



**LCR CA Transforming Cities
Fund Smart Ticketing
Business Case DRAFT**

April 2019

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Executive summary

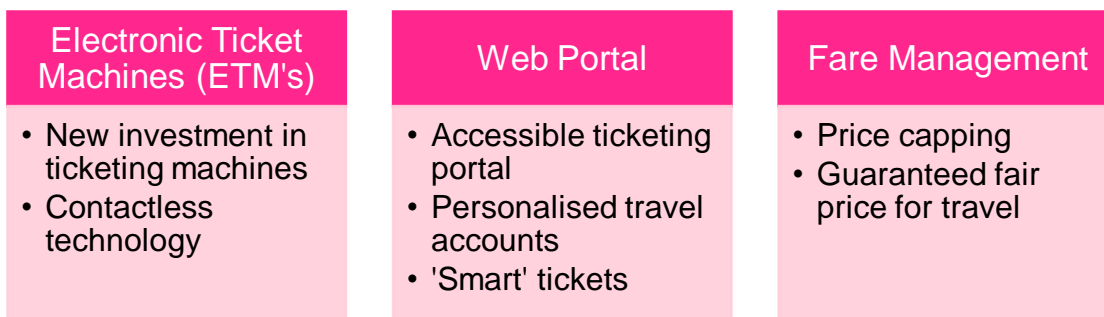
To be completed following full comments on draft.

1 Introduction

1.1 Headline Description

Liverpool City Region Combined Authority (LCR CA) aim to transform the way people pay for and use public transport ticketing through a Smart Ticketing and Technology Programme (known as 3TP), and have requested a Business Case to assess the costs, benefits and overall feasibility of the scheme. The proposed 3TP investment programme consists of multiple elements which are summarised in Figure 1.

Figure 1: Elements of the 3TP Investment Programme



Source: Merseytravel

It should be noted that these investment elements will be analysed fully as part of the Strategic and Management Cases of this Business Case, however the Fare Management elements will form a second phase of the works and will not be appraised within the other cases at this point. These Fare Management elements will be developed in detail and appraised fully at a later stage.

1.2 Context

The current ticketing offer in the Liverpool City Region (LCR) is complex, uses multiple-platforms, consists of multiple products and requires a significant amount of knowledge and understanding by the user to make optimal ticketing choices. As a result, this complexity can constrain the use of public transport. In addition the range of available tickets does not always reflect well the current travel demand patterns of residents and visitors in the area.

ETM's that allow contactless payment and other smart ticketing features are not uniformly installed on all buses in the region due to the heterogeneity of the fleets which are owned by several different operators in the LCR, and comprise vehicles of different ages and types. There is also no means to order smart ticketing products online in advance at present, or to register and view travel usage history or report lost or stolen cards.

An aim of the Transforming Cities Fund (TCF) is to transform sustainable transport connectivity in key commuter routes in major city regions. The proposed smart ticketing scheme in Liverpool City Region will transform the public transport offer across the LCR by streamlining and

enhancing the transport ticketing system. After the TCF investment it will be easy and convenient for customers to travel by multiple modes of transport in the LCR, supporting a reduction in car use whilst furthering job prospects and economic growth.

The challenge for the LCR in developing smart ticketing technology is to strike the correct balance between immediate, relatively small-scale positive outcomes with low risk in delivery, versus higher return, greater impact alternatives which subsequently carry more development risk. This challenge is discussed in more detail later in the Business Case.

1.3 Scheme Objectives

The following objectives are specific to this smart ticketing scheme (3TP) and were agreed in a workshop with representatives from Mott MacDonald, Merseytravel, LCR CA and the Smart Applications Management team. The objectives are:

- 1. Streamline existing arrangements for ticketing and facilitate the introduction of new technologies and customer offers to reduce the current travel constraints. This will place the Liverpool City Region at the forefront of new ticketing and payment technologies.**
- 2. Ensure greater access to employment, education, other services and opportunities for passengers, whilst improving air quality and reducing carbon emissions across the Liverpool City Region.**
- 3. Improve the efficiency of operation of the public transport network for administrators and operators, helping to attract inward investment, boost productivity, and generate additional revenue through increased use of public transport.**

These will be discussed in more detail later in the Business Case.

1.4 Purpose of the Business Case

This Business Case is for the implementation of the 3TP Smart Ticketing programme. The purpose of this Business Case is to expand upon the findings of the Strategic Outline Business Case (SOBC), updating the evidence base and the need for intervention. A traditional Business Case at this stage would follow an appropriate appraisal process and present a preferred option. In this case, however, the only options that exist are either implementation of the 3TP programme or the alternative 'Do Nothing' option. As a result, this Business Case will only compare these two options and discuss the reasons that the 'Do Something' 3TP programme is considered essential for implementation. The Business Case will also define how the scheme will be funded, procured and delivered.

This Business Case will adhere to guidance presented in the Green Book from the Department for Transport. The following diagram shows the progression of the business case process from a SOBC to the Full Business Case (FBC). It is currently assumed, however, that given the context and size of the investment decision for smart ticketing in the LCR, that this Business Case documentation will be sufficient to fully support the investment relating to Phase 1 of the 3TP as described in Section 1.5.

Figure 2: Standard DfT Business Case Process

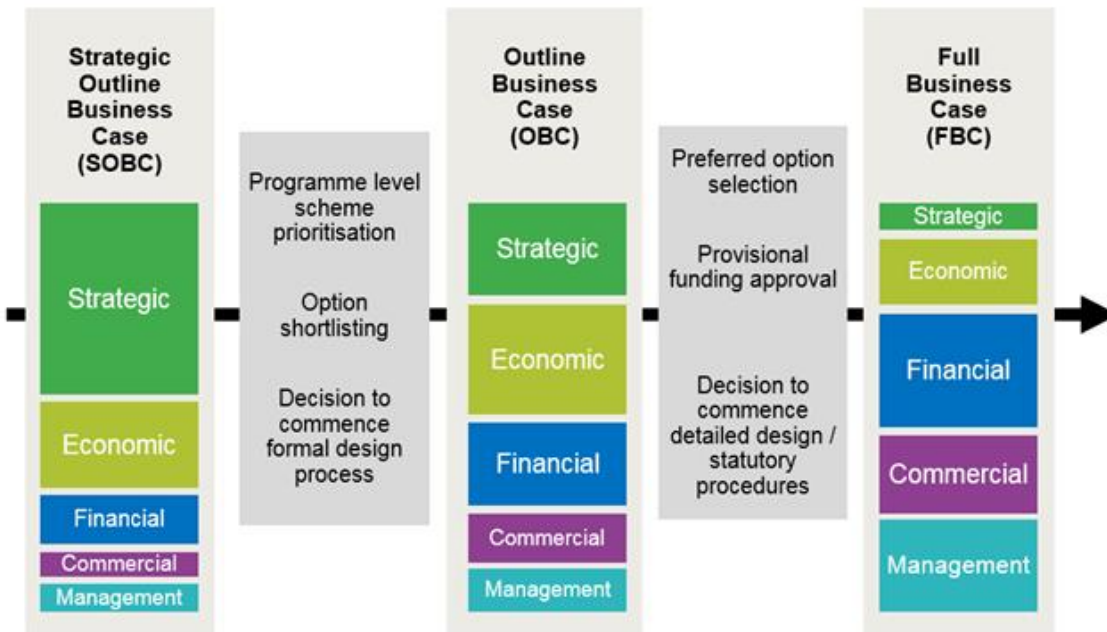


Source: Department for Transport

An agile development process will also be implemented. This is to ensure that the case presented in this Business Case is sensitive to technological developments and thus minimises the risk of a lag between the time it takes to justify and implement the smart ticketing scheme and the speed of technological advances on the market.

The following diagram highlights the relative weight of the various component cases at each stage of the Business Case process.

Figure 3: Relative Weight of Component Cases



Source: DfT

This highlights that at the latter two stages of the process, the Economic and Financial Cases begin to play more prominent roles alongside the Strategic Case while the Commercial and Management Cases stay relatively high level at this stage.

1.5 The Scheme

Merseytravel and Liverpool City Region Combined Authority (LCR CA) have agreed that the roll-out of the LCR Smart Ticketing scheme (3TP) and subsequent benefit realisation will be undertaken through two distinct phases; Phase 1, and Phase 2 with an intermediate Phase 1.5 to capture deliverables not explicitly noted within the Phase 1 programme but which are possible following the delivery of Phase 1 without further capital investment. In this way, Phase 1 is representative of the immediate benefits that will be instigated through the installation of new ETM technology and the Web Portal. Phase 1.5 comprises several additions that could be undertaken following the installation of the technological infrastructure in Phase 1 but are not part of the Phase 1 programme itself. Phase 2 then relates to the outputs that are proposed relating to fares management following the rollout of TfN's Project Abbot system expected to follow in the next 2-3 years. More information on the key deliverables of each phase and the benefits that will be attributed to each stage, are found in the following sections and sub-sections.

In this Business Case document, the Strategic and Management Cases will review and make the case for the entire 3TP scheme (Phases 1, 1.5 and 2) since these will not change between phases. However, the investment that this Business Case supports is for Phase 1 of the 3TP scheme only (described in more detail below) and consequently, the Economic, Financial and Commercial Cases relate only to this Phase 1 investment.

1.5.1 Phase 1

Phase 1 will help to ensure that public transport customers are provided with a modern, consistent and secure payment and smart ticketing service across the LCR, through equipping smaller bus operating companies, who currently lease their ETMs from Merseytravel, with new ticket machines allowing contactless payment, onboard ticket collection, and improved journey data recording. Through this initiative smaller bus operators will be able to cover their costs and contribute directly to the unified smart ticketing scheme.

Another component of phase 1 is the development of a Web Portal, accessible from a range of devices, for customer registration, management of individual travel accounts, commercial card hot-listing (to prevent fraudulent misuse) and the sale of smart advance tickets (for collection on board the bus).

Further information on the phase 1 deliverables is shown in Table 1.

Table 1: Phase 1 Deliverables

Deliverables	Output	Primary Outcomes (Direct Benefits)	Secondary Outcomes (Indirect Benefits)
New ETM ticket machines	Extend contactless payments on bus to all operators	<ul style="list-style-type: none"> Faster boarding times than equivalent cash payments or ITSO smartcards on current PARKEON machines- reduced journey times 	<ul style="list-style-type: none"> Increases patronage on public transport
		<ul style="list-style-type: none"> Faster boarding times than equivalent cash payments or ITSO smartcards on current PARKEON machines - improved reliability through improved dwell time certainty 	<ul style="list-style-type: none"> Increases patronage on public transport Reduced sensitive kerbside carbon and other harmful emissions Potentially reduced 'peak vehicle requirement'
		<ul style="list-style-type: none"> Removes customer need for cash or correct change - convenience 	<ul style="list-style-type: none"> Increases patronage on public transport

Deliverables	Output	Primary Outcomes (Direct Benefits)	Secondary Outcomes (Indirect Benefits)
		<ul style="list-style-type: none"> Reduces cash handling by operators 	<ul style="list-style-type: none"> Improved security, safety, revenue protection and cash handling/processing time and cost
		<ul style="list-style-type: none"> Provides greater equality between large and small operators 	<ul style="list-style-type: none"> Allows smaller operators to fully participate and record usage as part of ticketing schemes.
		<ul style="list-style-type: none"> Simplified transaction process with no prior knowledge of fares required - more attractive to non-bus users 	<ul style="list-style-type: none"> Increases patronage on public transport.
		<ul style="list-style-type: none"> Ability to use Google and Apple Pay for payment - convenience, safety and security 	<ul style="list-style-type: none"> Increases patronage on public transport
	Electronic collection of Solo tickets on bus	<ul style="list-style-type: none"> Advance purchase of Solos online 	<ul style="list-style-type: none"> Reduced volume and hence transaction costs for PayPoint based purchases
	Improved geo-location from new Ticketer machines and improved traffic light priority	<ul style="list-style-type: none"> Improved real-time information 	<ul style="list-style-type: none"> Increased patronage on public transport
<ul style="list-style-type: none"> Operator fleet management benefits through better information on vehicle location 		<ul style="list-style-type: none"> Improved service and resource planning for operators 	
<ul style="list-style-type: none"> Live contact between buses and control centre. 		<ul style="list-style-type: none"> Improved service and resource planning for operators 	
<ul style="list-style-type: none"> Improved geo-referencing of customer demand data 		<ul style="list-style-type: none"> Improved service and resource planning for operators 	
Web-Portal	Web-based payments for Adult Solo day, bundle, week and 4 week ticketing products.	<ul style="list-style-type: none"> Advance purchase of Solos online. 	<ul style="list-style-type: none"> Reduced transaction cost for PayPoint
		<ul style="list-style-type: none"> Faster boarding due to advance purchase - reduced journey times through reduction in cash fares or on-bus ticket purchase 	<ul style="list-style-type: none"> Increases patronage on public transport
		<ul style="list-style-type: none"> Faster boarding due to advance purchase - improved reliability through improved dwell time certainty 	<ul style="list-style-type: none"> Increases patronage on public transport Reduced sensitive kerbside carbon and other harmful emissions Potentially reduced 'peak vehicle requirement'
		<ul style="list-style-type: none"> Removes customer need for cash or correct change - convenience 	<ul style="list-style-type: none"> Increases patronage on public transport
		<ul style="list-style-type: none"> Reduces cash handling by operators 	<ul style="list-style-type: none"> Improved security, safety revenue protection and cash handling / processing time and cost

Deliverables	Output	Primary Outcomes (Direct Benefits)	Secondary Outcomes (Indirect Benefits)
	Personalised user accounts - adult	<ul style="list-style-type: none"> Personalised accounts to improve convenient purchase of appropriate available tickets - e.g. storage of existing card / bank details, storage of recent ticket type purchases 	
		<ul style="list-style-type: none"> Potential for enhanced analysis of customer data for operators/Merseytravel/LCR 	<ul style="list-style-type: none"> Improved service and resource planning for operators.
		<ul style="list-style-type: none"> Personalised usage and expiry information available for passengers 	
	Commercial card hot-listing	<ul style="list-style-type: none"> Reduced fraud 	

Source: Mott MacDonald

1.5.2 Phase 1.5

Phase 1.5, an intermediary stage in the LCR Smart Ticketing process, which subject to commercial negotiations and discussions with bus and other operators, could see the implementation of several further elements made possible by the infrastructure provided in Phase 1. If implemented these will have numerous additional benefits as detailed below.

Further information on the phase 1.5 deliverables is shown in Table 2.

Table 2: Phase 1.5 Deliverables

Deliverables	Output	Primary Outcomes (Direct Benefits)	Secondary Outcomes (Indirect Benefits)
New ETM ticket machines	Electronic collection of multi-modal tickets (e.g. Trios / SaveAways) and operator only products on bus	<ul style="list-style-type: none"> Advance purchase of multi-modal tickets online 	<ul style="list-style-type: none"> Reduced volume and hence transaction costs for PayPoint based purchases
	Producing and reading of bar-coded tickets	<ul style="list-style-type: none"> Reduction of ticket misuse and recording of all journeys made 	<ul style="list-style-type: none"> Increased ticketing revenue
	Individual operator fare capping	<ul style="list-style-type: none"> Ensures cheapest price is paid for daily / weekly travel 	<ul style="list-style-type: none"> Increased patronage on public transport Provides better value for the customer.
Web-Portal	Young person user accounts	<ul style="list-style-type: none"> Improved data on demand and usage for operators / Merseytravel / LCR Personalised usage and expiry information available for passengers 	<ul style="list-style-type: none"> Improved service planning
	Web-based payments for all smart ticketing products (assuming rail or	<ul style="list-style-type: none"> Advance purchase of all smart tickets online Reduced station ticket office costs 	<ul style="list-style-type: none"> Reduced volume and hence transaction costs for PayPoint based purchases.

Deliverables	Output	Primary Outcomes (Direct Benefits)	Secondary Outcomes (Indirect Benefits)
	multi-modal ticket collection possible at stations)	<ul style="list-style-type: none"> Smart annual tickets (storage of 13no 4-week products with application of appropriate discount) 	<ul style="list-style-type: none"> Removal of residual paper season tickets and elimination of need for photocard - reduced administrative costs
Host Card Emulation on Smart Devices	Smart tickets on smart devices (Android only)	<ul style="list-style-type: none"> Faster delivery of purchased tickets – close to real-time fulfilment? Convenience, further time savings for boarding. 	<ul style="list-style-type: none"> Improved safety and security Improved convenience Increases patronage on public transport

Source: Mott MacDonald

1.5.3 Phase 2

The main aim of phase 2 is to integrate 3TP with Transport for the North's Project ABBOT (Account Based Back Office Ticketing) in project years three and four. Project ABBOT aims to enable customers to travel across the North by any mode of public transport using their contactless bank card for a fair price. Customers will register with ABBOT through a website (or via each respective local transport authority's website) and provide personal and payment details including the contactless bank card they will use for travel. Their contactless bank card then becomes a form of identity to tap-in on the bus, tram, ferry or rail service and tap-out at the end of the journey. The ABBOT system will calculate the payment due (which should not exceed the cheapest price available for the journey or collection of journeys) and allocate revenue collected to the transport operators involved. More information on Project ABBOT is available here: <https://transportforthenorth.com/IST/>

Further information on the phase 2 deliverables is shown in Table 3.

Table 3: Phase 2 Deliverables

Deliverables	Output	Primary Outcomes (Direct Benefits)	Secondary Outcomes (Indirect Benefits)
ABT Roll-Out	Account-based Ticketing	<ul style="list-style-type: none"> Price Capping Complex fare structure can be simplified at point of use 	<ul style="list-style-type: none"> Ensures only cheapest available price is paid Potentially removes need to actively purchase day or weekly tickets

Source: Mott MacDonald

Beyond phase 2 of the programme, LCR Smart Ticketing could also see the extension of Web Portal facilities to include other ticket types including rail and multi-modal products. The ticketing Web Portal could also ultimately be further extended to offer additional services to customers including Mersey Tunnel toll payments, Mersey Ferries ticketing, cycle hire and links to journey planning, timetables and disruption information.

Further information on these later stage deliverables are shown in Table 4.

Table 4: Later Stage Deliverables

Deliverables	Output	Primary Outcomes (Direct Benefits)	Secondary Outcomes (Indirect Benefits)
ABT Roll-Out	Intra-Northern Smart Travel	<ul style="list-style-type: none"> Single smartcard / smart device required for travel across the North of England 	
	Mobility As A Service Development	<ul style="list-style-type: none"> Customers can access all LCR mobility services e.g. Tunnel Tolls, Mersey Ferries, cycle hire and journey planning from a single point 	<ul style="list-style-type: none"> Reduces private car usage

Source: Mott MacDonald

1.6 Report Structure

The remainder of this Business Case is structured in accordance with the DfT's five-case model for transport Business Cases. The sections that comprise the Business Case are:

- Section 2 presents the **Strategic Case**, updating the 'case for change', including expected wider economic benefits, policy context, scheme objectives, discussion of options, and key influences on the scheme.
- Section 3 sets out the **Options Appraisal Process**. This section will only include a 'Do Something' and 'Do Nothing' option.
- Section 4 sets out the **Economic Case**, identifying the range of economic, environmental, social, and public accounts impacts that are expected to arise from the scheme and, therefore, the scheme's anticipated Value for Money (VfM).
- Section 5 presents the updated **Financial Case**, including anticipated expenditure and a proposed funding breakdown.
- Section 6 contains details of the **Commercial Case** for procuring the scheme, including the potential options for ETM provision.
- Section 7 contains the **Management Case**, including the indicative programme, governance structure and quality, communications, and risk management strategies.

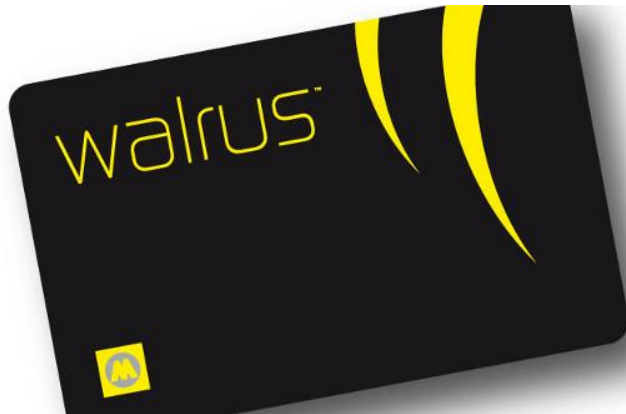
2 Strategic Case

Note that the Strategic Case of this Business Case relates to the entire 3TP scheme (Phases 1, 1.5 and 2).

2.1 Baseline Context

The strategic context for transformative investment in ticketing technology is multi-faceted. The current public transport ticketing offer in the LCR is considered complex by non-users, as evidenced by numerous public surveys and by the relatively low levels of uptake of certain ticketing products. The number of fares available, and the concern caused by accidentally purchasing a ticket which subsequently is not valid or more expensive than necessary for the purpose, can discourage people from wanting to use public transport in the region. Simplifying the public transport ticketing offer in the LCR through the introduction of contactless payment technologies is vital to enable partners to take full advantage of the greater move towards the use of convenient contactless purchasing technology. 90% of all bank cards issued in the UK are now contactless and 60% of consumers in the North West made contactless transactions in 2018 (UK Card Association and Visa). With 66% of all UK adults owning a smartphone (according to Ofcom), there is also an excellent opportunity to install the necessary technology to enable customers to utilise their smartphones for information, payment and real-time updates – either using existing contactless payment applications such as Apple Pay or Google Pay, or via Host Card Emulation in which an ITSO smartcard is installed electronically on the device - and thus help remove the barriers to public transport across the LCR. Contactless payment technologies, such as the existing LCR smartcard shown in Figure 4, are also attractive because customers neither need to carry cash or be concerned if they do not have sufficient change for the required fare.

Due to the complexity of the existing system, there is a clear potential for passengers on public transport services to purchase the wrong ticket in terms of coverage, mode or validity restrictions. In some cases, this may lead to the passenger holding an invalid ticket for a particular journey raising the risk of a fine or potential further action by operators. However, at a lower and more common level, it raises the potential for customers to overpay for their journey as a result of their ticket being over-specified for the journey they wish to make. The move to smart ticketing and contactless technologies will, ultimately, provide the opportunity to completely remove the burden of ticket choice from the customer, ensuring that only the required fare is paid and making public transport more attractive and simpler to use in comparison to potential other modes of transport.

Figure 4: LCR Smartcard

Source: Merseytravel

2.1.1 Liverpool City Region Combined Authority and Merseytravel

The creation of the LCR CA saw the transfer of local transport authority powers from Merseyside Integrated Transport Authority and Halton Council. With the transfer came responsibility for the Merseyside and Halton Local Transport Plans (LTPs). In response to this, the LCR have developed 'A *Transport Plan for Growth*'¹ which provides a single strategic framework and delivery plan for transport in the LCR.

At a practical level, the LCR CA is supported by Merseytravel, who acts as the accountable body and is responsible for managing funds on its behalf. The following diagram shows how Merseytravel sit within the governance structure of the Combined Authority.

¹ See: <https://www.merseytravel.gov.uk/about-us/local-transport-delivery/Documents/8375%20Plan%20for%20growth%20WEB%20FINAL.pdf>

Figure 5: The Combined Authority

Source: A Transport Plan for Growth (Liverpool City Region Combined Authority)

Improving the accessibility and attractiveness of public transport in relation to the private car is recognised by both Merseytravel and the LCR CA as a key factor in supporting strategic priorities such as the visitor economy, improving the environment and facilitating economic growth. Merseytravel provides strategic leadership in this area by developing and promoting multi-operator and multi-modal ticketing products, ensuring the means are available to travel smoothly on all public transport services across the LCR regardless of operator or mode.

A delivery programme has been developed in relation to the first phase of the Smart Ticketing (3TP) project in 2019 / 2020 which will further improve the ease in which passengers can access public transport services. The programme of improvements includes the replacement of ETMs on buses owned by smaller operators to match those being rolled out on all Arriva buses in the region, allowing contactless payments, electronic ticket collection and improved journey recording and data capture. This complements the existing ETM (including contactless) provision on local Stagecoach buses. The creation of a web-portal will allow the advance purchase of smart-tickets, enhance security and improve customer journey information. Funding is now being sought for the Smart Ticketing scheme to achieve the goals set out later in this

Business Case document, which will further enable the wider strategic aims of Merseytravel and LCR to be realised.

2.1.2 Local Context

2.1.2.1 Liverpool City Region (LCR)

The LCR, see Figure 6, refers to the political grouping of local authorities centred on the major city of Liverpool and its wider zone of influence comprising the boroughs of Halton, Knowsley, Sefton, St Helens and Wirral.

