

[30] UK Cards Association led the initiative for the payment guidelines. Another example is Australia, where AusPayNet (previously APCA) has taken the lead for developing such, initially for Sydney ferry.

- Open APIs
- MaaS integration
- Back office fare calculation and concession registration.

Source information

https://www.govtech.com/fs/How-Contactless-Ticking-Is-Increasing-Convenience-for-Transit-Travelers.html

https://www.initse.com/ende/projects/projects-north-america/portland-showcase.html

The Netherlands – OV-Chipkaart

Trans Link Systems (TLS) in The Netherlands was the first ticketing implementation that applied a national scale. In 2008 all Dutch Public Transport Authorities accepted the OV-chipkaart. Some 60,000 devices are now accepting the roughly 18 million issued OV-chipkaart for travel based on tag-on and tag-off.

A single back office is used for the clearing, settlement and revenue attribution, as well as for customer support through web services and contact centre agents.

Although there are more than 75 different designs for the OV-chipkaart (including designs for each region), they all share a common OV-chipkaart branding, so customers understand the national function.

In 2012 Account Based Ticketing was added, initially focussing on business users. Now it is available for all registered customers, allowing for post-paid travel, rather than pre-paid travel. This was all done by upgrading the back office and did not require a change to front end devices. Another update of the back office was completed in 2018 in preparation for EMV acceptance, including linking to an acquiring bank. By upgrading devices on a number of railway stations to accept EMV, a limited pilot was run in the first half of 2019 with 1,000 customers. This proved to be very successful and received strong support from the users.

As a result, central government has set a target for full EMV contactless implementation by end of 2023, involving all devices to be upgraded to EMV.

Relevance for New Zealand

- National scale
- Multimodal integrated travel
- Multi tenanted back office
- National and regional concessions and travel products
- EMV open loop and account-based ticketing (EMV piloted)

Source information

https://www.scheidt-bachmann.de/en/article/news/scheidt-bachmann-introduces-account-based-ticketing-to-the-dutch-fare-collection-system/

https://www.thalesgroup.com/en/events/uitp/news/netherland-ticketing

https://www.iamexpat.nl/expat-info/dutch-expat-news/end-ov-chipkaart-sight

Chile – Valparaiso

The city of Valparaiso started a pilot for account-based ticketing with EMV contactless cards for the Metro and buses in April 2018. This was a limited pilot with only 50 access points that have been upgraded to accept contactless EMV cards next to the existing closed loop cards. The next step in the pilot is focusing on student concession holders. While still in its early days, this is demonstrating that EMV technology has become more mainstream and more affordable. The pilot included tag-on / tag-off based travel and fare calculation.

Relevance for New Zealand

- Low cost readers
- Open loop account-based ticketing
- Replacement of concession cards

Source information

https://newsroom.mastercard.com/latin-america/es/press-releases/metro-valparaiso-implementa-innovador-sistema-de-pago-con-tarjeta-de-credito-sin-contacto/

http://www.mikroelektronika.com/en/card-validator-vega-cvb?from=0#fotky

https://www.sonda.com/en/news/metro-valparaiso-has-widely-implemented-the-nsc-as-means-of-payment-across-its-entire-transport-network-using-sonda-technology/

Appendix 4 - Obtaining customer insights

The following research has been undertaken over the last five years to develop an understanding of customer requirements and insights:

National Ticketing Programme February 2017 – Decision Paper D9 – Customer Experience Requirements

Paper evaluating the features most travellers expect in integrated fares and ticketing today and into the future and considers optional features that will encourage adoption by the minority of public transport travellers who currently prefer cash.

Colmar Brunton September 2017 – Understanding Public Transport Cash Payers

GW commissioned Colmar Brunton to understand the impact of removing cash payment for public transport fares and move to a cashless system. This multi-stage research was undertaken, incorporating quantitative and qualitative phases. Their report identifies findings and explores the underlying motivations behind cash preference for some public transport users and provides insights into a behaviour change strategy.

WAKA KOTAHI February and May 2019 - Accessibility Workshops

WAKA KOTAHI with the Project NEXT Team facilitated engagement workshops with accessibility representatives in Auckland and Wellington to surface the needs from people with disabilities, impairments and access concerns to ensure removal of barriers to public transport.

PwC April 2019 – Project NEXT Customer Experience Research

Project NEXT commissioned PwC to undertake customer experience research through undertaking qualitative research with a small sample in Auckland and Wellington focussed on selected areas of the ACCOUNT-BASED TICKETING Open Loop customer experience. Areas included customer transition experience, payment options, denial of travel, managing a transit card, concessions, group travel and consistent experience across NZ. PwC also had access to previous AT customer insights research undertaken by Futurescope – Enhancing HOP for current and prospective users, 2016.

PwC May 2019 – Project NEXT Ticketing Solution RFP Input: Customer Experience Input Report

PwC report summarising the findings of the customer experience research identifying key customer experience requirements to deliver against future anticipated benefits, providing guidance and direction on ideal customer experience. This also draws upon a number of PwC chosen referenced customer experience research sources.

GravitasOPG – National Ticketing Research

Between 19 February 2021 and 21 March 2021, GravitasOPG undertook a survey. of 2420 respondents who use public transport at least monthly (pre-COVID). This comprised an online survey with participants of previous public transport research for Waka Kotahi, Greater Wellington Regional Council, Auckland Transport and Dynata panel members, and by phone for

hard to reach groups and those underrepresented on panels including the unbanked, youth, Māori and those with limited access to the internet.

The purpose of the study was to understand:

- How current PT users pay for PT, top-up, use contactless payments day-to-day, feel about cash use, and feel about the current PT payment system
- Going forward, how users feel about the new system, prefer to pay for PT, can be encouraged to use the system, will use the system in other regions, and will use the system for children.

These customer insights have been used to help identify and develop the business requirements for a solution that will meet customer experience needs

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Appendix 5 - Alternative ticketing solutions

Alternative options

A ticketing solution is an essential part of providing public transport as it provides two key functions – a payment system that enables users to purchase tickets to travel on public transport, and an information system that identifies where and how many people got on and off at specific stops and stations and the types of travellers such as those paying full fare and those eligible for concessions.

Options range from no ticketing system and free travel by all users through to a single national system, as illustrated below.

Figure 39 The continuum of ticketing options from free public transport/no ticketing to the NTS

Each option is discussed in the following sections. For an option to be shortlisted for detailed analysis, it must meet three key criteria:

i. Financial expectations – not result in substantial extra initial or ongoing costs, or cost more than another similar option
ii. Customer expectations – deliver on changing customer service levels and current and future expectations
iii. PTA expectations – option that PTAs would consider as a viable alternative.

What if public transport was free?

Free use has had mixed results with most systems trialling free use (for all) reverting to paid fares. Free use is about fare policy rather than ticketing and most advocates for free use are focused on reducing cost barriers for those with low incomes and students rather than free use for all. The key advantage of free use is increased patronage and better accessibility for those on low incomes. However, this can be achieved through other, more targeted, policy initiatives such as the Community Connect card being trialled in Auckland. The key disadvantages are that farebox revenue must be made up from rates or other revenue sources which is often not

practical and, for some, not considered equitable. In those countries and cities that have introduced free public transport, there has been little reduction in private vehicle use. For example, Tallinn, Estonia introduced free fares in 2013. The result has been an increase in patronage of 14% but only a 3% reduction in private vehicle use. Hasselt, Belgium introduced free fares in 1996 but ceased in 2014 when it became unaffordable.

Provision of efficient, cost effective, high quality public transport requires the use of tickets to tag on and off to provide the information to continually monitor performance and manage day-to-day operations. Free use disincentivises use of tickets. This results in loss of information making it more difficult to improve network operations to best meet demand. In other jurisdictions there has been little further development of public transport services after the introduction of free fares. Rather, it is improving service quality that has the greatest effect in growing patronage and achieving mode shift.

Free use is the most expensive of the options as it would cost in the order of $385 million per annum across New Zealand. As such, it does not meet financial expectations and has not been shortlisted.

Retain existing solutions for the next 10 years – Do Nothing option

Under this option, each PTA would extend use of their existing closed loop platforms for the foreseeable future, refresh equipment only when essential and “sweat the asset”. Ongoing investment would be limited to essential changes required to meet fare policy and legislative requirements. Extended agreements would need to be negotiated with existing suppliers to avoid the cost of procurement, transition, and change.

While this option does not meet the tests of customer expectations or PTA expectations, it does provide a current cost baseline against which other options can be assessed. This Do Nothing counterfactual includes those facilities, functions and services that are either currently committed or formally planned over the 14 year appraisal period, which means that to be a valid basis for comparison the Do Nothing option includes:

- maintenance and/or replacement of existing facilities/functions/services in each region
- upgrade projects that introduce new functionality such as open loop
- completion and maintenance of committed projects or policies in each region
- continuation and improvement of public transport policies.

This means that the counterfactual description for each PTA’s way forward is that:

AT would extend the life of the HOP closed loop integrated ticketing solution for buses, rail and ferries and add account-based and open loop capability including capital replacement of on-board card readers and all other required front office hardware to enable these improvements. AT expects to gain a small, increase in patronage from the introduction of open loop, which would improve efficiency and reduce the need for future increases in staff numbers.

GW would continue the closed loop Snapper ticketing system for buses and replace paper tickets on rail and ferries with Snapper (and manage validation using on-board electronic handheld ticket validators rather than gated stations). This includes a minimum EMV capability, initially with fixed fares and without daily aggregation. However, technology evolution to an

account-based solution with full EMV capability would be anticipated during the life of the counterfactual. GW expects the introduction of Snapper on rail (and ferry) to provide a range of benefits including:

- improved revenue protection
- removing cash on-board and paper tickets
- other savings from train-based staff efficiencies, reduced retail network commissions and other efficiency and growth benefits
- time savings for customers through avoiding time spent topping up and purchasing tickets.

Regional Consortium would extend the contract to continue with RITS. The Regional Consortium has achieved four main benefits since the staged introduction of RITS was completed in 2019/20:

i. improved information management
ii. reduced fare evasion
iii. enhanced customer retail experience
iv. reduced travel time.

ECan would replace the current electronic ticketing system, which is now at end-of-life (technologically and economically), with a solution similar to RITS or join RITS with the addition of mobile payment. By adopting RITS and a new mobile app, ECan expects to gain similar levels of benefits as the RC (as they both have very similar levels of patronage).

Extend Auckland's HOP system to all New Zealand

The option to extend AT's HOP system to all partner PTAs was considered and assessed by NineSquared[31] during the development of the earlier Indicative Business Case. NineSquared assessed whether it would be better to extend the existing AT HOP system to all PTAs by 2022/23 and defer the benefits that come from implementing an account-based ticketing system until 2026 (when the current AT HOP contract ends), or whether the benefits of an account-based system were sufficiently large that its early introduction (2022/23) is sensible from a financial, customer and public transport perspective.

Developing a single account-based ticketing system now, and extended to AT HOP in 2026, was the lowest cost scenario. NineSquared noted that their economic scenario that transitioned AT HOP to a single, national, account-based solution in 2023 rather than 2026 suggested only marginal reductions in net present cost of between $2.8 million and $4.5 million.

NineSquared concluded that, from a financial perspective, the comparator model outcomes indicate a new account-based solution should be procured early rather than firstly transitioning to the AT HOP system and jointly procuring an account-based ticketing system in 2026.

This option did not meet the financial test, nor the expectations of all PTAs, and would only meet customer expectations over the short term. As such, it has not been shortlisted.

[31] NineSquared is a specialist economic consulting and commercial advisory firm based in Australia specialising in the fields of transport, resources and regulatory economics, policy development and analysis, and advising on commercial arrangements between government and the private sector.

Enhance current solutions for the next 10 years - Do Minimum

Under this option, existing systems would be retained and enhanced whereby:

- each PTA would seek to extend use of their existing closed loop platforms for the foreseeable future
- a local path for minimum investment improvements would be supported
- there is no full market procurement
- extended agreements are negotiated with existing suppliers to avoid the cost of procurement, transition, and change
- implementation projects and operations are locally managed.

This is expected to result in:

- AT entering a new contract with Thales prior to the current contract extension ending in 2026 and adding open loop functionality to HOP.
- GW continuing with their existing supplier, Snapper, with its closed loop solution for bus and extend this to Snapper on rail – a trial is currently underway.
- ECan joins the Regional Consortium to deliver a tag-on / tag-off closed loop solution with existing supplier, INIT, the existing contract is further extended, and equipment is deployed from the previously procured pool.
- Regional Consortium continues with its RITS tag-on / tag-off, closed loop solution and extends the contract for this beyond the current 5 year term.

This is a Do Minimum option and is a 'light' version of the Regional Upgrade option below. As such, it does not meet PTA expectations and has not been shortlisted.

Upgrade current solutions over the next 10 years - Regional Upgrade

Under this option, existing systems would be retained and upgraded. This is expected to result in:

- AT entering a new contract with Thales prior to the current contract ending in 2026 and adding account-based and open loop functionality.
- GW extending Snapper to rail – a trial is currently underway – and adding open-loop and account-based functionality in the future (next 2-5 years).
- ECan either joining the RC or procuring a new ticketing solution which would include account-based and open loop capability.
- RC extending their current contract and continuing with the Bee Card.

This is the pathway PTAs have been following to date and would likely continue in the absence of the NTS option. This option is expected to meet financial, customer and PTA expectations and has been shortlisted for detailed analysis.

Two to four new regional solutions

This option involves procuring new solutions for each region whereby each PTA would design and execute a procurement strategy supported by a business case. Investment would be aligned to regional long term plans and requirements, with implementation and operations managed locally.

There are several variations under this option:

- AT procures a new account-based open loop solution and GW, ECan and RC jointly procure an account-based open loop solution
- AT and GW jointly procure a new account-based and open loop solution, as does ECan and RC
- AT and GW each procures a new account-based open loop solution and ECan and RC jointly procure an account-based open loop solution,
- AT, GW and ECan each procure a new account-based open loop solution and RC either retains its existing solution or procures a new solution later.

One variation of the option was considered previously. This comprised GW, ECan and RC developing an account-based and open loop solution while AT continued with HOP. This option was discontinued when AT joined the NTS procurement process in 2018. For GW, ECan and RC, this would be roughly similar in cost to the current NTS solution; adding separate solution development costs for AT would result in higher overall costs nationally. As such, this option does not meet financial expectations and was not shortlisted.

Single national solution

The NTS concept is for a modern solution available to partner PTAs that provides strong national and regional benefits that cannot be achieved by maintaining the current regional approach. While each PTA has different business requirements driven by size, topography, local regulations, modes, fare policy, and history, a modular, segmented and parameter driven approach together with an appropriate commercial model would give each region autonomy and flexibility for their individual requirements with benefits that can only be achieved with a single national solution.

Because the NTS environment consists of multiple PTAs, a single, central solution will need to be ‘multi-tenanted’ to:

- Segment each PTA as a separate financial entity
- Segment specifications of routes/trips and fares
- Allow PTA-based business rules for each PTA’s own segment (if required)
- Allow transport operators to serve multiple PTAs.

Such a system should allow for:

- End-users to be a single entity, regardless of the PTA they are utilising at any time
- Accounts related to customers, not PTAs – a PTA will not be able to “own” an account
- Products that apply across all PTA’s, e.g. national products such as SuperGold or the Community Connect card
- Potential to add other transport-related point-to-point applications to the solution, such as road tolling, park and ride, and congestion charging.

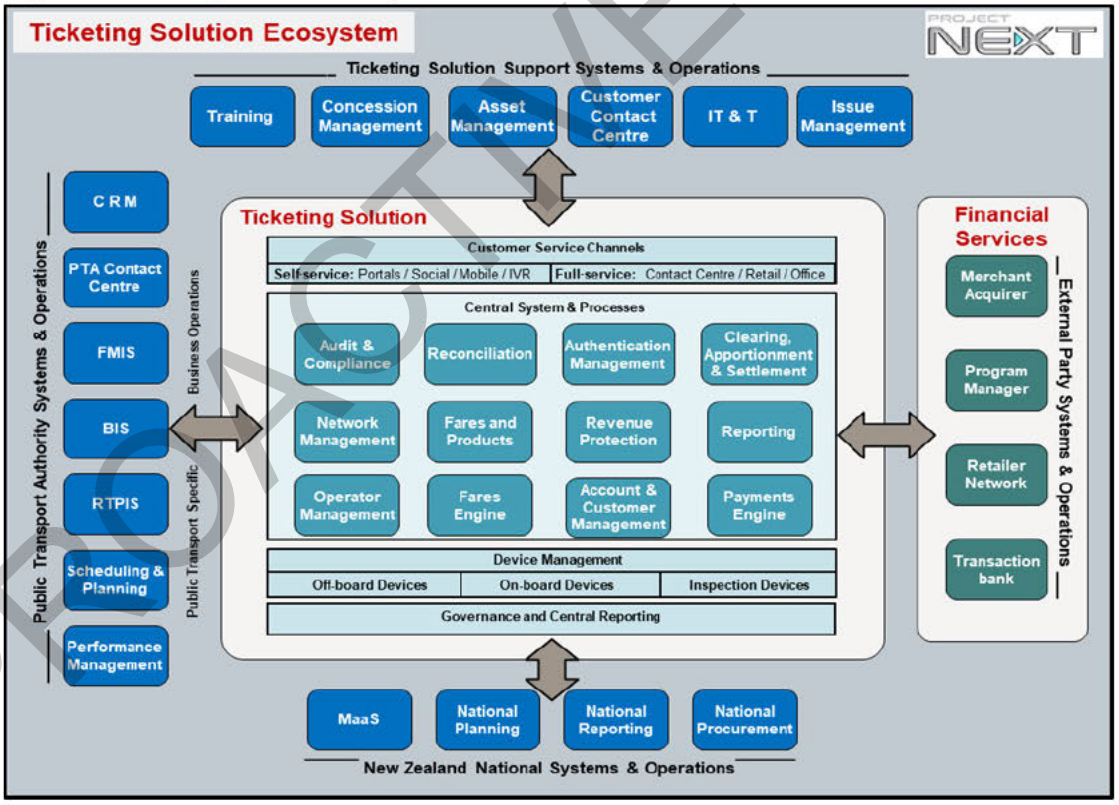
Ticketing solutions comprise a range of component parts which need to be brought together to form a cohesive and integrated whole. The conceptual design for the NTS involved defining the components that would achieve the best solution for New Zealand. These components include:

- Ticketing and payments
- Concept of operations - operating model and commercial model
- Supporting systems that enable integration with real time information systems, financial systems, transport planning systems, etc.
- Extensibility
- Revenue protection
- Support for cash fares
- Support of regional fare policies
- Reporting.

For each component there are options. These were evaluated against criteria relevant to that component, and documented through a series of decision papers, culminating in a 'solution concept' paper to ensure the most suitable mix of components were identified to best deliver the benefits of investment established during the Investment Logic Mapping. The details of the multi-criteria analysis and preferred option for each component forming a single, national solution are set out in Appendix 5.

