



National Transport Authority

Final Business Case - Next Generation Ticketing

Implementation of NGT Solution in the Greater Dublin Area

KPMG

This report contains 98 pages

NGT-GDA-FBC v10

Document review and approval

Revision history

Version	Author	Date	Revision
1	CM/BC/FC	21/02/24	
	CM	29/03/24	
	CM/BC/MP/FC	26/04/24	
	CM	03/05/24	
	CM	11/06/24	
	CM	11/07/24	
	MP	01/10/24	
	CM	24/10/24	

This document has been reviewed by

	Reviewer	Date reviewed
1	PON	29/02/24
2	PON	03/04/24
3	PON	03/10/24
4	PON	24/10/24
5		

This document has been approved by

	Subject matter experts Name	Signature	Date reviewed
1			
2			
3			
4			
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Glossary

ABT	Account Based Ticketing
AFC	Automated Fare Collection
AVL	Automatic Vehicle Location
BAU	Business as Usual
BIBO	Be-In Be-Out
BRP	Benefits Realisation Plan
CAP	Climate Action Plan
CAPEX	Capital Expenditure
CBA	Cost-Benefit Analysis
CEA	Cost Effectiveness Analysis
cEMV	Contactless Ticketing System
CER	Cost Effectiveness Ratio
DGOU	Digital Government Oversight Unit
DBC	Detailed Business Case
DPENDR	Department of Public Expenditure, NDP Delivery and Reform
EA	Economic Appraisal
EJP	Expert Judgement Panel
ENPV	Risk-Adjusted Net Present Value
Framework Agreement	The single-party framework agreement awarded to Indra Sistemas S.A. for matters related to the development and deployment of the NGT Solution
FBC	Final Business Case
GDA	Greater Dublin Area
HICP	Harmonised Indices of Consumer Prices
ICT	Information and Communications Technology
IG	Infrastructure Guidelines (DPENDR's December '23 updated guidelines, previously known as Public Spending Code Guidelines)
KPI	Key Performance Indicators
MaaS	Mobility-as-a-Service
MCA	Multi-Criteria Analysis
NGAVL	Next Generation Automatic Vehicle Location
NGT	Next Generation Ticketing
NIFTI	National Investment Framework for Transport in Ireland
NPF	National Planning Framework
NPV	Net Present Value
NSO	National Strategic Objectives
NTA	National Transport Authority
NTA CCC	NTA's Consolidated Contact Centre
O&M	Operations and Maintenance
OBM	Operator Business Model
OPEX	Operational Expenditure
PAG	Project Approval Guidelines
PBC	Preliminary Business Case
PEP	Project Execution Plan
PID	Project Initiation Document
PIT	Programme Integration Team
P30/P50/P80	"P" (probability) refers to the confidence level surrounding the accuracy of the cost estimate. So, for example, at a level of P30, there is a 30% confidence level or likelihood that the programme will be on or below budget at this level. P50 and P80 levels indicate higher confidence levels, generally accompanied by much higher cost estimates.
PMV	Pole Mounted Validators
QRA	Quantified Risk Analysis
RCF	Reference Class Forecasting
RTPI	Real-time Passenger Information
SPC	Shadow Price of Carbon
SPL	Shadow Price of Labour
SPPF	Shadow Price of Public Funds
TAA	Transport and Accessibility Appraisal
TAF	Transport Appraisal Framework
TFI	Transport for Ireland
VAT	Value Added Tax
VfM	Value for Money

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1 Executive Summary

1.1 Overview

Next Generation Ticketing (NGT) is the National Transport Authority's (NTA) project to transform and modernise the system for ticketing and payments on Irish public transport. NGT aims to transition to an Account-Based Ticketing (ABT) system which incorporates open payments (mobile and card-based) and secure tokens. The system will continue to support customers purchasing tickets with cash. NGT represents one of the key initiatives of the BusConnects Programme and the *NGT – Greater Dublin Area (GDA)* project will be the second element of the overall NGT Programme to be implemented following the approval by the NTA of the implementation of the *NGT - BusConnects Dublin* project, on Dublin City Bus Services operated by Bus Atha Cliath and Go Ahead bus services.

As noted within this FBC, as well as deriving many benefits over the current ticketing system, the provision of the NGT solution is required as the current cash ticketing system is obsolete with significant maintenance required. In addition, to extend the life of the current system carries significant risk to the NTA as there are concerns regarding the ability to maintain and source equipment for that system. This is also compounded with the overall risk to revenue collection for the services within this FBC. With this in mind, demand for the project is predicated on the need to replace the current ticketing system with an up to date and modern solution which will bring additional benefits to citizens.

1.2 Report Purpose

This report represents the Final Business Case (FBC) for the *NGT – GDA* project, which covers the rollout of the NGT Solution to other modes of public transport in the urban and suburban regions of Dublin. The *NGT – GDA* project follows and will build on the scope of the *NGT – BusConnects Dublin* project which covered ABT and back-office set-up, cash alternative and implementation of the NGT project on Dublin City Bus Services.

The expansion of NGT to public transport services in the GDA is dependent upon the infrastructure being implemented as part of *NGT – BusConnects Dublin* project, and as such this FBC has been developed as a follow on to the approved FBC for the *NGT – BusConnects Dublin* project. The structure of this FBC is consistent with NGT - BusConnects Dublin to ensure alignment between both business cases and support the streamlining of NTA review and approval. Where appropriate, additional information is included in this FBC to capture the publication and requirements of the Infrastructure Guidelines (IG) (DPENDR's December '23 updated guidelines, previously known as Public Spending Code Guidelines) and the recently published NTA Project Approval Guidelines (Infrastructure Projects and Programmes).

1.3 Strategic Relevance and Objectives

NGT aligns with a wide range of international, national and local policies. It forms part of the wider BusConnects Programmes that will transform bus services across Dublin, Cork, Limerick, Galway and Waterford. By extending the project to other modes of public transport throughout the GDA, the project will make public transport in Dublin more attractive through an improved passenger experience which will, in turn, encourage more people to use public transport which aligns well with the relevant planning, climate and transport strategies. Further details in relation the strategic relevance and objectives of the *NGT – GDA* project,

including how it will align with further public transport projects in the GDA region are set out in section 3.

1.4 Detailed Business Case

The Detailed Business Case (DBC) is the full and complete statement of the Sponsoring Agency's functional and operational requirements for the *NGT – GDA* project expressed in output requirements. The DBC was initially prepared and approved in October 2021 and this FBC includes an updated DBC in order to reflect the project parameters and capture the outcome of the tendering process. Refer to section 4 for further details.

1.5 Transport Accessibility Appraisal

The Transport and Accessibility Appraisal (TAA) is a requirement of the Transport Appraisal Framework (TAF) for projects with an estimated cost greater than €30m and is designed to capture impacts which are challenging to monetise and assess using traditional appraisal techniques. The results are summarised in section 5 and shows that the Do NGT-GDA option will have a "Slight Positive" or "Neutral" impact across all categories considered in the TAA, whereas the Do Minimum option scores a neutral impact across all criteria.

1.6 Financial Appraisal

A detailed financial appraisal has been undertaken (refer to section 6) which assesses the movement in costs from the estimated *NGT – GDA* project budget (Preferred Option Estimate) against the outturn tender costs (FBC Outturn Cost). It also assesses the incremental financial spending over the Do Minimum counterfactual from the perspective of the NTA which involves maintaining the current closed-loop card-based ticketing system as the primary mechanism for public transport fare payment in GDA. In summary, the total *NGT – GDA* project cost (FBC Outturn Cost) of €211m represent a material saving of c. €344m against the Preferred Option Estimate, thereby providing a strong rationale from a financial perspective to proceed with the preferred option. While the FBC Outturn Cost is €14m higher than the Do Minimum option, it is important to note the risks associated with implementing the Do Minimum option. As outlined separately in this FBC, significant risks exist, such as the risk of extending outdated ticketing equipment past its planned life, the increasing costs and difficulty of replacing the current ticketing equipment, and the risk of not being able to achieve other NTA initiatives which require improved passenger boarding time.

1.7 Economic Appraisal

An economic appraisal (refer to section 7) has been undertaken consisting of a Multi-Criteria Analysis (MCA) and Cost Effectiveness Analysis (CEA) to determine if the proposed option is desirable from a social perspective. The MCA confirms that the Do NGT-GDA option has the highest level of effectiveness when compared to the counterfactual Do Minimum. The average level of effectiveness of the Do NGT-GDA option was 'slightly positive'. The CEA finds that implementing NGT results in a better economic outcome than the Do Minimum, with the lowest real cost per unit of effectiveness, at €3.3m per MCA Score. This shows that it is the most cost-effective option and delivers the most effective solution for the cost.

1.8 Risk Management

A detailed Risk Management Strategy has been developed setting out the mechanisms by which risks are managed throughout *NGT – GDA* project delivery and operations. The *NGT – GDA* project will adapt the BusConnects Dublin Risk Management Framework and the same Risk Management Plan that is in place for the *NGT – BusConnects Dublin* project given both projects are running close together. The *NGT-GDA* Risk Management Plan will however be adapted to ensure it captures project specific risk mitigation strategies and controls at *NGT – GDA* project level. The *NGT* Project Manager holds overall responsibility for managing and reporting risks and issues within the *NGT* project with engagement with the BusConnects Programme Risk Lead who is responsible for identifying, managing and reporting strategic programme-level risks. Further details in relation to the key *NGT – GDA* project risks are set out in section 8 and a full Project Risk Log has been included in the appendices to this project.

1.9 Benefits Realisation

The Benefits Realisation Plan (BRP), refer to section 9, for the *NGT – GDA* project focusses on those benefits that *NGT – GDA* project will contribute to directly. The plan sets out in detail the methodology for identifying, monitoring and evaluating project benefits throughout the planning and delivery stage to ensure the *NGT – GDA* project delivers on its promise to improve the experience of using public transport in the GDA.

1.10 Governance and Evaluation Plan

Consistent with other public transport projects, the NTA fulfills the role of both the Sponsoring Agency and Approving Authority functions identified in the IG. The role of the Approving Authority will be performed by the Transport Planning and Investment (TPI) Department of the NTA, with the Transport Technology Directorate ultimately responsible for the delivery of the *NGT – GDA* project, acting as Sponsoring Agency. Section 10 details the governance structures in detail including the role of the *NGT* Project Board and executive groups and the NTA's dual role as Sponsoring Agency and Approving Authority. The section also presents the monitoring and evaluation plan for the delivery of the *NGT – GDA* project including how key performance indicators will be used to monitor and evaluate the *NGT – GDA* project's delivery and success.

1.11 Recommendation for the Approving Authority

It is recommended that the NTA proceeds with the investment in the *NGT – GDA* project to successfully achieve the project's objectives and deliver the full range of benefits and financial savings set out in this FBC. In addition, the need for the project has been determined as the current cash ticketing system is obsolete with significant maintenance required. To extend the life of the current system carries significant risk to the NTA as there are concerns regarding the ability to maintain and source equipment for that system. This is also compounded with the overall significant risk to revenue collection for the services within this FBC. In addition, the project represents financial and economic value for money whilst building synergies with projects such as *NGT – BusConnects Dublin*. Therefore, *NGT – GDA* project represents an important next step to achieving the benefits of a modern, sustainable, flexible and customer friendly ticketing in the GDA and across Ireland as well as mitigating a significant risk to the NTA.

2 Introduction

NGT is the NTA's strategic technology programme to transform and modernise the system for ticketing and payments on Irish public transport. Whilst the NGT solution will continue to support customers purchasing tickets with cash through the life of the system, NGT also aims to transition to an ABT system within 2-3 years. ABT is a type of ticketing that allows smarter and ticketless travelling for passengers. ABT is enabled by a system that will deliver a common user experience irrespective of mode of travel and will accept multiple identifiers or tokens as payment such as contactless bank cards, mobile phones etc. These tokens are linked to an account in the back end which logs the journey the passenger takes. The boarding and alighting ticketing data (tag-on/tag-off) is constantly recorded to determine fares and can be linked to real time passenger information to help inform the passengers choice, calculate the correct fare for the passenger, to settle the correct transaction once the journeys are completed and to apply promotions, fare changes and fare connections. This will interact with fare caps that the NTA may apply in its ticket pricing strategy that would allow customers to continue to travel as normal on public transport services once they have hit a certain value, but no further spend would be incurred for travel above that cap.

This will address many of the weaknesses of the current closed-loop smart card ticketing scheme (called TFI Leap Card). It will also provide the platform for the development of ticketing and payment for public transport in Ireland and will provide the foundation for subsequent developments in ticketing and payments, such as Mobility-as-a-Service (MaaS).

The initial rollout of the NGT being implemented in Ireland (the NGT project) is captured through the *NGT – BusConnects Dublin* project as part of the BusConnects Programme. As part of the implementation, a single-party framework agreement (the NGT Framework Agreement) was awarded to Indra Sistemas S.A. (the NGT Service Provider) along with the initial scope of deployment of the NGT Solution covering ABT and back-office set-up, cash alternative and implementation of the NGT project on Dublin City Bus Services operated by Bus Atha Cliath and Go Ahead bus services.

The single party NGT Framework Agreement was adopted as the preferred contract type from amongst other options, as it would allow the NTA more flexibility around the goods or services contracted for under the framework, both in terms of volume and also the specifications of the relevant goods and services. This also enables the NTA to award multiple contracts for ancillary goods or services related to ticketing solutions, over the term of the contract, to an approved service provider which would leverage existing infrastructure for new development and testing, enable seamless integration with the ticketing solution and lower turn-around-time for deployment.

The NTA is now at the point where it is seeking to progress the next scope of deployment of the NGT Solution under the NGT Framework Agreement for urban and suburban services in the GDA and this FBC covers the rationale for extension of the NGT to GDA under the Framework Agreement to the NGT Service Provider.

2.1 Report Purpose

This report represents the FBC for *NGT – GDA* project, involving the adoption and extension of the NGT Solution to include city services in the urban and suburban regions of Dublin including the following public transport services and operators:

- Iarnród Éireann (Irish Rail) urban and commuter Heavy Rail services;
- Luas Light Rail services in Dublin;

- Commuter Bus services; and
- selected Commercial Bus Operators who serve GDA.

While this is the second element of the wider NGT Programme to be implemented, it will be delivered to integrate with the preceding *NGT – BusConnects Dublin* project scope and other subsequent NGT projects across all transport modes.

The expansion of NGT to public transport services in the GDA is dependent upon the infrastructure being implemented as part of *NGT – BusConnects Dublin* project, and as such this FBC has been developed as a follow on to the approved FBC for the *NGT – BusConnects Dublin* project. The structure of this FBC is consistent with the structure of the *NGT – BusConnects Dublin* project to ensure alignment between both business cases and support the streamlining of NTA review and approval. Where appropriate, additional information is included in this FBC to capture the publication and requirements of the IG.

2.2 Project Rationale and background

At present, Ireland’s major cities and urban areas suffer from serious traffic congestion, with Dublin ranked as the 1st most congested city in the World¹. This costs the state enormously in terms of lost productivity, higher cost of conducting business, loss of inward investment, environmental emissions and high accident rates.

Acknowledging this, investments in public transport strive to enhance its appeal for users of motorised personal transport. From a ticketing system standpoint, this involves improving the flexibility and user-friendliness of ticketing systems, particularly during multi-modal interchanges. As a result, boarding time on public transport is expedited by minimizing interactions with on-board transport staff. Additionally, this streamlined approach, reduced ticketing complexities and improved efficiency enhances the appeal of public transport for both existing and new customers. Further, as part of the wider investment in public transport, it has been recognized that the current ticketing system in use on public transport services is no longer fit for purpose as it is not integrated, the costs of maintenance are rising significantly, and it is increasingly difficult to add additional features. An integrated ticketing system will reduce traffic congestion by offering an optimised and efficient public transport system which is attractive to users.

NGT is the core initiative that constitutes the overhaul of the ticketing system, with a broader vision to ensure that public transport systems have an efficient ticketing system that is future-proofed to new technologies (e.g. MaaS). This project involves the adoption of the NGT system and the operational commencement of the solution across public transport services in the GDA.

This scheme will reduce costs of congestion, increase productivity, lower costs of conducting business and lower environmental emissions. It builds upon the *NGT – BusConnects Dublin* project which is the first element of the NGT Programme to be implemented. The *NGT – GDA* project will be delivered to seamlessly integrate with the *NGT – BusConnects Dublin* project and all other subsequent NGT projects.

¹ [https://www.tomtom.com/traffic-index/ranking/Dublin-is-the-second-slowest-city-for-drivers-in-the-world,-new-data-shows-\(thejournal.ie\)](https://www.tomtom.com/traffic-index/ranking/Dublin-is-the-second-slowest-city-for-drivers-in-the-world,-new-data-shows-(thejournal.ie))

2.3 Methodology

Due to the nature of the wider NGT Programme, the investment decision into developing a new ticketing system was approved through the Preliminary Business Case (PBC) for BusConnects Dublin. An FBC was subsequently prepared for the *NGT – BusConnects Dublin* project, capturing scope from the NGT Framework Agreement for the development of the ABT and back-office functions, the cash-alternative solution and the rollout to Dublin City Bus Services.

This FBC builds on the above and considers the extension of ticketing services to GDA in advance of NTA approving the scope under the NGT Framework Agreement. As the investment decision to develop a new ticketing system has previously been approved, this FBC considers two scenarios. Firstly the ‘Do Minimum’, in which the existing card-based ticketing Leap scheme is maintained as the primary mechanism for fare payment (detailed in Appendix-12) on those public transport services outlined in section 2.1, and the Do NGT Option which considers the extension of the NGT Solution to the GDA through the NGT Framework Agreement.

This FBC is based on a comprehensive understanding of up-to-date costs, benefits, risks, deliverability and affordability, providing a basis on which to decide whether to proceed with the delivery of the *NGT-GDA* project.

For completeness, this report also describes the programme scope and the procurement process, in order to constitute a single reference document for Decision Gate 3 – Approval to Proceed.

This FBC has been prepared in accordance with the IG, TAF and NTA Project Approval Guidelines (PAG). It should be noted that a review of the demand assessment has not been undertaken for this FBC. This is due to the fact that the provision of the NGT solution is required as the current cash ticketing system is obsolete with significant maintenance required. In addition, to extend the life of the current system carries significant risk to the NTA as there are concerns regarding the ability to maintain and source equipment for that system. This is also compounded with the overall risk to revenue collection for the services within this FBC. With this in mind, demand for the project is predicated on the need to replace the current ticketing system with an up to date and modern solution which will bring additional benefits to citizens.

Following the IG and TAF the report contains the following elements:

- Strategic Relevance and Project Objectives
- Detailed Project Brief
- Transport Accessibility Appraisal
- Economic Appraisal (Cost Effectiveness Assessment)
- Financial Appraisal
- Risk Management Strategy
- Benefits Realisation Plan
- Governance and Evaluation Plan

3 Strategic relevance and project objectives

3.1 Introduction

This strategic relevance and project objectives review is a prerequisite to proceeding to appraise the project’s financial and economic characteristics. This section forms an important part of the bridge between public policy and the *NGT – GDA* project as it analyses the project’s objectives, strategic relevance and alignment with policy in order to confirm the project’s value and compatibility within the NTA’s overall portfolio and strategic goals.

3.2 Strategic alignment with public policy

The NGT project furthers the objectives of local, national and international policy. By identifying the relevant strategies and policies in transport, tourism and urban development, this report reviews and outlines how these strategies and policies interact and relate to NGT generally and the adoption of *NGT within GDA*. The strategies and policies reviewed are as follows:

Table 1: Applicable strategies and policies

Applicable strategies and policies
Project Ireland 2040: The National Planning Framework and National Development Plan 2021-2030
National Sustainable Mobility Policy
Climate Action Plan 2023
National Payments Plan
Harnessing Digital – The Digital Ireland Framework
Transport Strategy for the Greater Dublin Area 2022 - 2042
Integrated Implementation Plan 2019 – 2024
Dublin Regional Tourism Development Strategy 2023 - 2027 - Fáilte Ireland

Detail on how the *NGT-GDA* project contributes to each of these strategies and policies is contained in Appendix 1 and a summary is provided below.

National Policy

Project Ireland 2040 combines the National Planning Framework (NPF) and the National Development Plan (NDP) 2021-2030 to provide a vision and strategy for Ireland's development. The NDP includes ten National Strategic Outcomes (NSOs), with NGT contributing to NSOs such as Sustainable Mobility, Compact Growth, Transition to a Low Carbon and Climate Resilient Society and Access to Quality Childcare, Education and Health Services.

The Climate Action Plan 2024 aims to achieve ambitious climate action targets by promoting modal shift to public transport and active modes, along with decarbonization efforts such as replacing diesel buses with low-emission vehicles. NGT is crucial for achieving these targets by providing an integrated ticketing solution that makes public transport more accessible.

National Sustainable Mobility Policy aims to achieve a 51% reduction in greenhouse gas emissions by 2030. NGT is highlighted for enhancing the public transport system through innovative payment methods and simplifying fare structures. By making public transport a more attractive offering, NGT will assist in delivering modal shift to more sustainable forms of transport in pursuit of reduced greenhouse gas emissions.

National Payments Plan aims to promote electronic payment methods and improve efficiency while considering sustainability. As NGT will drive more efficient public transport payment methods it helps meet the objectives of the plan including sustainability and efficiency, security and resilience, and innovation and inclusion.