Figure 6: Liverpool City Region (LCR)



Source: Merseytravel

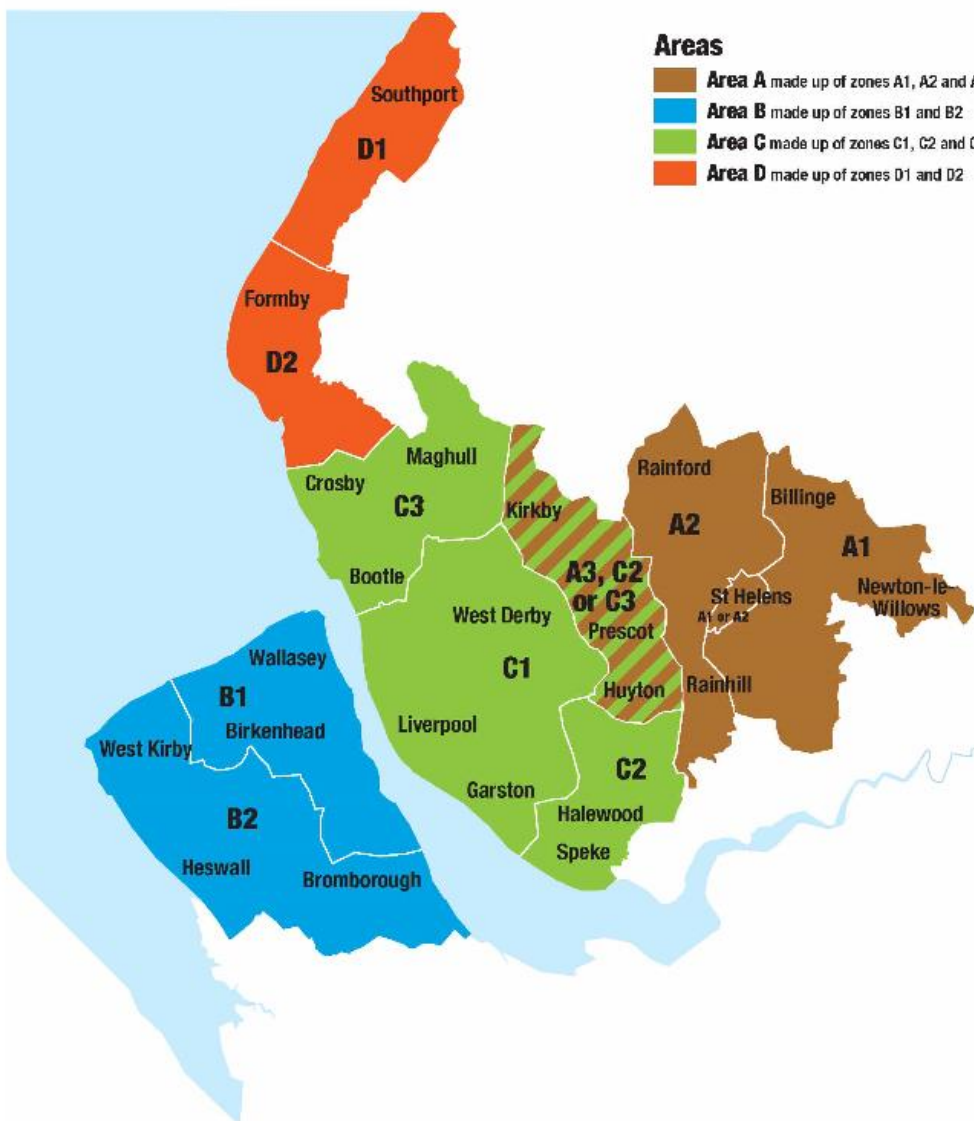
LCR has a combined authority and a directly elected metro mayor. The LCR has secured significant devolution of funding and administration from central Government via its City Deal. The combined authority oversees strategic development in the area and, through its integrated transport committee and delivery body Merseytravel, has overall responsibility for co-ordination of local passenger transport, is the franchiser for the long-term Merseyrail Electrics concession, and owns and operates the historic Mersey Tunnels and Mersey Ferries operations between Wirral and Liverpool City Centre.

In this capacity Merseytravel oversees, but does not operate, both the deregulated bus network (which includes services operated by the major providers Arriva and Stagecoach, and a smaller proportion of local providers), and the local suburban Merseyrail network Wirral and Northern Lines (the City Line is operated separately under the Northern franchise). Merseytravel does operate, or directly contracts, a non-commercial subsidised network of bus routes to ensure a minimum level of bus coverage on routes across the City Region.

As is discussed in more detail in Section 2.1.4., the range of available tickets in Liverpool City Region is large and complex with tickets offered by operators only for their own services (including singles, day tickets, weekly, monthly and annual tickets) and tickets offered by Merseytravel which are available for use across operators but which are restricted either by mode, zone, or hours of operation. Merseytravel are responsible for the retailing and promotion of these which they do via a number of outlets. In addition to this, Merseytravel has negotiated a number of Quality Bus Routes under the existing ‘Merseyside Bus Alliance’ (described below) which are dually operated by 2 or more companies with a combined timetable and clockface frequency. On these routes, tickets from either operator may be accepted on any service, improving the ticketing offer for the bus passenger but adding another layer of complexity to the overall picture.

The following figure shows the zoning system employed as part of Merseytravel’s range of available public transport tickets. These are discussed in more detail in section 2.1.4.

Figure 7: Merseytravel Public Transport Ticket Zones - 2019



Source: Merseytravel

It should be noted that the above diagram in Figure 7 does not currently include Halton. This is because Halton is still in the process of being integrated with the wider LCR and it is intended to ultimately form part of the overall ticketing picture in LCR.

2.1.2.2 Liverpool City Region Bus Network

Liverpool City Region's bus network is extensive and provides bus coverage across the component boroughs. The network is centred on Liverpool City Centre but separate sub-networks exist in Wirral (centred on Birkenhead), Sefton (centred on Southport), and in St Helens (centred on the town centre). In addition, due to its history as a Unitary Authority and not part of the original metropolitan county of Merseyside, Halton currently has a separate bus network to the rest of the LCR, and does not form part of the integrated ticketing area provided by Merseytravel. Work is underway to integrate the transport network in Halton to that in the wider LCR but this will not be realised during the timeframe of the 3TP project.

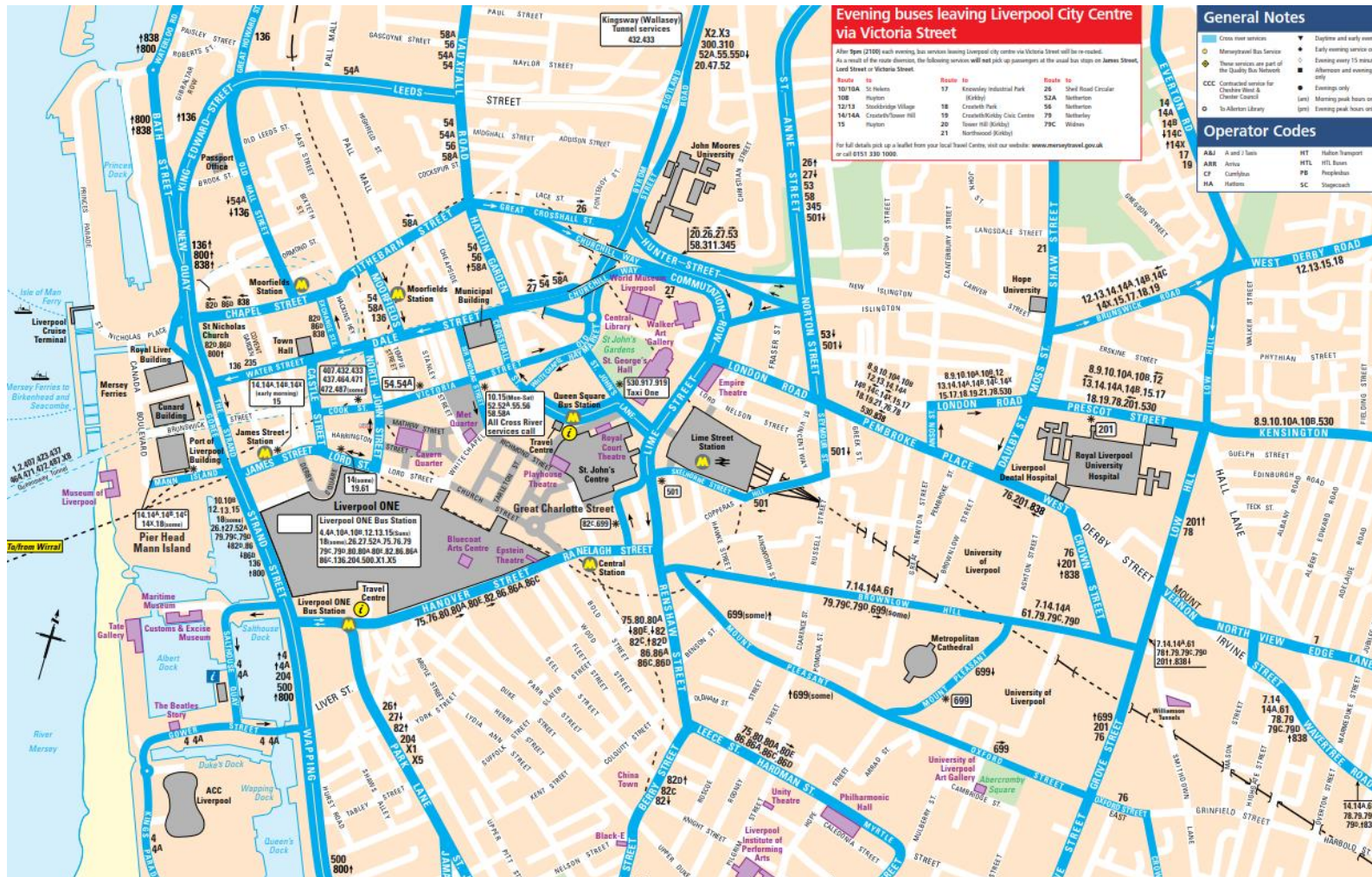
Buses in LCR are predominantly provided by the two large operators of Arriva and Stagecoach. Alongside Merseytravel, these two companies are part of a voluntary quality partnership arrangement known as 'Merseyside Bus Alliance'. Under this banner, the operators and Merseytravel have undertaken to work together to deliver quality improvements, co-ordinated marketing and promotional events, data sharing and problem solving on the network. The Bus Alliance was created in 2017 as an alternative model to a more regulated franchised model in which operators would tender for the right to operate routes on a concessionary basis (as occurs in London).

Under the alliance model, fare paying bus patronage in Liverpool City Region has grown consistently in the two years since its signing following decades of decline. Recent figures show that more than 140 million passenger bus journeys were made in 2018 which shows growth from 2017 but is still some way short of the more than 160 million trips made 10 years ago. There is therefore a need to do more to make the bus more attractive to users to generate significant mode shift away from the private car.

Other smaller operators also operate some commercial bus services in Liverpool City Region, however much of the mileage provided by smaller operators is directly contracted by Merseytravel as non-commercial bus provision.

Part of the LCR bus network is shown in the extracted plan below. This highlights the large number of bus routes that converge in Liverpool City Centre at the twin hubs of Queen Square (for services to the north, east and cross-river) and at Liverpool One (for services to the south and south-east).

Figure 8: Liverpool City Centre Bus Network Map Extract



Source: Merseytravel

2.1.2.3 Liverpool City Region Rail Network

LCR has an unusually well-developed local rail offer in comparison with other major British cities. It has an extensive and well-used suburban rail network split into two 'halves': the third-rail DC Merseyrail Electrics network comprising the Wirral and Northern lines offers frequent electric services on 8 radial routes into Liverpool City Centre with metro-like frequencies in the central underground section and an efficient link and loop system of interchange between the two main trunks. The City Line, by contrast, is operated by Arriva Rail North as part of their wider set of sub-urban rail services across the north of England, and provides lower frequencies on longer routes between Liverpool and Manchester, Wigan, Warrington and Crewe. This network is largely overhead AC electrified but with some routes operated using diesel stock depending on the extent of electrification on the wider network.

The local rail network is shown on the following plan:

Figure 9: Local Rail Network Map



Source: Merseytravel

The Wirral and Northern lines of the network in LCR are operated by Merseyrail Electrics under a 25 year concessionary agreement with Merseytravel as franchisers. As a result, some fares, service levels, quality and frequency are influenceable by Merseytravel under the concession agreement, as is the implementation of smart ticketing schemes – a separate scheme to install smart ticket validators on all Merseyrail platforms is being rolled out later this year.

The City line, by contrast, is operated under a much shorter franchise and, as part of the Northern franchise, is let in partnership between Transport for the North (TfN) and the Department for Transport (DfT) with Merseytravel providing partner level input.

2.1.2.4 Mersey Ferries

Merseytravel owns and operates the Mersey Ferries service in Liverpool City Region. Run predominantly as a tourist attraction, but with a well-used commuter service in the morning and evening weekday peaks, the ferries connect the Pier Head in Liverpool with the two Wirral terminals of Seacombe and Woodside. Although a small part of the overall public transport offer in LCR, the ferries accept integrated tickets in the form of SaveAway and Trio tickets (see later sections for details) for single trips only (i.e. for journeys between Liverpool and Wirral or vice-versa but not for full River Explorer cruises).

Although owned and operated by Merseytravel, and with significant plans to bolster the service in the future including the procurement of a new vessel, the Mersey Ferries service is likely to remain a small component of the public transport picture in LCR and will not be considered further in the context of the 3TP project.

2.1.3 Policy Context

Any investment in the ticketing infrastructure for the LCR must align with national, regional and local policy and strategy. Table 5 shows an overview of the alignment of 3TP with relevant national, regional and local policy and strategy documents.

Table 5: Alignment with National, Regional and Local Policy and Strategy

Policy/Strategy	Scheme Alignment
National	
DfT Transport Investment Strategy: <ul style="list-style-type: none"> Support a more reliable, less congested and better connected transport network. Build a stronger more balanced economy by enhancing productivity Enhancing global competitiveness by making Britain a more attractive place to trade and invest, 	<ul style="list-style-type: none"> Improve the user experience through smart ticketing and a Web Portal The rollout of modern ticketing systems will improve perceptions of the LCR as a place committed to innovation in investment and business Smart technology can redirect vehicles and users around the system to make more efficient use of the network through enhanced use of data and information Use of data science techniques for analysing travel, joining up, and managing our networks using information collected through smart ticketing can facilitate a reduction in congestion and improve business performance
DfT National Industrial Strategy	<ul style="list-style-type: none"> The investment in smart ticketing in the LCR will greatly support the National Industrial Strategy, as the infrastructure upgrade will help innovate the economy, enable people to access good jobs, attract business growth and establish prosperous communities.
Regional	
TfN Strategic Transport Plan - Pan Northern Travel	<ul style="list-style-type: none"> The project contributes directly to the strategy for the North and the Intelligent Smart Ticketing (IST) initiatives of Transport for the North. The project delivers the key contactless bank card infrastructure required by TfN's Project ABBOT in the LCR as well as taking customers on a journey from traditional ticketing approaches to modern on-line account-based approaches.

Policy/Strategy	Scheme Alignment
TfN Integrated Smart Travel Program	<ul style="list-style-type: none"> The smart ticketing project will contribute directly to the program and will help TfN deliver modern payment methods and mobile travel information using emerging technologies. This will make journeys quicker, easier and more convenient for customers.
TfN Electric Vehicle Strategy	<ul style="list-style-type: none"> The project will contribute directly to the Electric Vehicle Strategy for LCR by potentially offering access, via a travel account portal, to e-car club sharing, cycle and e-cycle hire. A smart ticket, phone or contactless bank card can be used as the common token to allow customers to access all these transport services with the Web Portal offering the potential for loyalty schemes and a way of making new service offers widely available to an already established customer base.
Local	
LCR Growth Strategy	<p>The <i>Liverpool City Region Growth Strategy</i> acknowledges the unique strengths and assets of each local authority, whilst also setting out the three 'pillars' for activity: Productivity, People and Place.</p> <p>This scheme supports all three 'pillars' of the strategy:</p> <ul style="list-style-type: none"> Productivity - improved ease and reduced costs of travel will help to attract inward investment and improve the efficiency of living, working and building a business in the LCR. People – improved efficiency of the network is expected to support access to employment, growing business access to the labour force and in turn lead to increased jobs, helping to reduce unemployment. By addressing some of the existing barriers to public transport use, the project is expected to disproportionately benefit those on the margins of the labour market. Place - the reduced costs of travel will lead to increased demand for public transport, and, through modal shift from the car, reduce congestion and road traffic accidents in the LCR and improve air quality and the health of residents and visitors.
Liverpool City Region Visitor Economy Plan (2020)	<p>The Liverpool City Region Visitor Economy Plan (2020) has been developed to help all stakeholders with a responsibility or interest in tourism and the visitor economy to prioritise activity and optimise the performance of tourism as a key economic sector for the City Region. The 3TP scheme will align with the plan by helping:</p> <ul style="list-style-type: none"> Provide high quality experiences for all visitors to the City Region by investing in the transport, visitor information and the overall destination welcome. Develop the visitor economy in a sustainable and responsible way to minimise potential negative impacts and maximise benefits for local businesses and residents.
Transforming Cities Fund	<ul style="list-style-type: none"> In the Autumn of 2017, the Government created a £1.7bn Transforming Cities Fund . This aimed to drive productivity through investment in public and sustainable transport, focused on enhanced intra-city connectivity in some of England's biggest cities. <p>The LCR CA was awarded £134 million directly from this fund. As a condition of funding, the allocations forms part of the Combined Authority's Strategic Investment Fund and will be managed in accordance with those principles².</p>
Single Investment Fund (SIF) Investment Priorities	<p>The Single Investment Fund unlocks economic potential and aims to accelerate sustainable growth and prosperity in the LCR. Key investment priorities relevant to the LCR Smart Ticketing scheme are:</p> <ul style="list-style-type: none"> Digital Infrastructure Develop infrastructure to facilitate future growth Support improvement of network infrastructure to facilitate future development Support investment that prioritises transport and gateway expansion, usually by infrastructure development, including Mersey Gateway, Northern Powerhouse rail and multi-modal opportunities.

² See: <https://www.liverpoolcityregion-ca.gov.uk/growing-our-economy/strategic-investment-fund/>

Policy/Strategy	Scheme Alignment
Transport Plan for Growth	<ul style="list-style-type: none"> Support improvements to transport connectivity and infrastructure development associated with growing identified visitor markets. Locally the project will contribute directly to the Transport Plan for Growth by enabling strategies to move customers to more sustainable modes of transport thereby reducing carbon emissions.
LCR Bus Strategy	<ul style="list-style-type: none"> The project will contribute directly to the Bus Strategy through making fare management and ticketing simpler, which in turn will help improve the image of the bus in the LCR.
LCR Long Term Rail Strategy	<ul style="list-style-type: none"> Introducing smart ticketing in the LCR will contribute to the long-term rail strategy. A simplified ticketing system will allow customers to travel quickly and more efficiently both in the LCR and the north of England more generally.
Mersey Ferries Long Term Strategy	<ul style="list-style-type: none"> The project will contribute directly to the Ferry Strategy. The introduction of smart ticketing, allowing customers to move easily around the LCR will help ensure Mersey Ferries are an important economic, social and cultural asset and as a result continue to play a central role in the LCR's success.
LCR Local Journeys Strategy	<ul style="list-style-type: none"> Improving the bus offer in the LCR, through investment in smart ticketing, will support the aims of the local journeys strategy. The smart ticketing programme has the potential to ultimately encompass cycle hire and other MaaS components.
Metro Mayoral Ambition	<ul style="list-style-type: none"> It is the objective of the Metro Mayor to make the Liverpool City Region a UK exemplar for smart ticketing and new payment technologies. This investment supports that ambition.

Source: Mott MacDonald

Table 6 considers the LCR Growth Strategy further and shows how smart ticketing enhancements will achieve the LCR's key investment priorities noted in the SIF prospectus. The table also evidences how the LCR Smart Ticketing project will provide short-term solutions to enable multiple longer-term opportunities.

Table 6: LCR Growth Strategy Priorities

Investment Priorities of the SIF Prospectus	How will the project contribute to achieving the key investment policies?
Productivity	<ul style="list-style-type: none"> A modern and efficient public transport system is a key factor in attracting business investment, and therefore raising GVA/jobs in the City Region. By making public transport more efficient and easier to use, businesses and employees will be drawn closer together – bringing agglomeration (productivity) economies. By reducing barriers to travel, businesses will have easier access to the labour market, and residents will have access to a greater range of opportunities. The wider programme which this project enables (see Q2), will provide further multiplier effects across these impacts.
People	<ul style="list-style-type: none"> A modern ticketing system and reduced costs of travel bring increased opportunity for residents, potentially increasing net employment. Enabling the use of underutilised capacity on public transport helps the LCR to meet the increased need for sustainable mobility as result of continued population growth.
Place	<ul style="list-style-type: none"> Investment in smart ticketing can enable an increase in public transport use and contribute towards a move towards smart mobility. The resultant reduction in private car use can enable opportunities to use the streetscape and 'places' in the city region for alternative, more sustainable uses.

Source: Merseytravel

2.1.4 Existing Smart Ticketing Offer

2.1.4.1 LCR's Existing Smartcard

The existing smart ticketing offer in LCR is comprised of a smartcard which was first introduced in 2013³. This is currently an anonymous ITSO⁴ smartcard with no registration required, although a one-off activation fee of £1.00 does need to be paid. Over the intervening years ticketing products from both Merseytravel and the two main bus operators have gradually been moved over to the smartcard. The offer, however, is still incomplete and confusing for users, where many of the potential benefits of the smart product remain unrealised.

The products currently available on the LCR's existing smartcard, along with the limitations of use, are noted in Table 7. This also shows that a similar, albeit reduced, range of tickets is also available for young people at a discounted price. These may be purchased at Merseytravel Centres and Pay-Point outlets, or in the case of SaveAways and Railpasses at Merseyrail stations.

Table 7: Existing LCR Smartcard Tickets for Adults and Young Persons

Product	Modes Permitted	Validity	Price	Current Limitations
SaveAway (Adult)	Bus	1 day	£4.10 (1 area)	Loaded on to card at point of purchase – no online purchase possible No advance purchase possible (except next day) May not be purchased on bus
	Rail Ferry	Same day or next day only After 09:30 only	£5.40 (all areas)	
SaveAway (Young Person)	Bus	1 day	£2.40 (1 area)	
	Rail Ferry	Same day or next day only After 09:30 only	£2.80 (all areas)	
Solo (Adult)	Bus	1 day	£4.80	
		3 days (bundle)	£13.50	No online purchase possible
		5-days bundle	£21.00	
		7 days	£19.20	Annual and term-time Solo unavailable on smart ticket
		4-weeks (28 days)	£64.70	
		Term	£132.00	
		Annual	£668.00	
All areas only				
Solo (Young Person)	Bus	1 day (MyTicket)	£2.20	1 day paper ticket only on bus
		7 days	£9.60	No online purchase possible
		4 weeks	£32.35	
		Term	£85.80	Term-time Solo unavailable on smart ticket
		All areas only		
Arriva Weekly Ticket (Adult)	Bus	Arriva only (plus Stagecoach buses on Quality Routes)	£16 from driver £15 as mobile ticket	Only available on Arriva buses
		7 days		Loaded on to card at point of purchase - no online purchase possible

³ Although some bus operators have introduced their own Smart Card products in other parts of the country, these have been replaced by the Liverpool City Region SMART Card

⁴ Integrated Transport Smartcard Organisation – a set of standards for smartcard configuration and operation

Product	Modes Permitted	Validity	Price	Current Limitations
				No advance purchase possible except as mobile ticket
Arriva Weekly Ticket (Young Person)	Bus	Arriva only (plus Stagecoach buses on Quality Routes) 7 days	£10.00	Only available on Arriva buses Loaded on to card at point of purchase - no online purchase possible No advance purchase possible except as mobile ticket
Stagecoach Weekly MegaRider (Adult)	Bus	Stagecoach only (plus Arriva buses on Quality Routes) 7 days	£14.00	Only available on Stagecoach buses Loaded on to card at point of purchase – no online purchase possible No advance purchase possible except as mobile ticket
Stagecoach Weekly MegaRider (Young Person)	Bus	Stagecoach only (plus Arriva buses on Quality Routes) 7 days	£7.00	Only available on Stagecoach buses Loaded on to card at point of purchase – no online purchase possible No advance purchase possible except as mobile ticket.
Weekly Railpass (Adult)	Rail	7 days 1 zone 2 zones or 1 area 3 zones or 1 area and 1 zone All areas	£16.70 £20.70 £26.20 £33.50	Only available at rail stations Loaded on to card at point of purchase - no online purchase possible No advance purchase possible
Weekly Railpass (Young Person)	Rail	7 days 1 zone 2 zones 3 zones All areas	£8.35 £10.35 £13.10 £16.75	Only available at rail stations Loaded on to card at point of purchase - no online purchase possible No advance purchase possible
Monthly Railpass (Adult)	Rail	1 month 1 zone 2 zones or 1 area 3 zones or 1 area and 1 zone All areas	£57.60 £72.30 £90.20 £116.90	Only available at rail stations Loaded on to card at point of purchase - no online purchase possible No advance purchase possible
Monthly Railpass (Young Person)	Rail	1 month 1 zone 2 zones 3 zones All areas	£28.90 £36.15 £45.10 £58.45	Only available at rail stations Loaded on to card at point of purchase - no online purchase possible No advance purchase possible
Term Time Railpass (Adult)	Rail	1 term 1 zone 2 zones 3 zones	£115.00 £146.00 £180.00	Only available at rail stations as a paper ticket No advance purchase possible

Product	Modes Permitted	Validity	Price	Current Limitations
		All areas	£236.00	
Term Time Railpass (Young Person)	Rail	1 term 1 zone 2 zones 3 zones All areas	£74.75 £94.90 £117.00 £153.40	Only available at rail stations as a paper ticket No advance purchase possible
Annual Railpass (Adult only)	Rail	1 year 1 zone 2 zones or 1 area 3 zones or 1 area and 1 zone All areas	£578.00 £723.00 £902.00 £1169.00	Only available at rail stations Loaded on to card at point of purchase - no online purchase possible No advance purchase possible

Source: Mott MacDonald

A key issue with the existing offer is that there is no means to 'collect' tickets electronically on a smartcard that have been purchased online, and no means to 'activate' stored tickets that have been purchased in advance on rail services (or at rail stations). This means that the only tickets that may currently be purchased in advance are Solos which are bought at PayPoint stores and then activated on bus on first use, and SaveAways for the following day which require no activation.