In summary, the NTS comprises a set of components interacting within a wider ecosystem, illustrated in Figure 4 below.

Figure 40 Ticketing Solution Ecosystem



Summary of Options

The following table summarises the assessment of the options.

Options	Meets financial expectations	Meets customer expectations	Meets PTA expectations
Free public transport	✗	–	✗
Do nothing (Counterfactual)	✓	✗	✗
Extend HOP	✗	–	✗
Enhance current (Do minimum)	✓	✗	✗
Upgrade current	✓	✓	✓
2-4 new regional	✗	✓	✓
NTS	✓	✓	✓

Three options were taken forward to the Economic Case for evaluation:

- NTS
- Regional Upgrade (upgrading current solutions)
- Do Nothing counterfactual.

Appendix 6 - Determining the NTS Requirements

Core Ticketing Solution

Ticketing solutions are highly complex and with the advent of next generation technologies such as Account Based Ticketing, open-loop payments and new technologies for recognising the start / end of a customer journey, a number of key decisions were required to inform the scope and nature of the National Ticketing Solution.

Together with the unique environmental factors for a national capability with a single platform for all partner PTAs, this further emphasised the need for investigations into a range of core solution components, including:

- Ticketing and payments
- Concept of operations - operating model and commercial model
- Supporting systems
- Revenue protection
- Support for cash and paper tickets
- Support of regional fare policy
- Reporting

For each of the above components there is a range of options, which form a 'long list'. These options were evaluated against criteria relevant to that component. The evaluation process was undertaken through a series of decision papers (refer to the bibliography), culminating in a 'solution concept' paper.

These papers assessed all of the components of a ticketing solution and the wider international context and emerging trends:

Figure 41 Recommendations for the key components of the NTS

Decision paper reference and title		Recommendation
D1	Ticketing and payment model This issue also supported by decision papers D7 and D9	Hybrid account based and open loop system.
D2	Concept of operations	Centralised shared services operating model.
D3	NTS Supporting systems	Open standards based.
D4	Revenue protection	Require: tag on – tag off for all trips on all modes, revenue protection "inspection" capability on all modes, and legislative amendments to support revenue protection. Consider a partly gated solution, with on board, ad hoc inspection.
D5	Support of cash / paper tickets	No on-board cash and no paper tickets. Passengers without smart cards or another appropriate token (e.g. smart phone) purchase pre-paid travel cards. Pre-paid cards would be available.

Decision paper reference and title		Recommendation
D6	Support of Regional Fare Policy This issue also supported by D9	Standardisation / alignment of fare capabilities and support of regional fare policies.
D7	Regulatory framework	Recommended EMV compliant systems mean banks under Financial markets legislation are responsible for issuing cards.
D8	Reporting (Financial and operational reporting)	Minimum reporting requirements to be at least that of current systems capabilities
D9	Customer experience requirements	Hybrid approach delivers aim of integrated fares and ticketing for travellers from day one.
D10	Emerging trends around transit payment, future proofing.	Need for NTS project aligned with MaaS, Smart Cities, intercity and hub & spoke operations, distributed ledger payments, payments outside transport domain integrated smart apps and enhanced services discussed in strategic case
D11	Fares and product implementation model	Agreed threshold approach with a central solution plus potential for regional customisation.

A further Solution Concept report was developed providing detailed requirements arising from the recommendations from the decision papers.

The findings from a market sounding undertaken in May, June and July 2017 provided current market information that updated or superseded these papers. Refer to the GRETS Market Sounding Report, July 2017).

The preferred option for each component forms the preferred ticketing solution described below. The details of the considerations and multi-criteria analysis for each component are set out in the following sections.

Ticketing and payment options

The four integrated 'electronic' ticketing and payment models and the international trend towards account-based ticketing and open loop payment are described earlier in the Strategic case. Determining which is best for the NTS involved assessment using multi-criteria analysis.

In summary, the advantages and disadvantages are described in the following table.

Figure 42 Advantages and disadvantages of the ticketing and payment options

	Advantages	Disadvantages
Closed Loop	• Proven technology and wide range of suppliers. • Fast transaction time allows fast boarding of passengers. • Customers can see information during Tag On / Tag Off (e.g. remaining balance). • Proven solution for concession management (e.g. SuperGold). • PTA controls branding and the customer experience.	• Customer experience related to card acquisition, card cost and top-up, e.g. queues, limited access points, inconvenient. • Complex and lengthy change process means high time to market for new services. • Costly and complicated to introduce new technology. • PTA liable for all card related fraud and security. • Vendor product lock-in.
Account-based	• Easy change management (done in back office). • Easy, automated concession management. • Very fast transaction time allows fast boarding. • Low cost fare media possible (secure token). • More flexible product options • Easier to introduce new technology (than closed loop).	• Costly issuance of transit cards and related customer service (but less than closed Loop). • Customer required to queue to purchase or top up transit card. • Vendor product lock-in. • PTA liable for all card related fraud and security. • No display of information during tag on – tag off. • Inspection potentially impacting afterwards rather than on the spot.
Open Loop	• Much reduced cost of fare media as payment cards are provided by the issuing banks. • No need for customers to queue up for either purchasing cards or top up. • Customer services partially covered by payment partners (issuing banks). • Easy to introduce new technology • Could provide a payment basis for MaaS. • Easy change management. • PTA not liable for card related fraud and security. • Off the shelf technology for readers with large number of suppliers • Proven standards used globally.	• No easy solution for concessions (e.g. child, student, SuperGold) or travel products. • No display of information during tag on – tag off (as cost is only known at the end of the journey). • Inspection potentially impacting afterwards rather than on the spot. • Introduces third party transaction fees (Merchant Service Fee). • Relatively new in transit with implementation models still evolving, however maturing rapidly.

	Advantages	Disadvantages
Hybrid	• Broadens customer benefits and minimises disadvantages such as enabling concessions by registering bank provided cards, reducing vendor lock in, and lowering costs • Highest customer convenience (and thus improved patronage) • Supports all fare models • Easy to introduce new technologies • Lowest cost of ownership • PTA not liable for card related fraud and security. • Bank card acceptance in transport ticketing has matured to ensure good vendor response for procurement.	• Merchant Service Fee (MSF) is a new component that requires careful management and negotiation. • Newest concept in transit with implementation models still evolving, however maturing rapidly. • No display of information during tag on – tag off (as cost is only known at the end of the journey). • Inspection potentially impacting afterwards rather than on the spot.

Assessment of the four options is set out in the following table which shows how a hybrid solution maximises the advantages of linking open loop functionality with an account-based ticketing system. For example, an account-based system brings easy concession handling of customer media and automated concession registration (such as SuperGold), and makes new, flexible products possible. Open loop adds customer convenience of not needing to queue for card purchases or for loading value or products, shares customer service between the PTAs and the issuing banks, and shifts security and fraud risk from PTAs to the issuing banks.

Figure 43 Assessment of ticketing and payment options

OPTIONS	CLOSED LOOP	ACCOUNT BASED	OPEN LOOP	HYBRID
Proven technology	✓	✗	✓	✓
Easy change management	✗	✓	✓	✓
Fast card transaction	<350ms	<300ms	<400ms	<400ms
Easy concession handling of customer media	✓	✓	✗	✓
Easy automated concession registration (e.g. SuperGold)	✗	✓	✗	✓
Cost based on Opex/Capex investment	✓	✓	✗	✗
Cost based on transaction volume	✗	✗	✓	✓
Customer information available at Tag-On / Tag-Off	✓	✗	✗	✓
Low cost fare media	✗	✓	✓	✓
New flexible product possible	✗	✓	✗	✓

Easy to introduce technology	✗	✓	✓	✓
Customer service partially covered by banks	✗	✗	✓	✓
No need to queue for card purchase	✗	✗	✓	✓
No need to queue for loading value or products	✗	✗	✓	✓
Direct on the spot inspection available	✓	✗	✗	✗
Off the shelf technology readers	✗	✗	✓	✓
Limited responsibility for security and fraud	✗	✗	✓	✓

Market sounding responses support an account-based solution

A market sounding was carried out during May, June and July 2017 to better understand:

- developments and options in industry practice and technology, particularly in the areas of customer experience, operational cost and risk, operational flexibility, business integration and support, and future evolution and lifecycle management.
- areas where potential suppliers could identify better or more appropriate approaches to realising the NTS outcomes.

Also, the process provided the opportunity for potential suppliers to identify areas where the business requirements, procurement or implementation timeframes, scope of services, scale of the solution (including minimum project value/size) or other factors are limiting potential supplier's ability to propose a suitable solution, or that would discourage the potential supplier from continuing to participate in any ongoing procurement process.

There was universal support (100% of submissions) for account based ticketing as the key solution concept and general support for open loop and EMV standard. No respondents recommended exclusive closed-loop / proprietary solutions with stored value cards. Suppliers are generally payment method and channel agnostic.

Concept of operations - operating model and commercial model

THE NTS is required to deliver the next generation of ticketing services to partner PTAs. These PTAs have widely different scale, different modes of transport, capability and capacity and particular operating and policy requirements.

However, there are also substantial requirements in common. This high degree of commonality together with the investment and resource required to implement ticketing solutions means that a centralised delivery model – concept of operations - is a logical approach.

There are multiple models through which services could be centralised and multiple ways in which the services could be allocated to a regional, central or third party provider.

Whilst a shared service model is presumed for delivery of services, not all services can be delivered centrally, some will have to be delivered regionally and some through third parties. All services though will be contracted and managed centrally in a shared service model.

Effective operation of the NTS will require services to be delivered through central, regional and third party capabilities. Centralised provision should be considered the default option, except where services have to be physically delivered regionally. Systems and support should be centralised wherever possible.

Centralised and regional services could themselves be delivered through some form of outsource agreement.

Third party provision is required for certain services irrespective of any shared service model and third parties may be procured and managed centrally to ensure optimal service quality and price for regions.

Support systems

A 'national-based' solution will need to interface with multiple regional systems, such as real time information systems, financial systems and transport planning systems.

Each region's system is likely to be different. Interfaces and connections to a national system will need to be developed differently for each variation, with the potential to create significant additional work for each region if bespoke interfaces have been defined. Therefore, the NTS should provide an interface mechanism that is standards-based where possible to minimise the need for costly and complex interface development.

Avoiding proprietary interface and data sharing should be avoided because it will:

- Lock any solution into a specific supplier
- Create a complex integration environment
- Make change and enhancements more complex and costly.

It is understood that interfaces into regional systems may not have an appropriate standard, so there is a need to develop open and published Application Programming Interfaces (APIs) to the NTS based on known and proven technologies; for example, Web Services where middleware could be utilised to minimise integration effort and enable ease of publishing these APIs.

The following assumptions have been made when analysing and evaluating the different standards:

- Only standards that are specific to electronic ticketing and its support have been considered. General IT standards and methodologies such as Internet RFCs (internet standards) are assumed as a given with any modern IT infrastructure.
- A specific technology may have different options which are covered by more than one standard. To provide flexibility, these standards are all considered within scope as this paper does not attempt to prescribe which of multiple choices would be selected.

The following principles should apply to the NTS and support systems:

- Where an accepted and approved standard is available from an authorised standards body, the standard should be used as part of the NTS solution.
- Interfaces between entities in any system where standards do not exist, should be communicated with open published interfaces (API's).
- Where de facto and emerging standards are in common place and no approved equivalent standard is available, these standards should be used.

These principles are designed to ensure that the system does not create a vendor lock-in with proprietary data and interfaces and other parties will be able to have access to components of the system.

The standards required include:

Open Loop standards - For open loop payment where existing fare media is used (chipped contactless bank cards) there is no choice but to comply with the standards already mandated by these schemes.

Transport Feed and Data Information - Standards that are used to share data about routes, time and fares.

Security - Any security standards or techniques must use algorithms and concepts that are in the public domain. The use of secret techniques will be strictly prohibited as this is not best practice and does not provide any surety over fraud or security breaches.

End-User Interface - Standards may form part of the human interface to ticketing within transport.

Open Interfaces - As described earlier, where a standard does not exist, an open interface specification is expected. These interfaces must be published and open for all to use. For machine-to-machine interfaces a form of Web Services should be used.

Extensibility

Extensibility refers to the characteristics of the National Ticketing Solution design, architecture and implementation to be readily extended to incorporate new operating entities and / or new business functions.

New Operating Entities

Over time the NTS will need to provide the ticketing needs for all Public Transport Authorities in New Zealand. This progressive transition process will be built around a series of core solution concepts tuned for each authority. The underlying design and architecture must enable this to be a seamless as possible through good design able to minimise customisation.

Equally, the NTS must be extensible to other types of organisations such as the Ministry of Education, new transport operators, concession authorities and the like.

New Business Functions

A core concept of the NTS is that it will be able to support MaaS solutions and integration in the future. This is centred on the account based design offering a single Transport Account for each participating customer. This will support the concept of end-to-end journeys through aggregation of services from both public and private operators.

Beyond MaaS there are a range of other transport related services that could be serviced by and managed through a national Transport Account. Examples include tolling, congestion charging, Park and ride and so forth. It is expected that such applications would include integration with specific business solutions, such as a tolling system with vehicle plate recognition, but integrated with the NTS for the presentation of all transactions in a common account, with payment management and aggregation and supporting business rules to enable value added services.

The characteristic of such business functions have to be carefully mapped to be supported and applicable to the core capabilities of the account based solution, e.g. transport related transactions with a transaction start point, end point and rules to calculate a charge.

Revenue protection

The NTS will enable partner PTAs to collect, account for and reconcile all fare revenue in support of the service contracting model(s) in use, whilst protecting revenues for multiple authorities with their own policies, through appropriate systems and processes.

The scope for revenue protection is therefore considerably broader than its conventional association with the customer's use of the ticketing solution, and the support of enforcement activity. As well as the innate security of the solution itself, revenue protection applies to all levels of NTS operation. It is related to the processes that will ensure that the correct fare for every trip is accurately and reliably calculated and charged, and the processes to ensure that the resulting revenue income is accurately and completely collected and accounted for.

The ability to uniquely record the start and end of every trip is a fundamental requirement of modern ticketing solutions because it provides for fare calculation, fares integration, customer experience, revenue security and the provision of quality data for operational management, network efficiency and wider analytical and policy purposes. For revenue security, tag on tag off enables easier determination of a customer's valid right to be on the network, and permits fare policies that encourage appropriate use of the solution, such as applying fare penalties for incorrect use (like neglecting to tag off). Note that no decision is required on the adoption by the NTS of a tag on/tag off model, as the alternative (tag on only) presents such a range of disadvantages that it is self-disqualifying.

Key considerations for revenue protection include scheme security, fraud detection and management, revenue leakage and cash handling, customer behaviour and the different characteristics of buses and trains. These are explained briefly below.

Scheme Security

The processes that describe the integrity of the solution, ensuring the accuracy and completeness of transaction data, and protecting the ticketing solution from loss through inefficiency or fraudulent activity. The nature and scope of scheme security requirements will depend partly on the fares and ticketing payment solution that is adopted for the NTS.

- Closed-loop or account-based - security risk lies with the scheme operator.

- Open-loop payment solution incorporating alternative payment service providers, depending on the model adopted – security risk may be partly transferred from the scheme operator to the payment service provider.
- Account-based (with scheme-issued fare media and also with open loop payment capability) maintains a significant proportion of security risk with the scheme operator, and would therefore require similar security provision as a closed loop-only solution.

Fraud detection and management

Fares and ticketing solutions of all types require capabilities to detect and isolate all known types of potentially fraudulent activity, to enable its full investigation, and to conclusively address it if proven. This capability will involve the use of tools to detect unusual usage (such as over-frequent use, or abnormal top-up activity), and the deployment of processes to contain and manage the impact of any security breach (such as the targeted hot-listing of identified fare media or the update of scheme-wide security).

Revenue leakage and cash handling

Operator staff may contribute to revenue leakage through indifference, or through deliberate action or inaction. For example, permitting free travel for ineligible customers or failing to collect revenue both lead to revenue loss, and the implications of handling cash in any system inevitably present situations where cash revenue can 'leak'. This provides a clear incentive to the NTS development to provide for minimising the direct interaction of staff with cash revenue.

Whether cash payment is permitted on board vehicles (involving manual cash handling by operators' staff and related to wider customer and operational efficiency reasons or is restricted to off-vehicle ticket purchase) has significant implications for potential revenue loss. The NTS participants may have different current or future policies relating to cash acceptance on board vehicles, which the solution is likely to need to accommodate.

Operators' management of collected cash revenue is a further potential weak link in the revenue protection chain. The NTS will need to provide the capability for reconciliation of cash fare revenues collected with the amount paid in by operator staff, or banked by the operator. Discrepancies could be an indicator of revenue loss or fraudulent activity.

It is also important to note that both fraudulent activity and revenue leakage may originate with highly creative and difficult-to-detect methods. It is essential that the NTS development adopts industry best practice in these areas, and is informed by the experiences of other schemes where unforeseen problems have arisen.

Customer behaviour

While customer behaviour can be positively influenced by the fares and ticketing solution and fare policies, there are notorious scenarios in contemporary ticketing schemes where customer behaviour can expose and exploit a 'loophole' generated by the application of the solution to fare policy. The ability to 'game' the system through legitimate exploitation of fares policy can result in revenue loss as well as contributing to negative media perception of the scheme. Recent examples include the unintended misuse of Sydney's 'Opal' multi-journey weekly fare cap, which has since been withdrawn.

Modal operating models – support of revenue protection activity

Bus Revenue protection

While tag on/tag off operation can help to minimise the scope for fraudulent travel, the NTS must provide the capability for support of revenue protection activity. This may take the form of traditional random 'inspection', which requires customers to be able to demonstrate they are in possession of a valid right to use the service at the time and in the location in question (e.g. that they have tagged on, or possess a valid concession to travel).

Inspection will need to be able to determine the tag on status of a customer's fare media (or depending on the existence of alternative fare payment models, the payment token they have registered). This implies the use and full support of some form of hand-held revenue inspection device.

Rail Revenue protection

Wellington has rail services as part of its public transport network, which presents a number of rail-specific issues and requirements in the context of revenue protection. Unlike a bus or ferry, where access to and egress from the vehicle provides the opportunity to begin and end the trip by 'entering' and 'leaving' the system, access to the rail system in practical terms is taken as access to the station or platform.

In many rail systems, all stations are 'closed', that is, it is possible to enter or leave them only via controlled gated access routes. This is especially the case in urban mass transit or metro (underground) networks, where movement onto and off stations is constrained by the physical configuration of access points.

Wellington's rail network is currently entirely 'open'. It is also acknowledged that the practicality and cost of 'closing' all stations is prohibitive, and is also complex for other reasons (for instance, some stations provide access routes for pedestrians not making rail journeys).

Research to date and the model adopted by Auckland rail suggests that the most practical model would provide the opportunity to tag on and off at every station, with validators at suitable locations. It should be noted that tag on/tag off on trains rather than on platforms has almost no precedent in international practice, partly since it could impede high passenger volumes boarding and alighting, but also as the opportunity to tag off on board prematurely presents a significant fare evasion opportunity.