Harnessing Digital – The Digital Ireland Framework aims to deliver digital commitments and enhance digital services. NGT supports this by offering a smarter alternative for public transport users through digital applications and universal systems.

Regional Policy

Transport Strategy for the Greater Dublin Area 2022 – 2042 aims to promote economic, social, and cultural progress in GDA by ensuring efficient and sustainable movement of people and goods. It emphasises transitioning to cleaner, low-emission transport options and increasing the use of walking, cycling, and public transport. The strategy highlights the importance of an integrated public transport network which NGT will play a key role in delivering due to the nature of ABT.

Integrated Implementation Plan 2019 – 2024 outlines transportation investments in the GDA, focusing on reducing congestion, addressing environmental concerns, and improving spatial planning. It identifies key investment areas such as bus, light rail, heavy rail, and integration measures for sustainable transport, with a specific focus on NGT as means to enhance public transport accessibility and reduce congestion in the Eastern region.

Dublin City Development Plan 2022 - 2028 emphasizes sustainable movement and transport, advocating for infrastructure projects to improve walking, cycling, and public transport options. The implementation of the *NGT – GDA* project will be significant in meeting these objectives of increasing public transport usage and reducing congestion by making public transport a more attractive option.

Dublin Regional Tourism Development Strategy 2023 - 2027 by Fáilte Ireland recognizes Dublin as a crucial entry point for tourists and stresses the importance of accessible public transport. It envisions seamless navigation for tourists across the region using ticketless public transport which the *NGT-GDA* project will be pivotal in delivering by improving accessibility to infrastructure and tourism amenities.

These strategies and policies emphasize sustainability, climate action, efficient transportation, and digital transformation as key pillars of Ireland's and the GDA's growth and development. Extending the NGT project to other public transport services in the GDA will play a clear role in supporting and meeting these key strategies and policies by using digital technology to provide a more attractive and accessible public transport option.

3.3 Objectives

The current transport environment in Ireland often sees public transport competing with the private car. The existing ticketing equipment will reach the end of its asset lifecycle and

require replacement within the next few years. This presents an opportunity to consider and implement new technology to improve the passenger experience.

The societal benefits of increased public transport usage replacing trips by car include improvements in air quality, reductions in CO2 emissions and reduced road congestion. These provide a clear rationale for Government intervention and/or investment in ticketing infrastructure. The private market has little incentive to take account of the wider positive social externalities and there is a risk of co-ordination failure across operators, and a non-integrated customer proposition. NGT has been identified as necessary to the growth of the public transport network. Importantly, this *NGT – GDA* project represents a significant opportunity for public intervention to provide a long-term, sustainable ticketing infrastructure by transitioning to an ABT scheme.

During the initial scoping phase of the NGT, the strategic objectives of the Project were developed. The objectives were developed in line with the Transport Strategy for the Greater Dublin Area 2022 – 2042 and the Common Appraisal Framework guidelines (now updated to the TAF in 2023).

Data related to customer satisfaction with ticketing will be collected starting from the Q2/2025 Customer Satisfaction Survey and tracked quarterly thereafter. Customer Satisfaction (CSAT) is a globally recognized way of measuring how products and services supplied by a company meet or surpass customer expectation.

Following the initial collation of the baseline data from the Q2/2025 Customer Satisfaction Report, targets will be agreed in Q3/2025 with the NGT Project Board to quantify appropriate metrics and outcomes for the NGT Solution.

Customer Satisfaction data will be evaluated against the baseline from Q3 2027 onwards following the deployment of the NGT Solution across the GDA. This will then form part of the ex-post evaluation to validate that the NGT-GDA project has delivered on its objectives.

In line with that approach, the objectives for *NGT – GDA* project are as follows:

- 1 Deliver one of the key NTA initiatives, referred to as “Just the Ticket”:** This aims to reduce the delays caused by the current payment processes at bus stops and improve the customer payment process experience at all payment points. To address this, the NGT will include an ABT system incorporating open-loop payments (i.e. bankcards and mobile payments such as Apple Pay and Google Pay), QR codes and secure tokens. This will enable cashless, self-service ticketing with minimal driver interaction on commercial and commuter bus services. The integration of this technology will improve the public transport system and enhance the customer experience.
Progress towards this objective will be assessed after establishing baseline data on customer ticketing (at point of use) experience from the TFI Customer Satisfaction Report in Q2 2025. Once this baseline data is in place, the NTA will evaluate the success of *NGT - GDA* by comparing the results from the TFI Customer Satisfaction Report post the project’s anticipated go-live date in **Q3 2027** against the baseline data. This data will be reviewed quarterly by the NGT Project Board.
In addition, data related to Estimated Wait Time (EWT) or schedule adherence across all routes (from NGAVL) will be baselined in 2026 and used to evaluate the performance of the NGT Solution versus legacy equipment.
- 2 Improve the customer experience by addressing some of the limitations and weaknesses in the current system:** Give customers greater choice, more convenience, and better value, thus making it easier to access and use public transport. Customers will

not need to pre-purchase a card or ticket or even pre-load travel credit, just use their choice of media to tap and go. The *NGT – GDA* project will facilitate this by allowing open payments, by implementing an account-based system using near real-time data exchange, with a 'mobile first' strategy, all connected to a central transit account.

Progress towards this objective will be assessed after establishing baseline data on customer experience (Use of legacy ticket media) from the TFI Customer Satisfaction Report in Q2 2025. Once this baseline data is in place, the NTA will evaluate the success of *NGT - GDA* by comparing the results from the TFI Customer Satisfaction Report post the project's anticipated go-live date in **Q3 2027** (use of open payments, QR codes and mobile app) against the baseline data. TFI Customer Satisfaction surveys will be undertaken quarterly. This data will be reviewed quarterly by the NGT Project Board.

In addition, the NTA will seek to measure the proportion of users currently using the LEAP card and cash versus those who move to ABT services when the project goes live in **Q3 2027**. Success towards this objective will see an increase in the number of users using the ABT services as a proportion of total customers versus the proportion of customers using the LEAP card and cash. It is anticipated that in the first year of operation approximately 7% of customers will migrate to ABT options with an incremental uplift of 10% per annum thereafter.

- 3 Customer experience and acceptance:** As the implementation of the first phase of NGT will allow open-loop payments across Dublin City Bus Services, much of Dublin's public transport journeys will be excluded. Passengers traveling on heavy rail services, light rail services and commuter bus services will not be able to use open-loop payments. In addition to this, customers embarking on a multi-modal journey will be disincentivised from using open-loop payments as they will not get the benefit of the 90-minute fare for this trip. Without the implementation of NGT GDA, this lack of integration will lead to an inconsistent customer experience which is likely to lead to confusion, suboptimal fares, and complaints from the public. There would likely be negative knock-on impacts of this, primarily a lower level of customer uptake than would otherwise be the case. Secondly, it is possible that the ability to use open-loop payments on only Dublin City Bus Services may attract more passengers to this mode of transport instead of light and heavy rail services which may lead to a less efficient modal distribution of passengers within Dublin. Introducing NGT across all modes of transport in GDA will ensure that customer experience is consistent, and passengers are able to benefit from the best fares available across any public transport journey in the region.

Success for this objective will simply be measured through the delivery of NGT solution on GDA services by Q3 2027 in line with the delivery of *NGT BusConnects Dublin*. It is anticipated that in the first year of operation approximately 7% of customers will migrate to multi-operator ABT options with an incremental uplift of 10% per annum thereafter.

- 4 Address the fact that the current ticketing equipment for cash payment in buses is obsolete, and the level of equipment failures is of concern:** The cost of maintaining this equipment is increasing and the supplier finds it very difficult to modify or introduce new features. Further, all the equipment are not capable of supporting bankcard payments. To address this, the *NGT – GDA* project will deploy new ticketing equipment that will include modern features and support modern payment methods.

Progress towards this objective will be assessed against the baseline data on service failures in the current ticketing equipment. The NTA will evaluate the success of *NGT - GDA* by demonstrating a reduction in service incidents due to ticketing equipment failures. Current ticketing equipment failure rates are approximately 17%, the objective of NGT is to have a failure rate no greater than 2%.

5 **System testing and extension template:** The first phase of the NGT rollout will establish the NGT system across Dublin City Bus Services. This will familiarise customers with the system and allow transport operators to resolve any early-stage issues which are experienced. The GDA extension, however, will be the first wide-spread test of the system’s multi-modal functionality and experience. This is therefore a critical step in NGT’s rollout and will serve as the template for all future regional extensions of the system.

Progress towards this objective will be assessed after establishing baseline data on customer experience (including modal interchange and customer complaints from fares) from the TFI Customer Satisfaction Report in Q2 2025. Once this baseline data is in place, the NTA will evaluate the success of *NGT - GDA* by comparing the results from the TFI Customer Satisfaction Report post the project’s anticipated go-live date in **Q3 2027** against the baseline data. TFI Customer Satisfaction surveys will be undertaken quarterly. This data will be reviewed quarterly by the NGT Project Board.

6 **Value for Money:** The rollout of NGT to GDA public transport services has a strong value for money focus. By building on those NGT systems implemented on Dublin City Bus Services, extension to GDA services will provide a strong value for money argument creating synergies and integration across projects. This business case seeks to set how the implementation of *NGT – GDA* will achieve this objective through delivery of the NGT solution on GDA services by Q3 2027.

These objectives are summarized below for clarity:

Objective	Metric	Definition (baseline data, specific level of change from baseline year and time bound date to be achieved by)	Plan to define the objective (if not included in FBC)
1: Deliver one of the key NTA initiatives, referred to as “Just the Ticket”	TFI Customer Satisfaction Report – Customer ticketing (at point of use) experience	Baselining data year: Q2 2025 Change (tbc) by Q3 2027	Level of change targeted to be confirmed after baseline data collection.
	Estimated Wait Time (EWT)	Baselining data year: 2026 ~10% improvement from 2028 ²	Level of change targeted to be confirmed after baseline data collection.
	Schedule adherence across all routes (from NGAVL)	Baselining data year: 2026	Level of change targeted to be confirmed after baseline data collection.

² Evaluation of NGT contribution to improvements in EWT will be based on appraising boarding and alighting times when cash has been removed from buses

		~10% improvement from 2028 ³	
2: Improve the customer experience by addressing some of the limitations and weaknesses in the current system	TFI Customer Satisfaction Report - customer experience (Use of legacy ticket media)	Baselining data year: Q2 2025 Change (tbc) by Q3 2027	Level of change targeted to be confirmed after baseline data collection.
	Migration from LEAP card/cash to ABT services	7% migration – Year 1 10% migration - annually	As per this FBC
3: Customer experience and acceptance	Delivery of NGT solution on GDA services	Achieved by Q3 2027	As per this FBC
	Migration from LEAP card/cash to ABT services	7% migration: Year 1 10% migration - annually	As per this FBC
4: Address the fact that the current ticketing equipment for cash payment in buses is obsolete, and the level of equipment failures is of concern	Service failures in the current ticketing equipment	Baseline data: Current Failure Rate of ~17% Failure rate no greater than 2% from 2028 onwards	As per this FBC
5: System testing and extension template	TFI Customer Satisfaction Report – Customer experience (including modal interchange and customer complaints from fares)	Baselining data year: Q2 2025 Change (tbc) by Q3 2027	Level of change targeted to be confirmed after baseline data collection.
6: Value for Money	Delivery of the NGT solution on GDA services which can be learnt from and rolled out nationwide (reducing the time and cost of implementation elsewhere)?	Achieved by Q3 2027	As per this FBC

Objective measurement for the NGT GDA project will be based on the benefits realization plan as outlined in Section 9. As many of the objectives rely on customer perception and satisfaction with the ticketing system, the NTA intends to establish baselines for the

³ Evaluation of NGT contributions to improvements in Schedule Adherence will be based on appraising boarding and alighting times when cash has been removed from buses

objectives through the TFI Customer Satisfaction Report by Q2 2025 with the intention to track progress quarterly and identify long-term positive trends that can be attributed to the NGT solution when it comes online.

3.4 Alignment with future GDA projects

There are a number of current and future public transport projects within GDA that NGT will directly benefit.

- The DART+ programme will provide a transformational increase in the capacity and frequency of the existing system between Dublin City Centre and the areas of Drogheda, Maynooth, Dunboyne, Celbridge and Greystones.
- There are also plans for an expansion of the current Luas light rail system across Dublin. This expansion would include an extension of existing lines coupled with the upgrading of existing carriages to accommodate higher passenger capacity.
- Finally, MetroLink will provide a high-capacity, high-frequency rail line running from Swords to Charlemont, linking Dublin Airport, Iarnród Éireann, DART, Dublin Bus and Luas services.

The NGT system will improve the current public transport offering and enhance the customer experience when using the multi-modal transport offering from future projects such as the DART+, Metrolink (although this will form part of a separate scope of the NGT Framework Agreement, which will be implemented in due course) and the Luas expansion.

3.5 Need to replace current ticketing systems

As noted above, there is a significant need to address the fact that the current ticketing equipment for cash payment in buses is obsolete, and the level of equipment failures is of concern: The cost of maintaining this equipment is increasing and the supplier finds it very difficult to modify or introduce new features. Further, the ticketing equipment on public transport is not capable of supporting bankcard payments or any form of account based ticketing.

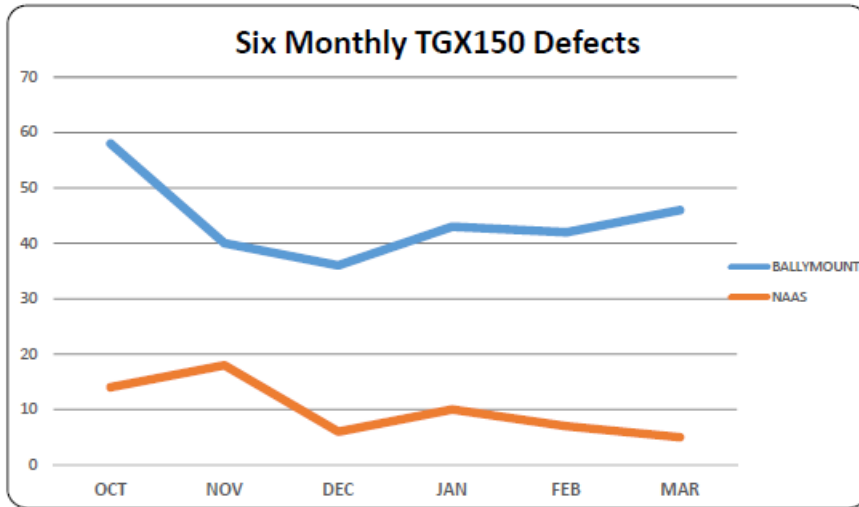
This failure rate can be demonstrated by the March 2024 report by Flowbird into the ticketing systems of Go Ahead Ireland. This demonstrated that Go Ahead Ireland is seeing significant defects in its ticketing systems as demonstrated by the 17.7% failure rate outlined below.

2.1. TGX150

Site	Week 1 01st-07th	Week 2 08th-14th	Week 3 15th-21st	Week 4 22nd-28th	Week5 29th-31st	Totals	Failure Rate %
BALLYMOUNT	14	0	23	9	0	46	25.1%
NAAS	0	0	0	5	0	6	10.2%
WEEK TOTAL	14	0	23	14	0	51	Ave 17.7%

In addition, the 6 month trend in failure rates can be seen below.

3.1. TGX150



The levels of failure are unsustainable alongside the running of ticketing systems that are considered out of date to the customer. Further detail on this can be found in the Go Ahead Ireland report at Appendix 21.

3.6 Final observations

This section has validated the strategic rationale of the *NGT – GDA* project’s objectives with a significant number of national and regional policy objectives.

The analysis of the rationale and strategic fit of this proposed project highlights the extent of its alignment with government policy, in particular the National Planning Framework and National Development Plan, Project Ireland 2040. The *NGT – GDA* project also complements the other national and regional strategies reviewed above and would enhance a number of future GDA projects.

4 Detailed Business Case

4.1 Document Purpose

The Detailed Business Case (DBC) is the full and complete statement of the Sponsoring Agency's functional and operational requirements for the *NGT – GDA* project expressed in output requirements. It was initially prepared and approved in October 2021 and this FBC includes an updated DBC to reflect the outcomes of the tendering process. It should be noted that this FBC is limited to seeking the approval for the implementation and operation of the NGT Solution on GDA public transport services through the NGT Framework Agreement.

4.2 Background

In the course of developing the DBC update, the project delivery team has considered 17 project parameters. These parameters, and the appropriate references, are detailed in Table 2 below. Note that not all of these are covered in this section but are included elsewhere in this document, as indicated in the table.

Table 2: Project Brief Parameters

Project Parameter	Reference in this document
1. Objectives	Refer to Section 3.3
2. Purpose	Refer to Section 4.3
3. Scope	Refer to Section 4.3 and Appendix 2
4. Deliverables/desired outcomes	Refer to Section 4.3
5. Performance	Refer to Appendix 3
6. Assumptions	Refer to Appendix 4
7. Governance and Reporting	Refer to Section 11.2
8. Preferred Option	Refer to Section 6
9. Known Risks	Refer to Section 9.4 and Appendix 13
10. Value Management Strategies	Refer to Appendix 5
11. Project Execution Plan	Refer to Appendix 20
12. Expected Functional Life	Refer to Section 4.6
13. Design restrictions/requirements	Refer to Section 4.3 and Section 4.5
14. Location	Not applicable. This is an ICT project and location or site options proposed for the facility does not apply.
15. Budget	Refer to Section 6
16. Constraints	Refer to Appendix 6
17. Procurement Update	Refer to Section 4.6

4.3 Project Purpose

The *NGT – GDA* project scope and requirements have remained relatively static throughout the procurement process. The scope covers the requirements to install and commission the NGT Solution into live operations on GDA public transport services (noting that the project will provide all ticketing equipment to deliver the NGT Solution on GDA public transport operators services), as below:

- 1 Configuring the public transport network and associated fares information (i.e. stops, stages, routes, zones fares data) and import all applicable transport networks and associated fares using the NGT Solution;
- 2 The supply, configuration, integration, installation and commissioning of fare-media acceptance devices;
- 3 Providing cash alternatives/cash replacement products;
- 4 Providing online sales services for cash replacement products and 2D Barcode Tickets;
- 5 Providing the payment gateway and acquirer services, including payment processing for purchases at manned and unmanned sales terminals such as TVMs and kiosks;
- 6 Providing integrated revenue inspection and penalty management capabilities, incorporating additional inspection devices;
- 7 Providing and establishing secure wireless communications links on GDA public transport services;
- 8 Providing additional operation and maintenance requirements to incorporate the newly installed equipment, infrastructure, systems and fare products, as well as any upgraded and expanded systems deployed in this requirement;
- 9 Including the GDA services within the 90 minute fares logic and the ability to process known fare and pre-paid product fare models for Open-Loop EMV;
- 10 Integrating with the existing Iarnród Éireann (Irish Rail) online booking engine i.e. S3 Passenger by Skills, including but not limited to the service specific seat reservations functionality;
- 11 Provide customers with self service capabilities and query support integrated with the NTA CCC.

Further detail on the *NGT – GDA* project outputs can be found at Appendix 2 detailing what will be delivered through this project.

4.4 Enabled Outputs and Benefits

Whilst the *NGT – GDA* project will provide scope to deliver the features outlined above, this business case does not seek to quantify those “enabled benefits” derived through the NGT project. This includes enabled outputs and benefits such as:

- Revenue generated from new fare structures implemented including benefits arising from possible fare caps implemented; and
- Additional patronage generated by consequences of the *NGT – GDA* project e.g. ease of payment and increased speed of boarding on participating bus services.

4.5 Option Assumptions and Exclusion from scope

In delivering this FBC, it is also appropriate to consider the assumptions surrounding the Do Minimum option and the FBC preferred option. These assumptions have been detailed at Appendix 4 and Appendix 12 respectively.

In summary, for the Do Minimum option, the existing card-based ticketing LEAP scheme is maintained as the primary mechanism for fare payment in public transport in the GDA. Investment must be made to source additional equipment, including replacement of life-expired equipment and components and to update System for Cross-domain Identity Management (SCIM) and security.

Investment will also be made in respect of products and customer propositions as these pertain to the Card-Based Ticketing architecture and form part of the extant roadmap for the current Leap scheme.

The operating contract for the existing scheme is due for renewal and this scenario assumes that the contract is re-procured for five years under the same / near-identical terms to the existing contract.

For the FBC preferred option, the NGT Solution will cater to emerging customers demand for more choice, more convenience and better value to opt for public transport services, by delivering the features outlined at Appendix 4.

It should be noted that the delivery of LEAP Operations (the provision and operation of the existing LEAP system) is not included within the scope of the *NGT – GDA* project as new validators will accept Legacy LEAP Cards and will be integrated with the existing LEAP Back Office Operations.

It should also be noted that decommissioning and deinstallation of existing legacy ticketing equipment will be the responsibility of the relevant Transport Operator, and, where fixed networking infrastructure and civil preparation works are required, these will be provided by the relevant Transport Operator acting as an agent of the NTA.

4.6 Procurement Process and Strategy

The NGT scope of services, including that for the *NGT – GDA* project, is intended to be procured under the NGT Framework Agreement. Whilst the intention is to deploy the full scope of NGT services utilising the NGT Service Provider, the NTA is not bound to do so and reserves the right to procure services outside of the NGT Framework Agreement.

The NTA has adopted an outsourced model for the implementation of NGT. The chosen procurement strategy has been set out in the table below.