At present, it is not possible to purchase multi-modal season tickets of a week or longer on the existing smartcard since the Trio product is not offered on the platform. In addition, the lack of a web-portal and registration also means that no past usage information is available for customers. Finally, the existing smart ticketing offer in the LCR does not have any capacity for price capping and customers are therefore required to understand the above range of products and restrictions when they purchase each ticket.

2.1.4.2 Mobile Ticketing

In addition to the above smart ticketing offer, it should be noted that both Arriva and Stagecoach operate their own smart ticketing offer. Due to the existence of the LCR smartcard, under the Bus Alliance Arriva and Stagecoach have both agreed to adopt the existing smartcard as the single card for use within the Liverpool City Region, however both operators offer a mobile ticketing product for their day and season tickets.

In both cases the mobile ticket in question is provided via a mobile app which is presented to the driver on the bus when boarding. In this way, the tickets are not SMART in and of themselves, however they may be bought online via the operator's app and may be purchased in advance in contrast to the existing LCR smart ticketing offer.

Whilst omitted from Table 7, as they are not compatible with the existing Liverpool City Region's smartcard, both Stagecoach and Arriva do offer annual ticketing products which can be purchased online.

2.1.4.3 Current offer

As is clear from the above, the ticketing offer in Liverpool City Region is diverse and confusing with many different available tickets for each journey and a significant amount of customer research required to try and optimise purchase. The mix of ticket delivery methods causes further complication, with only a limited range available on the existing smartcard, and the

remainder formed of a mix of paper and mobile tickets, purchasable from a variety of different locations and via different methods. The result of this is significant customer confusion, reduced attraction of public transport and limited benefits realisable from the current smart ticketing products.

2.1.5 So what does this mean for the Business Case?

The key points to take away from this section in the Strategic Case are as follows:

- The current public transport ticketing offer in the LCR is complex. Simplifying the public transport ticketing offer through the introduction of uniform contactless payment technologies is vital to enable operators and passengers to take full advantage of the benefits associated with contactless payment technology.
- Smart ticketing and contactless technologies provide the LCR with the opportunity to remove the burden of ticket choice from the customer, ensuring that only the required fare is paid making public transport more attractive and simpler to use.
- Improving the accessibility and attractiveness of public transport is important to both Merseytravel and the LCRCA as transport is a key means to support strategic priorities such as growing the economy and improving the local environment.
- The programme of improvements proposed for the LCR Smart Ticketing scheme (3TP) includes the replacement of ETMs on buses, especially those owned by smaller operators, electronic ticket collection and improved journey recording and data capture. The creation of a web-portal will also allow the advance purchase of SMART-tickets and is expected to enhance security whilst improving customer journey information.
- The ticketing offer in the LCR is diverse and confusing with many different tickets available for each journey. The mix of ticket delivery methods causes further complication, with only a limited range available on the existing LCR SMART ticket, and the remainder formed of a mix of paper and mobile tickets, purchasable from a variety of different locations and via several different methods.

2.2 Existing Issues and Opportunities

In this section the primary issues and opportunities that have given rise to the need for an improved and enhanced smart ticketing scheme in LCR are discussed in more detail. The paragraphs below introduce the issues and present some potential solutions.

2.2.1 Ticketing Constraints on Public Transport use

As noted earlier, the current ticketing arrangements in the LCR do not always reflect well the existing travel patterns of public transport users across the City Region and thus constrain public transport use across the area. For example, cross-river journeys require at least 2 zone tickets which are significantly more expensive than single zone tickets, despite cross-river journeys making up a large proportion of public transport journeys in LCR. This issue reduces mobility and makes it harder and more inconvenient for people to access everyday goods and services. If, however, all transport services could be paid for by a smart ticket, phone or contactless bank card the above constraints could be alleviated.

The provision of smart ticketing removes the need to tender the correct fare, which only slows boarding time as drivers look for change. The 'back office' requirements for handling cash would also be reduced which would then increase the efficiency of public transport operations across the LCR. To ensure, however, those customers who are unbanked or prefer to utilize other methods of payment can continue to travel an alternative option of multi-operator, multi-journey tickets loaded onto a smartcard will be possible.

2.2.2 Lack of Universal ETM Coverage

Whilst ticket machines with contactless capabilities are currently installed on Stagecoach and will be implemented on Arriva buses from June 2019, there is no universal installation of ETMs with this capability across the LCR. Many smaller operators cannot afford ETM technology meaning passengers still need to carry cash if they want to travel on these services. This has implications on the willingness for people to travel on such routes and impacts the overall financial viability of the services provided.

In response to this, the 3TP programme provides an opportunity for all bus operators in the LCR to be provided with contactless 'Ticketer' ETMs, enabling customers to use their smart tickets on all buses. By investing in this technology LCR will be ensuring customers are offered modern, consistent and secure payment services. Customers using the new smart-ticketing infrastructure would complete transactions through one of two platforms; existing contactless payment applications such as EMV (debit and credit cards), Apple Pay or Google Pay, or via Host Card Emulation where an ITSO smartcard is installed electronically on the device. Importantly, the successful implementation of smart ticketing ETMs across the LCR will help enable the city region to be an early adopter of TfN's project ABBOT when this is available.

2.2.3 Ticketing Outcome if left to the Commercial Market

If left solely to the commercial market, individual transport operators in the LCR may introduce different technologies or ticketing solutions. This lack of cross-compatibility could maintain or worsen the complex and confusing ticketing system already in place in the LCR. Money for smart ticketing could be injected with the right intent but the lack of network-wide compatibility could mean that the outputs, as a result, could have reduced value. Moreover, without any unified strategy and approach to the commercial market some bus operators may fail to see the value of improving the technological infrastructure, resulting in gaps in the ETM and resultant smart ticketing provision.

The 3TP Smart Ticketing scheme, therefore, implements the vision of the Metro Mayor and the LCR CA by providing the LCR with investment and leadership in new technology; facilitated centrally through enhanced governance structures. The installation of consistent and universal SMART ticketing enables the LCR to initiate modern payment solutions in a structured, consistent and controlled manner across various operators and modes. More detail on the opportunities presented by the transformative smart ticketing agenda to the LCR are noted below:

- Structured – All partners in the city region public transport system will have a defined and integrated role that is part of an overarching smart ticketing solution architecture.
- Consistent – Services will be integrated across all modes to enable easy and affordable mobility for customers as they access work, education, leisure and other activities in the LCR
- Controlled – The LCR will be able to ensure development in smart ticketing is controlled and developed for the wider benefit of customers. The Metro Mayor and CA are uniquely placed within the City Region to show the direction and control necessary to ensure a fit for purpose solution is developed that aligns with the wider aspirations of the LCR.

2.2.4 Ticket Collection

The existing ETMs that are installed on buses across the City Region, do not allow customers to pick-up smart ticketing products ordered previously online. Without upgrading the ETM asset base, customers will continue to face the inconvenience of having to remember to visit a travel shop or a Pay-Point outlet, prior to boarding a bus or a train, to ensure that they have a valid ticket in-hand. Furthermore, the lack of smartcard validation at most train stations means that smart ticket holders continue to require a receipt for their journey as proof of purchase, thereby eliminating part of the environmental benefit associated with smart ticketing technology.

By installing the 'Ticketer' ETM technology, tickets purchased in advance can be collected on-bus rather than from a PayPoint station. The direct sale of tickets both at Merseytravel shops and at PayPoint locations would not be removed entirely to cater for those customers who still wish to pay up-front and in cash for their travel needs. The development of a Web Portal, necessary to support on-board ticket collection, will add value to the customer offer by providing a platform for the online sale of tickets (ITSO smartcard products) and will enable customers to manage their travel account (including family accounts) from one place. The parallel development of rail ticket validators (not included within the 3TP programme) will only further enhance the transport offer in the LCR through deeper integration of multi-modal smart ticketing.

2.2.5 Lack of Account-Based Ticketing

Due to the current lack of a web-portal for smart ticketing, and an integrated commercial back office, there is currently no account-based ticketing system set up on a network-wide level for the LCR meaning there is currently no way to hotlist lost or stolen cards, or for users to access their personal travel data. In addition, there is no means by which fares can be capped to ensure a fair price is paid in each case. Together, this can cause unnecessary inconvenience and may be a factor in discouraging people who otherwise would travel by public transport.

The creation of a Web Portal and the establishment of customer accounts would enable customers to access all their travel data from a single point. The public would also benefit from a forum/portal where they can report lost and stolen smartcards and hot-listing can be undertaken to reduce the level of fraud. A Web-Portal can then also be a key part of an integrated Account based ticketing if a full commercial back office is implemented.

The Smart Ticketing project ultimately also has the potential to contribute to the Electric Vehicle Strategy for the LCR through additional MaaS services offered via the travel account portal. These include e-car club sharing, cycle and e-cycle hire.

2.2.6 Lack of customer journey and disruption data in the LCR

At present there is only a limited amount of travel data that can be collected in the LCR due to the limitations of existing ticket machine GPS data recording, and incompatible fare stages between operators. Consequently, it is often hard for operators to respond effectively to capacity and operating problems on the network due to highway pressure points and demand spikes. The proposed programme of ETM replacement will allow significantly improved journey data capture using accurate GPS locations and improved ticket type recording to help reactive and proactive planning of timetables.

2.2.7 So what does this mean for the Business Case?

The key points to take away from this section in the Strategic Case are as follows:

- The current ticketing arrangements in the LCR do not always reflect the existing travel patterns of public transport users across the City Region and thus constrain public transport use as a result. If all transport services could be paid for by a SMART ticket, phone or contactless bank card it would be considerably easier to move through the LCR.
- Whilst ticket machines with contactless capabilities are currently installed on Stagecoach buses (with scheduled introduction for Arriva in summer 2019), there is no universal installation of ETMs across the LCR. If all bus operators in the LCR were provided with contactless enabled 'Ticketer' ETMs, customers could be provided with modern, consistent and secure payment services. The successful implementation of such SMART ticketing infrastructure would also put LCR in a strong strategic position to adopt TfN's project ABBOT in later phases of the project.
- If the ticketing infrastructure was left solely to the commercial market, individual transport operators in the LCR may introduce different technologies or ticketing solutions. This lack of cross-compatibility could maintain or worsen the complex and confusing ticketing system already in place. A coordinated approach to installing SMART ticketing infrastructure would mean the LCR has modern payment solutions which are structured, consistent and controlled across various operators and modes. This is likely to increase uptake of usage to the benefit of all parties.
- The existing ETMs that are installed on buses across the LCR do not allow customers to pick-up SMART ticketing products ordered previously online. This means passengers face the inconvenience of having to remember to visit a travel shop or a Pay-Point outlet, prior to boarding a bus or a train, to ensure that they have a valid SMART ticket in-hand. The installation of 'Ticketer' ETM technology and associated Web Portal, will alleviate this issue so customers can collect tickets purchased in advance on-bus rather than from a PayPoint station.
- The LCR currently has no web-portal platform for SMART ticketing across a network-wide level. This means there is currently no way to hotlist lost or stolen cards, or for users and families to access their personal travel data. The absence of a web-portal also prevents advance online purchase of tickets, so passengers are not equipped with the confidence that they are paying a fair price. The creation of a Web Portal, in association with the installation of Ticketer ETM machines will alleviate these issues and enable customers to access all LCR mobility services from a single point.
- The provision of a web-portal also provides a platform for the LCR SMART Ticketing scheme to connect into and contribute to the Electric Vehicle Strategy and other MaaS initiatives in future, offered via the travel account portal. These services could include e-car club sharing, cycle and e-cycle hire, and payment of Mersey Tunnel tolls.
- The lack of accurate geographical passenger journey information and disruption data in the LCR hampers economic potential as it takes operators longer to deal with issues across the transport network. The improved geolocation and recording of passenger journey data offered by the upgraded ETMs could, however, transform this process.

2.3 Logic Map for the Strategic Case

Mott MacDonald in association with relevant parties at Merseytravel and LCR CA devised a logic map, see Figure 11, to illustrate and summarise the thought process detailed in this Business Case. The logic map sets out the agreed scheme objectives and the appropriate context behind them whilst also considering the inputs necessary for the project to be implemented. From there the logic map moves to state the key outputs; the tangible products that would be installed through the scheme investment. The primary (immediate) and secondary outcomes (benefits that are likely to be evidenced at a later date) are noted whilst the wider strategic impacts the scheme may have some contribution towards are also acknowledged.

2.3.1 Scheme Objectives

As discussed earlier in Section 1.3, the objectives specific to this smart ticketing scheme (3TP), as agreed with the project strategic group, are:

1. Streamline existing arrangements for ticketing and facilitate the introduction of new technologies and customer offers to reduce the current travel constraints. This will place the Liverpool City Region at the forefront of new ticketing and payment technologies.
2. Ensure greater access to employment, education, other services and opportunities for passengers, whilst improving air quality and reducing carbon emissions across the Liverpool City Region.
3. Improve the efficiency of operation of the public transport network for the administrator and operators, helping to attract inward investment, boost productivity, and generate additional revenue through increased use of public transport.

These objectives were agreed by the Strategic Group within the LCR overseeing the 3TP Smart Ticketing project.

2.3.2 Context

The issues and opportunities discussed in the previous sub-section are reiterated in the below table. This describes the issues in more detail, discusses the impacts of each and notes the proposed solution or opportunity in each case.

Table 8: Summary of the Key Issues and Opportunities

Context	Problems/Issues	Current Impact of the Issue	Solutions/Opportunities
Ticketing constraints on public transport use	Lack of alignment with modern payment technologies and MaaS principles	<ul style="list-style-type: none"> • Reduced attractiveness of public and sustainable transport services due to the confusing and complex ticketing offer and the lack of flexible ways to pay without cash. Without this the opportunities to improve health and wellbeing, enhance the economy and benefit the environment are reduced. 	<ul style="list-style-type: none"> • All transport services could be paid for by a smart ticket, phone or contactless bank card, and supported by potential loyalty schemes and business discounts made available through the Web Portal. • The need to tender the correct fare would be removed, speeding up journeys. • 'Back office' requirements for handling cash would be reduced, whilst the efficiency of public transport operations in the LCR will be improved. • Customers who are unbanked or prefer to utilize other methods will continue to have access to multi-operator, multi-journey tickets loaded onto a smartcard.

Context	Problems/Issues	Current Impact of the Issue	Solutions/Opportunities
Lack of universal ETM coverage with contactless capability	Inefficiency of cash transactions, ticket choices, and payment channels	<ul style="list-style-type: none"> The ETMs currently in use, particularly by the small bus operators, are over 10 years old and do not have the capability necessary to support secure contactless payments. 	<ul style="list-style-type: none"> All bus operators in the LCR could be provided with contactless enabled 'TICKETER' ETMs and thereby encouraged to take a full role in the smart ticketing scheme and to ensure customers are offered modern, consistent, and secure payment services. Contactless infrastructure will allow new payment and ticketing solutions to be adopted in the LCR and will pave the way for the region to be an early adopter of TfN's project ABBOT.
Ticketing outcome if left to the commercial market	Current Smart Ticketing and payment arrangements have been, and could be, developed without an overarching strategy that aligns with the wider plans of the LCR CA.	<ul style="list-style-type: none"> The absence of leadership at an LCR level leaves bus operators free to promote their own smart ticketing products leaving a confusing and inconsistent transport offer, and a lack of integration between the bus operators and the transport modes. Without the SMART Ticketing scheme the opportunity to create market leading public transport infrastructure that aligns and exceeds customer's expectations is lost. 	<ul style="list-style-type: none"> The Smart Ticketing project will implement the vision of the Metro Mayor and the LCR CA by providing the LCR with investment and leadership in new technology, facilitated through established governance structures. The project will allow the LCR to implement smart ticketing and payment solutions in a structured, consistent and controlled manner across operators and modes that will contribute towards the wider transformation agenda of the LCR. <ul style="list-style-type: none"> Structured – All partners in the city region public transport system will have a defined and integrated role that is part of an overarching smart ticketing solution architecture. Consistent – Services will be integrated across all modes to enable easy and affordable mobility for customers as they access work, education, leisure and other activities in the region. In time the aim is to enable customers in the LCR to be able to use a single ticketing option to access the full range of transport services including bus, rail, ferry, bikes and park & ride. Controlled – LCR will be able to ensure development in smart ticketing are controlled and developed for the wider benefit of customers. The Metro Mayor and CA are uniquely placed within the City Region to offer the direction

Context	Problems/Issues	Current Impact of the Issue	Solutions/Opportunities
Lack of electronic ticket collection on buses	No existing ticket collection procedures to enable customers to pick-up pre-ordered tickets.	<ul style="list-style-type: none"> Customers are not able to order ticketing products online and collect from the bus driver on boarding. 	<p>and control necessary to ensure a fit for purpose solution is developed that aligns with the wider aspirations of the LCR.</p> <ul style="list-style-type: none"> The LCR has an opportunity to build upon the physical and digital infrastructure implemented through the investment in the 3TP scheme to ensure consistency across operators, modes and areas. This would make travel in the LCR easier and more customer friendly. The provision of 'TICKETER' ETMs will allow advance-purchased tickets to be collected on the bus rather than relying on PayPoint systems as currently The development of a Web Portal will add value to the customer offer by providing a platform for the online sale of tickets (ITSO smartcard products) and will provide a space for customers to manage their travel account (including family accounts) in one place. The direct sale of tickets at Merseytravel shops and the PayPoint retail network (albeit at much reduced volumes) could be maintained to enable customers who wish to pay for their travel needs up front and in cash to do so.
Lack of account-based ticketing	Lack of alignment with modern payment technologies and MaaS principles	<ul style="list-style-type: none"> Without access to personalized, simple, comprehensive information about the travel choices available, costs and payment information, members of the public are not able to take advantage of services available to them. A lack of account-based ticketing will leave LCR unprepared for the eventual rollout of Project Abbot and fare management during Phase 2 of the project. 	<ul style="list-style-type: none"> The Web Portal and the establishment of customer accounts will be the first step to provide customers with the ability to access all LCR mobility services including public transport, cycle hire, journey planning and walking routes from a single point. The Web-Portal will provide a forum for the reporting of lost and stolen smartcards allowing the hot-listing of these cards to reduce fraud. The Smart Ticketing project has the potential to ultimately contribute to the Electric Vehicle Strategy for the LCR by offering services via the travel account portal such as e-car club sharing, cycle and e-cycle hire.
Lack of customer journey information and disruption data in LCR.	Existing lack of accurate geo-referenced passenger journey data and inconsistent fare stages between	<ul style="list-style-type: none"> Bus operators have only limited data on the journey behaviour and habits of passengers, and on 	<ul style="list-style-type: none"> New ETM technology enables service providers to collect a much greater depth and breadth of information on user travel patterns.

Context	Problems/Issues	Current Impact of the Issue	Solutions/Opportunities
	operators. Limited live journey time data reduces effective response to disruption.	their preferred ticketing choices. <ul style="list-style-type: none"> Operators have a limited ability to accurately plan services to meet demand and to respond to periods of disruption. 	<ul style="list-style-type: none"> By utilising this ‘big data’, operators are able to respond much more quickly to problems on the network, pressure points and demand for capacity increases. This intelligent mobility management enhances the economic performance of the city region; a lack of investment in ticketing infrastructure is preventing the city region from taking advantage of this opportunity.

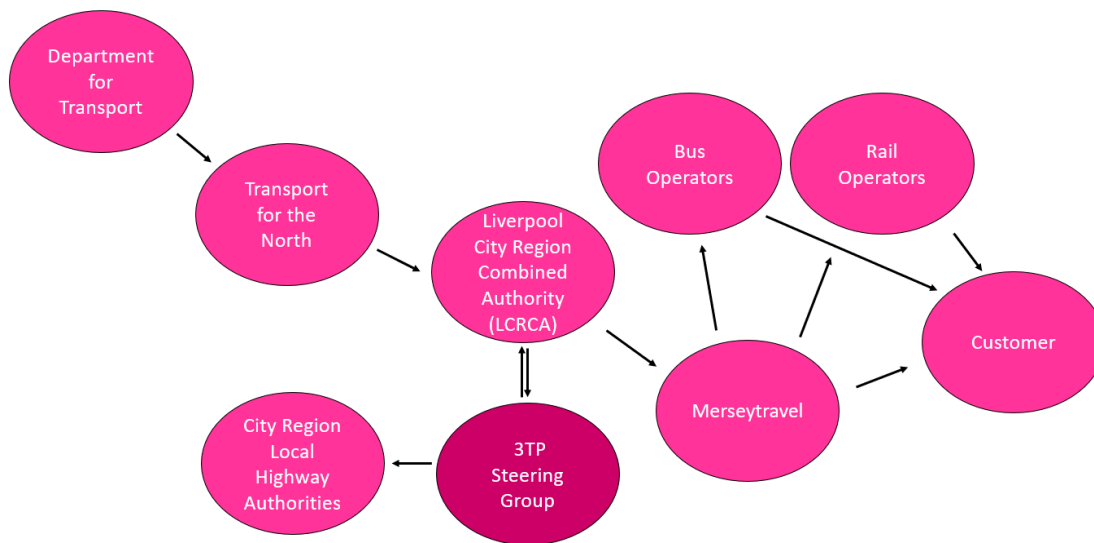
Source: Mott MacDonald

2.3.3 Inputs

The key inputs that will be required to support the LCR Smart Ticketing scheme as confirmed by the project Strategic Group are:

- Finance –capital funding will be obtained from the LCR Transforming Cities Fund.
- Cooperation from bus and rail operators in LCR. This to ensure the successful implementation of unified smart ticketing technology.
- Smart Ticketing team at Merseytravel – to oversee the project and its implementation, and to integrate with the concurrent ticketing strategy for LCR.
- IT transport team at Merseytravel – provide back-office IT support to ensure the ETMs work correctly and will be largely responsible for the creation of the Web Portal.
- LCR CA– key decision-maker and body involved in the day-to-day implementation of the Smart Ticketing scheme across the LCR.
- 3TP Steering Group – to make strategic decisions in relation to the 3TP scheme and to provide strategic oversight.
- Transport for the North – developer and owner of Project Abbot. TfN will need to provide the relevant information to ensure the LCR SMART ticketing offer and Project Abbot align.
- DfT – Ultimate source for funding
- City Region Local Highway Authorities – responsible for the operation and management of the strategic road network across various local authorities.
- Customer – requires customer to make use of the new ticketing structure and delivery mechanisms.

Figure 10 shows the relationships between the main parties involved in the LCR Smart Ticketing programme.