There should also be the opportunity to purchase a ticket prior to travel, but how this facility is provided (e.g. via ticket vending machines on platforms), its capabilities (e.g. via cash, card or other payment method) and whether, due to the alternative purchase options available under the chosen fare and ticketing payment model, it is cost-effective and necessary in all cases. This scenario would be supplemented by access control gates at selected points in the network, designed to encounter the majority of rail trips. Wellington station is clearly the primary candidate, as it accounts for either the start or end of around 80% of all rail trips on the network. Increasing the proportion of journeys with access control at one end of the journey as a minimum would require gating initially at a limited number of strategic stations.

Legislation and powers of enforcement

The existing revenue protection policies and capabilities of the NTS participants may have evolved over extensive periods, to provide a pragmatic level of protection within relevant resource constraints and within the enforcement powers to which participants have access. However, it is expected that the opportunity to take full advantage both of the NTS and of new legislative powers will permit the development and support of enhanced revenue protection capabilities.

Recent changes to the Land Transport Act provide public transport authorities with significantly enhanced revenue protection capabilities, and the potential to ensure that the equitably-applied obligation to pay for travel remains the accepted norm.

Opportunities to standardise

Whilst each Region retains control and responsibility for their regional fare policy, fares and products, there are a number of areas identified which would benefit from standardisation at a national level. Generally these opportunities result in enhanced and consistent experience for customers and efficiencies for Transport Service Providers. The following table sets out opportunities for standardisation across regions.

Figure 44 Opportunities for National Standardisation

Opportunity	Description
Age and Concession Definitions	The age of a child / student is different in different regions, and therefore does not provide a consistent experience to customers. If we were to have national concessions where these ages were a factor, it would be more intuitive for travellers have uniformity for all New Zealand.
Refunds of Transit card Balance / Card Surrender	With a National Transit card, there will be a requirement to have a National Approach to the balance transfer from a transit card. This national approach may include a decision on first level partial balance refunds (at a Customer Service Centre) as well as second level refunds through a central entity. Part of this discussion should also consider whether a fee applies to either first or second level refund
Refunds for Fare Adjustment	Often there is a requirement to make a fare adjustment and have this adjusted to the transit account resulting in an adjustment transaction to a Transit Card or bank account for a contactless bank card. A consistent National Approach may be required to ensure consistent behaviour across multiple PTAs.
Network Topology	Each region has its own topology, resulting in the potential for duplicate names of routes, stops and trips. Consideration should be given to a set of standards that could be employed by each PTA, so that there is national approach to the PT Network Topology.
GTFS (General Transit Feed Specification)	The GTFS feed has become the default standard for communicating network topology and timetables to ticketing systems as well as other support systems such as real-time and journey planners. Most PTAs are now using this format; however, as the format does not support concepts such as PTOM units, some regions have adopted different extensions to this standard resulting in different interpretations. There is a requirement for a National Ticketing system to come up with a standard for all tenants.

Opportunity	Description
Device User Interface	A National consistent approach to device messages is required. This would for instance cover the readable success and fail messages on validator and gate displays, coloured lights and sounds. Similar it could include accessibility GUIs and supported languages for vending machines.
Default Fares (Penalty) Policy	As a National Ticketing system, a consistent approach to how and when default fares (penalty fares) are applied would be more understandable to the customer.
Infringement policy	Legislation on this is relatively new and so far only AT has implemented an infringement process. There is a potential to introduce a national consistent infringement policy.
SuperGold Times	PTAs in New Zealand have implemented different rules governing the concession times for SuperGold users. This provides an inconsistent approach to these users. Considerations should be given to a national approach to these times.
Concession Verification	With many PTAs, now having to electronic verification of concessions; example MSD for SuperGold and some educational institutions, having a consistent National approach and/or a national portal will assist regions in implementing a verification process.
Mobile Apps and Websites	Mobile apps are expensive and difficult to manage. Should a Mobile App (that could be skinned) be part of a National approach to ticketing?
Transit card pricing	This considers the potential for a national pricing structure for the Transit Card. It may include pricing for the purchase of the Transit Card, proposed introduction pricing, minimum top up values.
Transit Card branding	This can cover the branding of the Transit Card itself, branding of "Tap Targets" on devices to assist in easy customer recognition as well as branding to be applied in communication material.
Operating hours / cut-off times	Although it is recognized that PTAs can define their own fare policy across days, the National Ticketing Solution will require a national agreed cut-off moment for end of day processing.
Fare Policy Simplification / Rationalisation	As this national solution is rolled out from Region to Region, there are opportunities to rationalise fare policy in a number of areas such as: (i) What concessions are offered (ii) The level of discount for each concession (iii) How passenger qualify for concessions (iv) Approach to daily and weekly caps (v) Approach to periodic passes (vi) Approach to Journeys
Apportionment Settlement and Reconciliation Policy Simplification / Rationalisation	There are numerous aspects of apportionment, settlement and reconciliation which could benefit from a national approach including: (i) Method for apportioning revenue from journeys (ii) Approach for PTOM reporting (iii) Smart Ticket apportionment (iv) All aspects of reconciliation (between systems/partners) (v) Many aspects of reporting

Support for cash and paper tickets

The ability for the NTS to support use of cash is a critical decision in development of the solution as it affects other key business areas - ticketing and payments, operating model, support systems, regional fare policy and revenue protection.

The options and implications for support of cash are summarised below.

Figure 45 Option for cash on board and paper tickets

Option	Passenger	Operator	Public transport authority
Option 1 – maintain paper tickets on-board	• Maximum flexibility for passeners • Can travel with cash or use a smart card • Slower boarding for all passengers, and potential sevice reliability issues in busier networks	• Cash handling on-board impacts boarding times, dwell times and network performance • Off-board cash handling – clearance, reconciliation, reporting • Serious security, fraud, revenue protection implications • Operational overheads	• Under PTOM, can be challenging to incentivise Operators to effectively manage cash (as not their money) • No destination data – potential impact to network planning
Option 2 – Paper tickets off-board only	• Can access public transport using smart card, cash or smart phone • Must be able to access somewhere to purchase a ticket either at outlets, via mobile, or self-service channels (much more limiting than on-board)	• Optimal for boarding times on-bus (minimises dwell times) • No cash handling required on-board • Optimal for revenue protection	• No destination data – potential impact to network planning • Cash handling / maintenance / security required for ticket dispensing devices. • Need extensive network of retails to give passengers access (a challenge for smaller regions)
Option 3 – No paper tickets	• Passengers without bank cards will need to purchase pre-paid cards or use their mobile to access public transport • Passengers tag-on and tag-off all services • No need to carry cash or have correct denomination	• Optimal for boarding times on-bus (minimises dwell times) • No cash handling required on-board or off-board • Optimal for revenue protection	• Optimal for network planning – all trips have origin-destination data • No cash handling required

Considering evaluation criteria of customer experience (both for the smart-card user and the cash user), operational and service efficiency, data quality and capital and operating cost implications, no paper tickets (option 3) is preferred.

Reporting

One of the advantages of a modern ticketing solution is that, as part of the process, the ticketing system will collect an enormous amount of transaction data. Most of this data is of a financial nature that will be used for financial clearing and settlement. The scope of the NTS will need to include reporting functionality to support this process. This means:

- Limiting the scope to basic reporting to focus on supporting functional operations
- Evaluating what additional regional reporting requirements can be met with the NTS solution
- Leaving advanced reporting out of scope for the NTS programme, and either link to the BI platform currently being procured to meet PTOM performance reporting, or a separate development after the successful deployment of the NTS
- Including Outcome-Based descriptions of the type of source data elements expected to be captured by the NTS solution.

Infrastructure Leverage

Many transport authorities have significant investment in ticketing assets that could be re-used in a new ticketing solution. Depending on age and the technology compatibility, there may be time, cost and customer benefits from re-use. Examples include:

Gates at platforms and wharves
Given that a gate mechanism can be controlled relatively easily, then an account-based ticketing supplier should be able to replace the inner workings of a gate with their own and leave the bulk of the physical gate intact. This alleviates new gate installation, which is a significant amount of work creating additional cost and delay.

Acceptance Devices on board vehicles and platforms
Currently, vehicles contain a range of ticketing and payment technology. Depending on suppliers, different combinations of functions are delivered with different devices. Current legacy systems devices that could be considered for reuse include:

- **Acceptance Devices -** used to read the Fare Media. There is often two or more of these devices on each vehicle as well as sometimes being included with the driver console.
- **Driver Consoles -** used by the driver for functions as cash sales, trip selection, etc.
- **AVL devices -** often a separate device that feeds location information to ticketing system components or real time system components.
- **Communications hubs -** mobile communication used to transport bi-directional information between the vehicle and back-office systems.

Historically most vehicle devices utilised for ticketing are proprietary to the supplier with no standards that govern a ticketing device to allow for open connectivity and integration with other components. Most new ticketing solution suppliers will have AVL inherently built into their devices. However, if AVL is a separate component, then existing AVL devices may be able to be utilised. The RFP asked for AVL capability to be built into their new equipment that can be leveraged by other PTA solutions such as Real Time Information. In-vehicle communication hubs should be leveraged as these are now becoming common in vehicle fleets to provide backhaul communications. From a technical perspective, if vehicle devices support Ethernet or wireless, these hubs should have little difficulty being re-used.

Ticket Vending Machines
TVMs have an extensive user interface, often with multi language support and specific support for customers with visual impairment or with hearing difficulty. When supporting two types of media (legacy and new), the user interface must be obvious so customers can intuitively use

the device with either media. This limits the options for account-based solution suppliers to offer improvements during transition.

As all current Ticket Vending Machines are for card-present payment transactions, they already have online connectivity that is also required with the prepaid 'Transit Card' Program Manager to allow the device to perform a top up. Development effort must consider the numbers of vending machines and the expected duration of the transition phase during which both the new and legacy cards must be supported. Currently there are 90 Ticket Vending Machines across Auckland, 26 Ticketing Kiosks in Wellington, 4 in Otago and 1 in Waikato.

Inspection devices
Currently, only AT has Inspection Devices. These Android devices are unlikely to be based on hardware that is suitable to become EMV and PCI compliant and therefore most likely cannot be upgraded for inspection on contactless payment cards. The RITS solution also has some devices, but it is unknown if these are suitable for EMV and PCI upgrade.

Customers will not be noticeably impacted if the Revenue Inspector is required to work with both an Inspection Device for legacy cards as well as an Inspection Device for EMV cards during the transition period.

Retail and Customer Service Centre Devices
The Retailer Network Manager will offer 'Transit Card' (prepaid close proximity card) sales and balance top up functionality, while using an application on the standard POS terminal of the retailers. Existing outlets in all regions can be brought into the Retail Network, this way providing both services for legacy cards (through the legacy retailer device) as well as for pre-paid 'Transit Cards' (through the POS). This will work for options 1, 2, 4 and 5. For Option 3, a separate development activity is required from the legacy supplier to offer services for the tokenised legacy cards.

Communications Network Infrastructure – Many PTAs have significant investment in LAN/WAN infrastructure. There should be no technical reason why these networks should not be leveraged. Technologies such as secure VPNs, VLANs and QOS should enable the core network infrastructure to be leveraged with minimal effort.

Appendix 7 - NTS Benefits

Description of benefits	National or Regional	How to measure
Customer		
Encourage easy adoption		
No need to purchase a card or top up before travelling	National	Time saved; number of people lost on PT because they have no way to pay
Encourages PT use amongst casual users & visitors because visitors can access public transport immediately on arrival using their overseas card or mobile payment device	National	Patronage growth
Contactless debit cards may provide an alternative to cash for some low income and cash reliant people	National	Patronage growth; maintenance of travelling population in low income areas?
Reduces travel planning time - don't need to factor in ticketing element in travel planning and users can transfer easily between services	National	Time saved
Lowest cost option		
Each day the best fare is automatically calculated for all my journeys	National	Analysis of users who 'over-pay' for convenience
I can pay for my journeys after I travel	National	Money that doesn't need to be prepaid
I don't need to tie up money on a prepaid travel card	National	$ value of card balances held across NZ today
I can apply my SuperGold concession to my own card or device and still travel anywhere in NZ	National	SuperGold trips
As a registered SuperGold card user I no longer need to prepay in case I travel in peak times	National	SuperGold peak trip $
I can visit friends and family in other parts of NZ and still get my SuperGold discount	National	SuperGold trips
Universal access to PT		
I can pay for PT in the same way anywhere in NZ	National	Patronage growth
I can take PT anywhere in NZ and be charged in the same way everywhere	National	Patronage growth
I can learn one system and it's the same way to travel everywhere on PT	National	Patronage growth
Increase choice		
I can pay using my contactless debit or credit card	National	Patronage growth
I can pay using a digital contactless card on my mobile device	National	Patronage growth
Self-service benefits		
I can manage my transport account anywhere in NZ	National	Reduced contact centre costs
I can manage my family's accounts together and control my child's spending	National	Reduced contact centre costs
I can keep track of my own spending on travel in one place	National	Reduced contact centre costs

Description of benefits	National or Regional	How to measure
I can correct my own journeys if I forget to tag on or off	National	Reduced contact centre costs
Better information		
Notifications allow me to control what information I receive	National	Reduced contact centre costs
I can be told when something goes wrong	National	Time avoided waiting for services
I can be told when my travel is disrupted	National	Time avoided waiting for services
I can adjust my journey to avoid disruptions	National	Time avoided waiting for services
I can save time by not waiting for PT	National	Time avoided waiting for services
Better customer service		
Reduced interactions with the driver mean they can focus on those that need the most help	National	Customer survey responses
Operational efficiency		
Enhanced data		
Improved network and fleet management	National	Comparison of fleet performance metrics across regions
Optimisation of services	National	Benchmarking services across regions
Consistent data across NZ	National	Standardised national reporting
Resourcing efficiency		
Can redeploy resources in different ways	National	Staff costs for ticketing today across NZ; reduced hardware spares
Revenue protection		
Establish or enhance the PT revenue protection regime	National	Reduced fare loss $
Easier to administer fare splits across regional boundaries	National	Shared service functions established and automated
New features and functions		
If we do nothing, we will spend a similar amount of money on disconnected ticketing systems	National	$ spent today on ticketing systems
Procurement efficiency		
Centralisation supports economies of scale for NZ which drives down price	National	$ spent on procurement activities
Managing events		
We can make travel to big events safer and more efficient to speed up foot traffic and prevent pedestrian congestion at key entry or exit points	Regional	Time costs for attendees at events; safety measures, farebox revenue
We can manage crowds better while not overcharging customers or losing revenue	National	Fare charging comparison and customer surveys
Centralisation of contracts		
Central management of key contracts provides increased negotiating power for NZ	National	
Service delays		

Description of benefits	National or Regional	How to measure
We can choose not to charge customers for delays in services	National	Fares saved due to service delays
Managing disruptions		
Supporting contactless ways to pay on PT helps support revenue collection on services should there be a resurgence of Covid-19	National	Drop in PT patronage as a result of Covid-19
We can manage disasters and other events more effectively to prevent customers being overcharged	Regional	Number of disrupted passengers on rail in peak Wellington
Provide a level of contact tracing in the event of COVID resurgence or other issue	National	Reporting capability developed
Marketing & brand		
NZ wide material & branding	National	Reduced cost
National policy initiatives		
Mode Shift		
NZ needs ticketing to support mode shift, city programmes (LGWM, ATAP) & climate change targets	National	Do minimum $
Increases patronage on PT and reduces private vehicle journeys	National	Private car journeys avoided; reduced emissions
Supports decarbonisation of the transport network, improving air quality and overall health benefits, and improves road safety (less cars on the road)	National	Private car journeys avoided; reduced emissions
Supporting national policy		
Ticketing systems provide levers to implement new central or local government policies	National	Policy changes monitored
National concessions		
SuperGold & Community Connect card support, ease of setting up other national concessions	National	Number of SuperGold and Community Services cards issued in NZ
Future innovation		
Decrease congestion		
Charge drivers who enter congested areas at peak times to drive demand towards PT away from private vehicles	Regional	Time saved not sitting in traffic; reduced emissions
Park and ride		
Support mode shift through combined parking & PT journey fares	Regional	Time saved not sitting in traffic; reduced emissions
Third party integration		
Possible integration with third parties in the future e.g., escooters,	National	Number and type of third parties integrated
Transport account		
Possible creation of a transport account for all transport payments e.g. parking, road tolling, etc	National	Annual report commentary

Appendix 8 - Cost Benefit Supporting Information

Introduction

The NTS cost benefit analysis quantifies, as far as possible, the economic benefits and costs of introducing an accounts-based, open loop, integrated ticketing solution for GW, ECan, AT and RC. The analysis follows a structured approach consistent with guidance in relevant chapters of Waka Kotahi's Monetised Benefits and Costs Manual and Benefits Management Framework appropriately tailored to reflect the nature and lifespan of an electronic, integrated fares and ticketing solution.

This appendix sets out the detailed information supporting the quantified benefits and costs for the NTS, Regional Upgrade and the Do Nothing counterfactual.

Monetised economic benefits

The economic benefits for both the Regional Upgrade and NTS options comprise the decongestion benefits and public transport (PT) user benefits from increased patronage (new users only in the first year), and the convenience of not needing to top up.

Decongestion and PT user benefits

The decongestion benefit assumes that increasing patronage will reduce the number of people travelling by private vehicle and have a small effect on reducing congestion.

The PT user benefits measure the aggregated benefits to users from switching to public transport. The aggregated benefits comprise the decrease in vehicle operating costs (cost of petrol, maintenance, etc.), a reduction in parking charges, and, in some cases, a decrease in travel time.

The assumptions underpinning the decongestion and PT user benefits (both nominal and discounted) are based on the following assumptions:

- An NTS patronage increase of 2% for the first year only following each PTA's on-boarding date.
- A Regional Upgrade patronage increase of 2% for AT only following the introduction of open loop for the first year only following implementation.
- Patronage data projections, set out in the table below, are based on forecasts prepared by the NTS Project Team from data and projections provided by PTAs based on actual data up until 2020/21. The impact of Covid has been factored into the three years from 2022/23 to 2024/25.