Table 3: Procurement Strategy

Procurement element	Preferred approach
Number of contracts	Initial framework agreement with multiple call-off contracts.
Procurement procedure	Competitive dialogue procedure with negotiation
Type of contract	Single supplier framework agreement
Length of contract	10 years plus two 5-year extensions at the discretion of the Authority
Number of shortlisted candidates	Five

The implementation of NGT project was procured through a Competitive Dialogue procedure using the Utilities Directive (2014/25/EU). Following a detailed dialogue process and the evaluation of the submitted Final Tenders, the NTA entered into the NGT Framework Agreement with Indra Sistemas S.A. for the provision of all the NGT projects, to be implemented through separate Call-Off Contracts or scope.

The combined scores from the quality and pricing evaluation are contained below and Tenderer C (Indra Sistemas S.A.) has been selected as the NGT Service Provider. Further detail of this procurement can be found at Appendix 18. The procurement process was delivered in line with the project objectives and that Indra Sistemas S.A was appointed on its ability to deliver those NGT objectives outlined within this document.

As noted, this FBC only seeks the required approvals to award the scope within the NGT Framework Agreement for the deployment of the NGT Solution to GDA public transport services.

Table 4: Procurement Scores

Category	Tenderer-A	Tenderer-B	Tenderer-C (Indra Sistemas S.A.)
Quality Score	53,994	44,937	44,358
Price Score	18,978	29,503	40,000
Total Score	72,972	74,440	84,358

4.7 Project Execution Plan

The Project Execution Plan (PEP) for the planning phase with initial proposed deployment approach is attached at Appendix 20. The PEP includes a high level project timeline and mobilisation timeline. This is the first version of the PEP and its associated timelines that will continue to be developed as the *NGT GDA* project progresses.

4.8 Climate, Adaptation and other Environmental Considerations

The *NGT GDA* project is an IT project that will support the collection of fares on public transport in the GDA area. Therefore, the delivery of NGT as a whole is intended to increase patronage on public transport by making it more attractive to citizens. The project will assist in achieving modal shift, encouraging the public to travel by more sustainable forms of transport and, in turn, will assist with reducing the impact on climate change and the environment as usage of the private car should reduce.

The NGT solution for GDA replaces an existing legacy ticketing system that is currently experiencing significant failure rates. Each failure requires a technician to travel to the ticketing machine wherever it is situated to undertake remedial repairs. This issue is significant increasing the climate and environmental impact of the legacy system as those journeys undertaken in work vehicles by technicians produces carbon emissions. As the failure rates have increased, it is assessed that the environmental impact of the existing system increases. By replacing the ticketing system with the NGT solution, it is anticipated that failure rates will significantly drop and maintenance of the ticketing system will be lighter touch.

The NGT solution will also implement account based ticketing where effectively customers will use their cards to tap on and off public transport negating the need for paper tickets. As stated by Intelligent Transport⁴, this approach will reduce single-use tickets through re-usable smart cards or digital ticketing has the potential to cut millions of tonnes of waste each year. It will also provide less energy consumption as the production of paper tickets requires energy for printing, cutting, and transportation. E-tickets, on the other hand, are created and distributed digitally, saving energy and reducing the reliance on fossil fuels⁵.

⁴ [Addressing the environmental impact of ticketing](#)

⁵ [Convenience Meets Sustainability: The Environmental Benefits of E-Tickets | by Ticket Gateway | Medium](#)

In addition, the existing legacy ticketing system require significant manual input if changes are required such as annual ticket price amendments. When undertaking such a task, the ticket machines on our public transport must be updated manually by staff. This is a labour intensive piece of work that incurs many days and weeks preparation by staff who will travel to update each system on the vehicle before the go live date of the ticket price changes. By moving to a new, modern cloud based solution, these changes to the systems can be done in a back office and simply pushed out through an update. This will significantly decrease the amount of travel and work required to make changes to the system and, in turn, it is anticipated that this will have significant climate and environmental benefits. The benefits of how technology assists in reducing maintenance costs and, in turn, the inherent climate and environmental impact are outlined by Limble⁶.

The emissions impact of a modern ticketing cloud based solution will be less than the existing on-premise based hardware solution used to operate Leap. Due to nature of these IT systems, it is very difficult to quantify the carbon emissions savings of the NGT solution. However, as outlined by Intelligent Transport and as recognised by the NTA, NGT will play a significant role in reducing Ireland's transport carbon emissions by implementing a new ticketing system that will seek to increase public transport patronage⁷, reducing waste, improve system reliability and functionality, and, in turn, reduce transport's carbon output.

⁶ [7 Ways Technology Reduces Maintenance Costs | Limble CMMS](#)

⁷ [Smart Ticketing: A Journey Towards Better Public Transport in Ireland](#)

5 Transport and Accessibility Appraisal

5.1 Appraisal Outcomes

As part of the TAF, all schemes with an estimated cost in excess of €30m are required to include a TAA in addition to a CEA or CBA.

The TAA is a supporting system that assesses the impact of the *NGT – GDA* project across the following six key criteria:

- Accessibility
- Social
- Land Use
- Safety
- Climate Change
- Local Environment

Each criterion has a range of different pre-determined indicators that can be used to assess the relative benefits of the respective options. Only relevant indicators have been considered – i.e., the impacts that may arise as a result of implementing NGT and its enabling impacts in the GDA.

The TAA is better placed for the assessment of physical infrastructure capital projects such as a road, bridge, or cycle lane. Due to the nature of the NGT solution being software based it does not completely align with the TAA and hence these criteria have not been used in the CEA. However, the appraisal is undertaken and provided below.

Following the completion of the procurement process, the TAA has been undertaken for the FBC Option has against the Do Minimum with the results shown in Table 5 below (a detailed breakdown of the analysis is provided in Appendix 15).

Table 5: TAA Results

Criteria	Do Minimum	FBC Option
Accessibility	Neutral	Slight Positive
Social Impacts	Neutral	Slight Positive
Land Use Impact	Neutral	Slight Positive
Safety Impact	Neutral	Neutral
Climate Change	Neutral	Slight Positive
Local Environmental Impact	Neutral	Neutral

An analysis across the six key criteria within the TAA reveals that the FBC Option results in a slight positive impact for Accessibility, Social Impacts, Land Use Impact and Climate Change. Whereas the Do Minimum scores a neutral impact across all six criteria. The TAA for the FBC Option for *NGT – GDA* project is different from that of *NGT – BusConnects Dublin* project, as the predominant implementation will be on heavy rail and light rail services in the GDA.

In relation to the TAA criteria, the main resulting benefits of upgrading the ticketing system and changing the fare structure are:

- Greater flexibility in terms of fares charged
- Greater ease-of-use, better customer service
- Application of best fare across multi-modal public transport journeys in the GDA

The *NGT – GDA* project will provide an enhanced journey experience and increased efficiency. Examples of additional benefits from implementing NGT such as cost convenience, customer satisfaction, health benefits, driver safety, innovation, journey insights & information, simple fare updating process, and cost savings are provided in the international case studies in Appendix 14.

Across the TAA themes, the following impacts of implementing NGT for GDA have been identified:

- **Accessibility** – A slight positive increase in accessibility through NGT, allowing greater flexibility in terms of fares charged when traveling via public transport to different urban centres. This is from customers being able to turn up with a bank card or mobile wallet instead of having to pre-purchase and pre-load a Leap card that customers can only buy in certain locations. This also ensures that a misplaced card does not result in a loss of funds, thereby enhancing the reliability of the service and providing assurance against this risk. In respect of the assessment of accessibility, this slight positive increase excludes the impact on schools as, whilst students can use the NGT solution, they currently avail of Young Adult/Student ticketing. This will continue following the implementation of NGT and is a fares issue rather than anything enhanced by the NGT solution at this time;
- **Social** - A slight positive increase in social impacts from implementing NGT. Deprived groups (such as those at a higher risk of poverty and social exclusion such as but not limited to unemployed people, people living in deprived areas, people with disabilities, single parent families, people on a low income) will see an improvement in public transport services from a greater convenience for passengers when paying, ensuring the best rate is charged for the journey, and improve overall customer satisfaction for passengers traveling via public transport.
- **Land Use Impact** – A slight positive increase as NGT allows for greater convenience for passengers when paying, ensuring the best rate is charged for the journey, and improved overall customer satisfaction for passengers traveling via public transport. It will allow for greater connectivity with existing public transport facilities making the current multimodal trip payment process more convenient and allowing more means of payment and smarter 'after-the-fact' fares charging.
- **Safety** – A very small improvement to safety may result from the increase in the attractiveness of public transport. Potentially, this could result in fewer private vehicles on the road, which might result in opportunities to use road space in ways for active travel, but this is anticipated to be marginal.
- **Climate Change** – It is anticipated that NGT will provide a better service which will increase the attractiveness of public transport. Additionally, it will assist with modal shift away from private vehicles, reducing the externalities associated with private car use.
- **Local Environment** – A very small improvement of air quality may result from the increase in the attractiveness of public transport resulting in a shift away from private vehicles. NGT is a national scheme, so it would be difficult to measure with regard to local air quality.

5.2 Conclusion

A TAA has been undertaken, and across the six key criteria (Accessibility, Social, Land Use, Safety, Climate Change, and Local Environment) the FBC Option results in a slight positive impact for four out of the six criteria, whereas the Do Minimum scores a neutral impact across all six criteria.

A slight positive result is not uncommon given that the project is software based whereas the TAA is more suited for capital intensive project delivery such as for roads, bridges, or cycle lanes. However, the TAA shows the benefits of the project relative to the Do Minimum.

6 Financial Appraisal

6.1 Introduction

A financial appraisal is required at FBC stage to evaluate the financial viability of the project in accordance with the IG and TAF. The financial appraisal assesses the movement in costs from initial estimates against outturn tender costs and assesses the incremental financial impact from the perspective of the NTA. The financial appraisal section is structured as follows:

- Introduction (Section 6.1);
- A summary of the overall results of the financial appraisal (Section 6.2);
- Overview of the financial appraisal assumptions (Section 6.3);
- Cost comparison analysis (Section 6.4) – details the difference in costs between the Do Minimum⁸, Preferred Option Estimate⁹ and FBC Outturn Cost¹⁰ options. The costs are compared in nominal terms by adding indexation throughout the assessment period;
- Incremental spending NPV analysis (Section 6.5);
- Affordability assessment (Section 6.6);
- Financial appraisal conclusion (Section 6.7); and
- Sensitivity analysis (Appendix 10)

It should be noted that throughout this appraisal, the Preferred Option Estimate is taken from the “NGT Cost Model”. The NGT Cost Model was created during the BusConnects Dublin PBC in order to estimate the total cost of the project. The model was divided per region and GDA specific costs could therefore be isolated and extracted for this FBC. This is in line with the methodology used for the *NGT – BusConnects Dublin* project FBC.

Further details as they relate to the Do Minimum and FBC Outturn Cost options are also included in Appendix 12.

6.2 Summary results

Table 6 below provides a summary of the results of the financial appraisal. Specifically, it compares the total FBC Outturn Cost, including the NGT Service Provider cost and all additional NTA costs, with the Do Minimum estimated cost and the Preferred Option Estimate. All numbers in the below table are in nominal terms and include VAT and contingency as detailed later in this section. The analysis demonstrates that the FBC Outturn Cost represents an incremental spending of c.€13.9 million over the Do Minimum cost however is substantially lower than the Preferred Option Estimate (c.€343.9m lower)¹¹. This highlights the value for money provided by the NGT Service Provider and reflects the competitive and robust tendering process undertaken. Overall, there is a strong justification

⁸ “Do Minimum” means the costs of maintaining the current closed-loop card-based ticketing system as the primary mechanism for public transport fare payment in GDA

⁹ “Preferred Option Estimate” means the estimated total cost of the NGT preferred option as calculated within the NGT Cost Model which was created to estimate the cost of NGT during the initial BusConnects Dublin PBC.

¹⁰ “FBC Outturn Cost” means the total estimated cost of proceeding with the NGT contract, based on the NGT Service Provider’s tendered cost and the wider NTA costs required to implement NGT.

¹¹ The difference in price can be attributed to the conservative nature of cost estimates at PBC stage accounting for unknown tender pricing, whereas, at FBC stage actual pricing has been provided. The Competitive Dialogue procurement process was designed to drive competition and deliver value for money in outturn tender pricing. However, it also ensured that the preferred bidder had the capacity and capability to deliver the project at the tendered price.

from the financial perspective to proceed with the preferred option. A step-by-step explanation of this appraisal is provided in the remainder of this section.

Table 6: Financial appraisal results summary (nominal terms, inclusive of VAT and contingency)

2023 Base Price (€m)	FBC Outturn Costs	Do Minimum	Preferred Option Estimate
Total Cost	211.2	197.4	555.1
<i>vs FBC Outturn Costs</i>	<i>/</i>	(13.9)	343.9

6.3 Financial Appraisal Assumptions

Set out below are the assumptions and approach underpinning the financial appraisal and modelling process.

6.3.1 Scope of Appraisal and Adjustment of Operator Business Model (OBM)

As part of the NGT tender submission, Tenderers¹² were required to submit a pricing template called the Operator Business Model (OBM). This pricing template allowed Tenderers to bid all payments they require to implement and operate the NGT solution. The OBM automatically calculated the total cost to the Authority based on these required payments, in the form of a Net Present Value – the Evaluation Price. Tenderers were awarded commercial points based on their relative Evaluation Prices with the lowest cost Tenderer being awarded full marks. The FBC Outturn Costs are extracted from the OBM.

It is important to note that the pricing evaluated within the NGT final evaluation covered the full scope of NGT across Ireland, including all 11 proposed call-off contracts. The scope of this FBC, however, covers only the GDA portion of NGT.

In line with this scope, only pricing relating to the implementation of the NGT Solution in the GDA was extracted from the OBM to use in this Financial Appraisal.

Lastly, it is important to note that during the NGT final evaluation, a 10-year evaluation period was appropriate to allow for sufficient accuracy in volume forecasting and pricing¹³. However, as discussed in the following section 6.3.2. of the FBC, a 20-year period was deemed most appropriate for this financial appraisal, in line with the IG guidance on similar projects and the maximum NGT contract duration (10-year initial contract with two possible 5-year extensions).

6.3.2 Project Timeline

In line with the 20-year financial appraisal period, it is important to note that the Preferred Option Estimate costs from the NGT Cost Model and the Do Minimum costs have been converted from a 36-year appraisal period to a 20-year appraisal period.

Secondly, in line with section 6.3.1. above, only costs related to the GDA portion of NGT were extracted for use in this appraisal. With these exceptions, the Preferred Option

¹² “Tenderer” means a Participant who has been invited to submit a Final Tender in response to the NGT ISFT

¹³ Although the risk of journey forecast inaccuracy over 20-years still exists in the FBC, PSC/IG guidance recommends a business case appraisal period of 15-20 years in the industry. Risk of forecast inaccuracy is mitigated through conservative journey forecasting and through the overall cost contingency and optimism bias that has been applied to total costs. It should also be noted that variable operating costs (which are the dependency of journey forecasts) are a low percentage of total project costs. Furthermore, volume discounts have been provided on most variable costs. This mitigates the risk of large increases in variable operating costs from the NGT Service Provider.

Estimate and Do Minimum costs follow the same methodology used in the initial NGT Cost Model.

In relation to outturn costs, pricing from the OBM, which evaluated the initial 10-year contract period, was extrapolated¹⁴ to cover a 20-year appraisal period for this appraisal. Any assumptions made to do this are specified in footnotes. FBC Outturn Costs otherwise maintain the same key project timelines that were used in the final OBM, including the implementation and operations start dates of the GDA region.

In line with the above, the financial appraisal is based on the OBM timelines with key notional dates as follows:

- Initial implementation phase of GDA: 1 January 2025 to 31 December 2026
- Operations phase of GDA: 1 January 2027 to December 31, 2044

The NGT Framework Agreement has an initial term of 10-years, with two possible 5-year extensions thereafter.

It is important to note that the above GDA timelines are expected to be implemented as one programme of work alongside NGT onto Dublin City Bus Services therefore any risks of interdependency between the two projects can be managed by the NTA. The overarching NGT Framework Agreement has been signed in April 2024, and the NGT Service Provider could commence work on the initial rollout in late Q2/early Q3 2024 following award of the scope for implementation of the NGT Solution in the GDA.

6.3.3 Project Costs

As part of the tendering process, each Tenderer was required to complete an OBM, as part of their pricing submission. The OBM was designed to capture tendered payments and costs of the implementation and operation of the NGT Solution. This was used as the basis of the financial evaluation and subsequently the NGT Service Provider's OBM submission has been used to forecast project costs for the financial appraisal.

Additional NTA costs have also been considered as part of the overall outturn cost. These costs relate to project management, administration, other indirect costs, and the maintaining of Leap system operations until these are able to be fully replaced¹⁵. In addition, costs are already included in the estimates for Operator costs which includes facilitation works and disposals and funds will be drawdown via the Grant Application Framework and managed/monitored through the PRS system. Disposal of equipment will be undertaken through the public transport operators and their own asset disposal strategies as the equipment belongs to those organisations. Lastly, additional equipment renewal costs have been added to the NGT Service Provider costs to account for the longer appraisal period in this FBC. The combination of these NGT Service Provider costs and additional costs are referred to as the "FBC Outturn Cost". More detail is provided on this in Appendix 11 and 12.

It is best practice that as part of the analysis of capital costs, residual value is given due consideration. In this current case, the NGT equipment is estimated to have no residual value after the duration of the project.

¹⁴ The extrapolation method used for each type of payment is also explained in appendix 12

¹⁵ Although maintaining Leap system operations is not part of the scope of NGT, in line with the approach of the BusConnects PBC, these costs are included until the end of 2031 when the system can be phased out entirely. The reason for this is that these costs will be incurred under both the Do NGT option as well as the Do Minimum counterfactual and therefore they should be included under both options to allow for a fair appraisal

6.4 Costs Comparison

This section sets out a detailed review of the difference in costs between the Do Minimum¹⁶ option and the Preferred Option Estimate¹⁷. This comparison is repeated against the Outturn Cost to show the estimated incremental spend of doing NGT.

The cost comparison is itemised under 3 steps as follows:

Step 1: Table 7 compares the total cost of the Do Minimum option and indicative total cost of the Preferred Option Estimate as per the NGT Cost Model. The costs are presented in real terms, i.e., in 2022 prices. The table is split between capital expenditure and operating expenditure and separately includes an amount for VAT, optimism bias and contingency for both options.

Table 7: Do Minimum and Preferred Option Estimate (real terms)

2022 Base Price (€M)	Do Minimum	Preferred Option Estimate	Incremental Costs
Capital Expenditure			
Service Provider Costs	12.3	75.2	62.9
NTA Costs		15.0 ¹⁸	15
Base cost	12.3	90.2	77.9
VAT (23%)	2.8	20.8	18
Base cost (including VAT)	15.2	111.0	95.8
Optimism Bias (40%) ¹⁹	6.1	44.4	38.3
Contingency (15%) ²⁰	2.3	16.6	14.3
Total Capital Expenditure	23.5	172.0	148.5
Operating Expenditure			
Base Cost	96.6 ²¹	203.2	106.6
VAT (23%)	22.2	46.7	24.5
Total Operating Expenditure	118.9	249.9	131
Total Cost	142.4	421.9	279.5

As shown in Table 7 above, the incremental cost of the Preferred Option Estimate over the Do Minimum was approximately €279.5m.

Step 2: In order to capture the likely effects of inflation, the Do Minimum and Preferred Option Estimate costs are compared in nominal terms. In other words, pricing in 2022 terms is indexed throughout the 20-year appraisal period. The inflation assumptions are based on Department of Public Expenditure, NDP Delivery and Reform (DPENDR) Guidance for evaluating large public projects as set out in Appendix 7. These updates show the estimated incremental cost of the Preferred Option while accounting for inflation.

¹⁶ The Do Minimum option is explained in more detail in Appendix 12

¹⁷ The Preferred Option Estimate capex and opex were extracted from the BusConnects PBC model. As the NGT appraisal period is 20-years as opposed to 36-years in the PBC model, opex and capex have been apportioned accordingly.

¹⁸ NTA's NGT implementation team costs were estimated to be €15m within the BusConnects Dublin PBC. Because no separate PBC was done for the GDA region, this estimate is maintained for GDA.

¹⁹ Optimism bias adjustment remains in line with the BusConnects approach.

²⁰ Contingency adjustment remains in line with the BusConnects approach.

²¹ The Do Minimum capex and opex were extracted from the BusConnects PBC model. As the NGT appraisal period is 20-years as opposed to 36-years in the PBC model, opex and capex have been apportioned accordingly.

The costs are higher than those set out under Step 1, given the addition of inflation (details for which are highlighted in Appendix 7).

Table 8: Do Minimum and Preferred Option Estimate (nominal terms)²²

2022 Base Price (€M)	Do Minimum	Preferred Option Estimate	Incremental Costs
Capital Expenditure			
Service Provider Costs	16.6	99.0	82.4
NTA Costs		17.4	17.4
Base Capital Expenditure	16.6	116.4	99.8
VAT (23%)	3.8	26.8	23
Base Capital Expenditure (inc. VAT)	20.4	143.2	122.8
Optimism Bias (40%)	8.2	57.3	49.1
Contingency (15%)	3.1	21.5	18.4
Total Capital Expenditure	31.6	221.9	190.3
Operating Expenditure			
Base Cost	135.6	276.7	141.1
VAT (23%)	31.2	63.6	32.4
Total Operating Expenditure	166.8	340.4	173.6
Total Cost	198.4	562.3	363.9

By making these updates, the difference in the incremental cost between the Do Minimum and the Preferred Option Estimate has changed, with the Preferred Option higher by approximately €363.9m.