Figure 10: Relationship between Input Parties

Source: Mott MacDonald

2.3.4 Outputs

The main output for the proposed scheme is a consistent and comprehensive smart ticketing and payment system for the public transport network across the LCR. These will be achieved through the installation of contactless Ticketer ETM machines which will also enable pre-ordered tickets to be collected on-bus. Further outputs include personalised user accounts, the ability to hotlist lost or stolen cards and, in the future, fare capping. The concepts of Mobility as a Service and Intra-Northern smart travel will also be capable of being developed in the longer term.

2.3.5 Outcomes

The investment in smart ticketing across the LCR will generate both primary and secondary outcomes. Notable primary outcomes include faster boarding, greater convenience and lower levels of cash-handling. Whilst personalised usage and expiry information could be made available for passengers, enhanced analysis of customer data could also be utilised by operators, Merseytravel and the LCR to further improve the transport provision available. Other primary outcomes include reduced fraud, price capping and a simplified fare structure at point of use for multiple modes of transport.

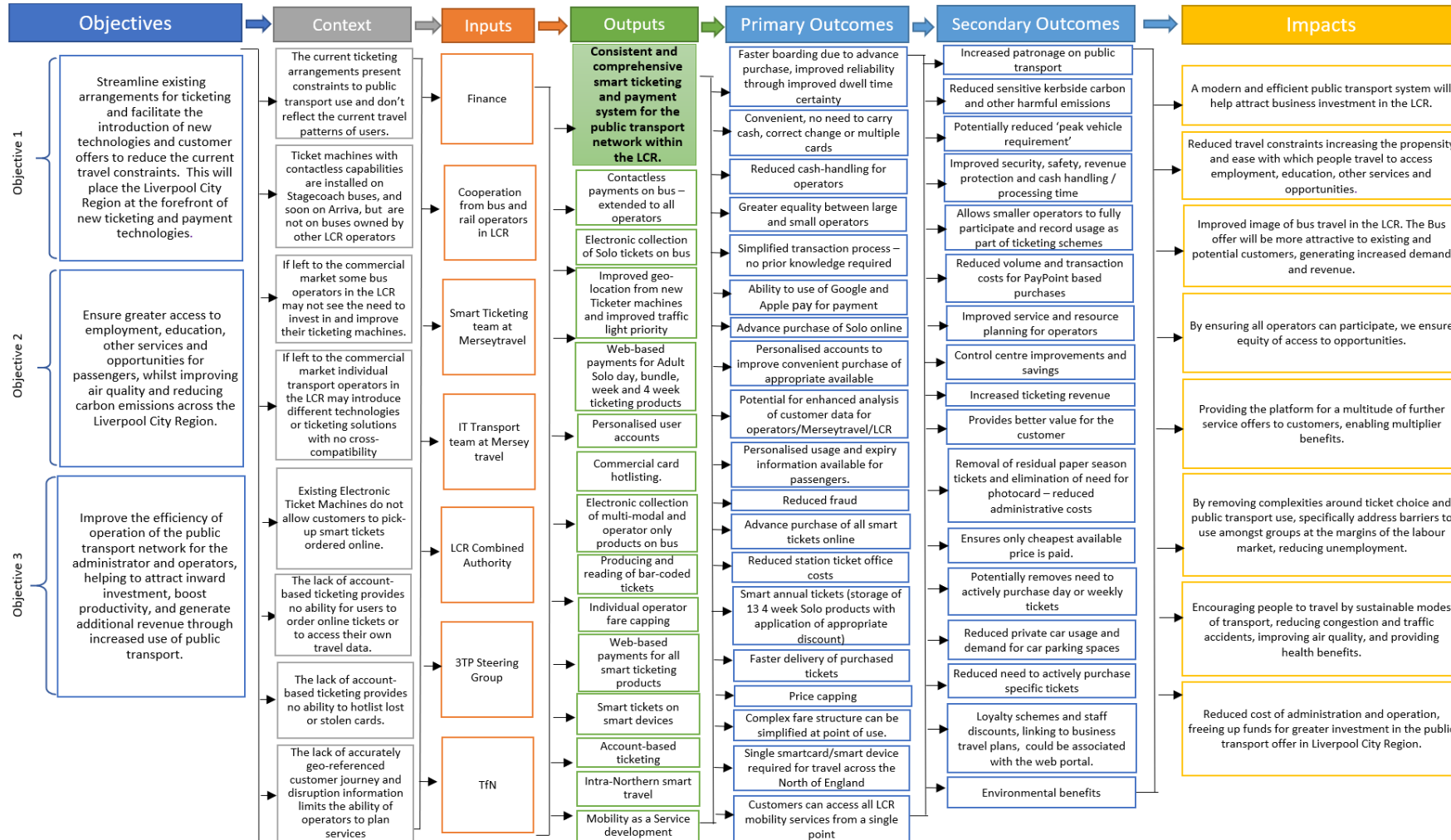
Potential secondary outcomes include increased patronage on public transport, lower private car use, reduced emissions and reduced peak vehicle requirements. Greater security, safety and improved revenue protection are additional benefits. Administrative cost savings may also be noted in the operator control centre as resources are deployed more intelligently through improved passenger transport data. Whilst overall there will be increased ticketing revenue, the customer will be provided with a product that is better value for money. A reduction in sensitive kerbside carbon emissions due to reduced dwell times could be noted whilst other environmental benefits are realised. Loyalty schemes and staff discounts, linking to business travel plans, could also be associated with the Web Portal.

2.3.6 Impacts

The impacts associated with the smart ticketing scheme are the wider strategic benefits. These include increased business investment as a result of a modern and efficient public transport system and reduced travel constraints, making it easier for the public to travel around the LCR. It is hoped with new smart ticketing technology installed across different operators that the perception of bus travel in the LCR will be enhanced leading to greater mobility and hence economic prosperity. A platform will also be created to provide a multitude of other service offers to customers in the future. If the smart technology encourages more people to use sustainable modes of transport then benefits such as reduced congestion, enhanced air quality and greater health benefits will also be realised as a result.

The logic diagram, shown in Figure 8, was compiled by assimilating the above factors together.

Figure 11: Logic Map



Source: Mott MacDonald

2.3.7 Constraints

There are several constraints associated with the LCR Smart Ticketing (3TP) project which will need to be addressed as the scheme is implemented. These include:

Transport Operators

Several rail and bus operators in LCR have their own schemes for smart ticketing and payment technologies driven by their commercial interests. Through the Bus Alliance, the main bus operators in LCR have agreed to make the LCR smart platform the sole smart ticketing product in the region, however their own cards are still in use in external and overlapping areas. In addition, some rail operators such as Trans-Pennine Express and Northern are releasing season tickets on their own smartcards.

Whilst multiple smartcard platforms within an area is not a problem in itself, the potential for confusion is significant and a strategy will be required that minimises this confusion whether this is a similar agreement with other transport operators to make use of the LCR smart platform, or whether this is to be solved using promotional and marketing techniques.

Existing Ticketing Scheme

The existing Pre-Paid Ticketing Scheme has been in place for many years and is to a large extent aligned with the needs and operational limitations of paper-based ticketing. The project needs to work within the constraints of the existing ticketing scheme arrangements until an updated ticketing strategy is agreed that makes full use of, and leverages, smart ticketing and modern payment technologies.

In addition, provision must be made for the transition of the existing paper-based ticketing system to a new smart ticketing system so that provision is in place for weekly, monthly and annual Trio holders, for example, to continue to use their old products until expiry.

Regulations

The project must work within the constraints of the ITSO smart ticketing standard and national rail standards for the delivery of local rail and national rail ticket interoperability.

The project must also comply with the UK Banking and Card Industry regulations.

2.3.8 Interdependencies

Operator Buy-in

The achievement of the project goals is dependent upon transport operator buy-in to the overall LCR vision and standards for smart ticketing and payment technologies. This will be achieved through negotiating legal and commercial arrangements with the transport operators. There may also be a need to establish a legally binding agreement with the operators which enshrines their own and the City Region obligations to ensure that the operators will accept LCRs ticketing system and structure in perpetuity. This potentially could be completed using the existing Bus Alliance and Merseyrail concession architecture, however given that this currently excludes smaller bus operators and other rail operators respectively, there may need to be a new forum for these agreements unless a franchise-based model for bus operations is adopted across the City Region to achieve the Metro Mayor's objectives.

New LCR Ticketing Scheme

To realise the full benefits of this project a new multi-operator, multi-modal ticketing scheme to reflect contemporary lifestyles and payment methods is required. This would replace the

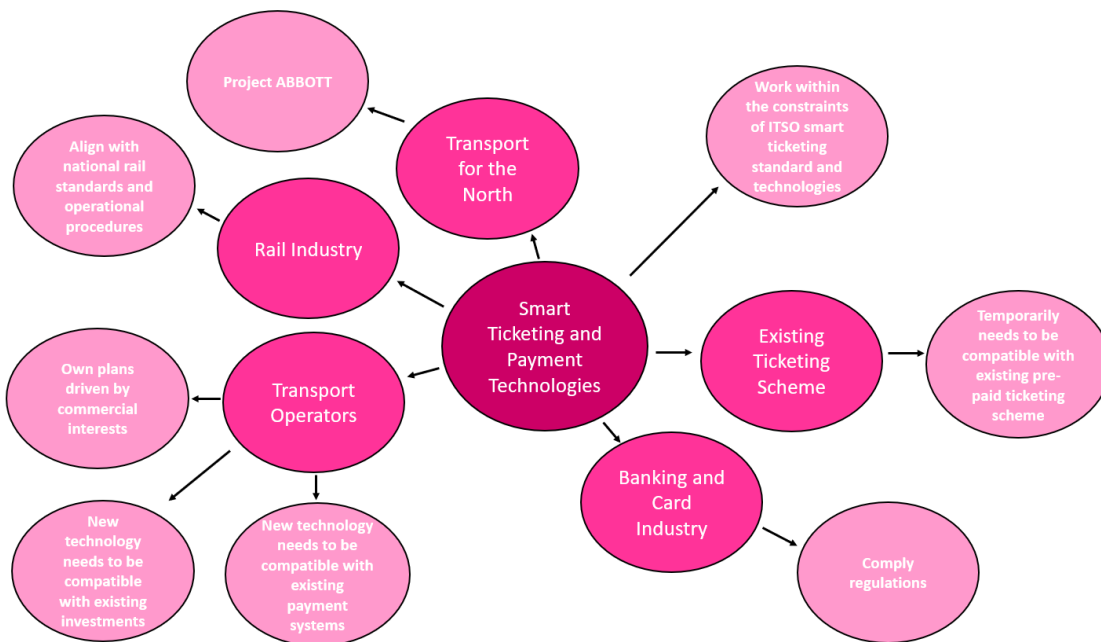
current complex structure of tickets, zones and prices. It should be noted, however, that the overall pricing structure need not be simplified significantly as part of this project as long as the customer interface and requirement for decisions is simplified. This will become much easier to realise in Phase 2 of the project in which the rollout of Project ABBOT and fares management will ensure that the customer need only tap their card to be ensured a fair price for any journey in the LCR.

Delivery of TfN’s IST programme

Phase 2 of the 3TP project is dependent upon the successful delivery of TfN’s Integrated and Smart Ticketing (IST) programme for the delivery of platform validator infrastructure for the rail component, and ultimately for the delivery of Project ABBOT to provide the back-office system required for fare capping and the fair price guarantee.

Figure 12 below summarises the key interdependencies for the 3TP project.

Figure 12: Interdependencies



Source: Mott MacDonald

2.3.9 Relationship with other programmes, projects and investments

Project ABBOT

DfT, through TfN, are investing in intelligent smart ticketing schemes across the north of England aiming to build on local schemes whilst ensuring a consistent customer experience. Project ABBOT is a key part of TfN’s £150 million Integrated and Smart Travel Programme, enabling smart ticketing on trains, light rail / trams and buses where passengers can use bank cards or travelcards to ‘tap in’ and, if necessary, ‘tap out’⁵. Project ABBOT provides the key back office support that will allow an, as yet, unnamed concept of pan-northern smart ticketing to be possible. The smart technology ensures passengers will always pay a fair price and enables customers to renew tickets online. The 3TP project will contribute to this wider vision by

⁵ <https://www.ukauthority.com/articles/transport-for-the-north-plans-for-smart-ticketing/>

putting in place the physical and digital infrastructure necessary to enable TfN's project ABBOT to be implemented in the LCR in the early 2020's.

Potential links to other projects

The funding sought for 3TP acts as an important enabler for potential later enhancements in the customer offer, including:

- Increasingly comprehensive data collected on the Web Portal and through customers' use of the transport network will enable a greater depth and clarity of assessment of the benefit of wider strategic investments and interventions in the public transport network;
- Making the greater level of data we collect available through 'open data' developments will enable business entrepreneurs to add value through complementary promotions, services and information;
- Improvements to Real Time Information, supported contract management and enhanced traffic priority schemes;
- Electronic delivery of smart tickets simplifying the ticketing estate, reducing printing costs and environmental impact; and
- Extension of Web Portal facilities to include rail tickets, other multi-modal products and other services offered through the Combined Authority will enable a 'transformative' seamless 'one ticket' offer.

Whilst there are a number of positive outcomes attributed with the smart ticketing scheme itself, it is important to recognise the huge impact the scheme will have more broadly when successfully interlinked with other projects and investments such as Project ABBOT and the wider strategic rail network in the north.

2.3.10 So what does this mean for the Business Case?

The key points to take away from this section in the Strategic Case are as follows:

- The logic map sets out the three scheme objectives and the context behind them whilst considering the inputs necessary for the project to be implemented. The logic map also highlights the key outputs, the primary and secondary outcomes along with the wider strategic impacts the scheme may contribute towards.
- Contextually, the logic map focuses on six main points: ticketing constraints on public transport use, lack of universal ETM coverage with contactless capability, the ticketing outcome if left to the commercial market, ticket collection, lack of account-based ticketing and a lack of real-time information and disruption data across the LCR.
- There are several key inputs needed to support and deliver the outputs, outcomes and wider impacts associated with the LCR SMART ticketing scheme.
- Through the installation of contactless Ticketer ETM machines, a consistent and comprehensive Smart ticketing payment system can be established on the public transport network across the LCR. Pre-ordered tickets will be collected, whilst the technology enabling personalised user accounts and the ability to hotlist lost or stolen cards will also be implemented. Another eventual Phase 2 output is the guarantee that all passengers will pay a fair price.
- Key primary outcomes expected as a result of the LCR SMART ticketing scheme include faster boarding, greater convenience of travel and lower levels of cash handling.
- Key secondary outcomes include increased public transport patronage, improved financial safety/security and lower administration costs.
- The broader impacts/strategic benefits of SMART ticketing include the potential to attract increased business investment to the LCR and to improve the perception of bus travel in the region. More use of bus, rather than car, has the potential to reduce congestion and improve public health and the environment.
- The main constraints associated with the LCR SMART Ticketing scheme involve obtaining effective collaboration from the different transport operators, devising an appropriate strategy to transition from the existing ticketing scheme to a contactless system, whilst working within the regulations determined by various bodies and organisations.
- The key interdependencies associated with the SMART ticketing scheme include the successful buy-in of transport operators, the adoption of a new ticketing system across the LCR and the delivery of the TfN's IST programme which is fundamental to incorporate phase 2 of the LCR SMART ticketing scheme with Project ABBOT.
- An investment in the LCR SMART ticketing programme will install the necessary physical and digital infrastructure for Project ABBOT to be realised in the early 2020s.
- The funding associated with the LCR SMART ticketing scheme provides the potential to enhance the customer offer in the future. This is especially true, when the LCR SMART ticketing scheme is successfully interlinked with both Project ABBOT and ticketing across the wider strategic northern rail network.

2.4 The Need for Intervention

The current smart ticketing and payment facilities on the LCR's transport network are arguably similar to those in many UK cities but fall well below the capabilities of London or other major European cities. They also do not meet the requirements set by Transport for the North for the roll-out of Project ABBOT across the north of England.

Where, however, smart tickets have been introduced on a smaller scale in the LCR they have been quickly adopted by customers and are seen to reduce bus boarding times as a simple tap is all that is required rather than a cash transaction. This is evidenced by the ongoing high volume of smart SaveAway, Solo and operator weekly ticket sales on LCR smart tickets over the last four years. A smart transaction takes typically 2 to 3 seconds whereas a cash transaction can take around 15 seconds, or sometimes much more, to complete. This should support the idea of implementing smart ticketing at a greater scale across the LCR.

Research by PWC, examining the potential impact of smart ticketing at a national level, suggests that customers value smart ticketing and that investment in smart ticketing technology could increase passenger use of public transport⁶. In that research, of 4,005 survey respondents, 7% said they would choose to travel by bus, and 8% by rail, instead of the private car if it was easier to buy a ticket. This equates to over 380 million more bus trips and 120 million more train trips in the UK annually. If the share of national bus trips made in LCR stays the same in relation to national usage (3.2%), this would amount to an additional 12.2 million bus trips made annually in LCR.

The economic appraisal section of this Business Case will evidence further examples of where smart ticketing has increased public transport usage.

2.4.1 Market Failure

The risk of market failure is another driver for the implementation of 3TP in LCR. Key reasons why market failure may occur in the absence of the scheme include the following:

- The adoption of smart ticketing and payment technologies has been challenging across the LCR as several commercial tickets are still delivered on paper and paid for with cash. This means there is little incentive for smaller operators to invest in new ticketing technology given the initial expense they would incur.
- Cash transactions, in themselves, can be problematic if the correct fare is not tendered by customers and bus drivers do not have sufficient change; this can lead to conflict situations where travel is sometimes denied to passengers. The inconvenience of needing to carry cash may disincentivise passengers from traveling by public transport more generally.
- If left to the commercial market individual transport operators, especially those who run socially necessary but otherwise commercially marginal services, either may not see the need for investing in standardised smart ticketing technologies or may introduce a variety of disparate and inconsistent technologies and ticketing solutions which would then have incompatible commercial and operational arrangements. As a result, customers may have to carry multiple cards and have multiple relationships with different transport providers, which is likely to cause unnecessary inconvenience and reduce the attractiveness of public transport overall.

⁶ <https://www.pwc.co.uk/government-public-sector/transport/documents/smart-ticketing-2018.pdf>.

2.4.2 Implications for Do Nothing

Without investing in a standardised smart ticketing platform, the current ticketing offer across the LCR will remain unchanged, meaning customers will continue to face confusion over the available ticketing options and will potentially be financially disadvantaged as a result. The full list of implications if the 3TP scheme is not implemented is reiterated below:

- Ticketing constraints on public transport use – the absence of modern payment technologies and the failure of the LCR to adopt technologies that in the future can support MaaS principles will continue to discourage people from travelling by public transport. This will subsequently impact the environment, the prosperity of the economy and the general health and wellbeing of the population.
- Lack of universal ETM coverage with contactless capability – contactless payments will continue to be impossible on some buses in the LCR meaning cash for walk-up fares is still required. This then adds to the dwell time and overall journey time. The lack of universal coverage slows uptake across the board.
- Ticketing outcome if left to the commercial market – non-uniform ticketing systems will continue to be used, leaving the customer with a confusing and inconsistent ticketing offer. Without an effective strategy to align the wider plans of LCR CA, the opportunity to create market leading transport infrastructure is lost.
- Ticket collection - if Ticketer ETMs (or equivalent) are not installed on buses across the LCR, customers will continue to be unable to collect tickets ordered online from the bus driver. This can be inconvenient and time-wasting, thus deterring people from travelling by public transport.
- Lack of account-based ticketing – Account-based ticketing provides users with a registered account accessible online at which they may link payment and Smartcards, and access their personal travel history, expenditure and card-usage. The account may also be used to report lost and stolen cards for addition to the hotlist to prevent fraudulent travel. Without account-based ticketing personalised, simple, comprehensive information about travel choices and the associated costs and payment options is much more difficult to access by the public. This prevents customers from fully benefiting from the travel services provided in the LCR. The absence of account-based ticketing also means the LCR will be unprepared for the rollout of Project ABBOT and will be unable to benefit from the fare management strategy intended to be rolled out during the second phase of the project.
- Lack of customer journey information and disruption data in the LCR – without the new ETMs associated with the 3TP scheme, the lack of detailed travel data will be increasingly problematic. This is because the technology is a key asset for operators to manage problems and pressure points on the network.
- Paper tickets – continuing to rely on paper tickets in the future is not desirable. Paper tickets require visual inspection and are subject to misuse in a variety of forms. This process of inspection and checking increases boarding times significantly. Confrontation between driver and passenger, which could have safety implications, is also possible if the date, route, or zonal validity is unclear. The introduction of a robust electronically validated smart ticketing system would largely alleviate these issues.

2.4.3 What are the alternatives?

Smart Ticketing products, integrated between modes and across operators, are now commonplace amongst the major cities of the world and in many smaller regional and sub-regional centres, particularly in continental Europe. The Oyster system in London has been in place for 16 years and has contributed significantly to the growth in public transport use in the city whilst helping lead to a decrease in the proportional use of the private car (alongside the congestion charge and now the Ultra-Low Emissions Zone). Elsewhere, Smart Ticketing initiatives lag behind in most other sizeable city regions in the UK, including Liverpool, where the ticketing offer is confusing, multi-platform and the absence of fare capping means passengers are not guaranteed a fair journey price.

The only real alternative to investing in Smart Ticketing in LCR to bring it into line with other successful cities worldwide, is to leave the development of ticketing delivery to the market. As has been discussed multiple times, it is clear that, even with the best of intentions, the concurrent development of multiple products, platforms, technologies and validities is unlikely to offer a customer-friendly ticketing offer, to alleviate the confusion over public transport ticketing, or to make public transport more accessible and attractive to the travelling public. Whilst on an individual operator level, some of the key objectives may be achieved, it is clear that a market-led approach would move away from an integrated multi-operator, multi-modal solution which is self-evidently more beneficial for the travelling public.

As an alternative, the capital investment could be injected into alternative non-smart ticketing strategies such as provision of ticket payment machines (selling paper tickets) at bus stops and train stations, or online alternatives in which the customer may print out their own tickets for journeys at home. This alternative might meet some of the objectives of the 3TP scheme but would fail to deliver on the sustainability objective due to the continued use of non-renewable paper ticketing products. It would also fail to shift the emphasis from the customer and their ability to research and understand which ticket is the best ticket for their journey. In addition, this option would not provide the benefits of the 3TP system in terms of improved journey data recording or operator and customer access to this information. Furthermore, it would not prepare the LCR for the rollout of Project ABBOT (in phase 2 of the 3TP programme) failing to integrate the city region with its neighbouring authorities' transport networks in the north of England.

As a final alternative, the investment proposed for SMART Ticketing could be redirected to the ticketing offer itself with the aim of resolving and rationalising the existing system to reduce confusion. The issue here, however, is that there is a danger that by simplifying the ticketing offer to make it understandable, the ability to differentiate price based on specific journey needs is lost making it more likely that customers end up paying for validity or mode choice that they do not need. Part of the argument for 3TP, particularly Phase 2 of the project, is that it would allow a simplified customer interface with the ticketing system whilst retaining the 'behind-the-scenes' complexity of the existing (or proposed future) offer, allowing a nuanced set of prices and reducing the likelihood of overpayment by customers.

2.4.4 Preferred Option

To improve the existing public transport, there is no plausible option other than to implement smart ticketing across the LCR. As noted previously, this would be delivered through three key phases (1, 1.5 and 2). The main deliverables and outputs associated with each phase are:

2.4.4.1 Phase 1

New ETM ticket machines

- Extend contactless payments on bus to all operators
- Electronic collection of Solo tickets on bus
- Improved geo-location from new Ticketer machines and improved priority on key routes

Web-Portal

- Web-based payments for Adult Solo day, bundle, week and 4 week ticketing products.
- Personalised user accounts – adult
- Commercial card hot-listing

The immediate outcomes as a result of phase 1 include faster boarding, reduced journey times resulting from lower dwell times on buses. The need for customers to have the correct change would also be alleviated, whilst less cash handling would be required by the operators improving security and reducing insurance liability and the risk of driver fraud. The development of smart ticketing in the LCR would simplify the transaction process as passengers could securely pay for tickets using Google and Apple Pay systems, which would provide greater equality between both large and small operators. The absence, or significant reduction in the volume of paper tickets, will help reduce fraudulent activity and provide a significant sustainable alternative.

Through the web-portal the development of personalised accounts would improve ticket provision, specifically, by enabling online purchase and subsequent collection of Solos on bus. Personalised accounts would also provide an essential platform for customers to access their travel data. The data collected through the smart ticketing infrastructure will further benefit operators, as there is greater geo-referencing information available to allow operators to better plan the distribution of their assets. Merseytravel and LCR Combined Authority can also use the available travel data to continue improving the transport infrastructure in the future.