Table 31 Patronage data

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Bus and Ferry														
AT	34,063,868	55,427,298	80,637,945	94,187,258	97,351,942	100,989,787	104,607,582	109,321,438	113,842,349	118,396,043	123,131,885	128,057,160	133,179,446	138,506,624
GWRC	11,724,844	17,571,912	23,990,483	27,706,696	28,487,976	29,398,326	30,228,971	31,447,541	32,628,601	33,607,460	34,615,683	35,654,154	36,723,778	37,825,492
ECan	6,779,265	9,786,069	12,961,502	14,652,349	14,903,029	15,153,709	15,411,322	15,673,315	15,939,761	16,210,737	16,486,319	16,766,587	17,051,619	17,341,496
RC	7,286,460	10,365,678	14,082,621	16,206,693	16,472,206	16,743,567	17,020,953	17,304,549	17,594,548	17,891,149	18,194,559	18,504,995	18,822,679	19,147,847
Train														
AT	14,779,276	24,048,219	34,986,352	40,864,987	42,238,047	43,816,397	45,386,048	47,431,247	49,392,733	51,368,442	53,423,180	55,560,107	57,782,511	60,093,812
GWRC	6,185,933	9,209,380	12,459,555	14,362,498	14,813,437	15,181,001	15,658,497	16,959,092	17,621,405	18,150,047	18,694,549	19,255,385	19,833,047	20,428,038
ECan	81,790	116,796	153,169	173,592	177,064	180,605	184,217	187,902	191,660	195,493	199,403	203,391	207,459	211,608
RC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Patronage														
AT	48,843,144	79,475,516	115,624,296	135,052,244	139,589,989	144,806,184	149,993,630	156,752,685	163,235,082	169,764,485	176,555,065	183,617,267	190,961,958	198,600,436
GWRC	17,910,777	26,781,291	36,450,038	42,069,194	43,301,413	44,579,327	45,887,468	48,406,633	50,250,007	51,757,507	53,310,232	54,909,539	56,556,825	58,253,530
ECan	6,861,054	9,902,865	13,114,672	14,825,941	15,080,093	15,334,314	15,595,539	15,861,217	16,131,421	16,406,230	16,685,722	16,969,978	17,259,078	17,553,104
RC	7,286,460	10,365,678	14,082,621	16,206,693	16,472,206	16,743,567	17,020,953	17,304,549	17,594,548	17,891,149	18,194,559	18,504,995	18,822,679	19,147,847

- Decongestion and PT user benefit values are set out in the Waka Kotahi Monetised Benefits and Costs Manual (MBMC) SP10 table 10.1. The relevant values are set out in Table 29 below.

Table 32 Decongestion and PT User Benefit values

Source: MTBC SP10 Table 10.1	Mode	Average trip length	Road traffic reduction benefits		PT user benefits	
			Peak	Off-peak	Peak	Off-peak
Auckland	All	7.7	12.61	0.86	10.89	7.26
	Rail	16.5	17.27	1.65	16.75	11.17
	Bus/Ferry	6.6	11.73	0.76	10.16	6.77
Wellington	All	12.14	13.25	1.25	13.85	9.23
	Rail	22.76	17.7	1.99	20.91	13.94
	Bus/Ferry	6.97	11.97	0.89	10.41	6.94
Christchurch	All	8.05	2.71	1.24	11.13	7.42
Regional Consortium	All	7.86	2.06	1	11	7.33

- Decongestion benefits values have then been calculated based on the following:

Table 33 Decongestion benefit inputs

	Road traffic reduction benefits						
	% passenger boardings at peak - bus	% passenger boardings at peak - train	% of total trips on bus	Weighted average by bus/ferry	Weighted average by Train	Weighted average VoT (road) across modes	Marginal cost of decongestion across modes
Auckland	53%	61%	76%	6.54	11.16	7.65	9.80
Wellington	53%	67%	63%	6.80	12.45	8.89	11.38
Christchurch	43%	0%	100%	1.87	-	1.87	2.39
Other	31%	0%	100%	1.33	-	1.33	1.70
Update factor							*1.28*
Average fare value							*$2.20*

- The calculation of NTS and Regional Upgrade decongestion is based on the forecast increase in patronage at appropriate PTA average rates

Table 34 NTS decongestion benefits - nominal and present value (at 4%)

	Total patronage	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
AT	37,711,790	-	-	1,533,210	2,701,045	2,791,800	2,896,124	2,999,873	3,135,054	3,264,702	3,395,290	3,531,101	3,672,345	3,819,239	3,972,009
GWRC	11,892,198	-	177,564	729,001	841,384	866,028	891,587	917,749	968,133	1,005,000	1,035,150	1,066,205	1,098,191	1,131,137	1,165,071
ECan	4,014,403	-	198,057	262,293	296,519	301,602	306,686	311,911	317,224	322,628	328,125	333,714	339,400	345,182	351,062
RC	3,993,822	-	-	115,748	324,134	329,444	334,871	340,419	346,091	351,891	357,823	363,891	370,100	376,454	382,957

	Total benefit	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
AT	369,427,184	-	-	15,019,425	26,459,614	27,348,655	28,370,618	29,386,950	30,711,193	31,981,232	33,260,482	34,590,901	35,974,537	37,413,519	38,910,059
GWRC	135,344,654	-	2,020,845	8,296,730	9,575,758	9,856,235	10,147,113	10,444,871	11,018,281	11,437,869	11,781,005	12,134,435	12,498,468	12,873,422	13,259,624
ECan	9,611,960	-	474,222	628,027	709,975	722,146	734,320	746,829	759,552	772,491	785,651	799,035	812,648	826,492	840,572
RC	6,790,760	-	-	196,807	551,130	560,159	569,387	578,820	588,464	598,326	608,412	618,730	629,287	640,090	651,148

Table 35 Regional Upgrade decongestion benefits - nominal and present value (at 4%)

Total patronage	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
33,477,536	-	-	-	-	2,791,800	2,896,124	2,999,873	3,135,054	3,264,702	3,395,290	3,531,101	3,672,345	3,819,239	3,972,009
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total benefit	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
327,948,146	-	-	-	-	27,348,655	28,370,618	29,386,950	30,711,193	31,981,232	33,260,482	34,590,901	35,974,537	37,413,519	38,910,059
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

- PT user benefits values have been calculated based on the following:

	Road traffic reduction benefits						
	% passenger boardings at peak - bus	% passenger boardings at peak - train	% of total trips on bus	Weighted average by bus/ferry	Weighted average by Train	Weighted average VoT (road) across modes	Marginal cost of decongestion across modes
Auckland	53%	61%	76%	8.56	14.57	10.0	12.81
Wellington	53%	67%	63%	8.79	18.58	12.41	15.89
Christchurch	43%	0%	100%	9.02	-	9.02	11.54
Other	31%	0%	100%	8.47	-	8.47	10.84
Update factor							*1.28*
Average fare value							*$2.20*

- The calculation of NTS and Regional Upgrade PT user benefits is based on the forecast increase in patronage at appropriate PTA average rates

Table 36 NTS decongestion benefits - nominal and present value (at 4%)

	Total patronage	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
AT	37,711,790.35	-	-	1,533,210	2,701,045	2,791,800	2,896,124	2,999,873	3,135,054	3,264,702	3,395,290	3,531,101	3,672,345	3,819,239	3,972,009
GWRC	11,892,197.89	-	177,564	729,001	841,384	866,028	891,587	917,749	968,133	1,005,000	1,035,150	1,066,205	1,098,191	1,131,137	1,165,071
ECan	4,014,403.43	-	198,057	262,293	296,519	301,602	306,686	311,911	317,224	322,628	328,125	333,714	339,400	345,182	351,062
RC	3,993,822.48	-	-	115,748	324,134	329,444	334,871	340,419	346,091	351,891	357,823	363,891	370,100	376,454	382,957
	Total benefit	**1/07/2022**	**1/07/2023**	**1/07/2024**	**1/07/2025**	**1/07/2026**	**1/07/2027**	**1/07/2028**	**1/07/2029**	**1/07/2030**	**1/07/2031**	**1/07/2032**	**1/07/2033**	**1/07/2034**	**1/07/2035**
AT	$ 482,903,538	$ -	$ -	$ 19,632,917	$ 34,587,171	$ 35,749,297	$ 37,085,176	$ 38,413,692	$ 40,144,700	$ 41,804,856	$ 43,477,050	$ 45,216,132	$ 47,024,778	$ 48,905,769	$ 50,862,000
GWRC	$ 188,944,671	$ -	$ 2,821,152	$ 11,582,452	$ 13,368,008	$ 13,759,561	$ 14,165,634	$ 14,581,312	$ 15,381,808	$ 15,967,563	$ 16,446,590	$ 16,939,988	$ 17,448,187	$ 17,971,633	$ 18,510,782
ECan	$ 46,335,890	$ -	$ 2,286,059	$ 3,027,498	$ 3,422,542	$ 3,481,212	$ 3,539,899	$ 3,600,202	$ 3,661,533	$ 3,723,909	$ 3,787,349	$ 3,851,869	$ 3,917,489	$ 3,984,227	$ 4,052,102
RC	$ 43,283,630	$ -	$ -	$ 1,254,431	$ 3,512,848	$ 3,570,398	$ 3,629,217	$ 3,689,341	$ 3,750,811	$ 3,813,669	$ 3,877,958	$ 3,943,723	$ 4,011,011	$ 4,079,870	$ 4,150,351

Table 37 Regional Upgrade decongestion benefits - nominal and present value (at 4%)

	Total patronage	1/07/2022	1/07/2023	1/07/2024	1/07/2025	1/07/2026	1/07/2027	1/07/2028	1/07/2029	1/07/2030	1/07/2031	1/07/2032	1/07/2033	1/07/2034	1/07/2035
AT	33,477,535.62	-	-	-	-	2,791,800	2,896,124	2,999,873	3,135,054	3,264,702	3,395,290	3,531,101	3,672,345	3,819,239	3,972,009
GWRC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total benefit	**1/07/2022**	**1/07/2023**	**1/07/2024**	**1/07/2025**	**1/07/2026**	**1/07/2027**	**1/07/2028**	**1/07/2029**	**1/07/2030**	**1/07/2031**	**1/07/2032**	**1/07/2033**	**1/07/2034**	**1/07/2035**
AT	428,683,449.60	-	-	-	-	35,749,297	37,085,176	38,413,692	40,144,700	41,804,856	43,477,050	45,216,132	47,024,778	48,905,769	50,862,000
GWRC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Convenience of not needing to top up

Customers who use bank-issued debit or credit card (whether physical or virtual) under an account-based and open loop hybrid system no longer need to top-up a transit card – HOP, Snapper, Metrocard or Bee Card – resulting in a time (and cost) saving. The key assumptions are that:

- The NTS conversion rate from transit card to bank-issued cards is estimated at 75% whereas GW estimate the Snapper on rail conversion rate from transit card to bank-issued cards at 10%
- For the Regional Upgrade option, introducing Snapper on rail will require rail customers to regularly top up their Snapper cards, which increases the time incurred
- The number of annual Snapper on rail top ups is based on the proportion of rail to bus patronage
- GW estimate the time spent topping up on average across the channels as follows:

Table 38 Regional Upgrade assumptions for time spent topping up

	NTS All % of total	Regional Upgrade AT and GW % of total	ECan and RC % of total	Time spent to top-up (minutes)	Time Value of Money
Merchant top-ups	18%	21%	50%	4.00	11.69
Kiosk top-ups	18%	21%	50%	4.00	11.69
IOS top-ups	33%	29%	-	0.50	11.69
Android top-ups	33%	30%	-	0.50	11.69
Total	**100%**	**100%**	**100%**	**1.96396***	

*weighted average

Table 39 NTS customers value of time to trop up transit cards

NTS	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
AT	23,194,678	1,802,836	2,933,500	1,719,140	533,643	909,822	1,511,457	1,488,005	1,555,058	1,619,366	1,684,141	1,751,506	1,821,567	1,894,429	1,970,207
GW	6,618,182	661,100	749,761	133,588	166,231	282,231	465,310	455,225	480,216	498,503	513,458	528,862	544,728	561,069	577,901
ECAN	2,294,077	515,789	99,209	48,065	58,583	98,289	160,056	154,715	157,350	160,031	162,757	165,530	168,350	171,218	174,135
RC	3,751,327	547,769	779,253	644,816	64,039	107,363	174,766	168,856	171,669	174,546	177,488	180,498	183,578	186,730	189,955
Total Value of Time Spent Topping up	**35,858,265**	**3,527,494**	**4,561,723**	**2,545,610**	**822,496**	**1,397,705**	**2,311,590**	**2,266,800**	**2,364,293**	**2,452,446**	**2,537,844**	**2,626,396**	**2,718,222**	**2,813,446**	**2,912,198**
Present value	**28,302,697**														

Table 40 Regional Upgrade customers value of time to trop up transit cards

Regional Upgrade	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
AT	32,894,903	1,802,836	2,933,500	4,267,778	4,984,878	1,576,625	1,635,540	1,694,131	1,770,472	1,843,689	1,917,436	1,994,134	2,073,899	2,156,855	2,243,129
GW	20,942,465	594,990	889,665	1,210,858	1,397,524	1,438,458	1,480,910	1,524,366	1,608,052	1,669,288	1,719,367	1,770,948	1,824,076	1,878,799	1,935,163
ECAN	15,605,192	515,789	744,461	985,913	1,114,560	1,133,666	1,152,777	1,172,415	1,192,388	1,212,701	1,233,360	1,254,371	1,275,740	1,297,474	1,319,578
RC	16,962,671	547,769	779,253	1,058,680	1,218,359	1,238,320	1,258,720	1,279,573	1,300,892	1,322,693	1,344,991	1,367,800	1,391,137	1,415,020	1,439,465
Total Value of Time Spent Topping up	**86,405,232**	**3,461,384**	**5,346,880**	**7,523,228**	**8,715,321**	**5,387,069**	**5,527,947**	**5,670,485**	**5,871,804**	**6,048,371**	**6,215,154**	**6,387,253**	**6,564,853**	**6,748,147**	**6,937,334**
Present value	**67,144,994**														

Table 41 Do Nothing customers value of time to trop up transit cards

Do Nothing	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
AT	75,773,016	1,802,836	2,933,500	4,267,778	4,984,878	5,152,369	5,344,903	5,536,375	5,785,857	6,025,127	6,266,132	6,516,777	6,777,448	7,048,546	7,330,488
GW	23,269,406	661,100	988,517	1,345,398	1,552,805	1,598,287	1,645,456	1,693,740	1,786,724	1,854,765	1,910,408	1,967,720	2,026,751	2,087,554	2,150,181
ECAN	15,605,192	515,789	744,461	985,913	1,114,560	1,133,666	1,152,777	1,172,415	1,192,388	1,212,701	1,233,360	1,254,371	1,275,740	1,297,474	1,319,578
RC	16,962,671	547,769	779,253	1,058,680	1,218,359	1,238,320	1,258,720	1,279,573	1,300,892	1,322,693	1,344,991	1,367,800	1,391,137	1,415,020	1,439,465
Total Value of Time Spent Topping up	**131,610,285**	**3,527,494**	**5,445,731**	**7,657,768**	**8,870,602**	**9,122,642**	**9,401,856**	**9,682,103**	**10,065,862**	**10,415,286**	**10,754,890**	**11,106,668**	**11,471,078**	**11,848,594**	**12,239,711**
Present value	**99,429,292**														

Economic costs – NTS detailed cost projection

The economic costs described in Section 4, Economic Case were derived from a detailed Total Cost of Ownership model comprising a range of capital and operating inputs and calculations that result in the estimate of the total costs over the 14 years expected operation of the NTS accounts-based, open-loop solution.

The detailed inputs are set out in Appendix 10.

The following cashflow projections of the operating and capital costs for each option are a key output from the model. The base year dollars are 2022/23, and the present value calculation of the costs is at a discount rate of 4% over 14 years.

Table 42 NTS capital and operating cost projection over 14 years

	Total $	2022 $	2023 $	2024 $	2025 $	2026 $	2027 $	2028 $	2029 $	2030 $	2031 $	2032 $	2033 $	2034 $	2035 $
Capital Expenditure Cost Category															
Software + licenses															
Equipment - back office															
Equipment - front office															
Compliance + certification			-												
Design, build, test															
Merchant acquirer setup															
Transit card programme manager setup															
Retail network manager setup															
Shared Service Organisation (SSO) setup															
	138,857,056														
Operating Cost Category															
Ticketing provider costs															
Front office maintenance															
Merchant acquirer (MA)															
Program manager costs (TCPM)															
Retail network manager costs (RNM)															
PTA ticketing solution costs															
SSO establishment costs - opex portion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SSO support costs															
	994,717,131														
Transition & existing system run-out costs															
Cubic Transition costs															
PTA Transition costs															
	204,016,543														
Risk Adjustments															
Non-pricing risk															
Total Cost of NTS scenario	**1,338,137,814**	**159,124,428**	**151,824,412**	**238,018,139**	**127,121,249**	**67,861,933**	**67,083,390**	**68,963,451**	**64,142,295**	**64,371,805**	**64,667,725**	**65,245,930**	**64,127,633**	**70,193,316**	**65,392,108**
Present value	**1,115,895,825**														

Table 43 Regional Upgrade capital and operating cost projection over 14 years

	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
Operating Cost Category															
Ticketing provider costs	[redacted]														
Front office maintenance (opex)	-														
Merchant acquirer (MA)	[redacted]														
Program manager costs (TCPM)	[redacted]														
Retail network manager costs (RNM)	[redacted]														
PTA ticketing solution costs	[redacted]														
SSO establishment costs (capex - duplicate)	-														
SSO support costs	[redacted]														
	[redacted]														
Capital Expenditure Cost Category															
Software + licenses	[redacted]														
Equipment - back office	[redacted]														
Equipment - front office	[redacted]														
Compliance + certification	[redacted]														
Design, build, test	[redacted]														
Merchant acquirer setup	[redacted]														
Transit card programme manager setup	[redacted]														
Retail network manager setup	[redacted]														
Shared Service Organisation setup	[redacted]														
	[redacted]														
Total capex + opex before adjustments	[redacted]														
Risk adjustments															
TSP pricing risk adjustments	[redacted]														
TSP non-pricing risk adjustments	-														
	[redacted]														
Transition costs	[redacted]	[redacted]													
Total cost of NTS system	**1,090,812,328**	**83,630,734**	**70,623,771**	**65,146,403**	**91,555,996**	**111,482,997**	**66,286,784**	**67,866,552**	**71,797,747**	**74,485,858**	**80,346,251**	**72,425,768**	**84,040,546**	**74,888,753**	**76,234,170**
Present value	**858,441,067**														

Table 44 Do Nothing capital and operating cost projection over 14 years

	Total $	2022 $	2023 $	2024 $	2025 $	2026 $	2027 $	2028 $	2029 $	2030 $	2031 $	2032 $	2033 $	2034 $	2035 $
Operating Cost Category															
Ticketing provider costs															
Front office maintenance (opex)															
Merchant acquirer (MA)															
Program manager costs (TCPM)															
Retail network manager costs (RNM)															
PTA ticketing solution costs															
SSO establishment costs (capex - duplicate)															
SSO support costs															
Capital Expenditure Cost Category															
Software + licenses															
Equipment - back office															
Equipment - front office															
Compliance + certification															
Design, build, test															
Merchant acquirer setup															
Transit card programme manager setup															
Retail network manager setup															
Shared Service Organisation setup															
Total capex + opex before adjustments															
Transition costs															
Total cost of NTS system	**784,171,091**	**69,179,762**	**46,035,705**	**49,720,129**	**52,140,611**	**52,681,994**	**53,283,948**	**54,231,040**	**60,993,755**	**64,660,020**	**70,047,995**	**57,366,583**	**57,836,321**	**58,658,860**	**59,511,668**
Present value	**611,335,528**														