Step 3: The final step in updating the cost comparison is to compare the FBC Outturn Cost with the Do Minimum costs and the Preferred Option Estimate costs. As the Do Minimum costs and Preferred Option Estimate costs are in 2022 pricing they have been: inflated to 2023 pricing²³.

The Optimism Bias and Contingency figure for the Do Minimum and Preferred Option Estimate was also revised downward in this step from 55% at Preferred Option Estimate stage (presented above in Table 7) to 50% to align with the figure used at FBC stage, ensuring a like-for-like comparison. See Appendix 8 for more details.

As discussed previously, in order to determine the FBC Outturn Costs, pricing was extracted from the OBM pricing submission. Table 9 below, shows the costs submitted by the NGT Service Provider and NTA costs inflated using HICP and labour inflation forecast. Together these are referred to as the FBC Outturn Cost. The FBC Outturn Cost is then compared against the Do Minimum costs and the projected NGT Service Provider costs.

²² All numbers capex and opex base costs within Table 8 are taken from Table 7 and inflation is applied as per appendix 6.

²³ The inflation adjustment is in line with the BusConnects PBC methodology and is detailed in Appendix 6. Do Minimum and Preferred Option Estimate costs are first inflated to 2023 pricing and then indexed throughout the appraisal period. This maintains consistency with the recently approved NGT Dublin BusConnects FBC.

Table 9: FBC Outturn Cost Comparison (nominal terms)

2023 Base Price (€M)	FBC Outturn Cost ²⁴	Do Minimum	Preferred Option Estimate
Capital Expenditure			
Service Provider Costs	35.5	16.6	99.0
NTA Costs ²⁵	18.2		17.4
Base cost	53.7	16.6	116.4
VAT (23%)	12.3	3.8	26.8
Base cost (including VAT)	66.0	20.4	143.2
Quantified risk (35%)	23.1	7.1	50.1
Contingency (15%)	9.9	3.1	21.5
Total Capital Expenditure	99.1	30.6	214.8
Operating Expenditure			
Base Cost	91.2	135.6	276.7
VAT (23%)	21.0	31.2	63.6
Total Operating Expenditure	112.2	166.8	340.4
Total Cost	211.2	197.4	555.1
Cost difference vs FBC Outturn Cost	/	(13.9)	343.9

As shown in the table above, following the competitive procurement process and receipt of tenders, the overall FBC Outturn Cost is approximately €343.9m lower than the Preferred Option Estimate. This cost saving is driven by lower outturn costs across both capital and operating expenditure and provides a strong rationale from a financial perspective to proceed with the preferred option. The procurement process was designed to drive competition and deliver the best value. In doing so, the procurement ensured that the preferred bidder met the minimum standards required by the NTA as well as the capacity and capability to deliver the project. Therefore, any risk in a lower price compared to the Preferred Option Estimate has been considered and managed by the procurement process and those processes outlined in Section 8.

While the total FBC Outturn Cost is higher than the Do Minimum cost, with an overall incremental cost of €13.9 million, emphasis should also be placed on the risks associated with implementing the Do Minimum option. As outlined separately in this FBC, significant risks exist, such as the risk of extending outdated ticketing equipment past its planned life, the increasing costs and difficulty of replacing the current ticketing equipment, reputational damage for the NTA and the risk of not being able to achieve other NTA initiatives which require improved passenger boarding time.

6.5 Financial Appraisal NPV Results

The table below shows the Net Present Value (NPV) of the incremental net cash outflows of the FBC Outturn Costs over the Do Minimum costs during the appraisal period. For NPV calculation, the incremental net cashflows are assumed to be occurring at the mid-point of each year and are discounted to 1 January 2024 at a rate of 2.91% in accordance with the

²⁴ FBC outturn costs are extracted from the OBM and indexed throughout the appraisal period.

²⁵ NTA Costs at FBC Outturn Cost stage have increased from what was included within the Preferred Option Estimate. Whilst the Preferred Option Estimate created a preliminary forecast, the volume of work required was unclear at this stage prior to the proposed NGT Solution being reviewed. The FBC Outturn Cost therefore shows a more accurate forecast of the likely NTA implementation costs.

recommended rate provided by the NDFA. As shown in Table 10, the incremental expenditure is positive for the FBC Outturn Cost against the Do Minimum (€13.9 million).

The NPV for the same cashflows shows a higher incremental spend of €28.8 million.

The reason this number has increased is that the NPV assigns a lower discount factor to earlier cashflows, when the FBC Outturn capex is greater than the Do Minimum capex. This leaves the overall discounted incremental spending greater than the non-discounted incremental spending.

Table 10: NPV Result

	Amount in €M
Total incremental net expenditure	13.9
Discount Rate @ 2.91%	
Net Present Value	28.8

6.6 Affordability analysis

As part of the FBC, it is necessary to re-assess the affordability of the project in order to ensure the NGT Service Provider represents value for money to the NTA and sufficient funding is available to meet all contractual obligations and additional NTA costs. Table 11 below summarises the costs associated with the project throughout the implementation, operation and extension phases. The costs are broken down into three categories:

- Outturn costs submitted by the NGT Service Provider;
- Additional NTA costs as outlined in Appendix 11; and
- Risk and contingency provision.

All costs are in nominal terms and inclusive of VAT.

Table 11: Affordability Assessment (nominal values, incl. VAT)

2023 Base Price (€M)	Total	2025	...	2027	...	2030	...	2035	...	2040	...	2044
NGT Service Provider costs												
Capital expenditure	43.7	9.0		4.7		0.0		0.0		0.0		0.0
Operating expenditure	128.3	0.0		3.8		5.2		7.3		8.7		9.8
Total NGT Service Provider costs	172.0	9.0		8.5		5.2		7.3		8.7		9.8
NTA costs												
NTA costs	6.2	20.9		9.7		7.5		(4.6)		(5.5)		(6.2)
NGT Service Provider and NTA costs	178.2	29.9		18.2		12.6		2.7		3.2		3.6
Contingency on capex portion (50%)												
Contingency on capex portion (50%)	33.0	11.6		3.7		0.0		0.0		0.0		0.0
Total FBC Outturn Cost	211.2	41.5		21.9		12.6		2.7		3.2		3.6
Total Preferred Option Estimate												
Total Preferred Option Estimate	555.1											
Difference												
Difference	(343.9)											

NGT – GDA project will be funded out the NTA’s overall budget, which is provided for out of an allocation from DoT. Within the total costs of NGT, the contracted amounts for delivery of the NGT – GDA project scope with the NGT Service Provider are the result of an extensive market competition and engagement. Throughout this competition, the NTA constantly looked to secure value for money, whilst meeting programme objectives.

The total FBC Outturn Cost has been compared against the Preferred Option Estimate as this represents the notional project budget to assess and determine affordability. As clearly outlined, the total FBC Outturn Cost is substantially lower than the project estimates thereby re-affirming the affordability of the preferred option.

6.7 Financial Appraisal Conclusion

In summary, the financial appraisal analysis demonstrates large savings from the FBC Outturn Cost against the Preferred Option Estimate thereby providing a strong rationale from a financial and affordability perspective to proceed with the preferred option.

7 Economic Appraisal

7.1 Introduction

The Economic Appraisal (EA) assesses the desirability of a project from the societal perspective. This form of appraisal differs from financial appraisal which is undertaken from the perspective of a particular stakeholder e.g., Sponsoring Agency or the Exchequer. The EA takes a wider view and considers non-market impacts.

7.2 Economic Appraisal approach

The TAF states that either a Cost-Benefit Analysis (CBA) or a Cost Effectiveness Analysis (CEA) is required as part of the EA. For both approaches to EA, CBA and CEA, the objective is to weigh up the economic impacts that are not captured in the financial analysis. The IG (December 2023) considers CBA as the preferred approach, but it may not be applicable in every situation. The challenges arise from the need to monetise economic impacts, which proves difficult due to the nature of benefits, data constraints, and a significant reliance on assumptions for analysis. In cases like this, where precise monetisation is challenging, CEA is commonly employed for government interventions. CEA assesses the economic efficiency of different options by examining their cost-effectiveness ratio in comparison to one another.

The subsequent publication of the IG in Dec 2023 affirms that this approach is aligned with the new Guidelines. From a quantitative perspective the use of CBA is limited by the modelling approach: the East Regional Model (ERM) is a strategic model that does not allow for the appraisal of NGT, as it does not allow for desegregation of impacts. For this reason, a CEA approach was agreed with the NTA and, subsequently, used for this analysis.

Following TAF guidelines (Module 7 – Section 7.5.7), this report uses MCA scoring as the effectiveness measure in the CEA.

7.3 Multi Criteria Analysis (MCA)

7.3.1 Methodology

An MCA looks at the qualitative aspects of the options to assess their level of effectiveness in achieving the objectives. In line with TAF, the criteria used within this MCA to identify the best performing option are the scheme objectives themselves. The detail of this MCA scoring criteria and the objectives is displayed below in Table 12.

Table 12: MCA Criteria Assessed – Project Objectives

Objectives	Description
Deliver one of the key NTA initiatives, referred to as “Just the Ticket”	Transition to ‘Just the Ticket’ to improve current payment processes at payment points.
Improve the customer experience by addressing some of the limitations and weaknesses in the current system	Implement an ABT system using near real-time data exchange, with a ‘mobile first’ strategy and by supporting secure tokens, all connected to a central transit account to improve the customer experience and to give customers greater choice, more convenience, and better value, making it easier to access and use public transport.
Customer experience and acceptance	Address the fact that since NGT Dublin Bus implementation will have preceded the <i>NGT – GDA</i> project, customers embarking on a multi-modal journey will be disincentivized as they will have to switch between two payment systems (NGT and Leap).
Address the fact that the current ticketing equipment for cash payment in buses is obsolete, and the level of equipment failures is of concern	Address current ticketing equipment, its obsolescence, and the concerning increase in equipment failures, by procuring new ticketing equipment that will include modern features, support modern payment methods, an improve reliability to address any concerns around failures of the system.
System testing and extension template	Provide a system testing and extension template for future phases of NGT roll-out.
Value for Money	Leverage synergies and integration across projects by building on NGT systems implemented on bus services in Dublin with only incremental cost to extend NGT to the rest of public transport in the GDA area.

Options were scored using the scale provided in the TAF (Module 7), as illustrated in Table 13.

Table 13: MCA Scoring and Rationale

Score	Description	
7	Major or highly positive	The option is likely to significantly improve conditions in the relevant criteria.
6	Moderately positive	The option is likely to improve conditions in the relevant criteria.
5	Minor or slightly positive	The option is likely to somewhat improve conditions in the relevant criteria.
4	Not significant or Neutral	The option will result in no changes to conditions in the relevant criteria.
3	Minor or slightly negative	The option is likely to somewhat worsen conditions in the relevant criteria.
2	Moderately negative	The option is likely to worsen conditions in the relevant criteria.
1	Major or highly negative	The option is likely to significantly worsen conditions in the relevant criteria.

7.3.2 MCA Results

A summary of the Options Appraisal Matrix is shown in Table 14.

Table 14: Options Appraisal Matrix Summary

Assessment Criteria	Do Minimum	Do NGT
Deliver one of the key NTA initiatives, referred to as “Just the Ticket”	4	5
Improve the customer experience by addressing some of the limitations and weaknesses in the current system	4	6
Customer experience and acceptance	2	6
Address the fact that the current ticketing equipment for cash payment in buses is obsolete, and the level of equipment failures is of concern	4	5
System testing and extension templateValue for MoneySystem Testing and Extension template	4	6
Value for Money	4	5
Total overall (out of 42)		
	22	33
Average scoring (out of 6)		
	3.7	5.5

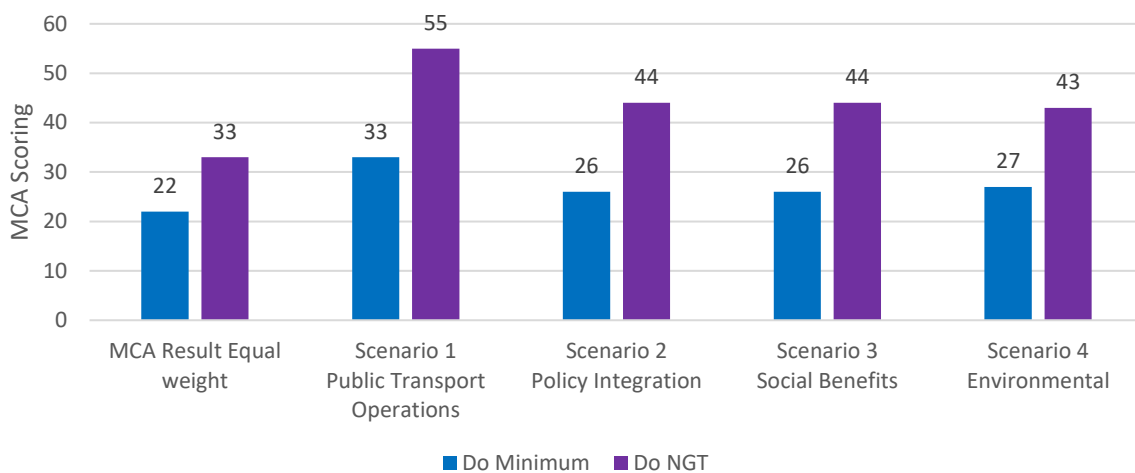
The MCA confirms that the Do NGT option has the highest level of effectiveness when compared to the counterfactual Do Minimum. The Do NGT option has an average level of effectiveness of likely positive effects from its implementation and for Dublin Bus users. Detail on how this scoring was established is outlined in Appendix 16.

7.3.3 MCA Sensitivity Analysis

An MCA sensitivity analysis was conducted by varying the weight assigned to each criterion. Four different scenarios were tested: Public Transport Operations, Policy Integration, Social Benefits and Environmental. For each, the weighting was doubled for a different set of criteria. Further detail on the scenarios is presented in Appendix 17.

The results of the sensitivity analysis are presented in Figure 1. The Do NGT option scored higher than the Do Minimum option in all four scenarios by an average of 44 points against 27.

Figure 1: MCA Sensitivity Analysis Scoring Results



7.4 Cost Effectiveness Analysis

CEA is a form of EA that compares the relative costs of different options and is generally used when choosing between alternative mechanisms for achieving a common objective or outcome. Generally, cost-effectiveness analysis is pursued to test the alternative that the mean cost-effectiveness of one project option is different from the mean cost-effectiveness of some competing option.

This methodology has several limitations that should be taken into consideration. Firstly, there is no reference value associated with the measure of benefit. This absence of a reference value can impact the comprehensiveness and accuracy of the analysis. Secondly, the scope of comparability is constrained to alternatives that share an identical natural unit of benefit.

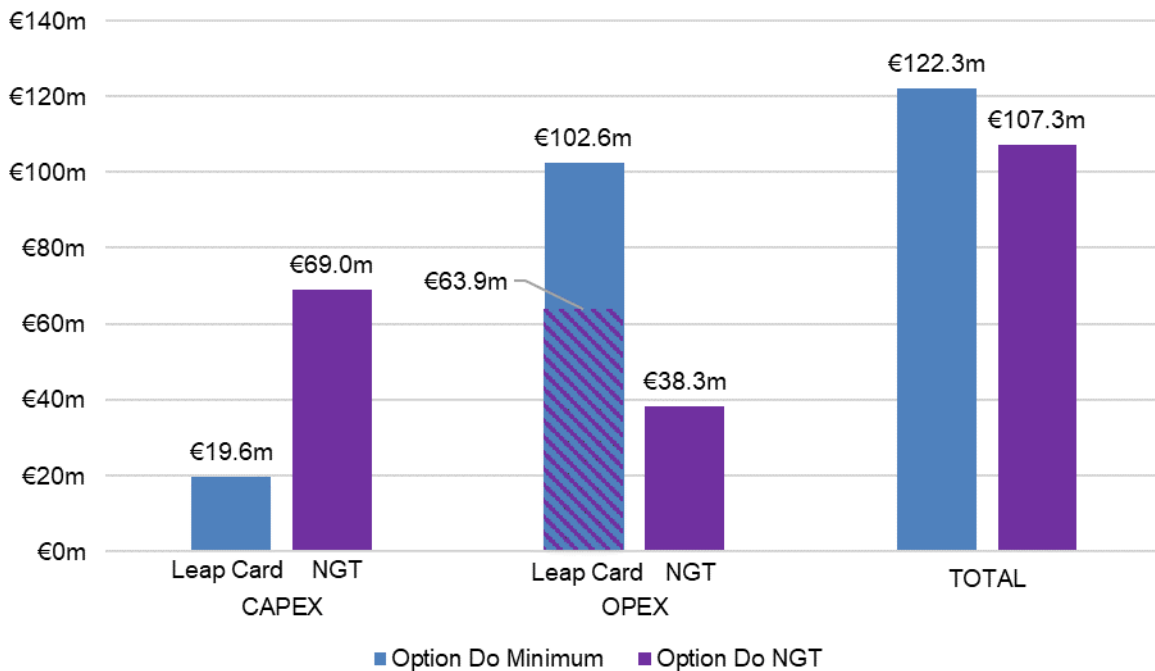
The CEA results are demonstrated for both the “Do Minimum” and “Do NGT” options. The appraisal period for both options is 20 years, as per Section 6. The economic discount rate used is 4%, as per PSC and TAF Guidelines.

7.4.1 Cost

Costs are taken from nominal totals presented in Section 6.3 adjusted back to real numbers (i.e., in 2023 prices) in line with IG guidance for EA. VAT and inflation have been excluded from the EA. A 50% contingency has been applied to Capex in both options.

The cost figures in 2023 prices are displayed in Figure 2. An incremental analysis is performed in order to rank the projects and identify the most cost-effective option, which involves comparing the additional costs for the Do NGT against the Do Minimum baseline. This approach is in line with guidance on reporting the additional costs of an intervention.

Figure 2: Costs for Option Do Minimum and Do NGT (2023 prices, excluding VAT and inflation)



In the Do Minimum scenario, the Leap card is sustained until the end of the appraisal period, leading to extended Leap card costs until 2044. In contrast, the Do NGT scenario requires maintaining the Leap card until 2031 before phasing it out (€63.9m in 2023 prices, see purple hatched section in Figure 2). Therefore, in the Do NGT, only the additional costs of operating the NGT are included, as the costs to run the Leap system are already a cost that exists on the exchequer. This cost incremental analysis gives an accurate reflection of the additionality that will impact on the exchequer as a result of this option.

Consequently, the benefits estimation for both options follows the same approach. Do NGT benefits in the MCA are specific to the NGT system, therefore benefits from the Leap Card being maintained until 2031 are not included in this option. Section 7.3 and Appendix 15 detail the application of the incremental analysis when estimating benefits.

Project inputs should be assessed based on their opportunity cost, as outlined in the IG. The IG specifies certain shadow prices and additional adjustments essential for conducting a CEA. These include the Shadow Price of Labour, the Shadow Price of Public Funds, and the Shadow Price of Carbon:

- **Shadow Price of Public Funds (SPPF).** There is a distortionary cost associated with the use of public funds versus private, namely the shadow price of public funds. As per the IG, it is recommended to consider 130% of the net public financial costs of the project. This encompasses all costs financed and funded by the Exchequer, encompassing operational and maintenance costs.
- **Shadow Price of Labour (SPL).** As per the IG, the estimation of the Shadow Price of Labour employs a standard rate of 100%.
- **Shadow Price of Carbon (SPC).** Not estimated as the emissions reduction directly attributable to *NGT – GDA* project cannot be isolated.

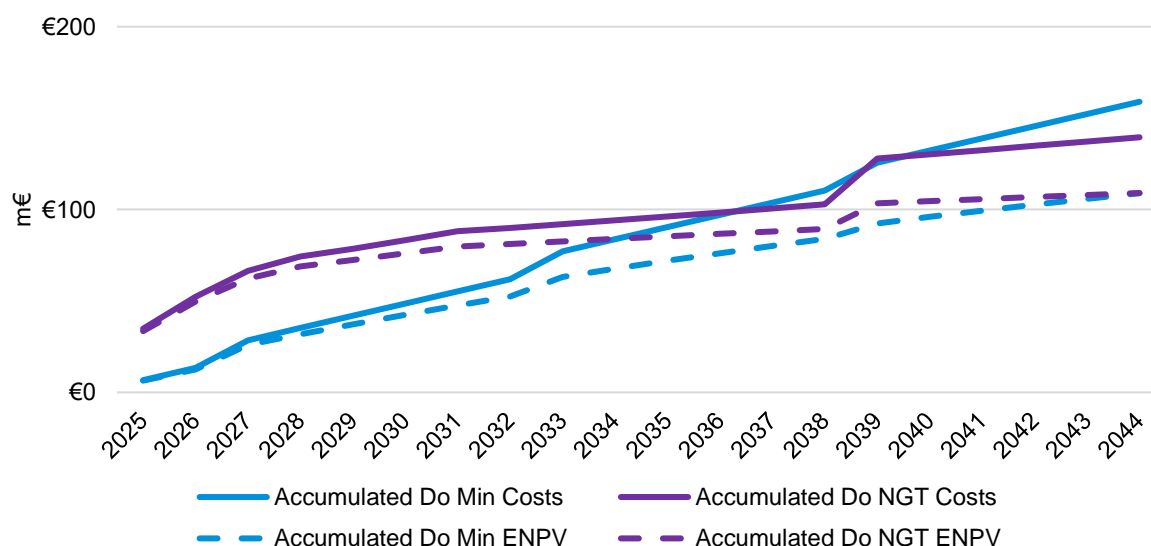
The final cost figures are displayed in Table 15.