In terms of the secondary outcomes associated with the installation of new ETM ticket machines, it is expected there will be increased patronage on public transport as a result of the improved convenience and confidence of the ticketing solution. If fewer customers pay for tickets in cash there will be greater passenger safety, improved security of the revenue collected and lower transaction costs associated with PayPoint based purchases. Further savings can be made in control centres, whilst operators can use the available data for improved service and resource planning. Reduced vehicular emissions would also benefit the environment.

2.4.4.2 Phase 1.5

New ETM ticket machines

- Electronic collection of multi-modal tickets (e.g. Trios / SaveAways) and operator only products on bus
- Producing and reading of bar-coded tickets
- Individual operator fare capping

Web-Portal

- Young person user accounts

- Web-based payments for all smart ticketing products (assuming rail or multi-modal ticket collection possible at stations)
- Family user accounts with multiple registered cards

Host Card Emulation on Smart Devices

- Smart tickets on smart devices (Android only at present)

The primary outcomes associated with phase 1.5 includes the collection on various modes of transport across the LCR of multi-modal tickets purchased previously online. This is not only more convenient for the customer but reduces overall station ticketing costs. Travel data will be available for customers to view their personal usage information whilst operators, Merseytravel and LCR can exploit the database to improve the transport infrastructure in the future.

The production and reading of bar-coded tickets could reduce fraudulent use of paper tickets across the network, particularly relating to paper day tickets which are difficult for drivers to assess the validity of quickly. Individual operator fare capping will also begin to ensure a fair price guarantee for journeys albeit only for travel exclusively on one operator.

Secondary outcomes that could be realised following the implementation of the phase 1.5 deliverables include improved patronage on public transport in the LCR, increased revenue and reduced transaction costs as a result of fewer PayPoint purchases. The customer will benefit from a better value for money product whilst the removal of paper tickets will make travelling around the LCR more sustainable and convenient. Customer safety and security will also be improved for younger travellers. Operators will also be able to use the data outputs associated with the investment to improve their service planning offer.

2.4.4.3 Phase 2 and Later Stage Deliverables

Account-based Ticketing (ABT) Roll-Out

- Account-based Ticketing
- Intra-Northern Smart Travel
- Mobility As A Service Development

Following the roll-out of ABT, price-capping between different transport operators in the LCR is expected to be possible. This will help simplify a complex fare structure at the point of use. The subsequent benefits of this investment will ensure only the cheapest available price is paid, potentially removing the need for passengers to purchase day or season tickets.

At a later date, the ABT could link into Intra-Northern Smart Travel and potentially the development of Mobility as a Service. This will mean that a single smartcard/smart device would be all that is required to travel across the North of England. Customers in the LCR would also be able to access all mobility services, such as Tunnel Tolls, Mersey Ferries, cycle hire and journey planning from a single point. Together this will reduce car dependency and usage within the LCR and more broadly across the North of England.

2.4.4.4 Strategic benefits

The overall impact of the wider strategic benefits, associated with the 3TP scheme, only increases as the three separate phases are progressed and implemented. Despite this, Phase 1, does help establish ticketing solutions for a modern and efficient public transport system that will in turn attract greater levels of business investment. With reduced travel constraints, and a simplified ticketing system, it will become easier to travel around the LCR. This will improve the perception of bus travel and public transport, more broadly, enhancing the level of revenue obtained; money which can then be reinvested to further improve the transport provision in the

LCR. This could include adding new service offers to the digital platform which would have a multitude of additional benefits. By ensuring all operators can participate in the 3TP scheme from the outset, through the installation of ETM ticket machines in Phase 1, the potential for operational and administrative cost savings will be maximised as the scheme progresses. This again, generates the necessary capital to continue to improve the public transport offer in the LCR. Lastly, if more people in the LCR travel by sustainable modes of transport as opposed to the private car, the resultant reduced congestion, improved air quality and improved health and wellbeing will be further strategic benefits realised as a result of the 3TP scheme.

2.4.5 So what does this mean for the Business Case?

The key points to take away from this section in the Strategic Case are as follows:

- The current smart ticketing and payment facilities on the LCR's transport network are similar to those in many UK cities but fall well below the capabilities of London or other major European cities. They also do not meet the requirements set by Transport for the North for the roll-out of Project ABBOT across the north of England.
- The risk of market failure is a significant driver supporting the implementation of the smart ticketing scheme in the LCR.
- Without investing in a standardised smart ticketing scheme, the current ticketing offer across the LCR will remain unchanged, meaning customers will continue to face confusion over the available ticketing options and will potentially be financially disadvantaged as a result.
- The only real alternative to investing in smart ticketing in the LCR is to leave the development of ticketing delivery to the market. However, with the best of intentions, the concurrent development of multiple products, platforms, technologies and validities is unlikely to offer a customer-friendly ticketing offer, to alleviate the confusion over public transport ticketing, or to make public transport more accessible and attractive in the LCR.
- Other less plausible alternatives include investing in non-smart ticketing options or attempting to simplify the existing complex ticketing strategy. Neither option though has the same degree of benefit as those attributed to the investment in smart ticketing.
- In order to fully immerse the LCR in the digital era, and realise the strategic benefits outlined, the preferred option is to invest in the three phased approach to implement and install effective smart ticketing infrastructure in the LCR; making it easier and more convenient for people to move around the region by public transport.

2.5 Strategic Case Conclusion

From the detail provided in the Strategic Case it is clear that:

- The ticketing offer across the LCR is diverse and confusing with many different tickets available for each journey. The mix of ticket delivery methods causes further complication, with only a handful available on the existing LCR smart ticket, and the remainder formed of a mix of paper and mobile tickets, purchasable from a variety of different locations and via several different methods.
- The current ticketing arrangements in the LCR do not always reflect the existing travel patterns of public transport users across the City Region and thus constrain public transport use as a result.
- Smart ticketing and contactless technologies provide the LCR with the opportunity to remove the burden of ticket choice from the customer, ensuring that only the required fare is paid making public transport more attractive and simpler to use.
- If the ticketing infrastructure was left solely to the commercial market, individual transport operators in the LCR may introduce different technologies or ticketing solutions. This lack of cross-compatibility could maintain or worsen the complex and confusing ticketing system already in place.
- The existing ETMs that are installed on buses across the LCR do not allow customers to pick-up smart ticketing products ordered previously online. This means passengers face the inconvenience of having to remember to visit a travel shop or a Pay-Point outlet, prior to boarding a bus or a train, to ensure that they have a valid ticket in-hand.
- The LCR currently has no web-portal platform for smart ticketing across a network-wide level. This means there is no way to hotlist lost or stolen cards, or for users and families to access their personal travel data. The absence of a web-portal also prevents fare-capping, so passengers are not equipped with the confidence that they are paying a fair price.
- The lack of real-time information and disruption data in the LCR hampers economic potential as it takes operators longer to deal with issues across the transport network.
- The key programme of improvements proposed for the 3TP scheme includes the replacement of ETMs on buses, especially those owned by smaller operator's, electronic ticket collection and improved journey recording and data capture. The creation of a web-portal will also allow the advance purchase of smart tickets and is expected to enhance security whilst improving customer journey information.
- Through the installation of contactless Ticketer ETM machines, a consistent and comprehensive smart ticketing payment system can be established on the public transport network across the LCR. Pre-ordered tickets will be collected, whilst the technology enabling personalised user accounts and the ability to hotlist lost or stolen cards will also be implemented. Another output is the guarantee that all passengers will pay a fair price.
- An investment in the 3TP programme will install the necessary physical and digital infrastructure for Project ABBOT to be realised in the early 2020s.
- Key primary outcomes expected as a result of the 3TP scheme include faster boarding, greater convenience of travel and lower levels of cash handling. Key secondary outcomes include increased public transport patronage, improved financial safety/security and lower administration costs.
- The broader strategic benefits of smart ticketing include the potential to attract increased business investment to the LCR through the improved perception and uptake of bus travel in the region.

- The main constraints associated with the 3TP scheme involve obtaining effective collaboration from the different transport operators, devising an appropriate strategy to transition from the existing ticketing scheme to a contactless system, whilst working within the regulations determined by various bodies and organisations.
- The key interdependencies associated with the smart ticketing scheme include the successful buy-in of transport operators, the adoption of a new ticketing system across the LCR and the delivery of the TfN's IST programme which is fundamental to incorporate phase 2 of the 3TP scheme with Project ABBOT.
- Whilst other less plausible alternatives include investing in non-smart ticketing options or attempting to simplify the existing complex ticketing strategy, neither option has the same degree of benefit as attributed to the smart ticketing investment.
- To fully immerse the LCR in the digital era and realise the strategic benefits outlined, the preferred option is to invest in the three phased approach to implement and install effective smart ticketing infrastructure across the LCR. This will make it easier and more convenient for people to move around the LCR by public transport.

3 Economic Case

The Economic Case considers the impacts of the scheme on users, non-users and society against the costs incurred and revenue generated to public and private sector parties. Impacts to users, non-users and society comprise direct impacts, e.g. changes in the times and costs of travel, and indirect impacts from effects such as mode shift. Impacts and costs are combined in the standard economic appraisal metrics.

3.1 Scenarios

The Do Something (DS) intervention of Phase 1 investment in ETMs and the Web Portal (see Section 1.5) is appraised against a Do Minimum (DM) scenario. In this case the DM is simply the continuation of existing working practices and constraints. Principal impacts of this include:

- Use of existing ticketing mediums on all affected routes, e.g. continuation of majority cash transactions; and
- Use of Paypoint outlets for purchase of Solo products (where these are not available on bus).

The DS simply introduces the Phase 1 components (only) in 2020, and tests the impact of these on:

- Ongoing costs to all parties, including the public sector via mechanisms such as the Bus Service Operators Grant (BSOG);
- Passenger demand and revenue;
- Non-users from modal shift effects; and
- Environmental and societal externalities from changes in bus operation and the use of different modes.

Behind both scenarios are a series of background trends which influence costs, demand, revenue and economic impacts over the appraisal period. These all take standard assumptions from the Department for Transport (DfT's) Transport Analysis Guidance (TAG). A number of these, including background trends in bus demand are captured via the application of these in the Liverpool City Region Transport Model (LCRTM).

3.2 Appraisal Period

The ETMs are assumed to have a lifespan of ten years, after which they would require complete renewal. For the purposes of the appraisal we have assumed that the web portal has a similar lifespan of ten years, after which it would require a complete overhaul. The appraisal period is therefore limited to ten years, and all major renewal costs are excluded. It is also assumed that all long-term operating costs associated with the DS scheme, barring some initial upfront items which are included, are the same, i.e. web portal operating costs are directly comparable to those for the Paypoint scheme, net of the assumed saving from transaction fees for the latter.

The assumed opening year of the scheme is 2020, with the appraisal period therefore covering 2020 to 2029.

3.3 Scheme Impacts

Section 2.3 described how the outputs of the DS scheme are expected to generate a set of outcomes, and, ultimately, how these will transmit into economic, social and environmental impacts. The purpose of the Economic Case is, as far as the evidence base permits, to translate as many of these impacts into monetary values which can be compared to scheme costs.

Figure 13 shows the typical impacts of transport investment, with changes in journey time and cost assumed to act as a proxy for impacts on the UK’s economic efficiency. The quantifiable impacts from Section 2.3 are highlighted under the Level 1 category. At this stage potential Wider Economic Impacts (WEIs) under the Level 2 and 3 (‘evolving’ and ‘indicative’ respectively) have not been quantified as they will not have an impact on the emerging Value for Money (VfM) category.

Figure 13: Impacts of Transport Investment

Established Monetised Impacts	Evolving Monetised Impacts	Indicative Monetised Impacts	Non-monetised Impacts
<i>Included in initial and adjusted metrics</i>	<i>Included in adjusted metric</i>	<i>Considered after metric using switching values approach</i>	
Journey time savings Vehicle operating costs Accidents Physical activity Journey quality Noise Air quality Greenhouse gases Indirect tax	Reliability Static clustering Output in imperfectly competitive markets Labour supply	Moves to more/less productive jobs Dynamic clustering Induced investment Supplementary Economy Modelling*	Security Severance Accessibility Townscape Historic environment Landscape** Biodiversity Water environment Affordability Access to services Option and non-use values

**These are a class of models rather than a specific economic impact*

*** A widely-used methodology for monetisation exists, but this is not included in WebTAG guidance because of concerns about its robustness. Detailed guidance is found in the Supplementary Guidance on Landscape.*

Source: Department for Transport

Table 9 summarises how the DS scheme will produce the highlighted impacts for economic appraisal, coupled with a summary of how it will also impact on public and private sector accounts through cost and operating expenditure implications.

Table 9: Smart Ticketing – Monetised Impacts and Cost Implications for Appraisal

ID	Impact	Transmission Mechanism
Monetised Impacts		
1	Journey time	<ul style="list-style-type: none"> • Reductions in transaction times for boarders reduces dwell times and thus in-vehicle times (IVTs) for bus trips • Increased demand from the initial IVT reductions will increase dwell times. This requires a feedback mechanism which links demand to time savings and operational efficiencies (see below)
2	Accidents	<ul style="list-style-type: none"> • Mode shift from the private car will reduce car-kms and thus road traffic accidents
3	Journey quality	<ul style="list-style-type: none"> • Introduction of more convenient and modern payment technologies will have a value to consumers over and above direct time savings
4	Noise	<ul style="list-style-type: none"> • Mode shift from the private car will reduce car-kms and thus road traffic related noise
5	Air quality	<ul style="list-style-type: none"> • Mode shift from the private car will reduce car-kms and thus local NOx and PM emissions • More efficient bus operations and reduced dwell time will reduce local NOx and PM emissions
6	Greenhouse gases	<ul style="list-style-type: none"> • Mode shift from the private car will reduce car-kms and thus greenhouse gas emissions • More efficient bus operations will reduce greenhouse gas emissions
7	Indirect taxation	<ul style="list-style-type: none"> • Mode shift from the private car will reduce indirect tax receipts to HM Treasury • Increased bus revenue will reduce tax receipts to HM Treasury as bus fares are zero rated for VAT
Public and Private Sector Cost Implications		
8	Scheme costs	<ul style="list-style-type: none"> • Phase 1 Capital Expenditure (CapEx) funded via the TCF • Phase 1 Operating Expenditure (OpEx) funded via the TCF • Reduction in transaction fees currently paid to Paypoint for the Solo ticket product
9	Bus Service Operators Grant (Central Government)	<ul style="list-style-type: none"> • More efficient bus operations leads to reduction in fuel use and BSOG payments
10	Bus operating costs	<ul style="list-style-type: none"> • More efficient bus operations leads to a reduction in Peak Vehicle Requirement (PVR) and associated costs, including labour, maintenance, fuel, insurance etc. • More efficient bus operations leads to overall efficiencies in fuel use

Source: Mott MacDonald

3.4 Assumptions

There is a natural degree of uncertainty around some of the expected outputs and outcomes of the DS scheme. These include:

- Take-up of contactless technology and the web portal; and
- Impacts on transaction times per passenger boarding (in turn influenced by take-up) and how this measures against the DM scenario.

3.4.1 Use of Contactless Technology

The new ETMs enable existing (and new) users to transfer payment from cash to contactless. Input data and assumptions are therefore required:

- Number of users currently paying by cash;

- Proportion of users who will be able to avail themselves of contactless technology; and
- Proportion willing to use contactless technology (who can).

The core split of base bus demand data, for routes which will be affected by the introduction of new ETMs, is taken from Merseytravel bus passenger survey data. This allows the splitting of demand to ticket types, for which existing payment methods are known. However, in a number of cases these products and ticket types are available through multiple purchase channels and the exact split of sales by product and ticket type were not available. In these cases, an equal split across the available purchase channels has been assumed, e.g. 50% each where cash and pre-paid options are available. Only the proportion currently by cash will see an impact on transaction time.

Availability and use of contactless technology for small monetary transactions is evolving rapidly. At the end of 2017, 78% of debit cards were contactless⁷. This is only likely to have increased further since that date, so is a conservative assumption. A take-up model was used to estimate how many people would be willing to use contactless out of all users, i.e. those who had it available and were willing to use it. This estimated at 50% in 2017, increasing to 57% by 2021.

Current transaction data for all payments shows a 50:50 split between cash and card payment, irrespective of the value. Circa 40% of card payments are contactless, i.e. 20% of total transactions. However, this is reflective of the cap⁸ on transaction value for contactless payment. As bus ticket prices will fall under this cap and only contactless payment will be accepted by card (i.e. there is no chip and pin equivalent) it can be assumed that all bus fare transactions will follow the 50:50 split between cash and (contactless) card payment. In order to be conservative around scheme impacts, it is assumed that the 50% transfer of cash to contactless remains constant over time.

This initial set of assumptions then transits into transaction times per boarder.

3.4.2 Transaction Times

Transaction time per boarder in the DM and DS scenarios by payment method has been estimated in partnership with bus operators. These, alongside the split of users across ticket types and these payment methods are key inputs and assumptions as they determine the end-to-end journey time saving which can be achieved on affected routes.

The DM and DS estimates are shown in Table 10.

Table 10: Transaction Time by Scenario and Payment Method

Type	DM (seconds)	DS (seconds)
Concession	5	2
Walrus	10	2
Contactless	N/A	5
Cash	15	15

Source: Mott MacDonald and affected bus operators

As well as the transaction time saving being only applicable for those paying cash, the DS savings will only be realised once for those using cash to purchase multi-journey products such

⁷ See: <https://www.theguardian.com/business/2018/jun/18/uk-debit-cards-transactions-overtake-cash-for-the-first-time>

⁸ Currently £30 (August 2019 value).

as daily and period tickets (weeklies etc.). The demand time saving impacts have therefore been reduced to reflect this (see Section 3.5).

3.4.3 Solo Sales and Payment Methods

The Merseytravel bus passenger survey provides an estimate of the number of journeys on Solo products. These have then been distributed to individual ticket types using the parallel distribution for own operator equivalent products between dailies, weeklies and longer period tickets. These bus trips are then converted into equivalent sales using standard trip rate assumptions, e.g. 2.9 for day products.

It has been assumed that 60% of all sales will transfer from Paypoint outlets and Merseytravel Travel Centres to the web portal.

Based on the number of sales and the current ticket prices, it is therefore possible to estimate a total transaction value which would transfer from Paypoint outlets to the web portal. 3% of this value is currently used to cover Paypoint fees, and this is assumed to be saved under the DS scenario.

No quantified impact on Travel centres has been included, albeit there could be efficiency savings in this area as well.

No demand impact is assumed from this transfer of Solo products from Paypoint outlets and Travel Centres to the web portal as it is not a direct impact on the times and costs of particular journeys. This is a conservative assumption as we would expect the reduction in times and costs associated with purchase to make travel by bus more attractive.

3.5 Demand Modelling and Revenue

3.5.1 Liverpool City Region Transport Model

The LCRTM has been used to extract existing journey time and passenger demand information for all routes which are anticipated to receive the new ETMs. The journey time data also feeds the scheme cost estimates in Section 3.6. LCRTM operates for the future years of 2025 and 2035. Only the former falls within the appraisal period of 2020 to 2029. 2035 outputs, which are presented, are used to interpolate impacts for 2026 to 2029 inclusive.

The LCRTM is a full Variable Demand Model (VDM) which forecasts changes in travel behaviour from a given intervention between DS and DM scenarios. It includes changes in:

- Trip frequency, i.e. the total volume of travel demand;
- Mode, e.g. the propensity to use car versus bus;
- Time of travel, i.e. the propensity to travel in a given time period and hour within period; and
- Destination, i.e. the propensity of residents to change where they live or where they travel to in response to changes in transport supply.

Take-up and transaction time impacts have been translated into time savings per boarding on the affected routes. DM and DS runs for three modelled time periods (AM peak, inter-peak, and PM peak) then provide the change in:

- Bus demand (boardings);
- Bus passenger-kms, driven mainly by boardings and changes in destination; and

- User impacts. The resultant differences between the DS and DM scenarios are then subject to the 'rule of a half'⁹ for new users attracted to bus under the DS.

Outputs are annualised using standard annualisation factors which include weekend, seasonality and bank holiday effects.

Only the first order demand impacts have been estimated in LCRTM. Section 3.5.3 covers secondary impacts which have been captured offline in subsequent analyses. These are summarised for affected routes in Table 11. In line with past trends and driven by projections from the DfT for competing mode influences such as fuel costs, the LCRTM predicts decline in bus patronage between 2025 and 2035, however this decline is almost entirely mitigated by the additional patronage predicted from transaction time reductions as shown in the following table.

Table 11: LCRTM Demand Impacts from Transaction Time Reductions

Year	Do Minimum	Do Something	Percentage Change
2025	5,138,910	6,093,584	18.6%
2035	4,300,034	4,990,192	16.1%

Source: Mott MacDonald

3.5.2 Willingness-to-pay for contactless convenience

For those transferring to the new payment method there is a second order demand impact related to journey quality. This reflects the increased convenience that new payment technologies offer to users. Evidence on this is available from Transport for Greater Manchester (TfGM) user and non-user research which examined potential changes in bus demand from contactless payment outside of any other impacts such as transaction time reductions.

These demand impacts by type of user, which is a combination of frequency of use and ticket type, can be converted into equivalent time reductions per average bus trip in LCRTM to provide the comparable effect for those who can now use the technology in the DS (who could not in the DM). This is the equivalent of a **0.2 minute reduction in generalised time for each journey** by users who can now use contactless.

This provides an additional demand uplift of approximately 3.2% amongst those users who transfer to contactless, as shown in Table 12.

Table 12: Demand change from quality impact for those transferred to contactless

	2025	2035
Affected users – base demand	1,109,919	935,249
New trips:	35,910	30,246
Percentage Change:	3.24%	3.23%

Source: Mott MacDonald

3.5.3 Secondary impacts

The LCRTM analysis omits two factors which depress the potential savings from reductions in transaction time, namely:

- Only the first trip on daily and period cash products will generate the saving in transaction time. For example, a passenger purchasing a daily ticket with cash will see the reduction in

⁹ See: TAG Unit A1.3 for further detail:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805260/tag-unit-a1-3-user-and-provider-impacts.pdf

Table 10 on their first board; however, subsequent boards will typically involve displaying the ticket to the driver. This is assumed to be the same for a contactless validation. As a result, a multiplier has been estimated for how many journeys on the affected routes by relevant users who transfer to contactless will not generate the transaction time saving. This is 69%, i.e. only 69% of the journey time savings and demand/revenue impacts as initially estimated from the LCRTM can be realised; and

- Increased passenger demand from both the journey time savings and quality effects will both, as a secondary impact, lead to an increased number of boards which serves to dissipate some of the initial journey time savings. This process is, in effect, iterative, and it is possible to estimate an equilibrium state by running the increases/decreases through a set of iterations until the percentage demand increase converges, i.e. when demand is no longer changing between iterations at two decimal places. With the assumed IVT elasticity of -0.5 from the LCRTM, the result is that only 65% of initial first order demand will be realised, i.e. 35% will be lost due to the increased dwell times caused by the demand increases themselves.

The combined effect of these two multipliers is therefore a multiplier of 45% on LCRTM outputs (0.69×0.65), or 55% of the initial demand estimate from the LCRTM and subsequent smart uplift in Table 11 will be lost from increased dwell times due to the first order demand increases, and initial overestimation of transaction time savings.

3.5.4 Passenger revenue

All new trips are assumed to carry the existing average fare from the 2017 version of LCRTM, which is £1.47 (2017 prices). This is assumed constant in real terms for the appraisal period, e.g. the weighted average fare across all users rises at RPI+0%.

The demand and revenue impacts after all first and second order demand effects have been accounted for is summarised in Table 13.

Table 13: LCR smart ticketing annual bus demand and revenue change

	2025	2035
Demand from time savings	429,131	310,229
Demand from quality impacts	35,910	30,246
Total Demand Change	464,836	340,327
Total Revenue Change (£s 2017 prices)	683,309	500,281

Source: Mott MacDonald

3.6 Scheme Costs

3.6.1 Capital Expenditure

Proposed Capital Expenditure (CapEx) is shown in Table 14 and totals £1.4 million (2019 prices), exclusive of adjustments for the economic appraisal which are detailed in Section 3.7. Costs are considered inclusive of initial risk adjustments.