Sensitivity Analysis

Scenario Details	NTS Benefits $	NTS Costs $	Regional Scenario Benefits $	Regional Scenario Costs $	Do Nothing Benefits $	Do Nothing Costs $	NTS vs Regional BCR	NTS vs Regional % change	NTS vs DN BCR	NTS vs DN BCR % change	Regional vs DN BCR	Regional vs DN BCR % change
Current Scenarios - NTS, Regional Upgrade and Do Nothing	**916,575,988**	**1,115,895,825**	**471,508,411**	**858,441,067**	**- 99,429,292**	**611,335,528**	**1.73**		**2.01**		**2.31**	
NTS costs +10%	916,575,988	1,227,485,407	471,508,411	858,441,067	- 99,429,292	611,335,528	1.21	-30%	1.65	-18%	2.31	0%
NTS & Regional costs +10%	916,575,988	1,227,485,407	471,508,411	944,285,173	- 99,429,292	611,335,528	1.57	-9%	1.65	-18%	1.71	-26%
NTS costs +20%	916,575,988	1,339,074,989	471,508,411	858,441,067	- 99,429,292	611,335,528	0.93	-46%	1.40	-31%	2.31	0%
NTS & Regional costs +20%	916,575,988	1,339,074,989	471,508,411	1,030,129,280	- 99,429,292	611,335,528	1.44	-17%	1.40	-31%	1.36	-41%
NTS benefits -10%	824,918,389	1,115,895,825	471,508,411	858,441,067	- 99,429,292	611,335,528	1.37	-21%	1.83	-9%	2.31	0%
NTS & Regional benefits -10%	824,918,389	1,115,895,825	424,357,570	858,441,067	- 99,429,292	611,335,528	1.56	-10%	1.83	-9%	2.12	-8%
NTS benefits -20%	733,260,790	1,115,895,825	471,508,411	858,441,067	- 99,429,292	611,335,528	1.02	-41%	1.65	-18%	2.31	0%
NTS & Regional benefits -20%	733,260,790	1,115,895,825	377,206,729	858,441,067	- 99,429,292	611,335,528	1.38	-20%	1.65	-18%	1.93	-17%
Capex cost +10%	916,575,988	1,129,994,030	471,508,411	874,358,848	- 99,429,292	613,185,182	1.74	1%	1.97	-2%	2.19	-5%
Capex cost +20%	916,575,988	1,144,092,236	471,508,411	890,276,630	- 99,429,292	615,034,837	1.75	1%	1.92	-5%	2.07	-10%
Capex cost +30%	916,575,988	1,158,190,442	471,508,411	906,194,411	- 99,429,292	616,884,491	1.77	2%	1.88	-7%	1.97	-15%
Half price fares	928,500,260	1,076,560,602	505,080,908	858,441,067	- 49,714,646	611,335,528	1.94	12%	2.10	4%	2.25	-3%
Half price fares & 5% patronage increase	975,147,980	1,080,679,213	530,334,954	872,584,264	- 52,200,378	620,613,409	2.14	24%	2.23	11%	2.31	0%
Half price fares & 10% patronage increase	1,021,795,701	1,085,020,850	555,588,999	886,950,486	- 54,686,111	630,110,987	2.35	36%	2.37	18%	2.38	3%
Patronage Uplift 1.5%	680,425,971	1,115,333,148	336,911,037	857,752,328	- 99,429,292	611,335,528	1.33	-23%	1.55	-23%	1.77	-23%
Patronage Uplift 2.5%	1,152,726,005	1,116,458,501	606,105,785	859,129,805	- 99,429,292	611,335,528	2.12	23%	2.48	23%	2.85	23%
10% efficeincy in ongoing PTA costs in NTS scenario	916,575,988	1,103,881,031	471,508,411	858,441,067	- 99,429,292	611,335,528	1.81	5%	2.06	2%	2.31	0%
10% efficeincy in ongoing SSO costs in NTS scenario	916,575,988	1,101,422,696	471,508,411	858,441,067	- 99,429,292	611,335,528	1.83	6%	2.07	3%	2.31	0%
3% Discount Rate	987,157,760	1,164,304,708	513,708,467	908,517,621	- 106,320,217	648,495,313	1.85	7%	2.12	5%	2.38	3%
6% Discount Rate	794,314,441	1,030,504,611	398,876,711	770,983,648	- 87,471,816	546,613,113	1.52	-12%	1.82	-10%	2.17	-6%
90% patronage	829,753,948	1,105,853,787	422,801,744	832,418,519	- 91,070,744	594,613,318	1.49	-14%	1.8	-11%	2.16	-6%

Appendix 9 - NTS total cost of ownership model - input assumptions and cost drivers

The following tables set out the key cost driver assumptions for the cost estimations calculated in the NTS total cost of ownership model.

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Passenger trips															
AT	-	-	86,881,891	137,753,289	142,381,788	147,702,308	152,993,503	159,887,739	166,499,784	173,159,775	180,086,166	187,289,612	194,781,197	202,572,445	210,675,343
GWRC	-	12,936,779	41,310,043	42,910,578	44,167,441	45,470,914	46,805,217	49,374,766	51,255,007	52,792,657	54,376,437	56,007,730	57,687,962	59,418,601	61,201,159
ECan	-	14,429,889	14,863,294	15,122,460	15,381,695	15,641,000	15,907,450	16,178,441	16,454,049	16,734,354	17,019,436	17,309,377	17,604,259	17,904,166	17,908,483
Waikato	-	-	1,781,536	4,467,777	4,512,455	4,557,579	4,603,155	4,649,187	4,695,679	4,742,635	4,790,062	4,837,962	4,886,342	4,935,205	4,984,557
Bay of Plenty	-	-	1,243,805	3,150,126	3,213,128	3,277,391	3,342,939	3,409,797	3,477,993	3,547,553	3,618,504	3,690,874	3,764,692	3,839,986	3,916,785
Northland	-	-	150,875	374,471	381,961	389,600	397,392	405,340	413,447	421,716	430,150	438,753	447,528	456,479	465,608
Hawke's Bay	-	-	298,528	756,068	771,190	786,613	802,346	818,393	834,760	851,456	868,485	885,854	903,572	921,643	940,076
Taranaki	-	-	357,758	932,727	979,363	1,028,331	1,079,748	1,133,735	1,190,422	1,249,943	1,312,440	1,378,062	1,446,965	1,519,314	1,595,279
Manawatu-Whanganui	-	-	593,172	1,502,299	1,532,345	1,562,992	1,594,252	1,626,137	1,658,660	1,691,833	1,725,670	1,760,183	1,795,387	1,831,294	1,867,920
Nelson	-	-	201,865	501,029	511,049	521,270	531,696	542,330	553,176	564,240	575,525	587,035	598,776	610,751	622,966
Otago	-	-	1,789,837	4,488,596	4,533,481	4,578,816	4,624,604	4,670,850	4,717,559	4,764,735	4,812,382	4,860,506	4,909,111	4,958,202	5,007,784
Invercargill	-	-	87,003	221,428	226,964	232,638	238,454	244,415	250,525	256,788	263,208	269,788	276,533	283,446	290,533
Gisborne	-	-	54,650	136,306	139,714	143,207	146,787	150,456	154,218	158,073	162,025	166,076	170,228	174,483	178,845
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0	27,366,668	149,614,258	212,317,153	218,732,574	225,892,660	233,067,542	243,091,586	252,155,279	260,935,758	270,040,489	279,481,814	289,272,551	299,426,015	309,655,339
Estimated number of daily aggregated transactions (assuming 2.2 trips on average per day per customer; includes all transaction types including Contactless, Transit card, SuperGold, QR code)															
AT	-	-	39,491,769	62,615,131	64,718,995	67,137,413	69,542,501	72,676,245	75,681,720	78,708,989	81,857,348	85,131,642	88,536,908	92,078,384	95,761,519
GWRC	-	5,880,354	18,777,292	19,504,808	20,076,110	20,668,597	21,275,099	22,443,075	23,297,730	23,996,662	24,716,562	25,458,059	26,221,801	27,008,455	27,818,708
ECan	-	6,559,041	6,756,043	6,873,845	6,991,679	7,109,546	7,230,659	7,353,837	7,479,113	7,606,525	7,736,107	7,867,899	8,001,936	8,138,257	8,140,219
Waikato	-	-	809,789	2,030,808	2,051,116	2,071,627	2,092,343	2,113,267	2,134,399	2,155,743	2,177,301	2,199,074	2,221,065	2,243,275	2,265,708
Bay of Plenty	-	-	565,366	1,431,875	1,460,513	1,489,723	1,519,518	1,549,908	1,580,906	1,612,524	1,644,775	1,677,670	1,711,224	1,745,448	1,780,357
Northland	-	-	68,579	170,214	173,619	177,091	180,633	184,245	187,930	191,689	195,523	199,433	203,422	207,490	211,640
Hawke's Bay	-	-	135,695	343,667	350,541	357,552	364,703	371,997	379,437	387,025	394,766	402,661	410,714	418,929	427,307
Taranaki	-	-	162,617	423,967	445,165	467,423	490,794	515,334	541,101	568,156	596,564	626,392	657,712	690,597	725,127
Manawatu-Whanganui	-	-	269,624	682,863	696,521	710,451	724,660	739,153	753,936	769,015	784,395	800,083	816,085	832,407	849,055
Nelson	-	-	91,757	227,740	232,295	236,941	241,680	246,513	251,444	256,473	261,602	266,834	272,171	277,614	283,166
Otago	-	-	813,562	2,040,271	2,060,673	2,081,280	2,102,093	2,123,114	2,144,345	2,165,788	2,187,446	2,209,321	2,231,414	2,253,728	2,276,265
Invercargill	-	-	39,547	100,649	103,165	105,744	108,388	111,098	113,875	116,722	119,640	122,631	125,697	128,839	132,060
Gisborne	-	-	24,841	61,957	63,506	65,094	66,721	68,389	70,099	71,852	73,648	75,489	77,376	79,311	81,293
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	12,439,395	68,006,481	96,507,797	99,423,897	102,678,482	105,939,792	110,496,176	114,616,036	118,607,163	122,745,677	127,037,188	131,487,523	136,102,734	140,752,427

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Number of buses															
AT	-	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340
GWRC	466	466	466	466	466	466	466	466	466	466	466	466	466	466	466
ECan	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305
Waikato	-	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Bay of Plenty	-	125	125	125	125	125	125	125	125	125	125	125	125	125	125
Northland	-	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Hawke's Bay	-	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Taranaki	-	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Manawatu-Whanganui	-	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Nelson	-	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Otago	-	96	96	96	96	96	96	96	96	96	96	96	96	96	96
Invercargill	-	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Gisborne	-	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	771	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614
Number of validators onboard vehicles															
AT	-	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974
GWRC	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166	1,166
ECan	602	602	602	602	602	602	602	602	602	602	602	602	602	602	602
Waikato	-	222	222	222	222	222	222	222	222	222	222	222	222	222	222
Bay of Plenty	-	246	246	246	246	246	246	246	246	246	246	246	246	246	246
Northland	-	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Hawke's Bay	-	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Taranaki	-	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Manawatu-Whanganui	-	86	86	86	86	86	86	86	86	86	86	86	86	86	86
Nelson	-	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Otago	-	192	192	192	192	192	192	192	192	192	192	192	192	192	192
Invercargill	-	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Gisborne	-	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1,768	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678	5,678
Number of platform & mobile validators & CSC acceptance devices															
AT	-	249	249	249	249	249	249	249	249	249	249	249	249	249	249
GWRC	162	162	162	162	162	162	162	162	162	162	162	162	162	162	162
ECan	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Waikato	-	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Bay of Plenty	-	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Northland	-	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Hawke's Bay	-	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Taranaki	-	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Manawatu-Whanganui	-	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Nelson	-	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Otago	-	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Invercargill	-	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Gisborne	-	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	178	481	481	481	481	481	481	481	481	481	481	481	481	481	481

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Number of driver consoles															
AT	-	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340
GWRC	466	466	466	466	466	466	466	466	466	466	466	466	466	466	466
ECan	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305
Waikato	-	111	111	111	111	111	111	111	111	111	111	111	111	111	111
Bay of Plenty	-	125	125	125	125	125	125	125	125	125	125	125	125	125	125
Northland	-	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Hawke's Bay	-	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Taranaki	-	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Manawatu-Whanganui	-	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Nelson	-	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Otago	-	96	96	96	96	96	96	96	96	96	96	96	96	96	96
Invercargill	-	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Gisborne	-	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	771	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614	2,614
Number of ticketing vending machines & ticket kiosks															
AT	-	120	120	120	120	120	120	120	120	120	120	120	120	120	120
GWRC	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	34	154	154	154	154	154	154	154	154	154	154	154	154	154	154
Number of inspection devices															
AT	-	200	200	200	200	200	200	200	200	200	200	200	200	200	200
GWRC	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bay of Plenty	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Northland	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hawke's Bay	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Taranaki	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manawatu-Whanganui	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	50	263	263	263	263	263	263	263	263	263	263	263	263	263	263

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
Number of gates															
AT	-	143	143	143	143	143	143	143	143	143	143	143	143	143	143
GWRC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
ECan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waikato	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bay of Plenty	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawke's Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taranaki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manawatu-Whanganui	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nelson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Otago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Invercargill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gisborne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	6	149	149	149	149	149	149	149	149	149	149	149	149	149	149
Merchant acquirer operating cost $															
AT	-	2,478,874	3,825,641	3,540,426	3,029,042	2,170,654	2,251,841	2,324,661	2,394,907	2,466,315	2,538,813	2,612,315	2,686,724	2,761,929	35,082,144
GWRC	323,426	1,203,355	1,221,240	1,134,975	976,412	715,997	759,193	789,707	813,863	838,752	864,396	890,817	918,038	946,085	12,396,255
ECan	338,413	407,796	402,964	365,895	304,434	209,770	211,793	213,782	215,733	217,640	219,499	221,304	223,048	219,237	3,771,310
Waikato	-	49,410	120,884	109,313	90,834	62,987	63,319	63,647	63,970	64,289	64,604	64,914	65,219	65,518	948,909
Bay of Plenty	-	32,478	80,245	72,773	60,180	40,527	41,148	41,775	42,410	43,051	43,699	44,353	45,014	45,682	633,335
Northland	-	3,395	8,052	7,038	5,408	2,930	2,853	2,768	2,675	2,571	2,457	2,333	2,197	2,049	46,727
Hawke's Bay	-	7,976	19,857	18,224	15,366	10,818	11,139	11,466	11,798	12,137	12,481	12,832	13,189	13,552	170,836
Taranaki	-	10,514	26,878	25,581	22,582	17,111	18,044	19,025	20,057	21,142	22,283	23,482	24,743	26,070	277,511
Manawatu-Whanganui	-	16,785	41,419	37,846	31,826	22,434	22,705	22,972	23,236	23,497	23,753	24,004	24,250	24,489	339,216
Nelson	-	4,862	11,687	10,478	8,453	5,305	5,380	5,457	5,533	5,611	5,688	5,767	5,845	5,924	85,990
Otago	-	48,683	118,494	106,200	86,920	58,180	57,698	57,156	56,553	55,884	55,147	54,336	53,448	52,478	861,177
Invercargill	-	2,235	5,544	5,037	4,160	2,771	2,821	2,872	2,923	2,974	3,026	3,079	3,132	3,185	43,759
Gisborne	-	1,571	3,834	3,556	3,052	2,234	2,302	2,373	2,445	2,518	2,594	2,672	2,751	2,832	34,733
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	661,839	4,267,932	5,886,739	5,437,342	4,638,669	3,321,719	3,450,236	3,557,661	3,656,103	3,756,383	3,858,440	3,962,206	4,067,598	4,169,032	54,691,901
Program manager operating cost $															
AT	-	942,089	1,540,169	2,505,524	3,778,136	5,701,844	5,136,824	5,367,767	5,768,387	6,153,032	6,693,091	6,085,628	6,306,702	6,541,402	62,520,597
GWRC	436,359	447,938	479,767	777,224	1,163,119	1,744,362	1,586,297	1,652,404	1,758,656	1,857,888	2,001,525	1,802,368	1,849,883	1,900,277	19,458,069
ECan	486,722	161,168	169,079	270,675	400,087	592,847	519,776	530,460	557,463	581,506	618,578	550,017	557,412	556,053	6,551,843
Waikato	-	19,318	49,953	79,407	116,580	171,553	149,368	151,383	157,989	163,663	172,892	152,666	153,648	154,769	1,693,188
Bay of Plenty	-	13,487	35,220	56,542	83,834	124,586	109,549	112,127	118,178	123,634	131,899	117,622	119,551	121,615	1,267,844
Northland	-	1,636	4,187	6,721	9,966	14,810	13,023	13,329	14,048	14,697	15,680	13,982	14,212	14,457	150,748
Hawke's Bay	-	3,237	8,453	13,571	20,121	29,902	26,293	26,912	28,364	29,674	31,657	28,231	28,694	29,189	304,298
Taranaki	-	3,879	10,428	17,234	26,304	40,241	36,424	38,378	41,639	44,842	49,247	45,208	47,301	49,533	450,659
Manawatu-Whanganui	-	6,432	16,797	26,965	39,980	59,415	52,244	53,473	56,359	58,961	62,903	56,094	57,014	57,998	604,636
Nelson	-	2,189	5,602	8,993	13,334	19,816	17,424	17,834	18,796	19,664	20,979	18,708	19,015	19,343	201,695
Otago	-	19,408	50,185	79,777	117,123	172,352	150,064	152,089	158,725	164,425	173,698	153,377	154,364	155,490	1,701,078
Invercargill	-	943	2,476	3,994	5,951	8,887	7,852	8,077	8,554	8,993	9,641	8,640	8,825	9,021	91,854
Gisborne	-	593	1,524	2,459	3,663	5,471	4,834	4,972	5,266	5,536	5,935	5,318	5,432	5,553	56,555
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total	923,081	1,622,317	2,373,840	3,849,087	5,778,198	8,686,086	7,809,972	8,129,205	8,692,426	9,226,515	9,987,725	9,037,860	9,322,051	9,614,700	95,053,063