Table 15: Undiscounted Cost and Economic Net Present Value (ENPV)

Cost Figures (2023 prices, excluding VAT and inflation)	Do Minimum	Do NGT
Total Cost (CAPEX and OPEX undiscounted)	€122.3m	€107.3m
CAPEX (undiscounted)	€19.6m	€69.0m
OPEX (undiscounted)	€102.6m	€38.3m ²⁶
Shadow Cost - SPPF (undiscounted)	€36.7m	€32.2m
Net flow (undiscounted)	€158.9m	€139.5m
ENPV (4% economic discount rate)	€108.9m	€109.0m

As Table 15 shows, the undiscounted net cash flow for the NGT is lower, despite higher annual costs in the initial years because the longer-term costs are lower. These variations are illustrated in Figure 3, which displays the accumulated undiscounted costs and Economic Net Present Value (ENPV).

Figure 3: Accumulated Undiscounted Cost and ENPV (4% discount rate)



7.4.2 Cost Effectiveness Ratio

Cost Effectiveness Ratio (CER) is used to draw comparisons across options in terms of value for money. CER represents the cost per unit of effectiveness, where units are the scores generated through the MCA. The most cost-effective project has the lowest CER.

$$CER = \frac{\text{Cost Option } n}{\text{Effectiveness Option } n}$$

Table 16 displays the CER for each option, taking into consideration the costs and effectiveness values presented in previous sections.

²⁶ As per Section 7.4.1 (page 33), it is assumed that costs related to the Leap card until 2031 are not included in the Do NGT scenario OPEX cost (€63.9m, 2023 prices). Do NGT OPEX is also reduced due to "Less Operator dependent OPEX absorbed by PSOs from 2032 onwards", resulting in €37.7m less operation costs in the overall appraisal period.

Table 16: CER Inputs and Results

CER (excluding VAT and inflation)		Do Minimum	Do NGT
ENPV (4% discount rate) [A]		€108.9m	€109.0m
Effectiveness: MCA Score (out of 42) [B]		22	33
Evaluation	CER - the lower, the more effective [A/B]	€5.0m	€3.3m
	Cost-effectiveness as %, baseline Do Min	100%	67%
	Ranking	2nd	1st

From the CER analysis, implementing the Do NGT option results in a better economic outcome than implementing the Do Minimum with the lowest real cost per unit of effectiveness, at €3.3m per MCA Score. This shows that it is the most cost-effective option and delivers the most effective solution for the cost. For the Do NGT option each additional score in the MCA cost approximately €3.3m to deliver compared to €5.0m for the Do Minimum. This demonstrates that it performs strongly in terms of cost, the impacts it will deliver and the combined cost effectiveness. From the EA, the Do NGT option therefore has the better outcome.

7.5 Sensitivity Analysis on Economic Appraisal

This section analyses a range of scenarios to evaluate the impact of varying our assumptions about each of the main costs discussed in this report. These assumptions are MCA scoring (Section 7.3.4) and capital/operating costs. A detailed table is shown in Appendix 17. Across all of sensitivity tests, the Do NGT option scores better than the Do Minimum option as it has a lower CER score.

Table 17: TAA and CEA Score

In addition, following review of the *NGT – BusConnects Dublin* project FBC, it was agreed that an additional sensitivity analysis would be undertaken to assess the cost effectiveness of the preferred option where LEAP costs were included in the Do NGT option. This sensitivity analysis has also been carried out for the *NGT – GDA* project FBC and can be found at Appendix 19. In summary, the inclusion of Leap costs does not impact the final assessment with Do NGT remaining the most cost effective option.

TAA Score								CEA Score the lower, the more effective	
Option	Accessibility	Social	Land Use	Safety	Climate Change	Local Environment	MCA Score out of 56	CER	Cost-Eff. %
Do Minimum	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	22	€5.0m	100%
Do NGT	Slight Positive	Slight Positive	Slight Positive	Neutral	Slight Positive	Neutral	33	€3.3m	67%

8 Risk Management

8.1 Risk Management Strategy

The NGT Project Board has the responsibility to govern and oversee the timely implementation and delivery within budget of the broader NGT Programme and oversight of any associated dependent projects. This includes overseeing effective risk management, which is crucial for the successful delivery of the *NGT – GDA* project's objectives. The broader NGT Programme will follow the BusConnects Dublin Risk Management Framework set out in the BusConnects Programme Management Handbook.

Following this strategy, the *NGT – GDA* project, will adopt the BusConnects Dublin Risk Management Framework, comprised of the following four documents – the Risk Management Policy (RMP), the Risk Appetite Statement (RAS), the Risk Management Handbook (RMH), and the Risk Engagement, Communications and Training (RECT) guidelines. Further, since the *NGT – GDA* project follows closely behind *NGT – BusConnects Dublin* project, it will adopt the same Risk Management Plan, while also ensuring that it captures project specific risk mitigation strategies and controls at the *NGT – GDA* project level. This approach to Risk management follows the NTA's risk management framework and action plan, and all associated policies including the risk appetite statement as set out by the NTA's Risk Management Team and the NTA's Capital Programme Office (CPO).

This will also enable several synergies in the delivery of the *NGT – GDA* project, such as maintaining a level of consistency across projects in the NGT Programme that would be delivered successively, ease of escalation and reporting to the NGT Project Board and leveraging the established tailored approach to risk management, taking into account the variations in scope, schedules, value, and complexity of different associated different projects such as the BusConnects Programme and the delivery of the *NGT – BusConnects Dublin* project. By actively managing risks, the *NGT – GDA* project aims to minimise the likelihood of threats and mitigate their potential impact on benefits, quality, costs, and schedules.

The *NGT – GDA* project will determine the acceptable level of risk exposure by adopting the guidelines set out in the BusConnects RAS to define the *NGT – GDA* project's risk appetite and tolerance levels. The risk appetite will be documented and approved by the NGT Project Board to ensure that risks, mitigation actions and escalations to the NGT Programme level align with the *NGT – GDA* project's overall risk appetite, helping to guide the management of *NGT-GDA* risks.

By following this tailored strategy, the *NGT – GDA* project ensures proactive risk mitigation, aligns its risk management practices with that of dependent programmes, industry best practices and NTA guidelines, and seeks to optimise the overall success through the management of risk. This commitment to active risk management at all levels supports the integration of effective project controls, clear governance and provides the NGT Project Board and the TPI (in its capacity as the Approving Authority) with a clear status of the *NGT – GDA* project, supporting improved decision-making.

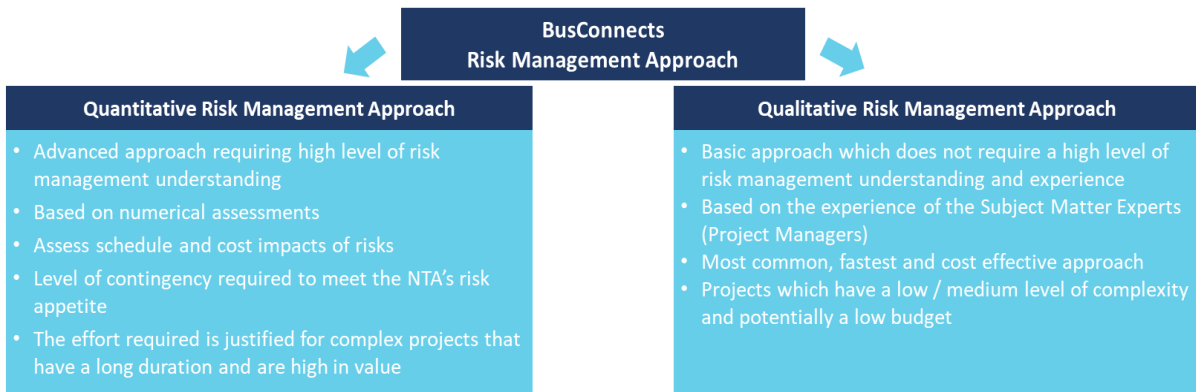
8.2 Risk Management Plan

8.2.1 Tools

The BusConnects Dublin Risk Register, which serves as the primary risk management tool for the *NGT – BusConnects Dublin* project, will also be used to as the primary risk management tool for the *NGT – GDA* project. The BusConnects Dublin Risk Register will be extended to record all information related to *NGT – GDA* project risks, including titles, descriptions, risk scores, mitigation actions, risk trends, updates, and items for escalation. The separation and integrity would be ensured by using specific identifiers and filters for the *NGT – GDA* project specific risks in the BusConnects Dublin Risk Register.

The *NGT – GDA* project has adopted a Qualitative Risk Assessment technique, to assess the risk probability and impacts, and prioritise risks based on their likelihood and potential impact on *NGT – GDA* project objectives. This approach allows for a comprehensive understanding of risks by the project delivery team, ranking risks based on their relative importance and potential impact and identifying targeted risk response strategies through risk focused meetings and workshops.

Figure 4: BusConnects Dublin Risk Management approach characteristics



As outlined above, by following the tailored BusConnects Risk Management approach, the NGT project ensures proactive risk mitigation, aligns its risk management practices with industry best practices and NTA guidelines.

The NGT project determines the acceptable level of risk exposure by adopting the guidelines set out in the BusConnects Risk Appetite Statement to define the project's risk appetite and tolerance levels. NGT's risk appetite will be documented and approved by the NGT Project Board to ensure that risks, mitigation actions and escalations to Programme level align with the project's overall risk appetite, helping to guide the management of NGT risks.

8.2.2 Roles and Responsibilities

The NGT Project Manager holds overall responsibility and will be the custodian for the Risk Management Process (explained in detail in the following Section). The Project Manager in collaboration with the other lines of assurance in Level-4 (see governance structure in Section 10.2) will determine the priority risks for escalation to the Executive Level, who are responsible for overseeing the overall delivery of the *NGT – GDA* project.

The NGT Project Manager takes overall ownership of NGT risk management activity including:

- Regular reviews of *NGT – GDA* project risks in the BusConnects Dublin Risk Register – The NGT Project Manager will proactively review and update *NGT – GDA* project specific risks, at least once a month, following monthly sessions with the NGT project leadership and the wider BusConnects Programme Integration Team.
- Integration of risk management at both the programme and project levels – Since the NGT Project Manager will also be managing the overall risk to the NGT delivery across the wider BusConnects Dublin Programme, the *NGT – BusConnects Dublin* project and the *NGT – GDA* project, the integration of risk management at both the programme and project levels will be facilitated. In this context the responsibilities of the NGT Project Manager would also include identification of common risks across multiple projects, potential project dependencies, and establishing controls to manage and mitigate these risks.
- Responsibility for data quality and accuracy in the Risk Register
- Coordination and tracking the completeness of mitigation actions identified for *NGT – GDA* project risks,
- Review of priority project risks for escalation during monthly discussions and ad hoc as required,
- Ensuring the project maintains a risk focused culture,
- Reporting of *NGT – GDA* project risks to NGT Project Board and key stakeholders,
- Onboarding of new *NGT – GDA* project resources in BusConnects Risk Management Framework, its approaches and processes,
- Supporting the integration of project controls across risk, finance and schedule.

8.2.3 Communication and stakeholder engagement

To further enhance risk communication and stakeholder engagement, the NGT Project Manager will develop a summary risk communication plan. This plan will outline the channels, frequency, and methods for sharing risk-related information with stakeholders including the NGT Project Board, ensuring transparency and effective communication. By regularly engaging stakeholders, both internally and externally, the project aims to foster a shared understanding of risks, gathers valuable input, and maintain stakeholder confidence in the project's risk management efforts.

In summary, implementing a robust Risk Management Plan ensures proactive identification, assessment, mitigation, and monitoring of risks within the *NGT – GDA* project. This comprehensive approach aligns with the overarching goals of the Next Generation Ticketing Project and optimises the *NGT – GDA* project for the delivery of the benefits identified in Section 9.

8.3 Risk Management Process

The *NGT – GDA* project will follow the Risk Management process, characterised by the following cycle:



Figure 5 – NGT – GDA project Risk Management process

This Risk Management process is adopted from the *NGT – BusConnects Dublin* project to ensure that robust risk management practices at project level and alignment to the NGT programme controls are maintained. The *NGT – GDA* project has adopted a Qualitative Risk Management approach until the Implementation phase, when it will adopt an advanced Quantitative Risk Management approach which is further described in the BusConnects Dublin Risk Management Framework.

- 1 Risk Identification: The NGT Project Manager facilitates regular *NGT – GDA* project specific risk identification sessions, engaging key stakeholders to capture a comprehensive range of risks through project controls meetings, risk focused meetings and workshops. Project delivery team members, subject matter experts, members of Level-4 lines of assurance (see governance structure in Section 10.2) and NGT leadership contribute to identifying and describing risks, including their causes, consequences, likelihood, potential impact and mitigations. Wider programme level risks are also identified through monthly engagement with the BusConnects Dublin Programme Risk Lead, through pre-mortem and programme risk workshops facilitated by the Programme Integration Team and in portfolio risk reviews with the NTA ICT team. These workshops provide a platform for leadership engagement, strategic risk identification, and the fostering of a risk-aware culture within the NGT project.
- 2 Risk Assessment: The *NGT – GDA* project will assess risks using guidance set out in the BusConnects Dublin Risk Management Framework to assess identified risks based on likelihood and impact across multiple categories, including but not limited to, Cost, Schedule, Health & Safety, Reputation, Environment, ICT, Social and Benefits. Once risks are assessed, appropriate risk mitigation actions are developed for each risk. These actions may involve risk avoidance, risk reduction, risk transfer, or risk acceptance, depending on the specific characteristics of each risk in line with the BusConnects Dublin Risk Management Framework. This comprehensive assessment enables the project delivery team to prioritise risks, set out key mitigation actions and identify key risks for escalation in collaboration with the other lines of assurance in Level-4 (see governance structure in Section 10.2) determine the priority risks for escalation to the Executive Level and the Sponsoring Agency – the Transport Technology Directorate.
- 3 Risk Monitoring and reporting: To ensure proactive risk management, the *NGT – GDA* project will establish a project specific process for ongoing risk reviews, updates, monitoring and reporting. The project delivery team will meet regularly, at a minimum monthly, to review and update project risks. These project risk meetings will serve as forums for discussing and reassessing risks, evaluating mitigation measures, and monitoring risk trends. Between these formal meetings, the NGT Project Manager, in collaboration with the project delivery team, will be responsible for actively managing risks, taking necessary actions to address risks and ensure their effectiveness.
- 4 Risk Reporting and escalation: The NGT Project Manager will report regarding all risk management initiatives and progress on the risk mitigation actions to the NGT Project Board on a monthly basis. Thereafter, the Project Manager in collaboration with the other lines of assurance in Level-4 (see governance structure in Section 10.2) will determine the priority risks for escalation to the Executive Level and the Sponsoring Agency – the Transport Technology Directorate, also monthly.

In summary, the Risk Management Processes, facilitate focused and deliberate efforts to identify, assess, prioritise and mitigate risks to eliminate or minimize potential negative impacts on the *NGT – GDA* project objectives, while also maximizing the opportunities for achieving desired outcomes.

8.4 Discussion on key project risks

While the Risk Log (presented in Appendix 13) captures the individual itemised risks for the *NGT – GDA* project, the main risks are discussed below:

Risk 1 – Dependencies, integration and timelines vis-à-vis *NGT – BusConnects Dublin* project : Since the implementation of the *NGT – GDA* project succeeds and builds on the platforms developed for *NGT – BusConnects Dublin* project and thereafter intends to be integrated with it, there is an overarching risk in respect of the dependencies, integration, coordination of timelines, as well as gap in milestones from the time the design of the system is signed off, to the time the system (involving significant hardware and supporting back-office equipment) is deployed.

Management strategy: The Project delivery team will adopt an agile approach to delivery, constantly validating proof of concepts and undertaking intermediate testing of deliverables for dependencies and integration, during the development phase. This agile approach will allow for flexibility, transparency and adaptability through the delivery of the project. In addition, it will enable quicker response to changes leading to a higher quality deliverable and this will all be undertaken in close collaboration with the contractor.

Risk 2: Unsatisfactory testing preceding deployment - If robust testing of the *NGT-GDA* solution is not performed, including its end-to-end functionality and integration, before deploying them on live public transport systems, then it could result in loss of revenue, significant disruption to public transport services and reputational loss for the NTA.

Management strategy: This risk will be an active risk through the deployment of the *NGT Solution* and particularly when any updates or maintenance activities are performed on the deployed solution. As part of the *NGT Service Provider's* scope, a fully functional test and training centre has been required to be established. This will replicate the ecosystem and facilitate training for personnel on systems, preceding the deployment of the solution on live public transport services. The *NGT Service Provider's* proposal in this respect has been assessed and forms part of the qualitative evaluation of the tenders. Further a standard operating procedure will be defined, which will establish standard ways of deployment (both hardware and software), assign roles & responsibilities to the deployment team and introduce checks and balances that follow good industry practice to provide an additional layer of assurance, thereby reducing risks associated with deployment to as low as reasonably possible.

Risk 3: Project Management capability of the *NGT Service Provider* and the *NTA project delivery team*: If the *NGT Service Provider* does not adequately project manage the development and deployment of the solution for the *NGT – GDA* project or the *NTA project delivery team* overseeing it's development and deployment do not satisfactorily manage the interface and complexities associated with the wider solution for the *NGT – BusConnects Dublin* project , then this will negatively impact the cost, schedule, quality of the solution and consequently the benefits intended to be realised from this project.

Management strategy: This risk will be an active risk through the term of the agreement and will be managed:

- by robust oversight of the *NGT Service Provider*, by the *NTA's* project delivery team,

- strong relationship management via the relationship tracker, and
- oversight of the NTA project delivery team through adherence to the governance procedures described in Section 10.

Further, the NGT Service Provider's proposal has been assessed across the following criteria, which form the foundation for implementing good practices in project management:

- the quality and experience of key personnel and the evolving organisation structure proposed to be deployed;
- the detailed implementation plan with timelines aligned to defined milestones in the delivery of the NGT Solution;
- the delivery plan and methodology with a clearly defined approach to quality assurance and dependencies;
- a requirements traceability matrix;
- formal training plan for all stakeholders involved in the deployment and O&M of the NGT solution; and
- the methodology for governance.

Once on-boarded the performance of the NGT Service Provider will be monitored and measured using defined Key Performance Indicators and Performance Indicators, which are linked to payments due to the NGT Service Provider. These will be monitored by the NTA Team and where appropriate, the NTA will exercise provisions in the framework for intervening and seeking specific performance by the NGT Service Provider.

8.5 Risk Value

The Risk Value at P50, as determined by the Expert Judgment Panel for the wider NGT project has been assessed to remain the most appropriate risk level for the *NGT GDA* project considering the current stage of the approval date, and it has been used to determine the total cost. The outturn of this risk can be found in the Financial Appraisal in Section 6.

This position is consistent with the procurement process to appoint the NGT Service Provider. Whilst the NGT Service Provider scored the best on price, it did score lowest on the quality criteria during the procurement process. However, the quality score achieved was well above the minimum pass mark outlined within the procurement documentation and, due to the robustness of the procurement process, it is anticipated that the bidder will deliver outputs to the standard outlined within this FBC.

Additional consideration was also given to the risk level applied to the Do Minimum scenario. It was assessed that the same risk level applies as determined by the Expert Judgment Panel. As outlined within this FBC, change is required as the current cash ticketing system on buses are obsolete with significant maintenance required. To take forward the Do Minimum option would require actions to extend the life of the current system. Significant risk remains with this option including the ability to maintain and source equipment for that system. This is compounded with the overall risk to revenue collection for the bus services within this FBC.

To that end, it is assessed that the P50 assessment by the Expert Judgment Panel remains appropriate as the risks remain at a project level. The assessment of this risk position can be found at Appendix 8.

9 Benefits Realisation Plan

9.1 Introduction to Benefits Realisation

The Benefits Realisation Plan (BRP) articulates the approach to benefits identification, delivery and monitoring for the *NGT – GDA* project. The *NGT – GDA* project will deliver a wide range of benefits to multi-modal public transport and active travel users in the GDA. This BRP focusses on the benefits to which *NGT – GDA* project will contribute and how benefits will be managed.

The *NGT – GDA* project will extend the ABT across multiple modes of public transport thereby providing users an effective and user-friendly ticketing system that supports multiple payment methods, such as mobile phones and debit/credit cards.

9.1.1 Benefits Management Principles

Since the *NGT-GDA* project succeeds the implementation of the *NGT – BusConnects Dublin* project and extends it's the application of the ABT to additional modes of public transport within the GDA, it will not only provide incremental benefits but also extend the benefits of *NGT – BusConnects Dublin* project to additional users. The benefits realisation will be managed and tracked consistently across both the *NGT – BusConnects Dublin* project and the *NGT – GDA* project.