Table 14: Phase 1 Capital Expenditure (£ '000s)

Item	2018/19	2019/20
Business Case Approval		65
Actora HOPS & CMS Upgrades Complete	51	100
Web Portal Phase 1 launched (top-up of Solo & Railpass)		110
Hotlisting of commercial products implemented		10
Operator ETM estate refreshed for EMV and ITSO Action Listing	253	757
EMV (Model 1 – payment) launched in LCR		50
TOTAL	304	1,092

Source: Liverpool City Region Combined Authority

3.6.2 Operating Expenditure

Local Government

In addition to CapEx items, a series of ongoing Operating Expenditure (OpEx) items are required during delivery up to 2022. These will be funded by other budgets within the LCR and TCF funding is **not** being requested to cover these. These OpEX items total £750,000 (2019 prices).

Annual OpEx savings are forecast from the migration of Solo sales from Paypoint to the web portal, which will save transaction fees for local government. However, these are also included in the private sector costs as a reduction in revenue, meaning the two largely offset across appraisal metrics. These fees are estimated at approximately £50,000 per annum for the quantum of Solo products assumed to transfer from Paypoint outlets to the web portal.

Private Sector

Reductions in transaction times and thus dwell times for passenger boardings will manifest themselves as efficiencies to operators:

- In the extreme, some affected routes have scope for reducing the amount of buses it takes to operate them – the Peak Vehicle Requirement (PVR); and
- Reduced dwell times will increase average speeds and reduce fuel consumption.

Analysis of the journey time savings from the LCRTM on a route by route basis identified the potential for saving **two** PVR buses from current operations. These PVR savings are combined with estimates of the marginal costs (per bus) from associated:

- Labour;
- Fuel;
- Maintenance; and
- Administration, insurance and depreciation.

These costs use LCR specific values wherever available. They are exclusive of fuel duty as this is accounted for through BSOG payments.

The estimated savings to operators per annum from the PVR reductions are approximately £330,000.

Further efficiencies are also anticipated to be generated, versus the DM situation, across routes where journey time savings are observed where speeds have increased and fuel use correspondingly declined. These values are approximately £35,000 per annum.

Central Government

As previously detailed, changes in bus operations from reductions in dwell times, and thus increases in average speeds, have implications for the amount of fuel operators consume. Operators are currently reimbursed for the fuel duty component of their fuel costs in the form of Bus Service Operators Grant (BSOG). This cost is excluded in the estimates of private sector efficiencies as the net effect is a reduction in BSOG payments from Central Government to operators.

This is calculated directly from the estimated reduction in fuel consumption from higher average speed and is estimated to be a saving of approximately £110,000 per annum (2010 prices).

3.7 Environmental Impacts

The changes in fuel consumed from bus operations noted in Section 3.6 can be translated directly into both local air quality and greenhouse gas emissions using estimates of NO_x, PM, and CO₂ emissions per litre of fuel consumed. 'Damage cost' monetary values (per tonne) are taken from the TAG Databook, Table A3.2 for road transport in 'urban big' areas. CO₂ central values (per tonne) are taken from Table A3.4. The annual impacts are approximately:

- £170,000 of benefits from reductions in NO_x and PM_{2.5}; and
- £30,000 of benefits from reduction in CO₂ emissions.

3.8 Non-User Impacts

Non-user benefits are captured as changes in the Marginal External Costs (MEC) of car use, and the following elements have been counted according to valuations contained in the TAG Databook (including evidence of diversion between bus and car), and guidance in TAG Unit A5-4, covering:

- Congestion;
- Road accidents;
- Greenhouse gas emissions;
- Local air quality;
- Road traffic noise;
- Road infrastructure repairs; and
- Indirect taxation impacts.

Changes in externalities associated with car use are estimated from the change in bus passenger-kms from the change in bus demand detailed in Section 3.5. WebTAG advises a car diversion factor of 30%.

Total monetised impacts, in 2010 values and prices (undiscounted), across all MEC items are approximately £400,000 per annum, with de-congestion effects from mode shift to non-users the most significant.

3.9 Economic Appraisal

3.9.1 Scheme costs and revenue

A number of adjustments documented in TAG Unit A1.2 are required to the total outturn costs before they can be used in economic appraisal:

- Re-basing to 2010 has been undertaken using the GDP deflator;
- Discounting to 2010 using a discount rate of 3.5% for 30 years from the current year (2019) and 3.0% thereafter; and
- For appraisal purposes, conversion of all costs to market prices using an indirect taxation factor of 1.19 (or 19%).

Optimism bias of 200% is applied to CapEX items, as per TAG Unit A1.2 Table 8, where IT projects at Stage 1 carry a very high value.

3.9.2 Scheme Impacts

All impacts discussed in preceding sections are monetised using values and formulae from the latest TAG Databook¹⁰.

3.9.3 Transport Economic Efficiency

Total Transport Economic Efficiency (TEE) impacts across the ten-year appraisal period are shown in Table 15. OpEx savings enter as negative in the table but are translated into benefits (by reversing the sign) in the appraisal. Impacts have been discounted to the DfT's base year of 2010.

Table 15: Do Something TEE Impacts, 2020 to 2029 (discounted 2010 values and market prices)

Item	Impact (£ '000s)
User impacts – bus commuters	100
User impacts – bus other	6,620
User impacts – bus employer's business	100
Non-User impacts – decongestion	3,710
Bus operators – revenue	4,430
Bus operators – OpEx	-2,410
TOTAL	17,370

Source: Mott MacDonald

3.9.4 Public Accounts

Table 16 shows the corresponding impacts on the Public Accounts (PA). Costs are positive and savings are negative.

¹⁰ See: <https://www.gov.uk/government/publications/tag-data-book> [accessed 11.07.19].

Table 16: Do Something PA Impacts, 2020 to 2029 (discounted 2010 values and market prices)

Item	Impact (£ '000s)
Local - OpEx	290
Local – CapEx	3,140
Central – BSOG	-790
Indirect taxation	1,030
TOTAL	3,760

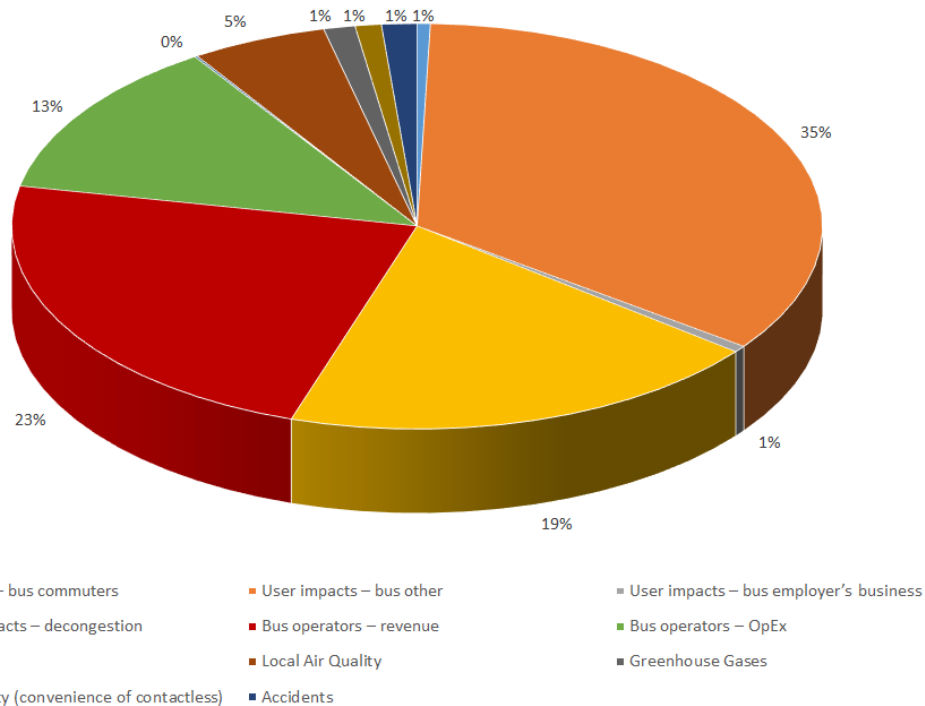
Source: Mott MacDonald

3.9.5 Analysis of Monetised Costs and Benefits

The principal impacts in the full Analysis of Monetised Costs and Benefits (AMCB) are shown in Table 40. This combines the TEE and PA with additional (monetised) social and environmental impacts. Benefits enter as positive numbers, and costs or disbenefits as negative numbers. As shown in Figure 14, the PVB is primarily driven by:

- Time savings to bus users on ‘other’ purposes;
- Decongestion for non-users;
- Revenue growth and OpEx savings for bus operators; and
- Air quality improvements from more efficient bus operation.

Figure 14: Present Value of Benefits Distribution



Source: Mott MacDonald

Partly due to the reductions in operating expenditure, the PVC is low. The Net Present Value (NPV) of the scheme is £18.1 million, and the BCR is 6.87.

Table 17: Do Something AMCB Impacts, 2020 to 2029 (discounted 2010 values and market prices)

Item	Impact (£ '000s)
Noise	20
Local Air Quality	1,040
Greenhouse Gases	240
Journey Quality (convenience of contactless)	200
Accidents	270
Economic Efficiency: Commuters	870
Economic Efficiency: Other	9,510
Economic Efficiency: Employer's Business	6,980
Indirect Taxation	-1,030
Present Value of Benefits (PVB)	18,100
Broad Transport Budget	-2,630
Present Value of Costs (PVC)	2,630
Net Present Value (NPV)	15,470
Benefit to Cost Ratio (BCR)	6.87

Source: Mott MacDonald

3.10 Value for Money Statement

The estimated PVB of the preferred DS option (DS1) is £18.1 million against a PVC of £2.6 million, resulting in an NPV of £15.5 million (2010 discounted, market, prices) and a BCR of 6.87. The BCR therefore offers 'very high' VfM under standard DfT guidance¹¹.

Optimism bias and risk adjustments reflect the level of scheme development, with the former carrying a high Stage 1 value for IT projects of this nature.

¹¹ See: <https://www.gov.uk/government/publications/dft-value-for-money-framework>

4 Financial Case

The Financial Case describes the funding requirement for the preferred option and the rationale for the selected funding mechanism.

4.1 Expenditure Profiles

4.1.1 Capital Expenditure

Proposed Capital Expenditure (CapEx) is shown in Table 18 and totals £1.4 million (2019 prices), exclusive of adjustments for the economic appraisal which are detailed in Section 3.7. Funding from TCF is being requested in order to meet these capital costs. Costs are considered inclusive of initial risk adjustments.

Table 18: Phase 1 Capital Expenditure (£ '000s)

Item	2018/19	2019/20
Business Case Approval		65
Actora HOPS & CMS Upgrades Complete	51	100
Web Portal Phase 1 launched (top-up of Solo & RailPass)		110
Hotlisting of commercial products implemented		10
Operator ETM estate refreshed for EMV and ITSO Action Listing	253	757
EMV (Model 1 – payment) launched in LCR		50
TOTAL	304	1,092

Source: Liverpool City Region Combined Authority

4.1.2 Operating Expenditure

Proposed Operating Expenditure (OpEx) is shown in Table 19 and totals £0.75million (2019 prices), exclusive of adjustments for the economic appraisal which are detailed in Section 3.7. These costs are to be met by other internal LCR budgets and funding is not being requested to cover these from TCF. Costs are considered inclusive of initial risk adjustments.

Table 19: Phase 1 Operating Expenditure (£ '000s)

Item	2018/19	2019/20	2020/21	2021/22
Actora HOPs & CMS Upgrades Complete	10	20		
Web Portal Phase 1 launched (top-up of Solo & RailPass)		50	80	100
Operator ETM estate refreshed for EMV and ITSO Action Listing			240	240
EMV (Model 1 -payment) launched in LCR			5	5
TOTAL	10	70	325	345

Source: Liverpool City Region Combined Authority

4.1.3 Supporting information

Information on each of the cost lines above is provided in the table below.

Table 20: Cost Details by Item

Item	Notes
Business Case Approval	Costs have been calculated for production of the Business Case.
Actora HOPs & CMS upgrades	There are extensive back office systems in place for the current smart ticketing system, which captures all the products sold (tickets) and details usage on both bus and rail services. Whilst handling millions of transactions, the system allows staff to also look at a specific customer, see what they have bought and where they have travelled. The upgrades would allow the process to be managed more efficiently as tickets could be bought on-line and collected on-bus.
Web Portal Phase 1 launched (top-up of Solo & RailPass)	To bring the customer offer into the 21st Century, a web retail portal needs to be established for customers to register and purchase certain smart ticketing products for collection at ATM or other collection points.
Hotlisting Commercial Products	The technology is already in place to remotely disable a lost or stolen concessionary pass. This process allows the same to be done with a commercial product and will be made significantly easier once the web-portal is online and registering of cards is available.
Operator ETM Estate refreshed for EMV and ITSO Action Listing	The current bus operator ticket machine estate is not fit for purpose as it does not allow contactless bank cards to be used to pay for tickets or for tickets purchased online to be picked up on-bus. Action Listing allows this innovation. The investment will put in place a fit for purpose ETM estate for smaller operators which will give them the same technological capability as the larger operators.
EMV (Model 1 – payment) launched in LCR	Following the above, EMV payments will be available on all buses in the LCR allowing single, or available day or season tickets to be purchased on-bus with contactless cards.

Source: Liverpool City Region Combined Authority

4.2 Funding Mechanism

Public funding is required to enable a consistent and comprehensive smart ticketing and payment system to be established for the public transport network within the LCR. Public funding will secure a fit for purpose Electronic Ticket Machine (ETM) estate for the City Region's bus fleet that will enable the (separate) modern smart ticketing and payment solutions being implemented.

Without public funding, commercial bus operators will invest in their ETM estate as determined by their own commercial interests and financial situation rather than the strategic requirements of the city region. This will see the introduction of a patchwork of equipment with varying capabilities that are unlikely to offer the consistent and comprehensive smart ticketing and payment services required by the City Region and public transport passengers, both current and future. This situation will be further exacerbated by unstructured investment by rail operators who will likely implement systems without full consideration to the wider needs of customers within the City Region.

Importantly though, the smart ticketing scheme will provide revenue savings for the transport operators in the LCR, as has been shown in Section 3 (Economic Case).

Public funding is needed for investment into the digital and physical infrastructure required by smaller bus operators and to deliver the back-office and web-based customer systems that will underpin the solution. This investment will contribute towards and build upon the Merseytravel and transport operator assets already in place and see the creation of on-line customer accounts that will cater for all travel not just travel via a single operator or transport mode. In addition to the funding the Combined Authority must engage with transport operators to build a

partnership approach whilst providing the leadership necessary to deliver a single, consistent smart ticketing and payment platform for the City Region. Without the active involvement and investment of the City Region the likely outcome will be the continued fragmentation of the ticketing offer to the customer.

At the time of writing (August 2019) the public funding being sought for this project has been pre-identified as the Transforming Cities Fund (TCF) monies administered by the LCR CA.

5 Commercial Case

The Commercial Case for Smart Ticketing provides evidence on the commercial viability of the scheme and the procurement strategy that will be used to engage the market. Here, risk allocation and transfer, contract timescales and implementation timescales are all documented.

Note that the Commercial Case of this Business Case relates only to Phase 1 of the 3TP scheme i.e. the investment being supported.

5.1 Approach

The DfT's guidance document sets out the issues that should be covered as part of the Commercial Case. This has been used as a basis for our approach to development of our Commercial Case for the LCR Smart Ticketing (3TP) scheme. Table 21 shows how this section aligns with DfT's requirements.

Table 21: DfT Commercial Case requirements

Content	DfT requirements	Section number and title
Introduction	Outline the approach taken to assess commercial viability.	5.1 Approach
Output based specification	Summarise the requirement in terms of outcomes and outputs, supplemented by the full specification as an appendix.	5.2 Output Based Specification Appendix A: Full Logic Map
Procurement strategy	Detail procurement/purchasing options including how they will secure the economic, social and environmental factors outlined in the economic case	5.3 Procurement Strategy
Sourcing options	Explain the options for sources of provision of services to meet the business need e.g. partnerships, framework, existing supplier arrangements, with rationale for selecting preferred sourcing option.	5.3.1 Procurement Options
Payment mechanisms	Set out the proposed payment mechanisms that will be negotiated with the providers e.g. linked to performance and availability, providing incentives for alternative revenue streams. (See the Office for Government Commerce's Achieving Excellence briefing for advice on payment mechanisms for construction projects.)	5.3.5 Payment Mechanisms
Pricing framework and charging mechanisms	To include incentives, deductions and performance targets.	5.3.4 Pricing Frameworks and Charging Mechanisms
Risk allocation and transfer	Present an assessment of how the types of risk might be apportioned or shared, with risks allocated to the party best placed to manage them subject to achieving value for money.	5.7 Risk Allocation and Transfer
Contract length	Set out scenarios for contract length (with rationale) and proposed key contractual clauses.	5.4 Contract Length
Human resource issues	Personnel/people management/trade union implications, where applicable, including TUPE regulations.	5.5 Human Resource Issues
Contract management	Provide a high-level view of implementation timescales. Detail additional support for in service management during roll-out / closure. Set out arrangements for managing contract through project / service delivery.	5.6 Contract Management

Source: DfT

5.2 Output Based Specification

Defining the output specification is the first substantive element of the Commercial Case – this section of the Business Case is intended to summarise the requirement in terms of outcomes and outputs to be delivered by the project.

The ultimate outputs of Phase 1 of the 3TP scheme include:

- Commission and installation of new ETM contactless ticketing machines for use by smaller bus operators; and
- Development of a web-portal.

The key outcomes resulting directly from these scheme elements are listed below:

- Faster boarding
- Greater convenience for passengers through universal system-wide smart solution
- Lower levels of cash-handling
- Greater equality between large and small operators
- Simplified transaction process – no prior knowledge required
- Ability to facilitate use of Google and Apple pay for payment
- Advance purchase of Solo and other smart tickets online
- Potential for enhanced analysis of customer data for operators/Merseytravel/LCR
- Personalised usage and expiry information available for passengers
- Reduced fraud
- Reduced station ticket office costs
- Faster delivery of purchased tickets
- Future-proofing capability for later phases delivery of:
 - price capping and simplified fare structure at point of use for multiple modes of transport
 - access to all LCR mobility services from a single point
 - single smartcard/smart device required for travel across the North of England

5.3 Procurement Strategy

All procurements and associated framework orders and contracts will be undertaken by a joint team made up of staff members from the Merseytravel IT, legal and procurement teams with support from the South West Smart Applications Limited (SWSAL), referred to under the trading name Smart Applications Management (SAM), procurement team.

The Merseytravel IT, legal and procurement staff will work alongside the technical and other teams as part of the Service Delivery Group. All procurement activity will comply with the Public Procurement Regulations 2018 and all other relevant statutory or EU Directive requirements.

The Merseytravel team have extensive experience in procuring multi-million-pound schemes following the Merseytravel Constitution and, where possible, make use of Government approved procurement frameworks for the purchase of high value solutions.

In order to deliver the scheme outputs and outcomes noted above, a procurement strategy and methodology is required that delivers the following:

- **Cost Certainty-** Achieve cost certainty, or certainty that the 3TP scheme can be delivered within the funding constraints.

- **Minimise Costs**- Ensure preparation and delivery stages of the project are cost-effective to minimise excess costs.
- **Programme**- Achieve an efficient delivery programme and highlight key project milestones.
- **Quality**- Obtain high quality ETM ticketing machines that are equipped with the necessary functions to allow contactless payments and supports the creation of a web-portal
- **Continuity of Project Knowledge**- Maintain project knowledge to support scheme implementation and successful rebuttal of any project challenge. The knowledge of the scheme and associated issues and constraints, generated through the development of the Business Case, is seen as an asset and will help enhance quality of delivery and achievement of programme.
- **Risk** – Obtain contactor/operator input to risk management and appraisals, including mitigation measures, to capitalise at an early stage on opportunities to reduce the risks associated with the commissioning, installing and implementing the new ETM ticketing machines and Web Portal across the LCR.
- **Deliverability** -Engagement with operators and stakeholders, throughout planning to scheme to delivery, to ensure the development of a successful proposal.

These are the criteria by which procurement strategies and methods have been based upon. The subsequent sections set out details of the preferred procurement route and how this was decided.

5.3.1 Procurement Options

Smart Applications Management (SAM) is an organisation specifically created to help commercial bus operators and public sector bodies realise the benefits of ITSO smart ticketing, by pooling resources and expertise to access best in class services and systems at an affordable price.

Procurement options have been considered through the SAM National Procurement Framework, a UK-wide resource for Public Sector Bodies and Transport Operators to have direct access to a full range of ITSO and wider ticketing services and goods. As the SAM National Procurement Framework is compliant with UK/EU procurement legislation, there is no requirement to complete individual, costly and time-consuming OJEU procurement exercises.

The Framework is comprised of 12 individual Lots and supports over 40 Suppliers. The lots relevant to the outputs of this scheme are:

- The ITSO Electronic Ticketing Machines (ETMs) Lot: and
- Web Portal Lot

Two suppliers were considered to procure the ETMs who have already signed the ETMs Framework Agreements with SAM and are therefore available immediately. These are Parkeon and Ticketer.

Ticketer were selected on the basis that they are the only supplier currently able to meet the technical requirements for cEMV and ITSO ATT15 (i.e. the standard specifications for Contactless and Smartcards nationally). The option to continue to procure on-bus ETM ticketing machines from Parkeon was also discounted as the technology doesn't support a uniform contactless ticketing approach across the LCR. Without a standardised system, the service will continue to be less convenient for people travelling around the LCR and will negatively impact the perception of public transport and overall patronage.

A Direct Award was therefore undertaken to select Ticketer as the supplier of the ETM machines in compliance with the Public Contract Regulations 2015.

For the development of the Web Portal, there are 3 suppliers who have signed a Web Portal Framework Agreement with SAM and are therefore available immediately. These are:

- Imaginet;
- SmartCitizen Ltd; and
- Unicard.

An appraisal of the three suppliers was undertaken based on the needs and requirements of Merseytravel. The appraisal covered 3 core areas:

- Technical Analysis
- Financial Analysis
- Contractual Analysis

Based on the results of this assessment and discussion with Merseytravel it was decided that the Web Portal would be procured through a single supplier, Imaginet.

5.3.2 Preferred Procurement

As noted above, the ETMs element of the scheme will be delivered (via a Central Purchasing Body) by Ticketer. At present, Merseytravel provide a managed ETM service to multiple smaller bus operators in the LCR, where Parkeon ETM machines are installed. In order to deliver the outputs identified within this scheme, the Parkeon ETM machines will be removed from the buses and replaced with ETM machines procured from Ticketer.

Despite this change in procurement of the ETM ticketing machines, Merseytravel will continue to provide support to the bus operators for the following services:

- The supply of ETM's through a leasing agreement
- Support contracts with the ETM supplier
- Provision of GPRS Mobile Data SIMS and data contracts
- Provision of ISAMs

The key benefits of this preferred method of procurement are listed in the points below:

- The infrastructure supports a centrally hosted, web-based back office; a fundamental component of the wider LCR ticketing strategy.
- Ticketer machines make smart ticketing systems accessible to every operator, irrespective of their size, and eradicate the need for operators to procure their own equipment, ensuring compatibility across the network.
- The operator is responsible for managing the system. A function which is supported by a hosted management service that users can access from anywhere via an internet connection.
- Licensing is ETM based rather than user based resulting in no restriction on the number of concurrent users an operator can have on the system at any one time.
- The ETM software is continuously updated and improved as part of the procurement agreement and licence fee.
- With this particular Ticketer system, tickets ordered previously online can be collected on-bus within hours of ordering rather than days fulfilling a key requirement of the project.
- Whilst configuration updates, Action Lists and Hot-lists can be deployed to the ETMs at any time, ETM transaction data is also constantly sent to the back office enabling near real-time views of transactions.

- The ETM's provided by Ticketer are essentially a computer-in-the-cab, which enables functions such as real-time tracking, the level of adherence to the timetabled journeys and communication aids to be supported. The Ticketer ETM can also be linked to other equipment including the destination blinds to help improve the accuracy of the information displayed.
- The Ticketer ETMs are comprised of multiple components. However, failure of one component does not mean the unit is inoperable and the machines as each part of the system can be removed and repaired independently.
- New software downloads run in the background and are installed on the next reboot to ensure technical developments do not infringe on the everyday operation of the ETM machine. As the hardware is remotely monitored, Ticketer are often able to make the operator aware of likely errors before they arise and remotely fix them within one working day. This helps ensure a reliable service can be provided.

Following successful procurement, Merseytravel will own substantial ETM and associated software assets which will then be leased under contract to relevant local bus operators. Although commercial negotiations will be undertaken to agree the rights and obligations of both Merseytravel and the bus operators, the 260 ETM machines will be leased from Merseytravel to operators for a period of 60 months from the agreed launch date.