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Retail network manager operating cost $															
AT	-	355,386	526,190	721,805	989,002	1,300,466	1,491,456	1,543,779	1,596,749	1,651,777	1,708,944	1,768,339	1,830,048	1,894,418	17,378,360
GWRC	195,941	168,977	163,910	223,907	304,469	397,851	460,575	475,234	486,814	498,749	511,049	523,725	536,790	550,328	5,498,319
ECan	218,555	60,798	57,765	77,978	104,731	135,216	150,915	152,561	154,312	156,105	157,941	159,822	161,747	161,035	1,909,480
Waikato	-	7,287	17,066	22,876	30,517	39,127	43,368	43,538	43,733	43,935	44,145	44,361	44,585	44,822	469,361
Bay of Plenty	-	5,088	12,033	16,289	21,945	28,415	31,807	32,248	32,713	33,189	33,678	34,178	34,691	35,220	351,494
Northland	-	617	1,430	1,936	2,609	3,378	3,781	3,833	3,889	3,945	4,003	4,063	4,124	4,187	41,796
Hawke's Bay	-	1,221	2,888	3,910	5,267	6,820	7,634	7,740	7,851	7,966	8,083	8,203	8,326	8,453	84,363
Taranaki	-	1,463	3,563	4,965	6,886	9,178	10,576	11,038	11,526	12,038	12,574	13,136	13,726	14,345	125,013
Manawatu-Whanganui	-	2,426	5,738	7,768	10,466	13,551	15,169	15,379	15,601	15,828	16,061	16,300	16,544	16,797	167,628
Nelson	-	826	1,914	2,591	3,490	4,519	5,059	5,129	5,203	5,279	5,356	5,436	5,518	5,602	55,922
Otago	-	7,321	17,146	22,983	30,659	39,310	43,570	43,741	43,937	44,140	44,350	44,568	44,793	45,031	471,548
Invercargill	-	356	846	1,151	1,558	2,027	2,280	2,323	2,368	2,414	2,462	2,511	2,561	2,613	25,467
Gisborne	-	224	521	708	959	1,248	1,403	1,430	1,458	1,486	1,515	1,545	1,576	1,608	15,682
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total	414,496	611,990	811,008	1,108,866	1,512,558	1,981,107	2,267,594	2,337,973	2,406,153	2,476,851	2,550,162	2,626,187	2,705,028	2,784,458	26,594,431
Shared service ongoing cost $															
AT	7,852,434	8,956,185	9,109,321	9,132,638	9,147,130	8,183,319	8,221,651	8,238,173	8,259,701	8,280,348	8,301,144	8,322,772	8,996,205	9,019,598	120,020,618
GWRC	2,435,859	2,778,247	2,825,750	2,832,984	2,837,479	2,538,501	2,550,392	2,555,517	2,562,195	2,568,599	2,575,050	2,581,759	2,790,661	2,797,918	37,230,911
ECan	848,309	967,549	984,092	986,611	988,177	884,055	888,196	889,981	892,307	894,537	896,784	899,120	971,872	974,399	12,965,988
Waikato	248,864	283,845	288,698	289,437	289,897	259,351	260,566	261,089	261,772	262,426	263,085	263,771	285,113	285,855	3,803,770
Bay of Plenty	177,206	202,114	205,570	206,096	206,423	184,673	185,538	185,911	186,397	186,863	187,332	187,820	203,017	203,545	2,708,504
Northland	21,065	24,026	24,437	24,500	24,539	21,953	22,056	22,100	22,158	22,213	22,269	22,327	24,134	24,196	321,974
Hawke's Bay	42,532	48,510	49,339	49,466	49,544	44,324	44,531	44,621	44,737	44,849	44,962	45,079	48,727	48,853	650,074
Taranaki	54,012	61,604	62,658	62,818	62,918	56,288	56,552	56,666	56,814	56,956	57,099	57,248	61,880	62,041	825,553
Manawatu-Whanganui	84,510	96,389	98,037	98,288	98,443	88,071	88,483	88,661	88,893	89,115	89,339	89,572	96,819	97,071	1,291,689
Nelson	28,185	32,146	32,696	32,780	32,832	29,372	29,510	29,569	29,646	29,721	29,795	29,873	32,290	32,374	430,789
Otago	250,024	285,168	290,044	290,786	291,248	260,559	261,780	262,306	262,992	263,649	264,311	265,000	286,442	287,187	3,821,495
Invercargill	12,517	14,277	14,521	14,558	14,581	13,045	13,106	13,132	13,166	13,199	13,232	13,267	14,340	14,378	191,319
Gisborne	7,705	8,788	8,939	8,962	8,976	8,030	8,068	8,084	8,105	8,125	8,146	8,167	8,828	8,851	117,772
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total	12,063,223	13,758,848	13,994,101	14,029,923	14,052,185	12,571,541	12,630,428	12,655,810	12,688,882	12,720,600	12,752,548	12,785,773	13,820,328	13,856,265	184,380,455
Number of Transport Service Operators (TSOs, PTAs)															
AT	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
GWRC	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
ECan	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Waikato	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Bay of Plenty	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Northland	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Hawke's Bay	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Taranaki	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Manawatu-Whanganui	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Nelson	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Otago	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Invercargill	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Gisborne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marlborough	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MoE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	3	12	12	12	12	12	12	12	12	12	12	12	12

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Total number of front office devices															
AT	0	5026	5026	5026	5026	5026	5026	5026	5026	5026	5026	5026	5026	5026	5026
GWRC	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884	1,884
ECan	923	923	923	923	923	923	923	923	923	923	923	923	923	923	923
Waikato	0	346	346	346	346	346	346	346	346	346	346	346	346	346	346
Bay of Plenty	0	379	379	379	379	379	379	379	379	379	379	379	379	379	379
Northland	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51
Hawke's Bay	0	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Taranaki	0	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Manawatu-Whanganui	0	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Nelson	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Otago	0	299	299	299	299	299	299	299	299	299	299	299	299	299	299
Invercargill	0	49	49	49	49	49	49	49	49	49	49	49	49	49	49
Gisborne	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Marlborough	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MoE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2,807	2,576	3,106	9,376	9,376	9,376	9,376	9,376	9,376	9,376	9,376	9,376	9,376	9,376	9,376
Number of Transit cards issued															
AT	-	-	52,264	103,809	192,027	317,122	508,736	531,661	553,648	575,794	598,825	622,778	647,690	673,597	700,541
GWRC	-	16,545	24,850	32,337	59,568	97,628	155,637	164,182	170,434	175,547	180,813	186,238	191,825	197,580	203,507
ECan	-	18,455	8,941	11,396	20,745	33,582	52,896	53,797	54,713	55,645	56,593	57,557	58,538	59,535	59,550
Waikato	-	-	1,072	3,367	6,086	9,785	15,306	15,460	15,614	15,770	15,928	16,087	16,248	16,411	16,575
Bay of Plenty	-	-	748	2,374	4,333	7,037	11,116	11,338	11,565	11,796	12,032	12,273	12,518	12,769	13,024
Northland	-	-	91	282	515	836	1,321	1,348	1,375	1,402	1,430	1,459	1,488	1,518	1,548
Hawke's Bay	-	-	180	570	1,040	1,689	2,668	2,721	2,776	2,831	2,888	2,946	3,005	3,065	3,126
Taranaki	-	-	215	703	1,321	2,208	3,590	3,770	3,958	4,156	4,364	4,582	4,811	5,052	5,305
Manawatu-Whanganui	-	-	357	1,132	2,067	3,356	5,301	5,407	5,515	5,626	5,738	5,853	5,970	6,089	6,211
Nelson	-	-	121	378	689	1,119	1,768	1,803	1,839	1,876	1,914	1,952	1,991	2,031	2,071
Otago	-	-	1,077	3,383	6,114	9,831	15,378	15,532	15,687	15,844	16,002	16,162	16,324	16,487	16,652
Invercargill	-	-	52	167	306	499	793	813	833	854	875	897	920	943	966
Gisborne	-	-	33	103	188	307	488	500	513	526	539	552	566	580	595
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	35,000	90,000	160,000	295,000	485,000	775,000	808,332	838,471	867,668	897,943	929,337	961,894	995,656	1,029,671
Number of Transit card top-ups															
AT	-	-	836,217	1,588,285	2,707,911	4,498,561	7,216,716	7,541,917	7,853,808	8,167,960	8,494,679	8,834,466	9,187,844	9,555,358	76,483,721
GWRC	-	264,723	397,599	494,756	840,005	1,384,905	2,207,806	2,329,012	2,417,703	2,490,234	2,564,941	2,641,889	2,721,146	2,802,780	23,557,498
ECan	-	295,277	143,056	174,361	292,539	476,377	750,356	763,138	776,139	789,361	802,808	816,485	830,394	844,541	7,754,831
Waikato	-	-	17,147	51,513	85,821	138,810	217,131	219,303	221,496	223,710	225,948	228,207	230,489	232,794	2,092,368
Bay of Plenty	-	-	11,971	36,321	61,109	99,819	157,687	160,840	164,057	167,338	170,685	174,099	177,581	181,132	1,562,641
Northland	-	-	1,452	4,318	7,264	11,866	18,745	19,120	19,502	19,892	20,290	20,696	21,110	21,532	185,788
Hawke's Bay	-	-	2,873	8,717	14,667	23,958	37,847	38,604	39,376	40,163	40,966	41,786	42,622	43,474	375,053
Taranaki	-	-	3,443	10,754	18,626	31,320	50,932	53,478	56,152	58,960	61,908	65,003	68,253	71,666	550,497
Manawatu-Whanganui	-	-	5,709	17,321	29,143	47,604	75,201	76,705	78,239	79,804	81,400	83,028	84,689	86,382	745,225
Nelson	-	-	1,943	5,777	9,719	15,876	25,080	25,582	26,093	26,615	27,148	27,690	28,244	28,809	248,577
Otago	-	-	17,227	51,753	86,221	139,457	218,143	220,324	222,528	224,753	227,000	229,270	231,563	233,879	2,102,118
Invercargill	-	-	837	2,553	4,317	7,085	11,248	11,529	11,817	12,113	12,416	12,726	13,044	13,370	113,055
Gisborne	-	-	526	1,572	2,657	4,362	6,924	7,097	7,274	7,456	7,643	7,834	8,030	8,230	69,605
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total	-	560,000	1,440,000	2,448,000	4,160,000	6,880,000	10,993,814	11,466,649	11,894,184	12,308,360	12,737,831	13,183,179	13,645,009	14,123,949	115,840,977

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
Fare revenue processed with NTS (all services)															
AT	-	-	-	179,671,752	284,873,802	294,445,538	305,448,373	316,390,564	330,647,844	344,321,552	358,094,414	372,418,191	387,314,919	402,807,515	3,576,434,464
GWRC	-	-	26,753,259	85,429,169	88,739,074	91,338,269	94,033,850	96,793,190	102,107,016	105,995,354	109,175,215	112,450,471	115,823,985	119,298,705	1,147,937,556
ECan	-	-	29,841,011	30,737,293	31,273,247	31,809,345	32,345,589	32,896,607	33,457,016	34,026,973	34,606,645	35,196,194	35,795,792	36,405,608	398,391,319
Waikato	-	-	-	3,684,216	9,239,363	9,331,757	9,425,074	9,519,325	9,614,518	9,710,663	9,807,770	9,905,848	10,004,906	10,104,955	100,348,396
Bay of Plenty	-	-	-	2,572,188	6,514,460	6,644,749	6,777,644	6,913,197	7,051,461	7,192,490	7,336,340	7,483,067	7,632,728	7,785,383	73,903,708
Northland	-	-	-	312,009	774,407	789,895	805,693	821,807	838,243	855,008	872,108	889,550	907,341	925,488	8,791,548
Hawke's Bay	-	-	-	617,356	1,563,549	1,594,820	1,626,717	1,659,251	1,692,436	1,726,285	1,760,810	1,796,027	1,831,947	1,868,586	17,737,784
Taranaki	-	-	-	739,844	1,928,879	2,025,323	2,126,589	2,232,918	2,344,564	2,461,793	2,584,882	2,714,126	2,849,833	2,992,324	25,001,075
Manawatu-Whanganui	-	-	-	1,226,680	3,106,755	3,168,890	3,232,268	3,296,913	3,362,852	3,430,109	3,498,711	3,568,685	3,640,059	3,712,860	35,244,780
Nelson	-	-	-	417,457	1,036,127	1,056,850	1,077,987	1,099,547	1,121,538	1,143,968	1,166,848	1,190,185	1,213,988	1,238,268	11,762,764
Otago	-	-	-	3,701,384	9,282,416	9,375,240	9,468,992	9,563,682	9,659,319	9,755,912	9,853,471	9,952,006	10,051,526	10,152,041	100,815,988
Invercargill	-	-	-	179,922	457,913	469,361	481,095	493,122	505,450	518,086	531,038	544,314	557,922	571,870	5,310,093
Gisborne	-	-	-	113,016	281,881	288,928	296,151	303,555	311,144	318,923	326,896	335,068	343,445	352,031	3,271,038
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	56,594,270	309,402,285	439,071,873	452,338,964	467,146,021	481,983,677	502,713,401	521,457,116	539,615,148	558,443,731	577,968,391	598,215,635	5,504,950,513
Total revenue (based on assumed farebox recovery rate of 35%)															
AT	-	-	513,347,862	813,925,149	841,272,966	872,709,636	903,973,039	944,708,126	983,775,864	1,023,126,898	1,064,051,974	1,106,614,053	1,150,878,615	1,196,913,760	11,415,297,943
GWRC	-	76,437,882	244,083,340	253,540,212	260,966,482	268,668,142	276,551,970	291,734,331	302,843,869	311,929,185	321,287,060	330,925,672	340,853,442	351,079,046	3,630,900,633
ECan	-	85,260,031	87,820,837	89,352,134	90,883,842	92,415,968	93,990,305	95,591,474	97,219,924	98,876,128	100,560,554	102,273,692	104,016,022	105,788,042	1,244,048,954
Waikato	-	-	10,526,332	26,398,180	26,662,162	26,928,783	27,198,071	27,470,052	27,744,752	28,022,200	28,302,422	28,585,446	28,871,301	29,160,014	315,869,716
Bay of Plenty	-	-	7,349,109	18,612,743	18,984,998	19,364,698	19,751,992	20,147,032	20,549,972	20,960,972	21,380,191	21,807,795	22,243,951	22,688,830	233,842,282
Northland	-	-	891,455	2,212,591	2,256,843	2,301,980	2,348,019	2,394,980	2,442,879	2,491,737	2,541,572	2,592,403	2,644,251	2,697,136	27,815,845
Hawke's Bay	-	-	1,763,875	4,467,283	4,556,629	4,647,762	4,740,717	4,835,531	4,932,242	5,030,887	5,131,504	5,234,135	5,338,817	5,445,594	56,124,976
Taranaki	-	-	2,113,840	5,511,083	5,786,637	6,075,969	6,379,767	6,698,755	7,033,693	7,385,378	7,754,647	8,142,379	8,549,498	8,976,973	80,408,617
Manawatu-Whanganui	-	-	3,504,800	8,876,443	9,053,972	9,235,051	9,419,752	9,608,147	9,800,310	9,996,316	10,196,243	10,400,167	10,608,171	10,820,334	111,519,707
Nelson	-	-	1,192,733	2,960,364	3,019,572	3,079,963	3,141,562	3,204,393	3,268,481	3,333,851	3,400,528	3,468,539	3,537,909	3,608,668	37,216,564
Otago	-	-	10,575,382	26,521,187	26,786,399	27,054,263	27,324,806	27,598,054	27,874,034	28,152,775	28,434,302	28,718,645	29,005,832	29,295,890	317,341,570
Invercargill	-	-	514,062	1,308,322	1,341,030	1,374,556	1,408,920	1,444,143	1,480,246	1,517,253	1,555,184	1,594,064	1,633,915	1,674,763	16,846,458
Gisborne	-	-	322,903	805,375	825,509	846,147	867,300	888,983	911,207	933,988	957,337	981,271	1,005,803	1,030,948	10,376,770
Marlborough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
MoE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Total	-	161,697,913	884,006,529	1,254,491,067	1,292,397,040	1,334,702,917	1,377,096,221	1,436,324,002	1,489,877,475	1,541,757,567	1,595,553,518	1,651,338,261	1,709,187,527	1,769,179,996	17,497,610,034

Operating expenditure

Table 45 Detailed operating costs for the NTS

Ticketing solution provider costs	
Front office maintenance & asset management	
Fixed charge for base asset management services	[redacted]
BPO asset management services Driver Console	[redacted]
BPO asset management services On-board Validator	[redacted]
BPO asset management services Ticket Vending Machine	[redacted]
BPO asset management services Ticket Kiosk	[redacted]
BPO asset management services Access Gate - Rail	[redacted]
BPO asset management services Platform Validator - Rail	[redacted]
BPO asset management services Platform Validator - Ferry	[redacted]
BPO asset management services Mobile Validator	[redacted]
BPO asset management services CSC Acceptance Device	[redacted]
BPO asset management services Inspection Device	[redacted]
	[redacted]
Governance, relationship management, project management	
Programme management / relationship management / governance	[redacted]
Project management / project administration / other administration costs	[redacted]
Subcontractor / Consortia member relationship and contract management	[redacted]
	[redacted]
Business continuity & disaster recovery	
Disaster Recovery	[redacted]
Business Continuity Planning Services	[redacted]
	[redacted]
Integration & interfaces	
Systems Integration	[redacted]
Ongoing integration responsibility	[redacted]
	[redacted]
Operations & service delivery	
Systems and Operational Administration	[redacted]
Event, Incident and Problem Management Services	[redacted]
Delivery Management	[redacted]
Database Management	[redacted]
Configuration Management	[redacted]
Systems and Operational Administration	[redacted]
Operational Management Services	[redacted]
Service Delivery Management	[redacted]
Operational Change Management Services	[redacted]
Configuration Changes and Deployment	[redacted]
Operational Monitoring	[redacted]
Ticketing Incident Management	[redacted]
Information Systems Support Services	[redacted]
Revenue Protection Support Services	[redacted]
	[redacted]
Finance, apportionment, charging	
Financial Services	[redacted]
Fees and Charges Services	[redacted]
Back Office Financial Audit Support	[redacted]
Apportionment, Settlement, Reconciliation Operations	[redacted]
Payment Gateway Services	[redacted]
	[redacted]

Other support, licenses, maintenance	
Annual support and maintenance cost - licences	[redacted]
Annual support and maintenance cost - resources	[redacted]
Licensing Services	[redacted]
Application Support	[redacted]
	[redacted]
Customer engagement services & training	
Customer Engagement Services	[redacted]
Training Services	[redacted]
	[redacted]
Reporting, data & analytics, compliance	
Reporting and Data Services	[redacted]
Data Management Operations Services	[redacted]
Data Asset Management Services	[redacted]
Compliance and Risk Services	[redacted]
	[redacted]
Hosting & storage	
Hosting Services	[redacted]
Storage and Data Management Services	[redacted]
	[redacted]
Other back office services	
Procurement Services	[redacted]
Testing Services	[redacted]
Security Services	[redacted]
Ticketing Services	[redacted]
	[redacted]
Inflation	- [redacted]
Total Ticketing Provider Costs	[redacted]
Financial services costs	
Merchant acquirer operating costs	[redacted]
Program manager operating costs	[redacted]
Retail network manager operating costs	[redacted]
	[redacted]
PTA ticketing solution costs (TSO - based on counterfactual)	
TSO onboarding - AT	[redacted]
TSO onboarding - GWRC	[redacted]
TSO onboarding - Ecan	[redacted]
TSO onboarding - Regional Consortium (RC)	[redacted]
	[redacted]
Shared Services operating costs	
SSO ongoing staff cost	[redacted]
Facilities	[redacted]
SSO budget	[redacted]
Network Costs	[redacted]
	[redacted]
Total operating costs	**839,487,626**