The principles guiding the benefits' identification, monitoring, management and eventual realisation are:

- 1 Alignment: Objectives and benefits identified align with the NTA strategies, Dublin regional strategies and Department of Transport goals and policies
- 2 Integrated: Benefits management activities are integrated into other project and programme management activities
- 3 Tangible: Benefits management is evidence based, driven by actual and real information as much as possible
- 4 Attributable: Benefits are specific and unique enough so their realisation can be attributed to the specific *NGT – GDA* project
- 5 Understood and owned: Benefits are widely known and understood by all, documented with clear roles and responsibilities, including ownership of benefits realisation
- 6 Actively managed: Benefits are managed throughout the programme lifecycle with regular reviews to ensure they are on track, highlighted areas for improvement and lessons learned as benefits are realised across different projects and programmes
- 7 Proportionate: Benefits management activities are proportionate to the size of the programme and scalable in terms of time, resource and activity spent on all stages of benefits management (identification, quantification, planning and measurement)
- 8 Evolutionary: Benefits are identified from the start and further specified and appraised as projects and programmes move through their lifecycle

9.2 Realisation of NGT GDA Benefits

This section outlines the *NGT-GDA* project objectives, *NGT-GDA* target benefits, how benefits will be monitored, and what data sources and metrics will be used to measure benefits realisation.

9.2.1 Objectives and Impacts

As stated in Section 3.3, the *NGT – GDA* project objectives extend the delivery of several of the *NGT – BusConnects Dublin* project objectives to additional users, while also providing incremental benefits. Figure 6 shows the *NGT – GDA* project Objectives, the corresponding solutions or *NGT – GDA* project outputs, the *NGT – GDA* project target benefits, when and how they will be measured, at what frequency and through what reports. This ensures benefits can be monitored to determine realisation. The *NGT-GDA* project target benefits are measurable via the associated verification method and metrics shown in the below figure.

Figure 6 NGT – GDA project Benefits Realisation

Objective	Solution	Target benefit	Benefit enablement	Benefit Build and verification	Benefit verification method	Metric	Frequency of measurement	Forum for Report	Responsible
<p>Objective 1:</p> <p>Deliver one of the key NTA initiatives, referred to as “Just the Ticket”:</p> <p>Transition to ‘Just the Ticket’ to improve current payment processes at payment points</p>	<p>Enabling open loop payments for cashless ticketing, with minimal driver interaction on Commuter Bus Services and Commercial Bus Operators</p>	<p>BEN 01</p> <p>Reduced interaction with driver on bus stops</p>	<p>Capability enabled by <i>NGT – GDA</i> project and verified in Project Closure Report as part of ICT PAG Phase 7 review</p>	<p>Benefit measured and verified Post Project as part of ICT PAG Phase 8 benefits review/ Infrastructure Guidelines’ Ex-Post evaluation</p>	<p>Benchmark data against baseline performance</p>	<p>Estimated Wait Time (EWT) or schedule adherence across all routes (from NGAVL)</p>	<p>Quarterly reporting as part of service performance</p>	<p>Quarterly Report</p>	<p>Head of Transport Technology Operations</p>
		<p>BEN 02</p> <p>Improved customer experience at points of payment</p>			<p>Customer survey – customer experience at points of payment</p>	<p>Align with regular customer survey or Execute Quarterly Survey</p>	<p>Quarterly customer survey</p>		
<p>Objective 2:</p> <p>Improve the customer experience by addressing some of the limitations and weaknesses in the current system:</p> <p>Implement an ABT system using near real-time data exchange, with a ‘mobile first’ strategy, and by supporting secure tokens, all connected to a central transit account to improve the customer experience and to</p>	<p>Implement ABT using near real-time data exchange with a mobile first strategy by supporting secure tokens all connected to a central transit account</p>	<p>BEN 04</p> <p>Increased proportion of users using ABT in GDA</p>	<p>Capability enabled by <i>NGT – GDA</i> project and verified in Project Closure Report as part of ICT PAG Phase 7 review</p>	<p>Benefit measured and verified Post Project as part of ICT PAG Phase 8 benefits review/ Infrastructure Guidelines’ Ex-Post evaluation</p>	<p>Benchmark data against baseline performance</p>	<p>Number of journeys using ABT versus LEAP or on bus cash payment</p>	<p>Quarterly reporting as part of service performance</p>	<p>Quarterly Report</p>	<p>Head of Transport Technology Operations</p>
		<p>BEN 05</p> <p>Reduced difficulty in transport modal interchange</p>			<p>Customer survey – customer experience with ABT service and mobile app</p>	<p>Align with regular customer survey or Execute Quarterly Survey</p>	<p>Quarterly customer survey</p>		
		<p>BEN 06</p> <p>Improved customer satisfaction with ABT mobile application and customer service performance</p>							

Objective	Solution	Target benefit	Benefit enablement	Benefit Build and verification	Benefit verification method	Metric	Frequency of measurement	Forum for Report	Responsible
give customer's greater choice, more convenience, and better value, thus making it easier to access and use public transport		BEN 07 Time to enact fare changes			Benchmark data against baseline performance	Time to implement fare changes	Quarterly reporting as part of service reporting		
Objective 3: Customer experience and acceptance: Address the fact that since the NGT Dublin Buses implementation would have preceded the NGT-GDA project, customers embarking on a multi-modal journey will be disincentivized from using the ABT as they will not get the benefit of the 90-minute fare, or any fare-cap. This could in turn lead to reduced customer satisfaction and lead to less efficient modal distribution of passengers within Dublin	Implement NGT on Public Transport services covering rail, light rail, commuter and commercial bus service operations in the GDA	BEN 04 Increased proportion of users using ABT in GDA	Capability enabled by NGT – GDA project and verified in Project Closure Report as part of ICT PAG Phase 7 review	Benefit measured and verified Post Project as part of ICT PAG Phase 8 benefits review/ Infrastructure Guidelines' Ex-Post evaluation	Benchmark data against baseline performance	Number of journeys using ABT versus LEAP or on bus cash payment	Quarterly reporting as part of service performance	Quarterly Report	Head of Transport Technology Operations
		BEN 05 Reduced difficulty in transport modal interchange							
		BEN 07 Improved customer satisfaction with ABT mobile application and customer service performance							
		BEN 08 Improved modal distribution of passengers using ABT across public transport in GDA, compared to the period since implementation of NGT for Dublin Buses			Benchmark data against baseline performance, from Cordon surveys on defined corridors	Modal distribution of passengers in different modes of transport in the GDA	Quarterly reporting as part of service performance		

Objective	Solution	Target benefit	Benefit enablement	Benefit Build and verification	Benefit verification method	Metric	Frequency of measurement	Forum for Report	Responsible
<p>Objective 4:</p> <p>Address the fact that the current ticketing equipment for cash payment in buses is obsolete, and the level of equipment failures is of concern:</p> <p>Address the fact that the current ticketing equipment needs upgrade and the level of equipment failures is of concern by procuring new ticketing equipment that will include modern features and supports modern payment methods</p>	Procuring and deploying new ticketing equipment that will include modern features and supports modern payment methods	<p>BEN 03</p> <p>Reduce service incidents due to ticketing equipment failures</p>			Benchmark data against baseline performance	Number of ticketing equipment failures in performance period	Quarterly reporting as part of service reporting		
<p>Objective 5:</p> <p>System testing and extension template:</p> <p>The GDA extension to NGT, will be the first wide-spread test of the system's multi-modal functionality and experience. It will also will serve as the template for all future regional extensions of the NGT Solution</p>	Implement NGT on Public Transport services covering rail, light rail, commuter and commercial bus service operations in the GDA	<p>BEN 05</p> <p>Reduced difficulty in transport modal interchange</p>	Capability enabled by NGT – GDA project and verified in Project Closure Report as part of ICT PAG Phase 7 review	Benefit measured and verified Post Project as part of ICT PAG Phase 8 benefits review/ Infrastructure Guidelines' Ex-Post evaluation	Customer survey – customer experience with ABT service and mobile app	Align with regular customer survey or Execute Quarterly Survey	Quarterly customer survey	Quarterly Report	Head of Transport Technology Operations
		<p>BEN 09</p> <p>Customer benefits from best fare available across public transport in the GDA</p>			Benchmark data against baseline performance	Number of journeys where best fare calculation applied	Quarterly reporting as part of service performance		

Objective	Solution	Target benefit	Benefit enablement	Benefit Build and verification	Benefit verification method	Metric	Frequency of measurement	Forum for Report	Responsible
		BEN 10 Reduced incidents of customer complaints reg. incorrect fare calculation			Benchmark data against baseline performance	Number of incidents where customer raises issues about fare calculation either through the mobile app or through CCC	Quarterly reporting as part of service performance		
Objective 6: Value for Money: Leverage synergies and integration across projects by building on NGT systems implemented on bus services in Dublin with only the incremental cost to extend NGT to public transport in the GDA area.	Implement NGT on Public Transport services covering rail, light rail, commuter and commercial bus service operations in the GDA	Benefit 11 Better value for public monies	Capability enabled by NGT – GDA project and verified in Project Closure Report as part of ICT PAG Phase 7 review	Benefit measured and verified Post Project as part of ICT PAG Phase 8 benefits review/ Infrastructure Guidelines' Ex-Post evaluation	Comparison of costs for implementing NGT Solution for GDA, incremental to the NGT Solution for Dublin Buses, against the Do-Min scenario in the FBC	Total Project Costs (incl. NTA costs)	Once, as part of Project Closure Report	Project Closure Report	Head of Transport Technology Operations

The *NGT-GDA* project targeted benefits (BEN01-BEN11) also contribute to several of the BusConnects Dublin Programme impacts, particularly those targets associated with improved public transport integration and improved user experience.

9.3 Benefits Roles and Responsibilities

Clear roles and responsibilities are critical for realisation of benefits as they provide clarity and accountability, ensuring that individuals and teams are aware of their specific tasks and contributions towards delivering the anticipated benefits.

The Head of Transport Technology Operations at the NTA is responsible for the implementation of the *NGT – GDA* project and for realisation of the *NGT – GDA* project benefits.

The NGT Project Manager is responsible for the following:

- day-to-day management of the *NGT – GDA* project, ensuring that benefits management products are being completed accurately and timely, and are agreed with the relevant stakeholders,
- updating project information, to ensure that the programme controls and management practices are aligned with benefits realisation,
- realisation of benefits through benefits-led decision making and the use of benefits management tools,
- ensuring appropriate documentation of requirements and changes to ensure delivery and optimisation of benefits.

9.4 Benefits Management Tools

To support management of benefits throughout the lifecycle of the *NGT – GDA* project, benefits registers and profiles will be prepared to support benefits reporting. A Project Benefits Register will be developed and managed by the NGT Project Manager. The Project Benefits Register will document the identified *NGT – GDA* project target benefits, *NGT – GDA* project objectives, and relevant stakeholders, serving as an essential tool for monitoring and tracking the progress of benefits at the project level. The Benefits Register will be linked to Benefits Profiles which will contain more detailed information about each benefit including specific metrics and indicators for tracking progress, dependencies or interrelationships with other benefits, key activities, owner, linked milestones, and target dates for the realisation of each benefit. These Profiles serve as a practical guide for effectively managing and delivering the benefits.

Both the Benefits Registers and Benefits Profiles are important artefacts, as they support the systematic identification, management, and realisation of benefits. These artefacts will be used to inform the Benefits Realisation Report that will be developed for Phase 8 of the ICT Project Approval Guidelines.

9.5 Benefits Verification and Metrics

In Figure 6, each targeted benefit includes a source of data, called the benefit verification method, with an associated metric that will be used to determine benefits realisation. Data required to measure project and programme impacts will be reviewed

and updated on an ongoing basis and reported quarterly through NGT project governance and reporting plan as detailed overleaf.

10 Governance and evaluation plan

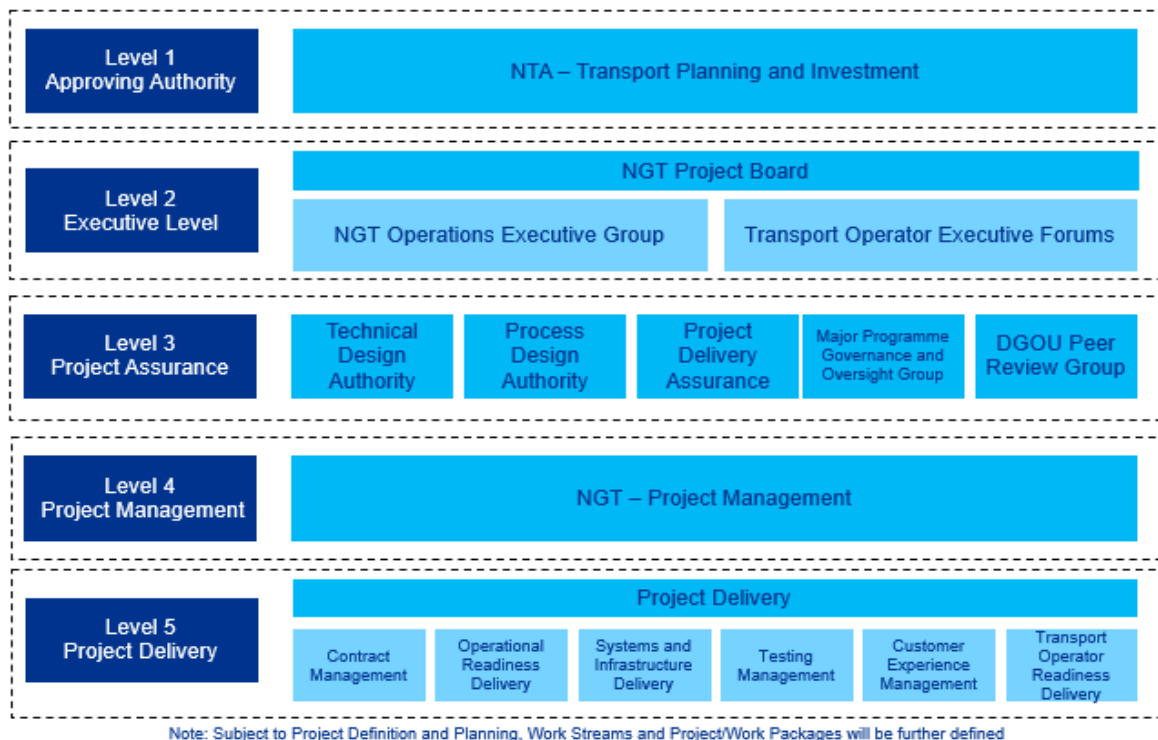
10.1 Overview

For the purpose of appraising and delivering public investment projects, the IG defines the following primary administrative roles: the Accounting Officer and the Approving Authority, who have responsibility for assessing the FBC and monitoring the *NGT – GDA* project as it is implemented; and the Sponsoring Agency, who is responsible for procuring the *NGT – GDA* project, updating the FBC and monitoring and management of the Implementation Stage and management of the contract. Per the TAF, the Sponsoring Agency must also develop and refine the arrangements needed for effective project or programme governance. In light of the completion of the tendering process, it can be confirmed that the governance structures for the *NGT GDA* project have been considered and it is assessed that the structures remain relevant for the delivery of the project.

This section details the governance structures for the *NGT – GDA* project including the role of the Project Board and executive groups and the NTA's dual role as Sponsoring Agency and Approving Authority. This section also presents the monitoring and evaluation plan for the delivery of the *NGT – GDA* project including how key performance indicators will be used to monitor and evaluate the *NGT – GDA* project's delivery and success. Governance

The *NGT – GDA* project will follow a five-level governance structure (Figure-7), from Level-1: The designated Approving Authority, to Level-5: The *NGT – GDA* project delivery team. These levels provide a comprehensive governance and assurance framework, enabling the project to be conducted according to the required standards of the NTA Project Approval Guidelines (PAG), while also conforming to the standards of the ICT Programme Management Office. This governance structure is outlined in the figure below.

Figure 7: Governance Structure for the NGT – GDA project.



10.1.1 Level 1. Approving Authority Governance

For the *NGT – GDA* project, as with all public transport projects, the NTA undertakes the role of the Approving Authority. The role of the Approving Authority will be performed by the Transport Planning and Investment (TPI) Department of the NTA. If the Approving Authority is satisfied that the FBC meets the required standards outlined in IG and TAF, it can approve the *NGT – GDA* project to proceed for contract award and implementation.

The Approving Authority also monitors budget, and ultimately approves the implementation of project benefits under the management and oversight of the Sponsoring Agency.

10.1.2 Level 2. Executive Level (Sponsoring Agency)

In accordance with the IG the Sponsoring Agency is responsible for project delivery and has primary responsibility for evaluating, planning, and managing the *NGT – GDA* project. The Transport Technology Directorate, within the NTA is the Sponsoring Agency for the *NGT – GDA* project and thus is ultimately responsible for its delivery. Thus, the independence and separation between the Approving Authority and the Sponsoring Agency is maintained, which will allow for robust appraisal, scrutiny and oversight.

The Sponsoring Agency has constituted the Executive Level coordination group that provides integration, coordination and joint decision making across the *NGT – GDA* project. It is a steering group that forms the main point of executive contact and senior leadership input at a Sponsoring Agency level. The Executive Level coordination group

comprises of the NGT Project Board, the NGT Operations Executive Group and the NGT Transport Operator Executive Forum. The details regarding the remits of these groups, their constituents and frequency of meeting are as below:

10.1.2.1 *The NGT Project Board*

The Sponsoring Agency has constituted the NGT Project Board to govern and oversee the timely implementation and delivery within budget of the broader NGT programme and oversight of any associated dependent projects. The NGT Project Board will be responsible for approving budgetary strategy, overseeing the assessment or mitigation of risks, defining and realising benefits, and resolving escalated issues and risks. The NGT Project Board will lead efforts to obtain the necessary approvals from the Approving Authority at each point during the lifespan of the *NGT – GDA* project to ensure it proceeds within the tolerances approved by the Approving Authority.

The NGT Project Board comprises of the NTA's Director of Transport Technology (the Chair in the capacity of the Sponsoring Director), the NTA's Chief Information Officer, the NTA's Finance and Corporate Services Director, NTA's PTS Director, the NGT Project Director, a designated Independent Advisor and a Subject Matter Expert. The NGT Project Board meets monthly or as required. It will invite additional attendees, at the discretion of the Sponsoring Director, including supplier executives, account representatives and others as relevant to the agenda items.

10.1.2.2 *The NGT Operations Executive Group:*

The Sponsoring Agency has constituted the NGT Operations Executive Group to oversee the readiness and governance of the NGT Programme from an operations perspective. The NGT Operations Executive Group comprises of the NTA's Director of Transport Technology (the Chair in the capacity of the Sponsoring Director), NTA's Head of Transport Technology Operations, NTA's PTS Finance Controller, NTA's Finance Services Lead and the NTA's ICT Services Lead. The NGT Operations Executive Group meets monthly or as required. It will invite additional attendees, at the discretion of the Sponsoring Director and others as relevant to the agenda items.

10.1.2.3 *The NGT Transport Operator Executive Forum:*

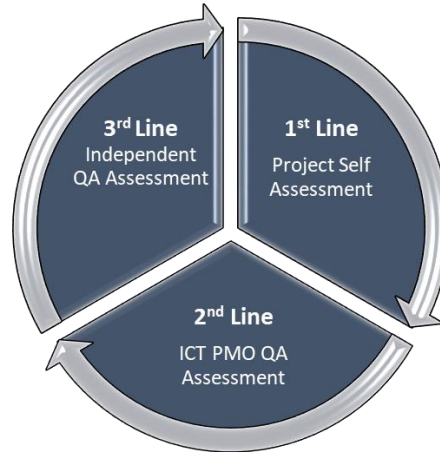
The Sponsoring Agency has constituted the NGT – Transport Operator Executive Forum to facilitate alignment and readiness governance with public transport operators. The NGT Transport Operator Executive Forum comprises of the NTA's Director of Transport Technology (the Chair in the capacity of the Sponsoring Director), the NTA's Chief Information Officer, NTA's Head of PTS Contracts, the NGT Project Director and representatives from transport operators' executive leadership. The NGT Transport Operator Executive Forum meets quarterly or as required. It will invite additional attendees, at the discretion of the Sponsoring Director and others as relevant to the agenda items.

10.1.3 Level 3. NGT Project Assurance

The project assurance for the *NGT – GDA* project will primarily be carried out by the NTA ICT Programme Management Office (PMO), in conjunction with that for the *NGT – BusConnects Dublin* project. The NTA ICT PMO will conduct project assurance for the *NGT – GDA* project through application of the NTA ICT PMO Quality Assurance

Framework (QAF) and adherence with the NTA Project Approval Guidelines (PAG). The ICT PMO QAF provides three lines of assurance for projects as illustrated in Figure-8 below.

Figure 8: ICT Programme Management Office Quality Assurance Framework



10.1.3.1 1st Line of Assurance – Project Self-Assessment

In the first instance, the NGT Project Manager is responsible for ensuring that the *NGT – GDA* project operates in compliance with the policies, procedures, guidelines, governance and controls as set out in the project plan, the NTA Project Approval Guidelines and the Infrastructure Guidelines. As part of NGT project governance, oversight is provided by the NGT Project Board. Any exceptions will be reported by the NGT Project Manager with appropriate remediation actions planned or completed as part of project status reporting.

As part of the ICT PMO QAF, the NGT Project Manager will conduct a quarterly self-assessment of resourcing, budget, schedule, risk and PAG adherence and review the outcomes with the NTA ICT PMO to identify any areas for improvement or remediation. The outcome of the quarterly self-assessment will be reported by the NGT Project Manager to the NGT Project Board.