The scope of works to be supplied by Imaginet for the development of the Web Portal will be set out within an Order Form developed in accordance with the Framework Agreement. The Order Form will define the services to be delivered in respect of Merseytravel's requirements and will identify key dates for delivery, payment mechanisms and resource allocation.

The Web Portal element of the scheme will be delivered through a phased approach. Phase 1 will therefore concentrate on the logistics of integration and collaboration of different parties to deliver a single ticket type via a Web Portal. Once this is shown to be a robust process, the commercial aspect of the portal will be expanded further in later phases of the 3TP project.

5.3.3 Procurement Timescales

It is recommended that a tender period of 10 weeks is included within the procurement programme to allow for the delivery and installation of the first batch of Ticketer ETMs. A further 5 weeks will then be required to allow delivery and installation of the remaining ETMs. An additional 5 weeks would also need to be factored in to accommodate customer acceptance. In total, 20 weeks are necessary for the full implementation of the ETM component of the 3TP project Phase 1.

It is recommended that a tender period of 18 weeks is included within the procurement programme to allow for the development of the first phase of the Web Portal. A further 5 weeks is allocated for customer testing and portal go-live implementation, a total of 23 weeks.

5.3.4 Pricing Frameworks and Charging Mechanisms

The charges for the Services and Goods are in accordance with the rates set out in Schedule 1 (Price List and Payment Mechanism) of the Framework Agreement. These charges will apply from the effective date of the signed Framework Agreement and will exclude Value Added Tax (VAT). These prices and charging mechanisms apply to both the purchase of the ETMs and the development of the Web Portal.

The pricing framework is broken down into two parts, upfront capital costs to be paid in Year 1 and ongoing non-capital costs to be made on an annual basis. The payment profile for the capital costs to be paid in Year 1 is broken down as follows:

- Signing Order-10%
- Successful pre-release acceptance testing-20%
- Successful user acceptance testing- 20%
- Successful Go-Live 30%
- Successful full implementation testing- 20%

5.3.5 Payment Mechanisms

Invoices must be addressed to the Contacting Body and sent directly to the address indicated within the Order Form, in this case Merseytravel. Payment shall be made by the Contracting body within 30 days of receipt of each valid invoice.

A purchase order for the Year 1 costs will be issued to Corvia Ltd (trading as Ticketer) by Merseytravel within 1 month of the date of the Order Form and Corvia (Ticketer) shall include such purchase order number under any and all invoices to Merseytravel.

The ongoing non-capital costs, with the exception of ETM maintenance, will be the responsibility of Merseytravel who will pay Corvia (Ticketer) directly. Operators will be responsible for arranging a maintenance agreement with Corvia (Ticketer) to invoice Operators directly.

5.4 Contract Length

To deliver the 3TP scheme, the existing contracts Merseytravel has with Parkeon for ETM maintenance and Mobius for mobile data SIMS will be terminated. Instead, Merseytravel will establish new contracts as summarised above. The lengths of the contracts associated with the various elements of this scheme are highlighted in the points below:

- Corvia Limited (trading as Ticketer), for a period of four years extendable by a further two years for the provision of Electronic Ticket Machine Support Services. This contract will only be agreed if the bus operators concerned each sign up to an ETM leasing agreement with Merseytravel.
- Imaginet Limited, for a period of three years for the hosting of the Web Portal.
- Systra Limited, for a period of three years for the provision of specialist technical support services to the Smart Ticketing programme. A separate contract will be undertaken with Systra for the upkeep and maintenance of the Smart Ticketing programme.

5.5 Human Resource Issues

Merseytravel will be responsible for oversight of the project on the client side of the delivery arrangement. Andrew Sweeney, Transport Solutions Team Leader, is the dedicated Programme Manager who will ensure appropriate resources are available to deliver 3TP.

There is also expected to be significant time implications for staff in both the IT and Bus Services teams at Merseytravel who will be directly involved in the management of the procured Electronic Ticket Machine estate and the associated systems. No additional staff resources should be needed for the operation of the new ETM service.

There is no trade union or TUPE implications arising from the contracts.

5.6 Contract Management

The contract for the supply and ongoing support of ETMs will be formed under the Smart Applications Management (SAM) Limited Framework Terms and Conditions. The contracts are managed on a day to day basis by nominated officers of the LCR Combined Authority being the Deputy Head of IT and The IT Transport Solutions Team Leader. The contracts cover the initial supply and implementation of the ETMs under the agreed project plan and the ongoing support & maintenance of the ETM estate.

Similarly, the contract for the supply and ongoing support of the Web Portal will be formed under the Smart Applications Management (SAM) Limited Framework Terms and Conditions. The contracts are managed on a day to day basis by nominated officers of the LCR Combined Authority being the Deputy Head of IT and The IT Transport Solutions Team Leader. The contracts cover the initial development and implementation of the portal under the agreed project plan and the ongoing hosting, support & maintenance of the portal.

5.7 Risk Allocation and Transfer

For each of the key risks identified in the risk register (reproduced in full as Table 16 in the Management Case), Table 22 sets out how these risks will be shared between the public and private sectors. The governing principle behind this table is that risks have been allocated to the party best able to manage them. Ticks are used in the table below to indicate the principal risk owner.

Table 22: Risk Allocation

Risk Category	Public	Private	Shared
Programme Risk	✓		
Operational Risk			✓
Maintenance Risk		✓	
Procurement Risk	✓		
Information Security Risk			✓
Demand Risk			✓
Policy Risk	✓		
Management Risk			✓

Source: Mott MacDonald

5.8 Consents

5.8.1 State Aid

Legal advice will be sought at each stage regarding State Aid. The ETM leasing arrangement will follow the established approaches concerning State Aid requirements by ensuring that there is a robust commercial and contractual agreement with any operator taking advantage of this scheme. The leasing arrangement will be open to all operators who comply with the requirements of the scheme.

5.8.2 Legal Issues

Legal advice and guidance will be sought at each stage of the project with a member of the Legal Team co-opted onto the LCR existing Smart Ticketing Service Delivery Group. The ETM leasing agreement contract will be established by the Merseytravel Legal Team.

Support for the scheme from the Section 151 officer has been provided and signed. Evidence of the letter from the Section 151 officer is provided within Appendix B.

5.8.3 Planning and Other Consents

As the smart ticketing scheme involves purchasing ETMs, developing a web-portal, and rolling out Project ABBOT based fares management system in later phases, planning permission is not required.

5.8.4 Other

The project will comply with several industry and technical standards. The ITSO standard for interoperable smart ticketing and the relevant rail standards will be at the core of developments and will ensure the wider interoperation of the scheme with other local and national solutions including those under development by TfN. The cEMV solution will comply with Payment Card Industry and other banking regulations. The Web portal will comply with Industry good practice, relevant IT security standards and Data Protection legislation.

The development of the on-line Retail Portal will be undertaken with the security of customers' personal data at the core of the design. It is envisaged that no personal or banking data will be stored on the portal. All personal data will continue to be stored securely in the existing Card Management System hosted for Merseytravel by ACT, this is the same location as where Concessionary Customer data is held. Concessionary and commercial data will be separated in distinct data partitions within the HOPS and CMS databases. All banking data will be held by our Merchant Acquiring bank, Barclays, in their secure on-line location. These privacy design approaches will be documented in a Privacy Impact Assessment.

5.9 So what does this mean for the Business Case?

The key points to take away from this section in the Commercial Case are as follows:

- Suppliers for the procurement of this scheme have been considered and selected under the SAM National Procurement Framework which is a more cost and time effective alternative to OJEU processes as suitably qualified suppliers are immediately available under the framework.
- The ETMs element of the scheme will be delivered (via a Central Purchasing Body) by Ticketer. This has been selected as the preferred procurement route on the basis that it is the only supplier able to meet technical requirements for cEMV and ITSO ATT15.
- The Web Portal will be procured through separate supplier, Imaginet. Details of the scope of work will be set out within an Order Form.
- Contracts will be formed under the SAM Limited Framework Terms and Conditions and will be managed on a day to day basis by the LCR Combined Authority.

6 Management Case

The Management Case assesses whether a proposal is deliverable. It looks at the project planning, governance structure, risk management, communications and stakeholder management to establish if adequate resources are in place to ensure delivery on time, on budget and in accordance with specifications.

Note that the Management Case of this Business Case relates to the entire 3TP scheme (Phases 1, 1.5 and 2).

6.1 Approach

The DfT guidance document, '*The Transport Business Case: Management Case*', outlines the areas that should be covered in the Management Case and these have been used to structure the development of the Management Case for 3TP scheme. The DfT requirements are set out below together with the relevant sections of this report where they can be found.

Table 23: DfT requirements for the Management Case

Content	DfT requirements	Section number and title
Introduction	Outline the approach taken to assess if the proposal is deliverable.	6.1 Approach
Evidence of similar projects	If possible, provide evidence of similar projects that have been successful, to support the recommended project approach. If no similar projects are available for comparison, outline the basis of assumptions for delivery of this project e.g. comparison with industry averages for this kind of work	6.2 Evidence of Similar Projects
Project dependencies	Set out deliverables and decisions that are provided/received from other projects.	6.3 Projects Dependencies
Governance, organisational structures & roles	Describe key roles, lines of accountability and how they are resourced.	6.4 Project Governance & 6.5 Project Team
Assurance & approvals plan	Plan with key assurance and approval milestones.	6.7 Assurance and Approvals
Project plan	Plan with key milestones and progress, including critical plan.	6.8 Programme & 6.8.1 Key Delivery Milestones
Risk management strategy	Arrangements for risk management and its effectiveness so far.	6.9.1 Risk Management Strategy
Communications and Stakeholder Management	Development communications strategy for the project.	6.10 Communications and Stakeholder Management
Project reporting	Describe reporting arrangements.	6.6 Project Reporting
Benefits realisation plan	Set out approach to managing realisation of benefits.	6.11 Benefits Realisation
Monitoring and evaluation	Summarise outline arrangements for monitoring and evaluating the intervention.	6.12 Monitoring and Evaluation
Conclusion	Summarise overall approach for project management at this stage of project.	6.13 So what does this mean for the Business Case

Source: DfT

6.2 Evidence of Similar Projects

Merseytravel have extensive previous experience in delivering projects which involve both the implementation of new technology, such as cEMV, and/or the creation of web-portals, these are summarised in Table 24.

Table 24: Evidence of Similar Projects

Project	Description	Cost
Tunnel Tolls Refresh Project including cEMV implementation in 2019	Installation of cEMV machines within the Mersey Tunnels estate forms the final part of the £3.1m refresh to improve the flow of traffic. Other improvements have included an improved website for the Mersey Tunnels and Fast Tag system and digital displays which indicate information about the transaction and status of Fast Tag account balances. Following a review of the data, the LCR CA have seen a significant improvement in traffic flow across the plaza since this refresh. Average journey times have been reduced by 15% as a result of the changes introduced.	£3.1m
City Region Apprenticeship Portal in March 2019	The LCR CA developed the UK's first one-stop Web Portal for apprenticeships. This is a new online facility that allows employers from across the six constituent local authorities (Halton, Knowsley, Liverpool, Sefton, St Helens and Wirral) to advertise their apprenticeship vacancies. The apprenticeship portal can be accessed at the following web address: www.be-more.info .	£30,000
Tunnel SCADA Replacement	In 2016, Merseytravel identified the need to update the traffic management and lane control system at the Mersey Tunnels. This involved the replacement of existing Lane Control Signs (LCS) and Vehicle Management Signs (VMS) with SCADA. The Tunnels SCADA is an IT solution to monitor and automate the operation of equipment within the Birkenhead and Wallasey Mersey Tunnels including lighting, air quality and water ingress management. The SCADA project replaced aging and expensive equipment with a modern standards based IT solution to enable Tunnels operations to be automated, monitored and controlled from a single control centre located in the City Centre. The project was considered a success as it was implemented with minimal disruption to the operation of the Tunnels and was implemented on time and to budget.	£6,000,000
Merseytravel Real Time Journey Planner Portal in 2012	In 2012, Merseytravel successfully launched an online journey planner and mobile journey planning 'app' that is enhanced by taking account of available 'real time information' from across the bus network. The journey planner provides timetable, real time information and map information for all public transport providers across Merseyside. It provides door to door journey plans for trains, buses, and ferry services as well as scheduled departures from a specific location.	£750,000

Source: Mott MacDonald

The successful completion of similar projects evidenced in Table 24 strengthens the argument that Merseytravel can effectively deliver the 3TP scheme.

6.3 Project Dependencies

The success and financial viability of delivering new smart ticketing infrastructure will depend on a variety of factors. The 3TP scheme, therefore, needs to take the following dependencies into account:

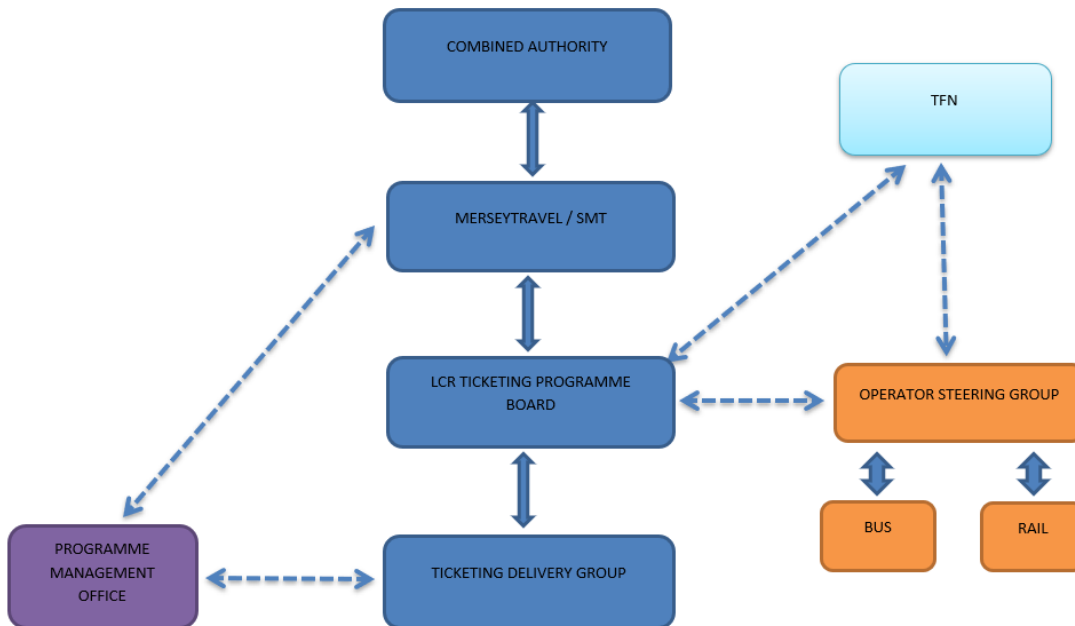
- Operator buy-in, although minimal financial investment is needed from the public transport operators themselves, commercial understanding and support is still needed for standardised ticketing to be adopted enabling the wider LCR vision to be achieved.

- Successful delivery of TfN's IST programme has to be realised before phase 2 of the 3TP project can commence.
- Interdependencies with the following proposed schemes should also be considered:
 - Project ABBOT, a unified and standardised approach to smart ticketing payments needs to be adopted to ensure the LCR can align with the wider strategic vision of Project ABBOT. Without the back-office support provided through project ABBOT the vision of a pan-northern smart ticketing system will not be possible.
 - Ticketing strategy - the 3TP scheme needs to align with the ticketing strategy authored by the LCR CA. A lack of cross-compatibility would impede the successful operation of public transport in the LCR.
 - Future changing of fares - the technology behind the 3TP scheme would need to be capable of accommodating any changes in future fares. Where possible, these details should be noted in the ticketing strategy to ensure maximum transparency and consistency.
 - Bus reform - the potential for franchising is something the 3TP scheme must be able to accommodate. Plans need to be devised to detail what changes may be necessary should franchising be introduced into the LCR.
 - Changes to rail franchising - in a similar way to bus reform the 3TP scheme would need to accommodate any changes made to the management and operation of rail services across the LCR.
 - Expansion of the rail network - with a greater demand for public transport services expected due to capacity enhancements at Liverpool Central Station, the smart ticketing scheme is important to help ensure efficient movement of people both through the station itself and the wider City Region.

6.4 Project Governance

Merseytravel have extensive experience and a proven track record delivering smart ticketing projects and the delivery challenges of this project will be addressed using established approaches. Projects are delivered in partnership with transport operators and other stakeholders through an established governance framework. The organogram in Figure 15 shows the proposed governance structure for the LCRCA Smart Ticketing Scheme.

Figure 15: Ticketing Governance Structure

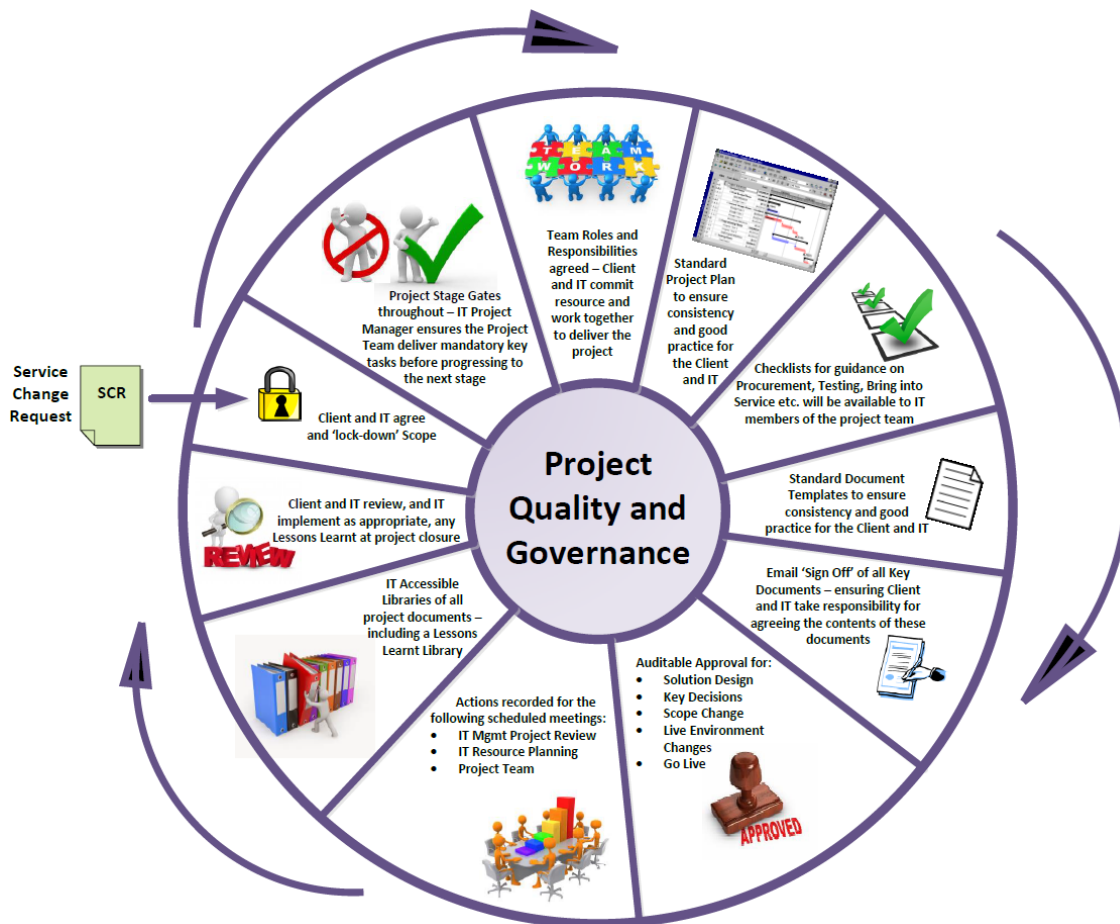


Source: Merseytravel

A Project Governance Review process has been devised to ensure the project is effectively controlled and adheres to process, cost, risk and outcome. The responsibility for the project governance aspect of the 3TP scheme, largely lies with the IT team at Merseytravel.

As a technology project, the scheme will follow the IT Project Management Framework. The key aspects of this framework are summarised in Figure 16 which sets out the management of risks, issues, dependencies and change control.

Figure 16: IT Project Quality and Governance



Source: Merseytravel

The physical infrastructure and the digital technologies to be deployed have been proven in other areas of the UK by the suppliers engaged by Merseytravel to undertake the works anticipated under this project. The project will build upon existing IT and smart ticketing solutions as well as introducing entirely new capability and capacity into the LCR.

The project technical approach follows industry good practice and will adhere to UK technology and security standards. The project will also follow standard IT processes in design, project management and operational service delivery. Staff training will be conducted and additional arrangements will be put in place, with both bus operators and Ticketer, to ensure operational support is provided to the Merseytravel IT team.

6.4.1 Roles and Responsibilities

Table 25 notes the key roles and associated responsibilities necessary for the successful delivery of the 3TP scheme.

Table 25: Project Team Roles and Responsibilities

Group	Role	Responsibilities
Combined Authority (CA)	<ul style="list-style-type: none"> Metro Mayor and leaders of the LCR who meet monthly 	<ul style="list-style-type: none"> Responsible for taking key decisions on the executive functions for the LCR
Merseytravel/SMT	<ul style="list-style-type: none"> Overall control and responsibility for the project on behalf of the Combined Authority. 	<ul style="list-style-type: none"> Approval of any financial expenditure or changes to the approved programme.
LCR Ticketing Programme Board	<ul style="list-style-type: none"> Responsible for strategic development of the programme 	<ul style="list-style-type: none"> Responsible for receiving reports from sub groups and making recommendations for approval by SMT/Merseytravel.
Ticketing Delivery Group	<ul style="list-style-type: none"> To manage day to day delivery of the programme 	<ul style="list-style-type: none"> Responsible for the day to day delivery of the programme by undertaking projects approved by the Programme Board. Includes representative from both the LCR CA and transport operators.
Programme Management Office	<ul style="list-style-type: none"> Strategic Body responsible for all programmes undertaken by the LCR CA. 	<ul style="list-style-type: none"> Reports on delivery and financial performance across all programmes.
TfN	<ul style="list-style-type: none"> Developer and owner of Project ABBOT. 	<ul style="list-style-type: none"> To provide the relevant information to ensure the 3TP offer and Project ABBOT align.
Operator Steering Group	<ul style="list-style-type: none"> Sub group of LCR Ticketing Programme Board with representative from all transport operators, this group 	<ul style="list-style-type: none"> Receives reports for Bus and Rail sub groups makes recommendations for consideration by LCR Ticketing Programme Board.
Project Team	<ul style="list-style-type: none"> To manage a package of works as defined by the work stream lead. 	<ul style="list-style-type: none"> To manage a package of works as defined by the work stream lead.

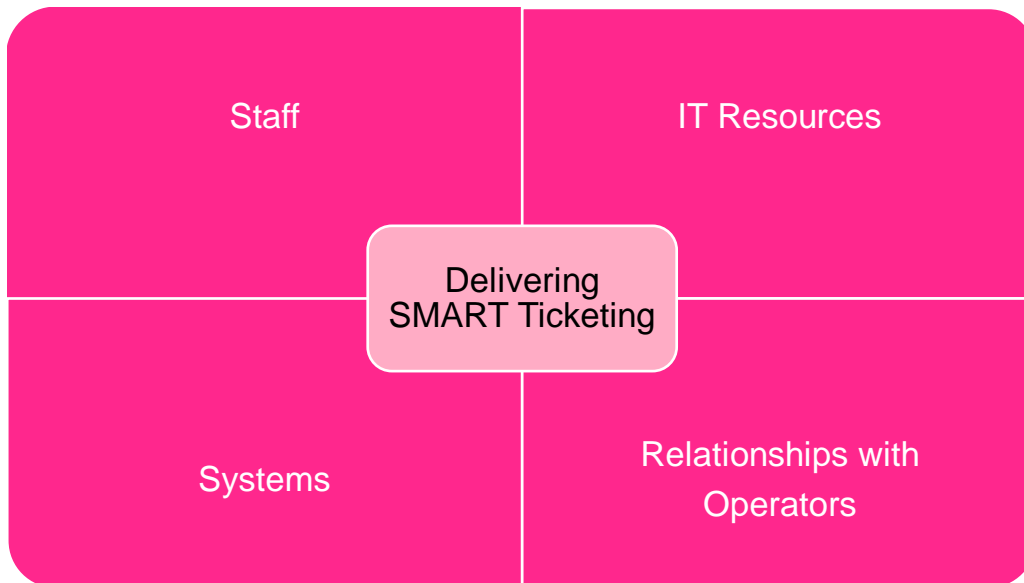
Source: Mott MacDonald

6.5 Project Team

Merseytravel has experience of delivering smart ticketing projects at the scale and complexity required to deliver the proposed interventions. The Merseytravel team manage the existing smart ticketing estate which will form the core of the enhancements proposed in this project.