Capital expenditure

Table 46 Detailed capital costs for the NTS

Ticketing solution provider costs	
Design, build, test	
Central back office design	[redacted]
Central back office build	[redacted]
Central back office customisation	[redacted]
Other central back office establishment services	[redacted]
Central back office equipment	[redacted]
Central back office licences	[redacted]
Other central back office software and licences	[redacted]
Integration to Financial Services Providers' systems	[redacted]
Interactive Voice Response system (IVR)	[redacted]
	[redacted]
Front office hardware	
Driver Console	[redacted]
On-board Validator	[redacted]
Ticket Vending Machine	[redacted]
Ticket Kiosk	[redacted]
Access Gate - Rail	[redacted]
Platform Validator - Rail	[redacted]
Platform Validator - Ferry	[redacted]
Mobile Validator	[redacted]
CSC Acceptance Device	[redacted]
Inspection Device	[redacted]
Front office hardware	[redacted]
Ticketing solution provider costs	[redacted]
Merchant acquirer setup	
Merchant acquirer implementation costs	[redacted]
Re-procurement after 6 years	[redacted]
Re-procurement after 12 years	[redacted]
	[redacted]
Transit card programme manager setup	
Program manager implementation costs	[redacted]
Re-procurement after 6 years	[redacted]
Re-procurement after 12 years	[redacted]
	[redacted]
Retail network manager setup	
Retail network manager implementation costs	[redacted]
Re-procurement after 6 years	[redacted]
Re-procurement after 12 years	[redacted]
	[redacted]
Financial services costs (MA, RNM, TCPM)	[redacted]

Shared service organisation establishment	
SSO Establishment Planning	[redacted]
SSO Procurement (Est.)	[redacted]
SSO Legal Services (Est.)	[redacted]
SSO TSO Consultation & Comms	[redacted]
SSO Facilities leasing	[redacted]
SSO Facilities Fit-out - Gen	[redacted]
SSO Facilities Fit-out - CC	[redacted]
SSO Infrastructure install	[redacted]
SSO Recruitment & Training	[redacted]
SSO Operational Services Est.	[redacted]
SSO Reporting establishment	[redacted]
SSO Process & Document Est.	[redacted]
SSO BCP plan development & est.	[redacted]
SSO Systems - Ticketing Solution	[redacted]
SSO Systems - Financial Services	[redacted]
SSO establishment Contingency	[redacted]
	[redacted]
Total Capital Costs (Nominal over 15 years)	**$138,857,056**

Appendix 10 - Key Risks

Key risks	Mitigation Approach
Operational Risks	
Prolonged approvals process The current target date of early 2023 as a pilot for ECan cannot be met due to a prolonged contract approvals process	Consider an at risk 'early works' programme ahead of contract signature to manage timelines Develop & maintain a realistic integrated programme plan as the basis for all time-based decision making when choosing target dates
A slow or extended approvals process extends the implementation timeline resulting in some Participants not joining	Sign up all NTS participants to the NTS Participation Agreement as soon as possible Senior level engagement between Waka Kotahi officers and equivalent PTA participant officers to ensure ongoing commitment Develop plan for approvals and gain NTS Steering Group agreement in advance
Waka Kotahi does not have the capability to act as the shared service organisation (TTP) resulting in inefficiency and delay to the NTS implementation & operations	Waka Kotahi formal ELT agreement to establishing TTP including a supporting organisational design Clearly defined roles and responsibilities for TTP resources Clear internal Waka Kotahi Governance groups to oversee appropriate resourcing, reporting & stewardship Agreed ongoing budget for TTP and supporting controls
Waka Kotahi does not establish the shared service organisation (TTP) in a timely manner delaying the programme and increasing reliance on expensive contracting resource	TTP establishment and resourcing plan signed off as soon as practical Active recruitment of new permanent resources Agreed transition plan for knowledge handover from contracting resource to Waka Kotahi Contracts in place for ongoing consulting services where required
Lack of capacity and capability Unable to secure appropriate TTP staff due to market limitations which affects capability to manage, deploy and operate the NTS	TTP establishment and resourcing plan signed off as soon as practical and active recruitment to commence Consider plans to invest in non-ticketing staff through training and education & early involvement in the NTS Consider active secondments of ticketing staff resources from PTA participants
Covid-19 impacts on staff and suppliers affecting time, cost and quality of the NTS	Manage Covid-19 risks in line with Waka Kotahi policy Supplier will establish a local capability within NZ to mitigate risks of international travel Co-locate Waka Kotahi staff and supplier staff in NZ where possible & practical
Digital	
Complex data sharing arrangements between many participants creates potential security or privacy gaps in the NTS	Independent review of security & privacy implications at the NTS design phase Privacy impact assessments at appropriate points in NTS development, including engagement of Waka Kotahi Security/Privacy staff (or their delegates) as required

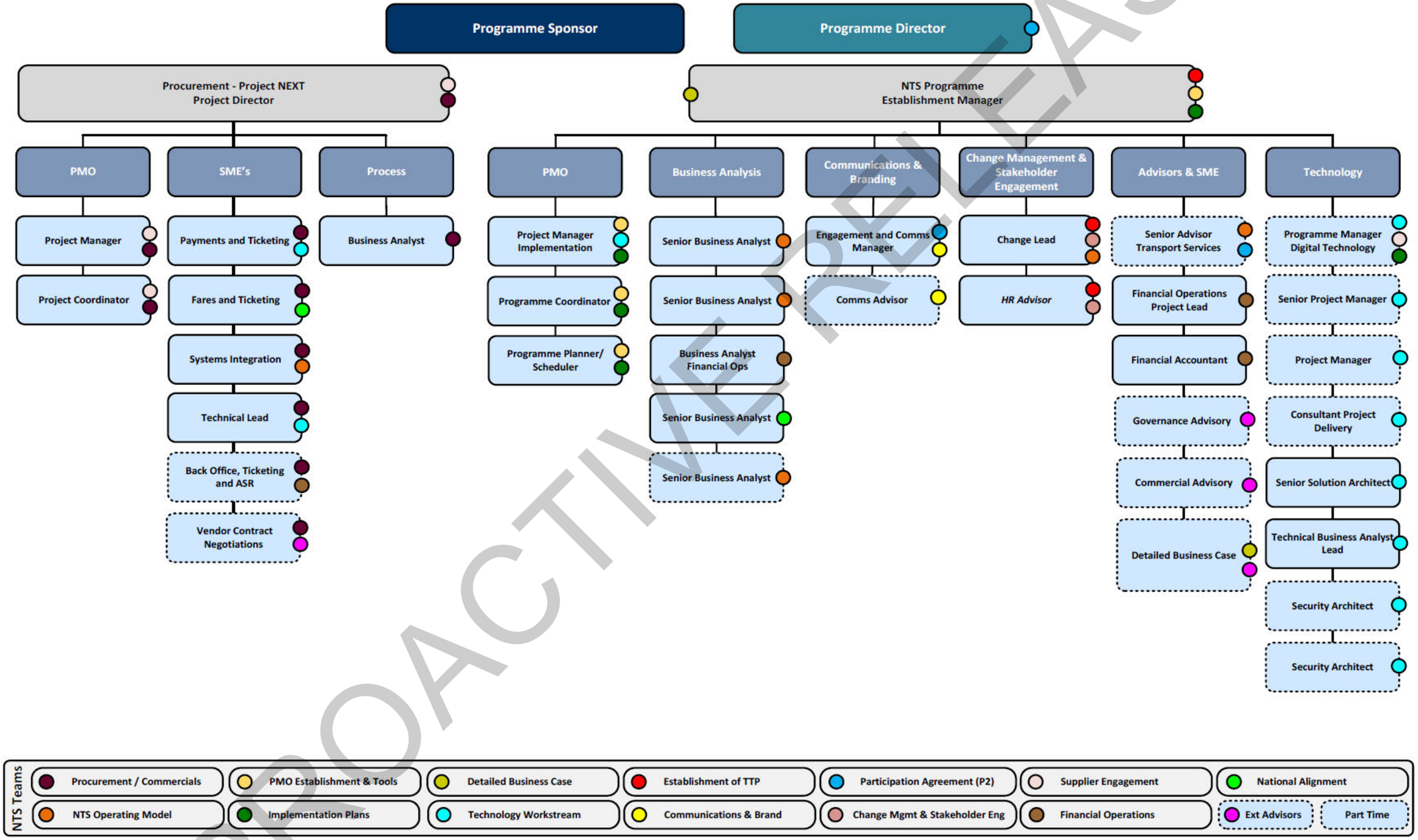
	Adequate contractual provisions for suppliers to comply with NTS requirements and to maintain compliance across the contract life Adequate Waka Kotahi policies & controls assuring security is operating as expected and regular audits to check Maintain PCI/DSS accreditation including supporting controls
Nature of data collected by the NTS makes the system a target for accidental and malicious actors	Ensure comprehensive security & privacy regime for all aspects of the NTS, suppliers, systems, processes, staff Develop comprehensive & timely reporting processes to detect and report any system breach or control failure
The end to end NTS is not secured adequately resulting in an information security & privacy breach	Involvement and independent review of security by Waka Kotahi staff at all key risk points over the life of the NTS, including in design/build/test phases, implementation, operations, and during transition Processes in place to detect & report on any security or control failures in a timely way Daily assurance over NTS operation, system security & integrity Maintain PCI/DSS accreditation including supporting controls
Contracted suppliers store personal data offshore in a jurisdiction which exposes the NTS and its customers to privacy risks	Review ticketing and financial supplier contracts carefully before signing, and take legal and other advice on the adequacy of data security, storage & transfer provisions, and obligations to make good on any failure Include provisions in Participation Agreements for similar requirements between participants Detailed consideration given to Te Tiriti in co-design and user experience including sovereignty of data.
Suppliers	
Lack of capacity and capability Supplier capability to deliver the NTS is compromised through an overseas location, differing time zones, and differing global priorities of work	Undertake due diligence process to ensure supplier responses are backed up by actual behaviour and experience in other jurisdictions Agree formal governance arrangements as part of the contracting process to ensure correct supplier behaviours at the right time and place Engage with existing customers of the chosen supplier where possible to gain visibility of the global workload and to agree mutually beneficial roadmaps where this is possible
Ability of suppliers to deliver the agreed scope within the committed timescales	Undertake due diligence process to ensure supplier responses are backed up by on time delivery in other jurisdictions Meet internal approvals deadlines according to supplier requirements so as not to be the main cause of delay for NTS rollout
Technology lock-in The choice of NTS results in technology lock-in and a potential	Due diligence for existing solutions including overseas experiences Contractual break points at sensible times

lack of flexibility through contract length of 10+ years	Ensure sufficient flexibility to negotiate with the chosen supplier during the contract to bring services in-house, or to potentially outsource more services to the supplier without a fundamental contract renegotiation
Integration not managed Integration between the different suppliers is not managed by the preferred supplier within expected boundaries & timeframes	Ensure early engagement between suppliers before contracts are signed to ensure they can work together properly Simplify the solution where practical to reduce interdependencies between competitors Actively manage suppliers
Technical failure Major technical failure results in loss or lack of service and no revenue collections	Ensure appropriate remediation clauses in contracts Develop recovery plans for an event and practice/test these regularly Due diligence with other customers to assess the risk of this kind of event and how to manage Connect in other necessary elements such as communications to manage events
Participants	
Key Participant withdraws Key Participant(s) does not sign or withdraws from the NTS, affecting viability	Senior level engagement between Waka Kotahi officers and equivalent PTA participant officers to ensure ongoing commitment Sign up all NTS participants to the NTS Participation Agreement as soon as possible Agree target NTS funding model to make joining attractive to participants Ongoing management commitment at all levels of Waka Kotahi & PTAs to ensure alignment
Delays Delays in timing mean that alignment to existing contracted ticketing services no longer exists	Expedite contract signatures, approvals processes & planning to ensure NTS rollout alignment with existing contract end dates Consider contract extensions where possible/necessary Make suitable contingency plans
Key Participant(s) take a longer than planned to agree and sign the Participant Agreements	Ensure participant early engagement in Participation Agreement development Actively manage outstanding tasks/risks/changes required to secure agreement Gain agreement 'in-principle' where possible Unblock at Mobility & Payments Governance Group (MPGG) where possible
National framework consequences Working within a national framework is perceived to have negative consequences for local decision making	Early engagement on what forms part of the National customer experience, and what remains local Senior level engagement between Waka Kotahi officers and equivalent PTA participant officers to ensure ongoing commitment & to flush out areas of concern early

	Unblock at Mobility & Payments Governance Group (MPGG) where possible
Confused accountabilities and complexity Lack of clarity over roles and responsibilities between PTAs and Waka Kotahi leading to confusion over accountability for aspects of the solution	Agreed Joint Responsibility Matrix (JRM) Agreed and signed off Operating Model Active TTP & PTA involvement in BAFO negotiations which determine and agree the final solution
Multiple participants create complexity resulting in not being able to agree the operating model	Early & ongoing engagement in development of the NTS operating model Early & ongoing engagement with all PTAs, TTP and suppliers in agreeing the scope and scale of services Secondments from PTAs to TTP to ensure PTA views fairly represented and understood
Customer	
Poor customer experience Technical or process failures result in a poor customer experience. For example: • System failures result in a lack of service for end customers and no revenue collection for NTS customers • Process for transition from the existing solution to the NTS has negative consequences for customers • A security or privacy breach results in compromised data for customer(s)	Chose a capable supplier with proven global track record Ensure adequate testing and piloting throughout NTS deployments Adequately resource TTP and PTA teams to ensure success Engender a close & collaborative working relationship with each supplier Plan well for transitions including customer communications and education and simple & easy transition processes Test key processes before deploying Run 'white label' pilots for friends & family & journalists to test the system ahead of formal launch Consider a 'soft launch' approach to tease out issues and gradually increase volumes Good relations with each supplier to quickly resolve any issues Ensure adequate controls and monitoring in place to catch or predict possible failures Ensure active response plans to fix issues quickly Run regular test exercises to simulate failure and test & refine responses Make customer transition as easy as possible Simplify refund processes, and make transferring pre-paid funds back to customers quickly and easily Have plans in place to actively correct individual journeys or large numbers of customers affected by a wider system issue Begin transition planning early, particularly around transitioning school children being mindful of holiday periods and volumes of customers to transition Involvement and independent review of security by Waka Kotahi/experts at all key risk points over the life of the NTS,

	including in design/build/test phases, implementation, operations, and during transition Processes in place to detect & report on any security or control failures in a timely way Daily assurance over NTS operation, system security & integrity Maintain PCI/DSS accreditation including supporting controls Processes in place to communicate with customers quickly and make good any issues

Appendix 11 - NTS Programme Structure



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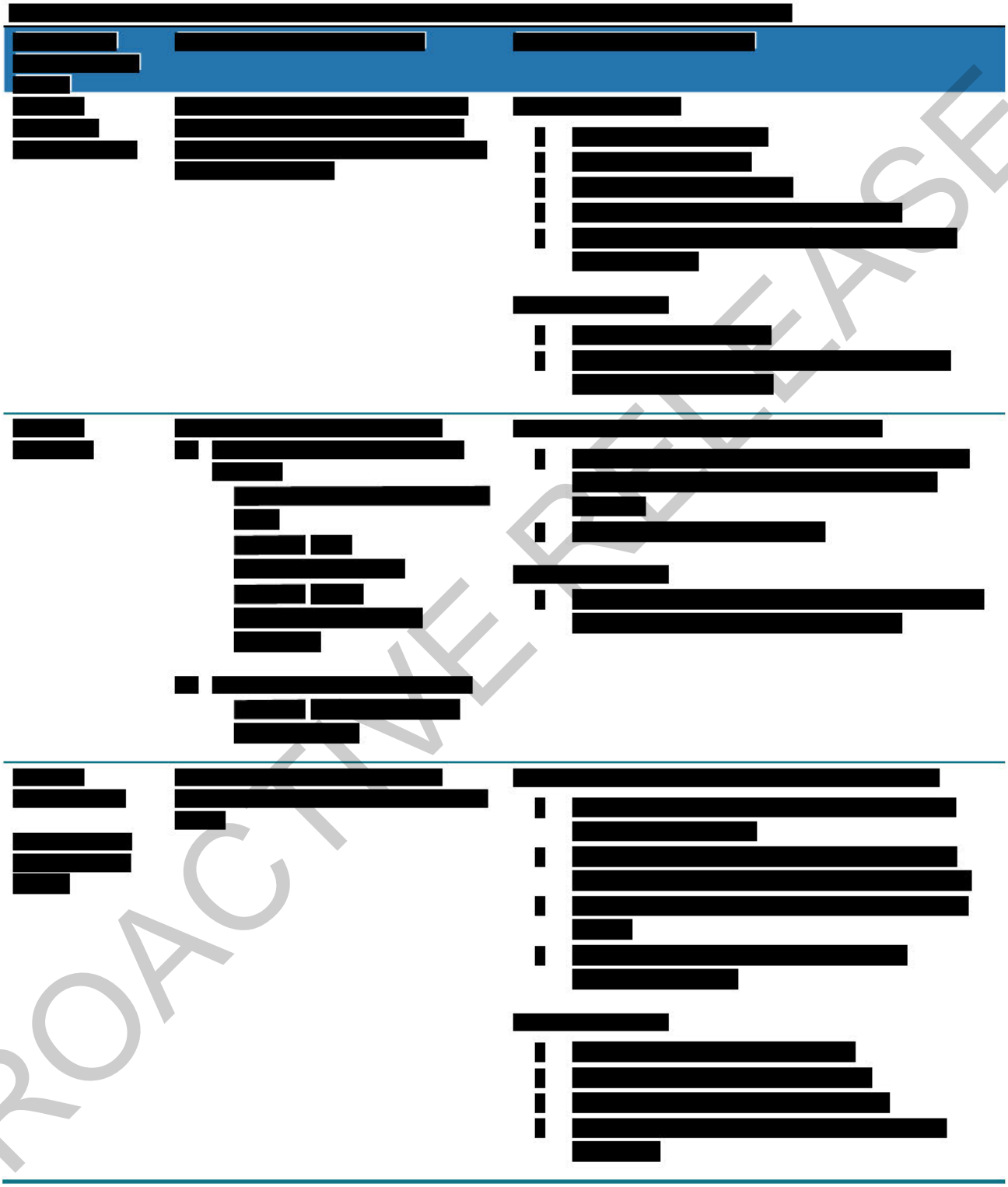
Appendix 12 - Transition summary for ECan, GW, AT, and RC

Transition planning documents were prepared to support the procurement process for the ticketing solution and enable respondents to provide prices for implementation of the ticketing solution. The planning assumptions and considerations are briefly summarised below to illustrate how the transition could apply to each PTA. Actual transition plans will differ because pre-transition assessment activities such as civil works audits/assessments and data analysis identifying the transition sequence that minimises customer impacts such as “broken journeys” have not yet been undertaken.