10.1.3.2 2nd Line of Assurance – ICT PMO Assessment

The NTA ICT PMO, will provide oversight of the *NGT – GDA* project through participation in governance forums, performance of assurance reviews as part of the ICT PMO Quality Assurance Framework and verification of adherence with the NTA Project Approval Guidelines through the PAG Gateway Reviews.

10.1.3.3 3rd Line of Assurance – Independent Assessment

In addition to this, the NTA ICT PMO, may also carry out or commission ad hoc reviews throughout implementation to ensure adequate adherence to project delivery standards. Other forums that may contribute to project assurance includes the NGT Technical Design Authority (ownership of the technical design of the project) and the NGT Process Design Authority (ownership of process and organisation of the project). The Major Programme Governance and Oversight Group will provide oversight of Major Investment Programmes by the Department of Transport and will provide oversight of

project status on a programme management level. Finally, the DGOU Peer Review Group will provide external project oversight from an IG perspective.

10.1.4 Level 4. NGT Project Management

The NGT Board will be responsible for appointing a project manager to execute the management functions of the project. At the project management level, there are several forums to support the progress of the *NGT – GDA* project. The NGT Project Board provide regular meetings to review the progress of the project against stage plans and consolidated work stream statuses, adjusting accordingly as required. The Transport Operator Delivery Management through monthly checkpoints will review progress on supplier and resource management.

10.1.5 Level 5. NGT Project Delivery

The delivery of the individual workstreams will be the responsibility of the NGT Project Manager. However, there are several NGT project delivery level forums that will input into the successful delivery of the workstreams. Through weekly NGT joint workstream meetings, the status reports on progress against project objectives will be reviewed. These meetings will also review the status of the Risk Register. The individual project workstream meetings will focus on progress towards weekly goals, addressing any emerging issues, and providing weekly status reports for consolidated project status reporting.

10.2 Monitoring stage

This section sets out an overview of the monitoring activities that will be required for the *NGT – GDA* project to ensure the project delivers against objectives and realises benefits. The monitoring activities will evolve throughout the lifecycle of the project.

10.2.1 Monitoring requirements

The IG provides guidelines for the monitoring of large capital projects to successfully monitor expenditure throughout the *NGT – GDA* project. To achieve effective monitoring, the *NGT – GDA* project will undergo monitoring in several key areas through the establishment of formal structured monitoring plans:

- Monitoring the progress of the *NGT – GDA* project against plans and expectations
- Monitoring of the *NGT – GDA* project environment

10.2.2 Monitoring Plan Responsibilities

Responsibility for putting monitoring structures in place primarily rests with the NTA in its capacity as the Approving Authority and the Sponsoring Agency. The NGT Project Manager will liaise with necessary stakeholders to monitor progress throughout the lifecycle of the *NGT – GDA* project. Together with the evaluation plan, progress of the *NGT – GDA* project will be reviewed at regular intervals throughout the *NGT – GDA* project lifecycle.

10.2.3 Monitoring of Performance

A key requirement for the FBC is the establishment of Key Performance Indicators (KPIs) for the *NGT – GDA* project. These indicators can be used to monitor future outcomes arising from the *NGT – GDA* project and help to measure the success of the *NGT – GDA* project. Together with the Benefits Management Plan, the project's KPIs aim to reflect the project specific objectives and provide a realistic and measurable way of evaluating the project's success and how the broader aspects and effectiveness of the project or the programme are to be assessed. This includes monitoring and evaluating the project during its implementation and upon its completion, i.e., Ex-Post Evaluation. The following KPIs, taken together with those generated for the Benefits Realisation Plan, help ascertain the overall operational success of the project and will guide the post-implementation review of the project.

Project Delivery KPIs	Description
Quality	The outputs of the <i>NGT – GDA</i> project were of the desired standard (as described in the <i>NGT Framework Agreement</i>)
Budget	The project was delivered within the expected budget as described in Section 6
Time	The time taken for implementation was within tolerances set at the outset of the Project
Scope	The <i>NGT – GDA</i> project was delivered to scope as set out in the project plan, with no ambiguities within definitions
Benefits Realisation KPIs	Description
Reduced driver interaction	Enabling open loop payments for cashless ticketing, with minimal driver interaction on Commuter Bus Services and Commercial Bus Operators
Improved customer experience at payment points	Improved customer experience arising from improved payment processes at points of payment
Reduced ticketing equipment failures	Address the fact that the current ticketing equipment needs upgrade and the level of equipment failures is of concern by procuring new ticketing equipment that will include modern features and supports modern payment methods
Increased adoption of ABT	Wider adoption of ABT over the current Leap, cash option
Reduced difficulty in transport modal interchange	There is reduced difficulty in transport mode interchange within the GDA

Improved customer satisfaction	Customer satisfaction has improved due to NGT improving the customer experience
Time to enact fare changes	Time to enact fare changes or implement promotions has reduced
Improved modal distribution of passengers across public transport in GDA, compared to the period since implementation of NGT for Dublin City Bus Services	Facilitate greater adoption and distribution of public transport through improved multimodal trip payment process
Customer benefits from best fare	NGT calculates best fare for users, across all forms of public transport in the GDA
Reduced incidents of customer complaints reg. incorrect fare calculation	Accurate application of fare calculation across different modes of public transport in the GDA
Better value for public monies	Efficient deployment of public monies, by leveraging synergies and integration across projects by building on NGT systems implemented on Dublin City Bus Services

In addition to the above high-level KPIs, the NGT Framework Agreement with the NGT Service Provider details specific KPIs for the reporting of contract management performance. These contract management specific KPIs must be addressed throughout the duration of the *NGT – GDA* project, with the preferred supplier tasked with the establishment of a reporting system to measure said KPIs (Preferred Supplier Framework Agreement Schedule 6 – Performance Indicators). While these KPIs are necessary for effectively managing the contract, they are too numerous and detailed to guide the post-implementation review. However, they will help determine whether the above KPIs on quality, scope and operations have been met.

10.2.4 Reporting

The NGT Project Manager will be responsible for overall project progress and producing requisite project reporting. They will proactively manage risk by developing, controlling and monitoring the Risk Register with timely reporting of escalations to the NGT Project Board. Other regular reports mandated in the IG, at the frequency specified therein, will be prepared and submitted to the Sponsoring Agency and the Approving Authority.

Further, the NTA have aligned cost control processes with international best practices, that will allow to track and compare actual expenditure to original project budgets and anticipate to deviations and cost overruns. Thus capital cost control processes are embedded in the governance through reporting allowing for escalation to the NGT Project Board when necessary.

An additional line of reporting occurs from the project assurance practices, under the heads of financial control, security, risk management, quality, inspection, and compliance. This will ensure an assured control of project delivery.

10.3 Review stage

The IG guidelines provide a prerequisite for the provision of periodic reviews throughout the course of the *NGT – GDA* project, as well as a post-project review process. Through these reviews, an assessment would be made as to whether:

- The basis on which a project was undertaken proved correct;
- The expected benefits and outcomes realised (see Benefits Realisation Plan);
- The planned outcomes were the appropriate responses to actual public needs;
- The appraisal and management procedures adopted were satisfactory;
- Conclusions can be drawn which are applicable to other projects or to associated policies.

10.4 Ex-Post Evaluation stage

As per the IG, the Ex-Post Evaluation for the proposed scheme will be undertaken 5 years after opening to allow sufficient time for the project impacts to be evaluated. The Post Project Review will evaluate the following four stages of the project:

- Project Conception;
- Project Planning;
- Project Implementation; and
- Project Operational Performance.

The aim of the evaluation is to determine whether:

- The expected benefits and outcomes materialised including operational performance
- The planned outcomes were the appropriate responses
- Conclusions can be drawn which are applicable to other projects

In addition, NTA's Project Approval Guidelines sets out Handover & BAU and post-project benefit review as part of PAG ICT phase 7 and 8 respectively, applicable to *NGT – GDA* project.

The purpose of PAG phase 7 Handover & BAU is to provide a fixed point at which acceptance of the project products by the NTA is confirmed and to recognise that the objectives set out in the Project Initiation Document (PID) have been achieved. It is also the Phase that marks the transition of solution management from the project to the Business as Usual (BAU) team, and the subsequent disbanding of the project.

Key deliverables of PAG phase 7:

- Lessons Learned Document
- Project Closure Report
- End of Project Submission to DGOU (if applicable)
- Gateway 7 report

The purpose of the PAG phase 8 post-project benefit review is to confirm that the expected benefits of the project products have been realised and how the products have performed when in operational use. Each expected benefit is assessed, and a decision is made on whether any additional time is needed to assess the residual

benefit. The Benefits Review may also serve to identify unexpected side-effects (both beneficial and adverse) and provide rationale for why these side-effects were not foreseen.

Key deliverables of PAG phase 8

- Benefits Realisation Report (also referred to as the 'Ex-Post Evaluation Report')

10.4.1 Stakeholder Management

At the *NGT – GDA* project level, stakeholder management will be undertaken as an extension of the *NGT – BusConnects Dublin* project, with the NGT Project Manager leading the coordination. Stakeholder management will be undertaken using:

- Stakeholder maps, extended to include the additional stakeholders in the GDA, with input from the NGT Project Board to manage stakeholder expectations, and
- a Stakeholder Engagement Strategy and a Communications Plan that aligns to the wider NGT Programme level approach.

10.4.2 Lessons Learned

PAG phase 7 “Handover and BAU” identifies a lessons learned document as one of its key deliverables. Lessons learned from completed projects translate into improved knowledge for the sector and wider public service, informing all future investment decisions. A lessons learned log will be maintained by the NGT Project Manager. This will form the basis for setting out conclusions that are applicable to other projects.

The lessons learned generated from the *NGT – GDA* project will be incorporated into the IG as appropriate, to be added to the lessons learned through ex-post evaluations of similar projects. Submission of both the Project Completion Report and Ex-Post Evaluation Report to the Approving Authority would incorporate these lessons learned, with the Ex-Post Evaluation also sent to the DPENDR for dissemination.

Appendix 1: Strategy and Policy alignment

United Nations' Sustainable Development Goals

Project Ireland 2040 is underpinned by and aligned with the United Nations' 17 Sustainable Development Goals. The sustainable development goals are a call for action by all countries to promote prosperity while protecting the planet. NGT meets the following goals:

Goal 9: Industry, Innovation and Infrastructure;

Goal 11: Sustainable Cities and Communities; and

Goal 13: Climate Action.

National policy

Project Ireland 2040

The National Planning Framework (NPF) and the National Development Plan (NDP) 2021-2030 combine to form Project Ireland 2040. The NPF sets the vision and strategy for the development of Ireland to 2040 and the NDP provides the enabling investment to implement that strategy.

A shared set of goals for every community across the country is expressed through ten integrated National Strategic Outcomes within the NDP. This is presented in Figure 1.

National Strategic Outcome ("NSO") 4 is Sustainable Mobility. BusConnects is one of the programmes needed to deliver this NSO and it is presented as such in the Project Ireland 2040 National Development Plan 2021 – 2030. NGT is a key programme extending beyond BusConnects, that will enable NTA to meet policy requirements, customer needs and adapt to modern technology and methods of public transport use.

NGT is a multi-objective programme and aims to contribute to the Project Ireland 2040's National Strategic Outcomes of:

- NSO 1: Compact Growth because successful sustainable, concentrated, land use development requires high quality, high capacity public transport.
- NSO 4: Sustainable Mobility because sustained growth depends on improved public transport that is more attractive to the user and less damaging to the environment.
- NSO 8: Transition to a Low Carbon and Climate Resilient Society because transport is one of the biggest contributors to Ireland's greenhouse gas emissions.
- NSO 10: Access to Quality Childcare, Education and Health Services because improved transport will improve access to services.

Project Ireland 2040: National Strategic Outcomes



As recognised by Project Ireland 2040, the Eastern region, and primarily the GDA, is Ireland's economic engine. By 2040, there will be roughly an additional one million people living in Ireland. The majority of this growth will occur in Dublin with an increase of around 250,000 people. Therefore, optimised and encouraging the use of public transport in GDA aids in developing an attractive and liveable region which can absorb this population growth whilst sustaining national prosperity and economic competitiveness.

Climate Action Plan 2024

The CAP24 lays out the road map for Ireland's climate ambition. It is consistent with the legally binding economy-wide carbon budgets and sectoral ceilings agreed to by the government in July 2022. Ireland set the goal of halving its greenhouse gas emissions (GGE) by 2030, and of reaching net zero by no later than 2050, through strengthened climate legislation, supported by annual updates of CAP to monitor progress (CAP 24 is the third annual update). CAP24 specifically references advancing the BusConnects programmes across all of the five cities.

The plan calls for significant reductions in transportation emissions by 2030. Meeting Ireland's 2030 transport abatement targets will necessitate transformative change and rapid action across all key decarbonisation channels. To meet this higher level of ambition, the earlier CAP 2021 targets have been revised, including:

- A 20% reduction in total vehicle kilometres travelled relative to business-as-usual;
- a 50% reduction in fossil fuel usage;

- a significant behavioural shift from private car usage to increase the total share of journeys undertaken by walking, cycling or public transport; and
- a continued electrification of our vehicle fleets.

In the absence of interventions, transport demand will likely increase significantly in line with population and economic growth resulting in negative impacts on our national competitiveness, quality of life and a failure to meet our decarbonisation goals. Cleaner, safer and more sustainable mobility, which will be provided under BusConnects Cork, is critical for climate policy.

The modelling work undertaken to inform CAP23 established highly challenging outcome focussed indicators for both 2025 and 2030 and which remain valid for CAP24. The Avoid-Shift-Improve framework for transport sustainability approach has been applied to categorise all actions. This framework emphasises the crucial role of spatial and land-use planning in designing transport systems that can support Ireland's net-zero ambition.

National Sustainable Mobility Policy

The DOT has reviewed its sustainable mobility policy, looking at all aspects of active travel (walking and cycling) and public transport policy. The updated policy was released in 2022 and has replaced the policies published in 2009: Smarter Travel: A Sustainable Transport Future 2009 – 2020 and the National Cycle Policy Framework 2009 -2020.

An extensive range of background papers were prepared by DOT looking at aspects of sustainability mobility e.g. public transport accessibility, active travel, congestion and the climate change challenge.

The purpose of the National Sustainable Mobility Policy is to “set out a framework to 2030 for active travel and public transport to support Ireland’s overall requirement to achieve a 51% reduction in greenhouse gas emissions by 2030.”

The policy specifically references NGT as enhancing the potential of the public transport system through “facilitating a variety of payment methods, including mobile phones and debit cards, and complementing a simpler fare structure that removes penalties for multiple trips.” It further states that “Cashless, self-service ticketing will reduce time consuming interactions with drivers and help cut boarding times.”

National Payments Plan

The Central Bank of Ireland published the National Payments Plan in 2013 with the aim of improving the efficiency of Ireland’s existing payment systems infrastructure by changing behaviour to make more use of secure and efficient electronic payment methods leading to a reduction in the reliance on cash and paper instruments. Furthermore, the policy aimed to improve the efficiency of cash distribution, which it acknowledged would remain an important payment method into the future.

The National Payments Plan is now 10 years old and is set to be renewed in 2024. The 2024 update to the National Payments Plan will have the following objectives:

- Access and Choice – promoting reasonable options for consumers and small business
- Security and Resilience – of the payments system and system operators

- Innovation and Inclusion – future focus that enhances interoperability and inclusion
- Sustainability and Efficiency – solutions that have regard to cost / benefit and the environment

NGT will be aligned to all of the above objectives, perhaps most notably objective 4, through driving more efficient public transport payment methods and encouraging the use of sustainable transport. NGT will also allow customers more choice in their payment method – in line with objective 1; will have a major focus on security and fraud prevention – in line with objective 2; and finally, will embrace innovative payment technology whilst ensuring that unbanked and cash-only customers can still purchase barcode tickets conveniently – objective 3.

Harnessing Digital – The Digital Ireland Framework

Connecting Government 2030 sets out a framework within which all public service organisations can deliver their own digital commitments focused on the targets set out in the national digital strategy, Harnessing Digital – The Digital Ireland Framework.

The Digital Government Services states that technology will ultimately underpin multi-modal intelligent transport systems. NGT aligns well with this ambition and offers a smarter alternative for public transport users. By incorporating universal systems and digital applications, NGT, will provide a more accessible service for all.

Regional policy

Transport Strategy for the Greater Dublin Area 2022 – 2042

This transport strategy provides a framework for the planning and delivery of transport infrastructure and services in the GDA over the next two decades. The purpose of the Strategy is: “To contribute to the economic, social and cultural progress of the Greater Dublin Area by providing for the efficient, effective and sustainable movement of people and goods”.

The document notes that to create a better environment and meet our environmental obligations public policy must encourage the transitioning to a clean, low emission transport system, increasing walking, cycling and public transport use, and reducing car dependency. Focusing specifically on public transport, the policy aims to create:

- An Enhanced Natural and Built Environment;
- Connected Communities and Better Quality of Life;
- A Strong Sustainable Economy
- An Inclusive Transport System

The policy notes the importance of metropolitan and regional transport operating as a network. This network being only as strong as its weakest link and the ability of people to change seamlessly from one mode to another walking to the bus; cycling to the train station; changing from one bus to another – is critical.

The policy references the implementation of NGT as a driver of the increased integration of the public transport network. It further notes the NTA’s aim to deliver NGT in the short term, in order to facilitate seamless multimodal travel and to reduce dwell times at bus stops. This clearly articulates support for a move towards NGT.

Integrated Implementation Plan 2019 – 2024 (NTA, April 2014)

In December 2019, the NTA published its plan for transport investment in the GDA up to 2024. The background of the implementation plan covers three main areas; congestion, environment and spatial planning. It also outlines details on the central infrastructure investment programme which provides the overall funding provision over the six-year period of the plan and identifies and describes the key investment areas:

- Bus Investment;
- Light Rail Investment;
- Heavy Rail Investment; and
- Integration Measures and Sustainable Transport Investment.

It further reviews the investment proposals under each of these respective areas and identifies key objectives and outputs while also outlining measures for effective integration of public infrastructure. A number of topical areas are also reviewed in detail including integration measures, sustainable transport investment, integrated service plan, integration and accessibility.

Under integration and accessibility, the Leap Card and NGT are discussed and reviewed in detail. This area highlights that the NTA anticipates the Leap Card Scheme will soon reach saturation point and the use of cash to pay for journeys will steadily decline. It discusses in detail many elements that has direct cross over with the vision of objective of NGT, highlighting the how transport operators internationally are exploiting technology changes to provide enhanced customer experiences. The plan also outlines how the NTA will commence the implementation of an account-based solution involving contactless bank cards, bar codes and mobile ticketing. The NGT extension across the GDA will be a key contributor to increasing the attractiveness of public transport and reducing transport congestion and emissions in the Eastern region through providing an efficient, easy to use, and integrated public transport service.

Dublin Regional Tourism Development Strategy 2023 – 2027 – Fáilte Ireland

Failte Ireland recognise Dublin as the key access point for Ireland and is often the first and/or last experience visitors have of the country. As a key area for tourism, it is crucial that all visitors can access all parts of Dublin city with as little friction as possible. One of the visions of their strategy is that 'visitors can navigate their way seamlessly across the region using ticketless public transport and way-finding that is accessible in their own language'. Their tourism development strategy further highlights the importance of the NGT by outlining the need for improved accessibility to basic infrastructure and tourism amenities as an essential part in meeting the needs and requirements of all visitors to Dublin. *NGT – GDA* project facilitates this through the implementation of the ABT across all public transport modes in Dublin.

Appendix 2: Project Scope

The below describes the requirements sought from the NGT Service Provider as part of the procurement process.



GDA Scope -
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Appendix 3: Performance

The NGT Service Provider, will be required to measure and report against defined Key Performance Indicators (KPIs) and Performance Indicators (PI) under the following heads:

- Revenue Assurance
- Financial Management
- Operations Management
- Management Information
- Incident Management
- Systems Management
- Service Delivery Management
- Security & Privacy Services
- Fare Management
- Customer Care Issue Management
- Governance
- Administration

The NGT Framework Agreement defines a framework that measures the performance of the NGT Service Provider against the KPIs and PIs, on the basis of which Performance Points are accrued. The payments due to the NGT Service Provider are then adjusted based on the Performance Points accrued, within a defined measurement period.

Appendix 4: Assumptions and Dependencies

Assumptions

The assumptions that have been made in relation to the demand for public transport services, to be provided under the NGT scheme are as follows:

- 1 The NGT Solution will cater to emerging customers demand for more choice, more convenience and better value to opt for public transport services, by delivering the following features:
 - Enabling customers use their choice of Fare Media (e.g. phone, bank card or other);
 - Enhanced customer self-service capabilities and query support;
 - Supporting multiple payment methods:
 - Secure payment into and from a preferred payments source (bank card, bank account, bank transfer or topped-up/pre-paid public transport account);
 - Choice of post-paid options;
 - Accepting Multiple Tokens:
 - For example, use a phone, a bank card, a Smart Phone Wallet and Smart Watch; or;
 - Use BIBO app; or
 - The DSP Public Services Card and (until such time that they are replaced) the current TFI Leap Cards;
 - Forgot a phone, use a bank card instead (and vice versa) associated with the same customer account;
 - Fares Aggregation:
 - Single payment (i.e. one payment transaction) for all public transport used in a period (i.e. a day or a week, or month);
 - Best value achieved without customers selecting specific products or tickets (i.e. best fare calculated and applied for the combination of journeys);
 - Capping, discounts and pre-selected products;
 - Fares Engine:
 - Real-time calculation and aggregation of public transport fares;
 - Central account:
 - Mobile app;
 - Full self-service capability including refunds;
 - Real-time account updates including travel history, payment history;
 - Multiple payment methods to an account;
 - Pre-loading a customer account with tickets or credit;
 - Linking of multiple Fare Media (e.g. different cEMV bank cards and a smart device (e.g. mobile phone, smart watch)) to a customer account.