To ensure successful delivery, the overall project will be broken down into discrete delivery areas and each area will follow established project management arrangements with a Project Manager assigned following industry standard project management approaches.

The diagram below shows the four key inputs needed to deliver the project successfully.

Figure 17: Key Components to Delivery the 3TP scheme

Source: Mott MacDonald

6.5.1 Staff

The technical team is supported by a wider team under the LCR existing Smart Ticketing Service Delivery Group made up of specialists from within Merseytravel and the bus and rail transport operator groups. The team have a proven track record of delivery of smart ticketing projects working in a challenging commercial environment with transport operators going back over five years with the successful relaunch of the LCR existing smart ticketing platform in 2013/14. The team can draw upon a wide range of skillsets including IT infrastructure, ITSO smart ticketing, cEMV bank cards processing and transport operations.

The Delivery Group reports into a Steering Group comprising senior staff from Merseytravel and the operators. The Steering Group works under the various governance arrangements of the constituent bodies; for the Directors in Merseytravel and the Combined Authority.

6.5.2 IT Resources

The IT Transport Team brings together the requisite skillsets from within IT and the restructure has increased staffing provision. The internal team is further enhanced with specialist technical resources from the Systra Ltd Smart Ticketing Team with proven delivery experience in the sector. Merseytravel IT have a robust project management framework in place that fits within the wider programme governance established to manage the smart ticketing programme.

6.5.3 Systems

The smart ticketing solutions in place at Merseytravel including those for concessionary and commercial ticketing have been operational for many years and are provided under contract by a range of specialist suppliers with wide ranging industry experience. The concessionary smart ticketing scheme has been in operation for over 10 years and the core concessionary systems have been extended and enhanced to include the current smart ticketing platform.

6.5.4 Relationships with Operators

Merseytravel has a proven track record of the development and operation of smart ticketing systems at a scale involving hundreds of thousands of card holders and millions of smart transactions. Merseytravel has operated an ETM leasing scheme for over 7 years and has experience managing the needs of bus operators and customers regarding ticketing and payment systems.

6.6 Project Reporting

Regular updates on the progress of the 3TP scheme will be reported to the Project Management Office at the Liverpool City Region Combined Authority. The specific reporting procedures are noted in the Merseytravel Constitution.

It is intended that multiple Project Governance Reviews will be undertaken by an appropriate member of staff, usually the Project Support Officer, the IT Contract Manager or the IT Governance Officer, in conversation with the Project Manager. Each review follows a set checklist which states the controls and details the necessary requirements to provide sufficient assurance.

Once the initial Project Governance Review has been undertaken in the early stages of the project commencing, it is expected additional reviews will take place at least every three months. The final Project Governance Review will be completed after the project is closed.

Delivery of the project will also fall under the review of the Liverpool City Region Combined Authority Programme Management Office who will monitor progress, risks, issues and expenditure and report to senior Officers at the Combined Authority.

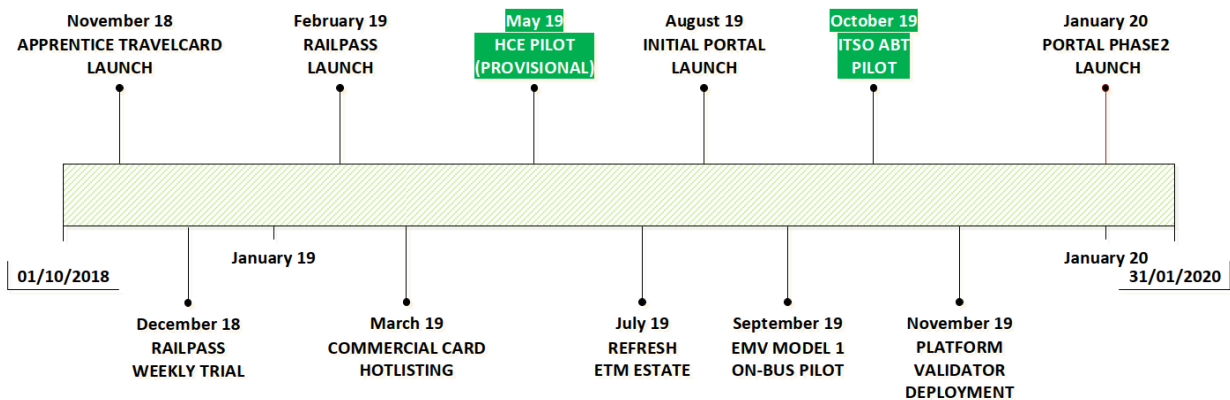
6.7 Assurance and Approvals

The funding decision for this scheme lies with the Liverpool City Region Combined Authority and therefore will be governed by the principles set out within the LCR CA SIF Assurance Framework.

The approval of this business case is the final assurance and approval stage towards scheme delivery and is expected in July 2019.

6.8 Programme

Figure 18 provides an outline programme of the key milestones and associated delivery dates for the whole 3TP scheme, following on from the progression the scheme has taken to date.

Figure 18: Delivery Timeline

Source: Merseytravel

6.9 Risk Management

The management of risk and uncertainty will be key to the successful delivery of the scheme, as it will identify threats to project delivery and enable effective risk management actions to be assigned. A risk management strategy will be developed and reviewed at key stages of project development. An effective risk management strategy should include:

- A continuous approach;
- Thorough identifications of risks;
- Provide active risk avoidance and mitigation;
- Effectively communicate the risks to the project team; and
- Deliver the scheme objectives to cost, quality and time indicators.

Merseytravel have identified the risks associated with the management and delivery of the project in the form of a risk register which is appended to this application. The production of a risk register is an integral component of the standard project management procedures that are conducted by the LCR Combined Authority.

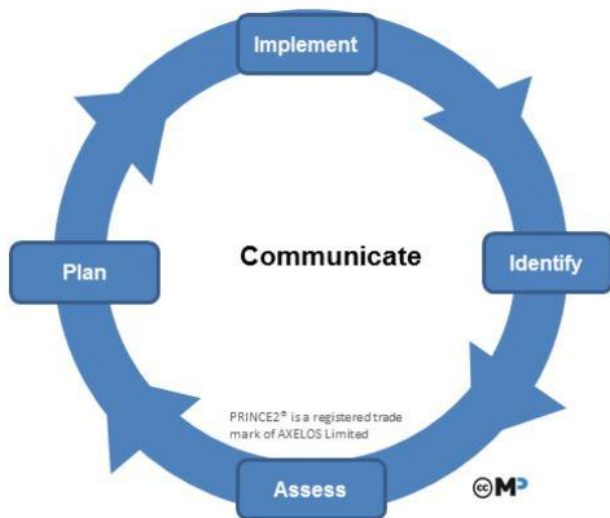
6.9.1 Risk Management Strategy

An effective risk management strategy for the project will be based on the principles for risk management contained within the OGC PRINCE2 guidance. The procedure for identifying key risks should follow as below:

- **Identify:** Complete the risk register (as appropriate to the area of the project and/or the producing organisation) and identify risks, opportunities and threats.
- **Assess:** Assess the risks in terms of their probability and impact on the project objectives.
- **Plan:** Prepare the specific response to the threats (e.g. to help reduce or avoid the threat), or this could also be to plan to maximise the opportunity if the risk happens.
- **Implement:** Carry out the above in response to an identified threat if one occurs.
- **Communicate:** Report and communicate the above to relevant project team members and stakeholders.

Risk management must be an ongoing process, as shown in Figure 19. Risk information is required to be always up to date to facilitate reporting.

Figure 19: Risk management process



Source: PRINCE2

A risk register has been developed and updated throughout the development of the Business Case in order to continually manage risks and mitigate impacts on the scheme delivery. Risks have been grouped into categories and rated High, Medium or Low based on their likelihood of occurring and expected impact on the scheme.

The likelihood and impact ratings and descriptions are summarised in the tables below.

Table 26: Risk Likelihood Ratings

Description	Descriptor
Is unlikely to occur in normal circumstances, but could occur at some time	Low
Likely to occur in some circumstances or at some time	Medium
Is highly likely to occur at some time in normal circumstances	High

Source: Mott MacDonald

Table 27: Risk Impact Ratings

Description	Descriptor
<ul style="list-style-type: none"> Insignificant disruption to internal business or corporate objectives Little or no loss of front line service 	Low
<ul style="list-style-type: none"> Noticeable disruption to internal business and corporate objectives Moderate direct effect on front line services 	Medium
<ul style="list-style-type: none"> Critical long term disruption to corporate objectives and front line services Critical reputational impact Regulatory intervention by Central Govt. 	High

Source: Mott MacDonald

A Red, Amber Green (RAG) appraisal has also been undertaken for each risk which considers both likelihood and impact to easily identify the risks which will be the biggest concern for delivering the project. Table 28 summarises the project risks and their likelihood and impact as identified in the Risk Register alongside the risk owner who will be responsible for undertaking mitigation measures.

Table 28: Risk Register

Risk Category	Project Risk Description	Impact (H/M/L)	Likelihood (H/M/L)	RAG Rating	Mitigation Measures	Action Owner
Programme Risk	Transport operators will not work with the LCR to achieve a City Region solution	H	M	A	The CA must engage with transport operators to ensue buy-in to a City Region solution	Combined Authority
Operational Risk	Bus operators will not sign up to the leasing agreement proposed by Merseytravel.	H	L	A	Negotiation with bus operators and presentation of a suitable leasing offer. Important to emphasise the operators will benefit.	Relevant HOS
Operational Risk	Technical problems introducing contactless payment technologies	H	M	A	Implement a solution proven elsewhere at the scale and complexity required	Deputy Head of IT
Procurement Risk	Web Portal development is delayed	H	H	R	Clear specification to supplier of requirements. Introduction of robust supplier and project management regimes	Deputy Head of IT
Procurement Risk	Technological lag, where more up to date ticketing and payment technologies are available before the procured technology is installed.	M	M	A	We have undertaken a thorough review of the technologies available and plan to implement industry good practice.	Technical Team
Information Security Risk	Security of customer data to align to information security standards and current GDPR legislation.	H	H	R	Implementation of industry standard information and data security standards	Technical Team
Programme Risk	The ETM rollout programme could be delayed by operators not applying enough resources to the programme.	H	M	A	Implementation of a comprehensive leasing agreement covering the obligations of both parties to ensure the successful deployment of the new systems.	Combined Authority
Demand Risk	Customers will not adopt the on-line retail channel via the new Web Portal.	M	L	A	Selecting a solution supplier with demonstrable experience of the development of successful smart ticketing Web Portals that have high adoption rates by customers.	Combined Authority/Operators
Policy Risk	Investment proposed will not contribute to achievement of the goals of the Metro Mayor and the Liverpool City Region.	M	L	A	Ensuring that the investment is part of the wider Smart Ticketing Programme and aligns with the Business Case being developed for the Transforming Cities Fund bid.	Combined Authority
Management Risk	Project will fail due to insufficient specialist support to the internal technical team.	H	M	R	Ensuring that special support is secured from a company with demonstrable expertise in the development of complex smart ticketing solutions at a scale similar to that required by the LCR.	Combined Authority

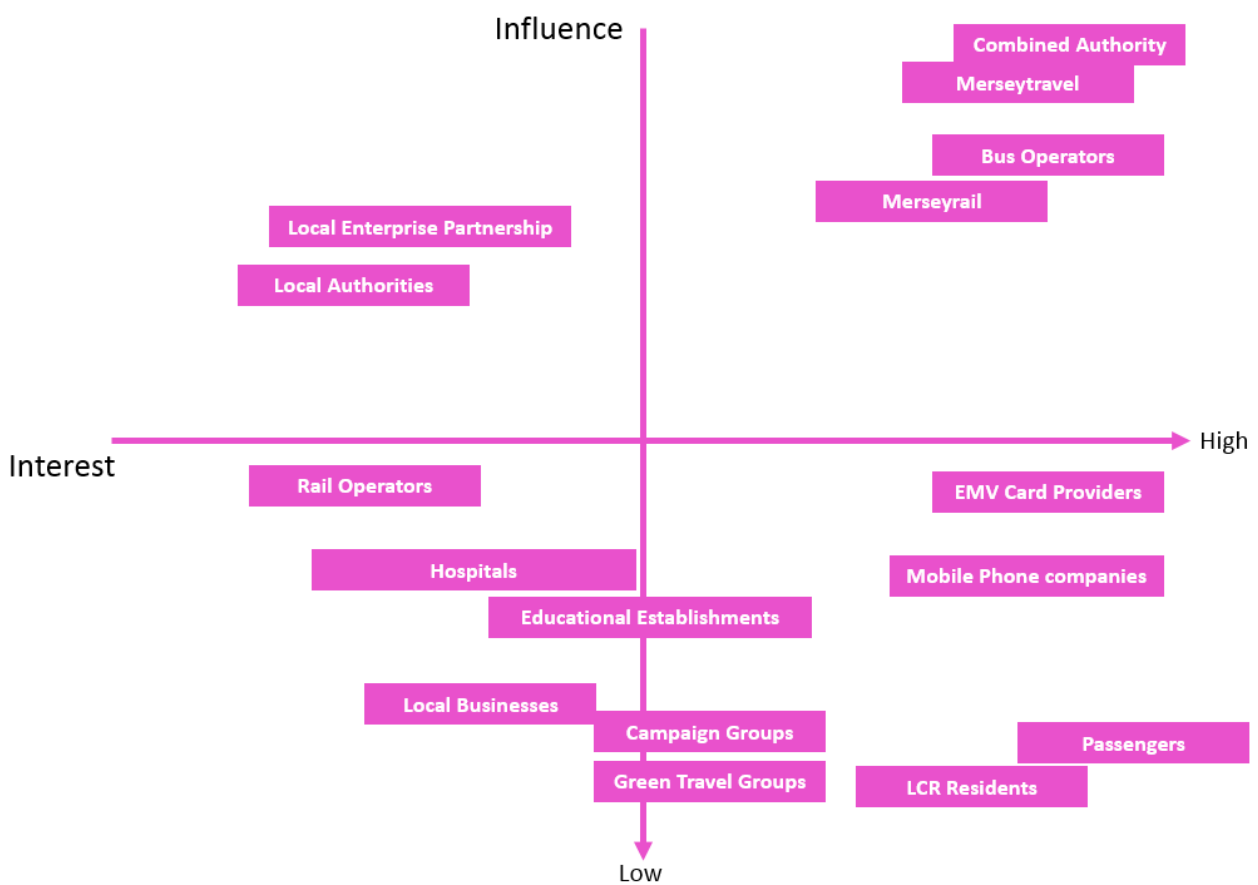
Source: Mott MacDonald

6.10 Communications and Stakeholder Management

The 3TP programme is of significant interest to Merseytravel Stakeholders and a briefing has been held with the Marketing and Communications team on the requirement for a Communications Plan to run alongside the programme. Communication issues will therefore be managed under the established procedures for the 3TP programme though the Smart Ticketing Delivery Group.

The Communications Plan will set out how and when stakeholders will be engaged at various stages throughout the programme and how different communication methods will be used to distribute information. Figure 20 outlines the key stakeholders that will be identified within the plan and their likely interest and influence in the programme.

Figure 20: Stakeholder Interest and Influence



Source: Mott MacDonald

6.11 Benefit Realisation

Table 29 outlines the approach to managing the realisation of benefits of the entire 3TP scheme (Phases 1, 1.5 and 2). It defines how the identified benefits align with the scheme objectives and the outputs required to realise the benefit. Benefits in this context are referred to as ‘a measure of the improvement that will be enjoyed by the organisation’.

Table 29: Full 3TP Scheme Benefits Realisation Plan Overview

Benefit	Objective alignment	Who benefits	Benefit owner	Key outputs/deliverables required to realise the benefit
A modern and efficient public transport system that helps attract business investment in the LCR.	Streamline existing arrangements for ticketing and facilitate the introduction of new technologies and customer offers to reduce the current travel constraints. This will place the Liverpool City Region at the forefront of new ticketing and payment technologies.	<ul style="list-style-type: none"> • Businesses/ future investors • Residents • Visitors • Commuters 	<ul style="list-style-type: none"> • Merseytravel 	<ul style="list-style-type: none"> • Contactless payments on bus – extended to all operators • Electronic collection of Solo tickets on bus • Web based payments • Personalised user accounts • Smart tickets on Smart devices
Reduced travel constraints increasing the propensity and ease with which people travel to access employment, education and opportunities.		<ul style="list-style-type: none"> • Residents • Visitors • Commuters 	<ul style="list-style-type: none"> • Merseytravel 	<ul style="list-style-type: none"> • Contactless payments on bus – extended to all operators • Electronic collection of Solo tickets on bus • Web based payments • Personalised user accounts • Smart tickets on Smart devices
Improved image of bus travel in the LCR generating increased demand and revenue.		<ul style="list-style-type: none"> • Businesses • Residents • Visitors • Commuters 	<ul style="list-style-type: none"> • Merseytravel 	<ul style="list-style-type: none"> • Consistent and comprehensive account-based smart ticketing and payment system for the public transport network within the LCR. • Contactless payments on bus – extended to all operators
Providing the platform for a multitude of further service offers to customers, enabling multiplier benefits.		<ul style="list-style-type: none"> • Residents • Visitors • Commuters 	<ul style="list-style-type: none"> • Merseytravel 	<ul style="list-style-type: none"> • Personalised user accounts • Commercial card hot-listing • Improved geo-location from new Ticketer machines and improved traffic light priority
Complexities around ticket choice and public transport use removed, addressing barriers to use amongst groups at the margins of the labour market, reducing unemployment.	Ensure greater access to employment, education, other services and opportunities for passengers, whilst improving air quality and reducing carbon emissions across the Liverpool City Region.	<ul style="list-style-type: none"> • Residents • Visitors • Commuters 	<ul style="list-style-type: none"> • Merseytravel 	<ul style="list-style-type: none"> • Fare capping • Web-based payments for Adult Solo day, bundle, week and 4 week ticketing products • Web-based payments for all smart ticketing products
Encouraging people to travel by sustainable modes of transport, reducing congestion and traffic accidents, improving air quality, and providing health benefits.		<ul style="list-style-type: none"> • Residents • Visitors • Commuters 	<ul style="list-style-type: none"> • Merseytravel 	<ul style="list-style-type: none"> • Consistent and comprehensive account-based smart ticketing and payment system for the public transport network within the LCR.
Reduced cost of administration and operation, freeing up funds for greater investment in the public transport offer in Liverpool City Region.	Improve the efficiency of operation of the public transport network for the administrator and operators, helping to attract inward investment, boost productivity, and generate additional revenue through increased use of public transport.	<ul style="list-style-type: none"> • Operators • Businesses/ Investors 	<ul style="list-style-type: none"> • Merseytravel 	<ul style="list-style-type: none"> • Producing and reading of bar-coded tickets • Electronic collection of multi-modal and operator only products on bus

Source: Mott MacDonald

6.12 Monitoring and Evaluation

Monitoring and evaluation are essential parts of any project. It provides an opportunity to improve performance by reviewing past and current activities, with the aim of replicating good practice in the future and eliminating mistakes in future work.

3TP is a key part of a much wider package of improvements which, in addition to smart ticketing, will consider fares, available ticketing products, zoning and fare allocation between operators etc. A Monitoring and Evaluation Plan will be produced as part of this wider overall package that the 3TP scheme fits within. This plan will aim to monitor the delivery of the scheme to ensure it is delivered within time and budget constraints and to specification, and to monitor the achievement of identified objectives as a way of measuring success.

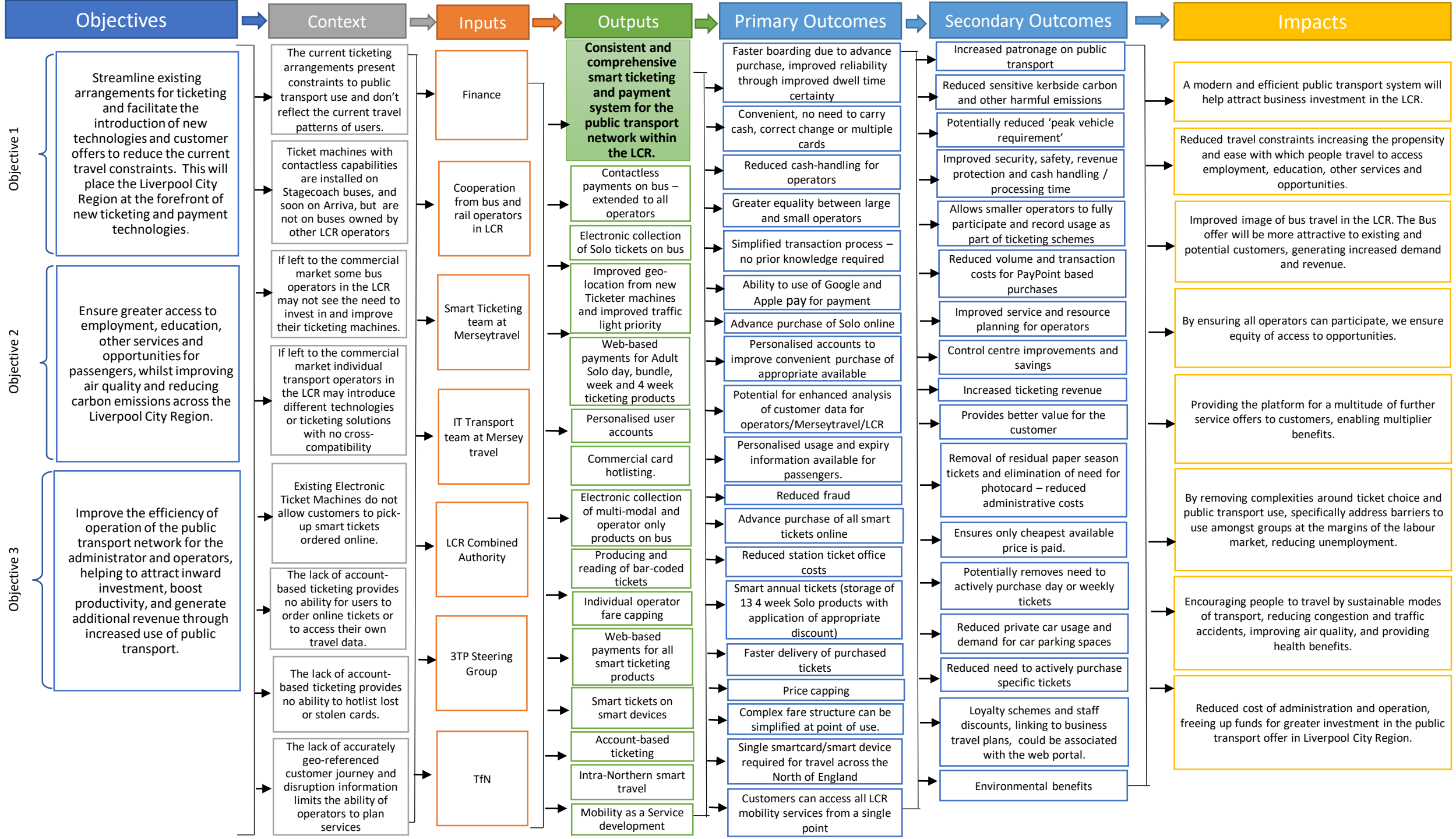
The plan will set out the methods and data requirements that will be needed to assess scheme performance as well as indicative costs and timeframes and the key responsible parties. It will assess the performance of the scheme against a number of suggested metrics (to be confirmed for the full package of fare and ticketing enhancement work). It is likely that, in the case of the 3TP-related components of the package, these metrics will include uptake of smart ticketing products by geography, ticket type, operator and mode etc.

6.13 So what does this mean for the Business Case?

Relevance to LCR Smart Ticketing Scheme

- This section has shown how the scheme can be managed and delivered within the proposed governance structure and how the extensive experience and proven track record of the project team in delivering smart ticketing will facilitate successful delivery within time and budget constraints.
- A robust risk management strategy and risk register have been developed to identify risks at the earliest stage and minimise the potential impacts. This will be closely monitored and updated as the scheme develops to enhance the successful delivery of the project.
- An approach to benefits realisation has been set out within the document to define how the identified benefits of smart ticketing in the LCR align with the scheme objectives and the outputs required to realise the benefit.
- A Monitoring and Evaluation Plan and Communication and Stakeholder Management Plan will be produced as part of the wider LCR Ticketing Strategy package of enhancement schemes currently in production.

A. Appendix A: Full Logic Map of 3TP Scheme



B. Appendix B: Section 151 Officer Sign-Off Confirmation