[redacted]

[32] Feedback from the Accessible community is an expectation of concessions and consistent customer experience in all regions in New Zealand.



[33] Go live date is assumed for business case cost modelling purposes only and does not represent a contracteual obligations which are ongoing at the date of the DBC.

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[redacted] live date is assumed for business case cost modelling purposes only and does not represent a contracteual obligations which are ongoing at the date of the DBC.

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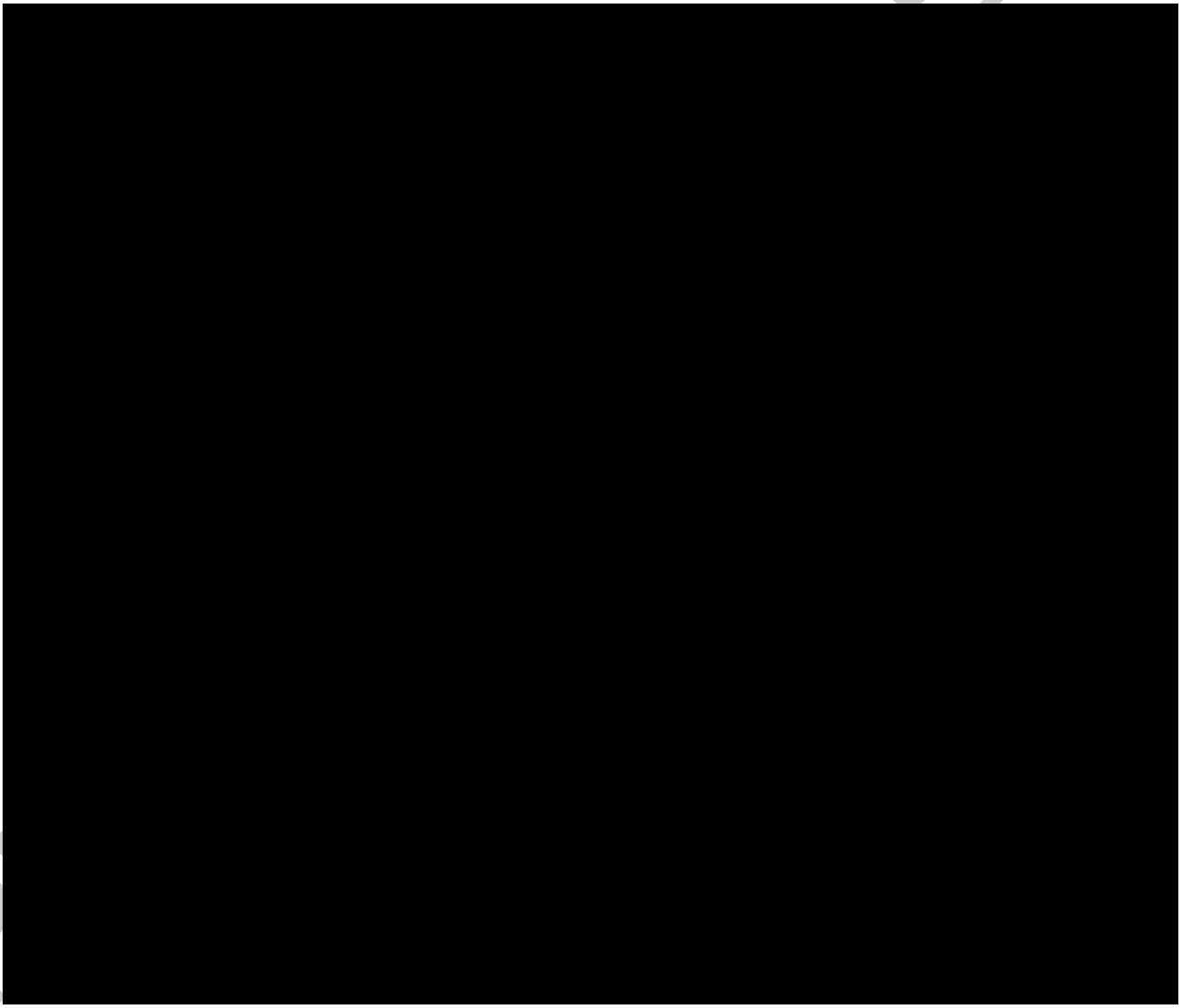
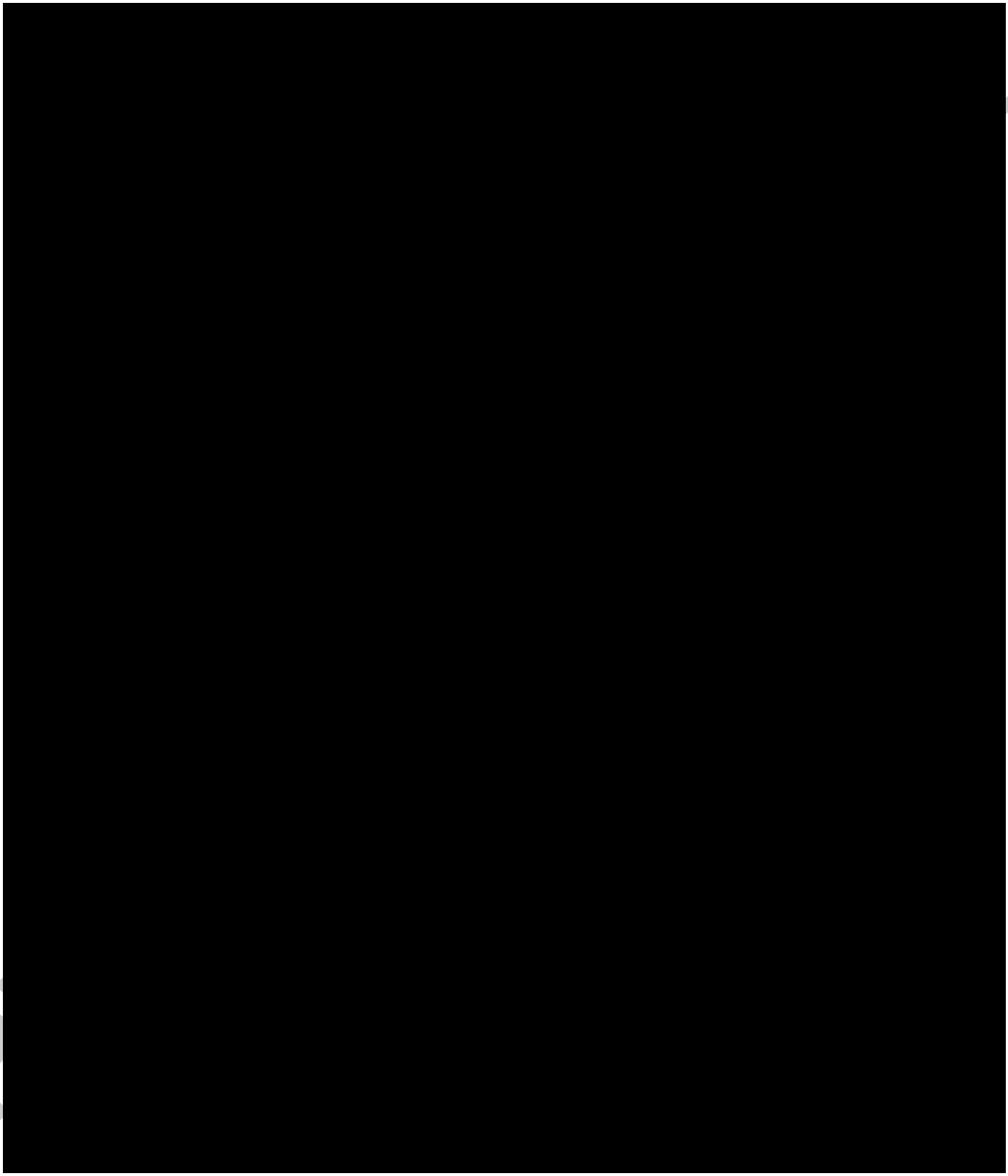


[35] Go live date is assumed for business case cost modelling purposes only and does not represent a contracteual obligations which are ongoing at the date of the DBC.



Glossary

Terminology	Description
Account based ticketing	Account-Based Ticketing is a ticketless way of allowing people to travel meaning they tap or scan using a secure token, linked to an account in the back office, to make a journey. The location and number of taps calculates the fare, which is charged to the passenger post journey. The secure token fare media can be a smartcard, debit/credit card, mobile device, which is securely authenticated when read by an NFC device on-board a bus or at a train station platform or gate. The customer's account may also contain specific information such as pre-purchased travel products, age of the account holder, applicable concession information, etc. Fare calculation will combine this information for the actual payment, which is processed at the end of the day, ensuring the lowest possible fares are charged based on the customer's eligibility for concessions.
AFC	Automated Fare Collection. Generic term referring primarily to the electronic payment aspect of public transport ticketing.
AIFS	Auckland Integrated Fares System. The identity under which AT HOP was procured.
API	Application Programming Interface
AT	Auckland Transport.
ATAP	Auckland Transport Alignment Project: brings together central government and Auckland Council to strategically align transport objectives and investment priorities for Auckland
AT HOP	Auckland Transport's multimodal public transport ticketing system, implemented from 2011.
AVL	Automatic vehicle locator: a device that makes use of the Global Positioning System (GPS) to enable an organisation to remotely track the location of its vehicle fleet by using the Internet.
Cardholder	A person (defined in the system or not) who has obtained a smartcard. In the payment industry, a cardholder is a non-consumer or consumer customer to whom a payment card is issued to, or any individual authorised to use the payment card.
Clearing Operator	Responsibility for clearing of all the transactions and for revenue attribution to the applicable scheme participants.
Closed loop ticketing	An AFC solution accepting proprietary contactless travel cards that are only valid within a specific transit environment.
Contactless ticket	A paper ticket with an embedded chip and antenna that communicates wirelessly (i.e. contactless) with on-board devices to update the information stored on the chip according to the business and fare rules. Contactless tickets offer limited use (e.g. single ride, few hours) and therefore the contactless ticket is considered as a disposable smartcard.
Concession	Refers to a cardholder profile allowing discounts

Terminology	Description
Current Ticketing Systems	Legacy public transport ticketing systems in use by regional councils, due for replacement. Ticketing 'systems' imply proprietary ticketing systems operating in closed environments in isolation from each other.
Customer	The traveller or a party acting on behalf of a traveller that interacts with the ticketing solution during travel, ticketing, retail action or customer service. A person that interacts with the Transport Operator, the Transport Service Provider, or the Transport Concession Authority during travel, ticketing, or ticketing management activities. The Customer role includes the role of Cardholder, Transit Account holder, as well as potentially the role of Payment Account holder in case of a payment relationship for topping up of a Transit Card account.
ECan	Environment Canterbury Regional Council.
Electronic Ticketing System	Semi-obsolete term relating to public transport ticketing (distinguishing from a 'manual' or 'paper-based' ticketing system).
EMV	Europay, MasterCard, Visa; a global standard applicable to contactless banking card systems.
ERP	Enterprise Resource Planning. In this context ERP is used to refer to the data and business intelligence-based activities and systems associated with the operation, management and planning of public transport services and public transport ticketing activities.
FAR	Funding Assistance Rate. NZTA funding support for the regional transport programmes of approved organisations.
GPS	Government Policy Statement (on Land Transport); sets out the results central government expects from investment in the land transport sector over a 10-year horizon.
GRETS	**G**W, **R**C, **E**Can **T**icketing **S**olution. Title for regional ticketing solution development that became the NTS in 2018 when Auckland joined.
GW	Greater Wellington Regional Council.
ILM	Investment Logic Mapping – a New Zealand Government Agency-supported process utilised in the development of the strategic business case for investment.
Integrated Fares	The property of a public transport network fare structure that enables consistent fares to be calculated between origins and destinations, irrespective of the route taken or transport modes used.
Integrated Ticketing	The ability to calculate and pay an integrated fare for a public transport journey made up of two or more 'legs'. Legs may be provided by different services/different operators/different transport modes, or permutations of all three.
Interim Ticketing Solutions	This comprises two bus ticketing solutions necessary to meet the business requirements of regional councils, for the period until an NTS ticketing solution becomes available:

Terminology	Description
	• Snapper interim ticketing solution (for GW) replaces operator-provided ticketing systems and supports the introduction of PTOM bus services • RITS – Regional Integrated Ticketing Solution, was implemented for the Regional Consortium as a closed-loop tag-on/tag-off smartcard system for a period of 5 years with opportunities for contract extension.
Issuing bank	A bank that issues a credit or debit card for one of the four supported payment schemes, e.g. a New Zealand retail bank issuing a Visa™ or MasterCard™.
LGWM	Let's Get Wellington Moving: a joint initiative between Wellington City Council, Greater Wellington Regional Council and Waka Kotahi to support and shape Wellington city and region's growth while making it safer and easier for people to get around and to move more people with fewer vehicles.
MA	Merchant Acquirer – external contracted (by Project NEXT) provider of transit service usage card and payment (pre-) authorisation, and clearing.
Multi-tenanted	Multi-tenancy means that a single instance of the software and its supporting infrastructure serves multiple customers. Each customer shares the software application and also shares a single database. Each tenant's data is isolated and remains invisible to other tenants.
NEXT / Project NEXT	The project established for the procurement of the National Ticketing solution and the development of the Detailed Business Case.
NFC	Near Field Communication. A wireless communication protocol, used predominantly in mobile 'phones, with potential for application to devices used in public transport fare payment.
NLTF	National Land Transport Fund - central government funding for investment in the land transport sector, defined in the GPS.
NLTP	National Land Transport Programme. Waka Kotahi's programme of ongoing investment in New Zealand's land transport system using NLTF.
NTS	National Ticketing Solution. The end-to-end solution to provide public transport ticketing for New Zealand and comprising the core ticketing solution plus the separately contracted financial services and supported services
Open loop ticketing	An AFC solution accepting contactless branded payment cards from international card schemes like Visa, MasterCard, UnionPay international, American Express, Discover and JCB, e.g.: PayPass or PayWave", and includes a virtual card on a mobile device. Also, EMV-compliant transit cards will be issued to cater for unbanked customers.
PTA	Public Transport Authority – a regional or unitary council responsible for providing regional public transport services. The Land Transport Management Act 2003 (LTMA) requires regional councils and unitary authorities to establish and appoint members of regional transport committees.
PTOM	Public Transport Operating Model - partnering basis between regional councils and operators for procurement of public transport services.
Public Transport Ticketing	The function necessary for the payment of public transport fares and provision of the associated business support activities.
RC	Regional Consortium. A formal collaboration between 9 regional councils for the purposes of public transport ticketing system procurement. The Regional Consortium currently includes Northland Regional Council; Waikato Regional Council; Bay of Plenty Regional Council; Taranaki Regional Council; Hawkes

Terminology	Description
	Bay Regional Council; Horizons (Manawatu); Nelson City Council/Tasman District Council; Otago Regional Council; and Invercargill City Council.
Revenue protection	Card/cardholder verification in order to avoid frauds and revenue loss (fare evasion) in an IFM system. (Also called inspection)
RITS	Regional Interim Ticketing Solution
RLTP	Regional Land Transport Plans. Statements by Regions on how they will optimise their land transport programmes.
RNM	Retailer Network Manager – external contracted (contracted by Project NEXT) provider of customer Transit Card retail services.
RPTP	Regional Public transport Plans. Plans by regions stating how they will deliver and optimise the public transport services.
RTI	Real Time Information is up-to-the minute information on when a bus or train service is due to arrive at your stop or station.
Smartcard	A plastic card with an embedded chip and antenna that communicates wirelessly (i.e. contactless) with devices to update the information stored on the chip according to the business and fare rules.
SP	Scheme Provider: Responsible for managing the overall scheme rules, ensuring all participants apply these and adhere to them, and responsible for on-boarding of new scheme participants.
SSO	Shared Service Operations – the organisation established by the partner PTAs to provide selected shared service operations on behalf of Transport Service Owners to ticketing service users. The Shared Service Operations will provide PTAs with co-ordinated operations management and change management, and support both TSO implementation and transition. Shared Service Operations will manage the ticketing and financial service contracts. The SSO handles the following roles:
Stored value	Money stored in smartcards.
SuperGold Public Transport Concession	The public transport travel concession administered by the Ministry of Social Development (MSD) with the NZ Transport Agency administering the public transport (PT) concession funded by the Ministry of Transport and implemented at a regional level to provide free travel on public transport for eligible persons according to a set of rules.
Tag-on and tag-off	To hover or tap a smartcard (transit card or bank-issued contactless debit or credit card) over a card reader, often involving graphic user interface, in order to confirm the start and end of a journey.
Tap	A ticketless way of allowing people to travel meaning they tap (tag-on and tag-off) using a secure token, linked to an account in the back office, to make a journey.
TCA	Transport Concession Authority – the organisation approved by the Transport Service Owner to authorise Customer concession applications and record individual customer concession entitlements in the ticketing solution. An example of a Transport Concession Authority is an educational institution.

Terminology	Description
	The TCA is responsible for performing the eligibility check for Customers that are entitled to the concession that is managed by the TCA.
TCO	Total Cost of Ownership – the total costs of the solution over its expected life, evaluated at 14 years to reflect 10 years of operation from the first meaningful live production use for the last of GW, ECan and AT. Therefore, allowing for an unforeseen delay of 6 – 12 months, the evaluation period would be 14 years from 2022/23 to 2035/36.
TCPM	Transit Card Program Manager – external contracted (contracted by Project NEXT) financial services provider of Transit Card services to Transport Service Owners, undertaking the issuing of cards (all form factors including virtual) and the managing of card funds.
Ticketing Solution	The means of collecting public transport revenue, either independently through use of a public transport ticketing system or collaboratively through participation in a public transport ticketing scheme.
TO	Transport Operator – the organisation that delivers operational transport services on behalf of the Transport Service Owner to the Customer utilising the ticketing solution. The Transport Operator is responsible for the accurate registering of Tag on and Tag off transactions for the modes of transport offered by the Transport Operator. In future it is possible that the Transport Operator could be a future transport offering such as a MaaS Transport Service Provider.
Token	An accepted form of authentication which could be a card, smartphone or proprietary device.
Total Mobility	The total mobility scheme assists eligible people with long term impairments to access appropriate transport to meet their daily needs and enhance their community participation by providing vouchers or electronic cards that subsidise the normal transport fare by 50% up to a maximum fare.
ToTo	Tag-on/Tag-off. The transaction event generated at the points a customer begins and ends a public transport trip, or enters and leaves the public transport network.
Transport Authority	The unit within a regional, unitary, or territorial authority responsible for local roads and public transport.
TSP	Ticketing Services Provider – the organisation contracted to provide Transport Service Owners and Transport Operators with the ticketing solution, solution implementation and operational services, and providing Customers with ticketing customer services on behalf of Transport Service Owners. The TSP handles the following roles:
TVMs	Ticket Vending Machines
Waka Kotahi	New Zealand Transport Agency