The NGT strategy also incorporates any other mobility solutions which can avail of a single mobility account such as parking, cycling, toll-collection, car hire, park-n-ride and any other new and emerging mobility solutions, such as micro-mobility options.

- 2 The NTA has statutory responsibility for regulating fares on PSO transport services. Currently fares tables and the implementation of fares changes are managed by the individual transport operators in their own systems. This will move into the NGT Solution back-office upon implementation.
- 3 NTA has separately procured a new Real-time Passenger Information (RTPI) solution (new National Journey Planner application with real-time passenger information and an upgraded on-street information displays/screens) and is currently implementing a

new NGAVL system. These three elements (NGAVL, Journey Planner and the NGT Solution) combined with the appropriate commercial approach can become the foundations of a national MaaS solution

- 4 The NGT solution will cater to the different profiles of customers such as (not an exhaustive list):
- Adult;
 - Students (for those attending third level education, a verified entitlement);
 - Young Adults 19-24 (age based entitlement);
 - Children <16 (Anonymous);
 - Children 16-19 and Schoolchildren (verified age based entitlement);
 - Free Travel (national concessionary travel scheme using IG issued by DSP);
 - Tourists;
 - Occasional/irregular users;
 - Commuter/regular users (including TaxSaver verified employee entitlements);
 - Bulk Purchasers (e.g. Business customers that offer pre-paid incentivised products and other forms of bulk sale of travel entitlements for conference delegates etc.).

Dependencies

The NGT will interact and be dependent on the following other developments and functions:

- The BusConnects Dublin Programme and the *NGT – BusConnects Dublin* project
- ID Management/Single Sign-On programme to improve the customer experience when engaging with a number of the Authority's customer facing services,
- Development of the Consolidated Contact Centre (CCC) project which will manage communications between customers and agents over a range of channels,
- The NTA Financial System procurement, which aims to procure a single core financial system which supports the wider NTA and all of its business areas including NGT,
- The Next Generation Automatic Vehicle Location (AVL) services systems, which aims to provide better real-time information on bus services with improved information for users, better tools to improve bus services and provide for more efficient use of resources and reduced costs and provide Improved reporting tools to help improve the network and manage existing services,
- TFI-GO app – mobile ticketing solution available via a mobile device application that connects to a cloud-based system
- Development of the National Fares Strategy, which will consider PSO fares, web fares, Rural Transport fares, integration with private operator's fares and the Free Travel Scheme.

The dependencies and interactions with these projects will be monitored to ensure that all relevant areas of these other projects are functionally aligned and technologically synced with the NGT Programme.

Appendix 5: Value Management Strategy

Value management has been at the forefront of the project activity since its inception. The project employs two strategic approaches to maximise value:

- 1 NGT specific value proposition: The drafting of the Contract included the provision of a value for money (VfM) clause (Clause 12 – Value for Money and Continuous Improvement), which will encourage the Service Provider to offer reductions in cost and improvements in scope to the NTA throughout the Term. The contract will include requirement for the contractor to agree a programme for the VfM Review with the NTA including the scope of Services which it will cover, and a review of all Payments and comparison with the prevailing market rates for services of a substantially similar nature, quality and coverage and provided at substantially similar service levels as the Services.
- 2 Value proposition through integration and synergies with the NGAVL project: The NTA is in the process of implementing the Next Generation Automatic Vehicle Location (NGAVL) system, which will be implemented ahead of the NGT. The NGAVL system will replace the existing bus AVL system infrastructure on buses, such that real time passenger information, service control, contract management and bus priority at traffic signals services can be maintained via a single, centralised managed service.

The NGAVL and the NGT projects have been aligned through the procurement phase to enable the NGT Service Provider to optimise the installation of the Pole Mounted Validators. This alignment aims to realise value by preventing redundant efforts to carry out surveys, designing the fitment etc. Additionally, the NGT project will be able to leverage lessons learned from NGAVL's implementation, particularly regarding the management of on bus installations for different bus models and effective engagement with bus operators.

Appendix 6: Project Constraints

The following are key, high level constraints considered during the procurement phase of the NGT Programme:

#	Constraint
1	Budgetary constraints, may change year to year depending on funding priorities. Competitive environment that includes non-state owned operators, who may need to be included in a manner compliant with State Aid rules
2	NGT Terminals require integration with other vehicle and back office systems e.g. AVL, communications, etc.
3	Internal project resources bandwidth
4	Transport Operator resources bandwidth
5	Types of cards and/or types of card based products that the Banks issue e.g. cards that are not allowed work offline

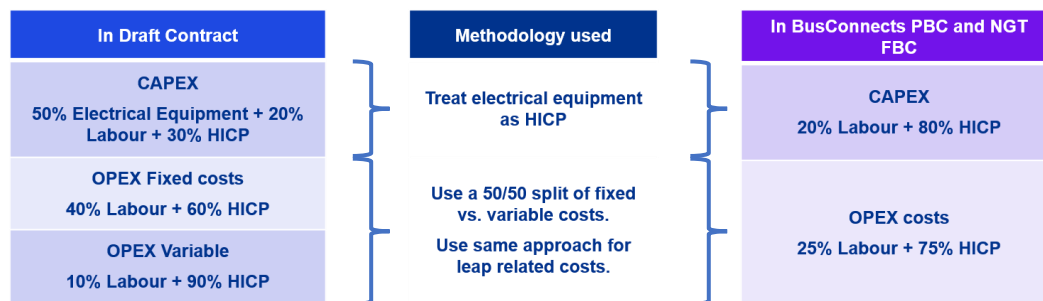
Appendix 7: Discount rate and inflation

The discount rate and inflation assumption for capital project appraisal is set by DPENDR in consultation with the National Development Finance Agency (NDFA)²⁷. At the time of report writing, a discount rate of 2.91% was recommended to be applied to nominal project cashflows.

The indexation rate used is also in alignment with DPENDR guidelines but is modified to the specifics of the NGT contract, and is in line with the BusConnects PBC. DPENDR guidance advocates for the use of HICP at a long-term indexation rate of 2%. More specifically, in NGT, a number of inflation indices will form part of the Contract (including Industrial Price Index of Electrical Equipment, Labour Cost Index and HICP).

Within this FBC, capex and opex inflation will follow a simplified formula based on the draft contract inflation mechanism and DPENDR guidance, as shown below:

Figure 9: Discount rate and inflation



Range	2023	2024	2025	2026	2027 onwards
Input rates					
HICP	6.3%	2.80%	2.00%	2.00%	2.00%
Labour related inflation	5.8%	4.90%	4.20%	3.50%	3.00%
Indexation rates used					
NGT (opex)	6.20%	3.22%	2.44%	2.30%	2.20%
NGT (capex)	6.18%	3.33%	2.55%	2.38%	2.25%

²⁷ <https://www.gov.ie/en/policy-information/1a0dcb-project-discount-inflation-rates/>

Appendix 8: Risk and contingency

Taking guidance from the Infrastructure Guidelines, and in response to the requirement to enhance the rigour of cost estimation processes across major programmes, the NTA convened an Expert Judgement Panel (EJP) to review and independently consider the robustness of the cost estimates and other inputs prepared for the NGT project. The panel was also asked to assess results of the Reference Class Forecasting (RCF) and Quantified Risk Analysis (QRA) work undertaken, and to make a recommendation on the appropriate contingency factor to be applied to the Capital Expenditure (capex) in respect of the project.

The EJP meeting concluded with the following unanimous consensus based on the key assumptions noted below. The EJP agreed that the following contingency factor (an allowance for all risks, contingencies, estimating uncertainties and unknown unknowns) range should be adopted using the QRA outcome as the baseline:

- P30 – 45%
- P50 – 50%
- P80 – 70%

This range was further discussed with the NTA and it was confirmed that the P50 contingency would be applied to NGT capex at FBC stage.

Appendix 9: Sunk cost

A) Procurement phase expenditure

A procurement phase sunk cost of approximately €9.1m is estimated to be incurred on the project until the planned award of the scope for implementing the NGT Solution in the GDA. This largely comprises of resource contracting costs (including legal support, business case and financial evaluation support), contractors, IT-related consultancy and service providers. These are shown below in Table 16. The costs have been split to cover the estimated procurement spending to framework agreement signing and the estimated spending up to the contract signing of the GDA extension. In accordance with the IG requirements, these costs have not been incorporated into the financial appraisal.

Table 18 below shows that the procurement spend up to framework agreement signing is estimated to be higher than the initial project budget of €4.6m. This is largely due to three change requests discussed below:

- In September 2022, the Steering Committee approved an increase in budget to €6.2m to account for changes in schedule requiring additional time from contractors and external resources (€1m), Financial Reconciliation Tool work costs (€350k), additional Operator Support (€200k) and a Contingency uplift (€250k)
- In February 2023, the Steering Committee approved an increase in budget of €220k relating to preparatory work which was performed to de-risk the NGT implementation of Leap acceptance by allowing NGT Tenderers to better understand and incorporate the security layer and communications protocols of the current Leap card
- Additionally, in February 2023, the Steering Committee approved an increase in budget of €590k in relation to a 3rd round of dialogue which the project delivery team believed was necessary to alleviate isolated, but material areas of concern with regard to the Tenderers interim proposed solutions

Thereafter, it is estimated that a further circa €0.7m will be spent on procurement costs up to the contract signing of the GDA extension, which is likely to occur around 2 months after the framework agreement signing.

Table 18: Procurement Project Cost (real terms, without VAT)²⁸

Description (Excl. VAT)	Initial budget to framework signing	Estimated spend to framework signing	Estimated spend on NGT implementation in GDA
Contractors	€2,200,000	€3,779,795	€4,093,148
IT-related consultancy	€1,200,000	€2,183,882	€2,364,930
Service providers	€1,200,000	€2,435,868	€2,637,807
Total	€4,600,000	€8,399,545	€9,095,885

B) Estimated expenditure on initial NGT – BusConnects Dublin project rollout (prior to GDA)

²⁸ Sourced from NTA 2024 budget

In addition to the procurement expenditure, Table 19 below also shows the estimated total cost of the initial *NGT – BusConnects Dublin* project rollout and operations. Due to the GDA region being an extension of NGT, which builds on the initial rollout and operations of the account-based ticketing back office; cash alternative solution and Dublin city bus services scope of the NGT Solution, these can be seen as sunk costs which have previously been appraised and approved. A summary of the estimated total costs of the *NGT – BusConnects Dublin* project rollout and operations are shown in the table below:

Table 19: Sunk cost of initial BusConnects Dublin rollout

Cost Categories – all costs relate to initial <i>NGT – BusConnects Dublin</i> project rollout and operations (€M)	FBC Outturn Cost
Capital Expenditure	
NGT Service Provider Costs	60.6
NTA Costs	27.2
<hr/>	
Total Capital Expenditure (real terms, ex VAT and contingency)	87.7
<hr/>	
Total Operating Expenditure 2024-2043 (real terms, ex VAT and contingency)	330.2
<hr/>	
Total Cost (real terms, ex VAT and contingency)	417.9
<hr/>	
Total Cost (nominal terms, including VAT and contingency)	568.1
<hr/>	

Appendix 10: Sensitivity analysis

A sensitivity analysis has been performed to illustrate the variability in NPV based on changes in key financial assumptions to test the project affordability under different conditions. A range of sensitivities have been considered against the total incremental project costs, including:

- Capital expenditure: -10% to +10%
- Operating expenditure: -10% to +10%
- Discount rate: -2% to +2%
- Inflation rate: -2% to +2%

The range of sensitivities performed do not fundamentally alter the results of the NPV analysis. The FBC Outturn Cost continues to show a moderate incremental spending over the Do Minimum option which is almost entirely driven by the larger capital expenditure. This leads to an incremental expenditure NPV of between €46.1m and €11.5m.

Table 20: Sensitivity Analysis Results

Factor	Change	NPV
Base Case		€28,791,764
	Decrease by 10%	€11,504,802
Capital and Operating Expenditure	Decrease by 5%	€20,148,283
	Increase by 5%	€37,435,245
	Increase by 10%	€46,078,727
Discount Rate	Decrease by 2%	€19,495,922
	Decrease by 1%	€24,616,307
	Increase by 1%	€32,182,896
Inflation Rate	Increase by 2%	€34,921,791
	Decrease by 2%	€36,197,465
	Decrease by 1%	€32,927,535
	Increase by 1%	€23,632,592
	Increase by 2%	€17,265,315

Appendix 11: NTA additional costs

In addition to the NGT Service Provider costs, the cost analysis also assumes wider NTA specific costs, such as staffing/contractor costs associated with managing the contract with the NGT Service Provider, will be incurred in the set-up of NGT. Table 21 below details these wider NTA costs (between 2025 – 2028). These costs were provided by NTA (in real terms, 2023 prices). The costs are profiled up to and including 2028 to tie in with the proposed implementation period of *NGT in GDA*.

Table 21: Additional NTA Costs (real terms, without VAT)

Cost Categories	2025	2026	2027	2028	Total
NTA implementation team ²⁹	€2,000,000	€2,000,000	€2,000,000	€2,000,000	€8,000,000
Transport Operator Resourcing ³⁰	€1,000,000	€1,000,000	€1,000,000		€3,000,000
Software integration ³¹	€1,000,000	€1,000,000			€2,000,000
Decommissioning and civil works prior to installation	€3,930,000				€3,930,000
Total	€7,930,000	€4,000,000	€3,000,000	€2,000,000	€16,930,000

²⁹ Estimated 8 FTEs required

³⁰ Estimated 4 FTEs required from 2025-2027

³¹ Provision for the enabling work required to allow integration with the Irish Rail online booking engine and, in particular, updates required to the published API's which are exposed by the IÉ service provider

Appendix 12: Do Minimum and NGT Service Provider cost summary

Do Minimum Option Cost Summary

In the “Do Minimum” scenario the existing closed-loop card based ticketing scheme is maintained as the primary mechanism for fare payment in public transport throughout the Greater Dublin Area. Investment must be made to source additional equipment, including replacement of life-expired equipment and components and to update its security.

Investment will also be made in respect of products and customer propositions as these pertain to the Card-Based Ticketing architecture and form part of the extant roadmap for the scheme.

The operating contract for the existing scheme is due for renewal and this scenario assumes that the contract is re-procured for five years under the same / near-identical terms to the existing contract.

The purpose of including this scenario is to provide a realistic baseline for the future of the Leap scheme should a decision be made not to invest in Next Generation Ticketing.

Baseline Do Minimum costs were estimated within the BusConnects Dublin PBC. These costs were then adjusted by a factor based on the relative number of Leap validators in the Dublin City vs GDA region, and by the relatively volume of journeys in the Dublin City vs GDA region³².

A summary of these adjusted GDA Do Minimum costs is presented below:

Table 22: Do Minimum Option Cost Updates (excluding VAT)

Cost Categories ³³	Do Minimum costs (real terms)	Do Minimum costs (nominal terms)
Capital Expenditure	€12,329,915	€16,588,778
Operating Expenditure	€96,641,871	€135,590,315
Total	€108,971,785	€152,179,093

NGT Service Provider Cost Summary

The proposed payments by the NGT Service Provider as part of this tender submission are summarised in Table 23. The table identifies all payments across the implementation and operations phases under the following categories:

- **Implementation Milestone payments:** A series of implementation milestone Payments have been set out in the Payments Schedule which serve as a means

³² The methodology used to adjust Do Minimum costs to the GDA region looked at the relative volume of validators required in Dublin City vs GDA and the relative volume of public transport journeys in Dublin City vs GDA over a 10-year period. An average of these two factors was used so that scale estimates were robust and based on multiple factors. The data source used for journey forecasts and validators per region was the OBM evaluation model. Journey estimates had been created in this model after consensus meetings with the NTA. Validator requirements were based on a 1:1 replacement of current validator volumes which was sourced from each Transport Operator. The formula took an average of the relative percent of validators and public transport journeys in GDA versus Dublin City Bus Services and then multiplied Do Min costs by this adjustment factor.

³³ Do Min capex costs assume a capital renewal every 6th year, whilst opex costs are assumed to remain constant each year. Cost estimates were adjusted from the 36-year appraisal period used in the NGT Cost Model, to a 20-year appraisal period used in this FBC. This is explained further in section 6.3.1. and 6.3.2 of this report.

of ensuring that the various tasks that form part of the rollout of the NGT solution to the Greater Dublin Area are achieved on time. The implementation milestone payments are intended to cover the upfront costs of implementation and include payments in respect of delivery of plans and technical readiness.

- **Fixed Operating Payments:** The NTA will pay the NGT Service Provider operating payments for the delivery of the Services once the solution becomes operational. The operating payments comprise of payments to cover the NGT Service Provider's costs of running the NGT system. The fixed operating payments cover payments in respect of: salaries, ICT, security, maintenance, cash handling and other costs.
- **Variable Operating Payments:** The Variable Operating Payments cover the NGT Service Provider's costs which are driven by the number of transactions experienced within the NGT system. These costs may be in respect of barcode ticket manufacturing and sales costs, payment gateway fees, merchant acquirer fees, chargeback defence costs or other costs. Variable operating payments are calculated based on the number of relevant transactions occurring in the GDA region.
- **Non-evaluated payments:** It's important to note that there are certain payments which are not included within the evaluation price, either because they are pass-through costs, or because they are equal across all Tenderers. The payments must, however, be included within the financial appraisal. The interchange+ fees on EMV card transactions are a pass-through cost which will be paid by the NTA with no markup accruing to the NGT Service Provider.

All payments presented below in Table 23 are in real terms (i.e., do not include inflation) and are exclusive of VAT (note: VAT is itemised separately in the cost comparison analysis in Section 6.3). The costs are therefore different to what is assessed in Section 6.3 (which include inflation and VAT) however are being presented below to detail exactly what the NGT Service Provider submitted as part of their tender response.

Table 23: Summary of NGT Service Provider Cost (real terms, without VAT)

Cost Categories	
NGT Service Provider Costs	
Capital Expenditure (2025 to 2027)	
Total Implementation Milestone Payments	€17,310,395
Operating Expenditure (2027 to 2044)	
Total Fixed Operating Payments	€43,259,800
Total Variable Operating Payments	€22,991,714
Additional non-evaluated Payments	
Renewal Payments ³⁴	€11,748,306
Interchange+ pass-through cost estimate ³⁵	€9,832,125
Total NGT Service Provider Payments	€105,142,340

³⁴ In order to convert the OBM costs from a 10-year evaluation period to a 20-year appraisal period, an extrapolation needed to be done: i) The monthly fixed operating payment is constant and was therefore extended by 10-years. ii) Variable operating payments were also extended by 10-years and their underlying transaction volumes were grown at their current constant growth rate. iii) Lastly, a capital renewal cost was added to capex in line with the NGT Cost Model methodology which assumes they are incurred every 6-years.

³⁵ Interchange+ payments are a pass-through cost. They were therefore not included in the bid evaluation, but they will accrue to the ultimate Service Provider and should be included in the financial appraisal and budgeting.

Appendix 13: Risk Log



NGT%20Risk%20Regi
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Appendix 14: International benefits case studies

International Case Studies

- The Metropolitan Transportation Authority (MTA) for New York, introduced a new ABT system called OMNY, in December 2020, as a replacement of the existing MetroCard. By April 2022, an average of 1.1 million contactless open payment taps per workday were recorded.
- In London, there was a significant uptake of using contactless payment as an addition to the PAYG Oyster Cards. In 2014, 2 million journeys were made using contactless payment when the system was first introduced. This number rose to approximately 18 million by 2018.³⁶
- In the Netherlands the Holland Travel Ticket provides unlimited access to all modes of public transport, promoting multi-modality and, potentially, a modal shift.³⁷
- In 2021, the Moscow Department of Transport launched a virtual 'Troika' card, an update to the previous physical card that was launched in 2013, and 'FacePay', a face recognition system that enables passengers to travel through the turnstiles without having to stop and use their bank or metro card.³⁸ This system can be set up by the users via the Mosmetro app where their photo is linked to the bank card and metro card.
- Singapore's Land Transport Authority (LTA) launched a two-year trial for the new account-based EZ-Link cards as part of SimplyGo in 2017.³⁹ The trial attained 100,000 SimplyGo users and over 26 million transactions over the two years.

Consumer Benefits

There are five main consumer benefits associated with NGT, which were also evident in the review of the international case studies. These are summarised below:

- I. Convenience/choice of media
 - Consumers are given more options to pay for public transport and are not required to always have a travel card with them, providing consumers with better flexibility.
 - The familiarity of contactless payment systems implemented in public transport services was identified as a benefit in cities across the UK, the USA, Australia, China, France and the Netherlands. This familiarity and convenience are significantly beneficial for visitors and tourists to a city, as it resolves the intricacies of purchasing tickets/smartcards, registering an account, or figuring out a local fare structure.
 - The Netherlands adopted a scheme where the Holland Travel Ticket provides unlimited access to all modes of public transport, promoting multi-modality and, potentially, a modal shift.⁴⁰
- II. Customer satisfaction

36 (Next Generation Ticketing Business Case - Phase 1 Preliminary Appraisal, 2017)

37 Holland.com (n.d.), 'Holland Travel Ticket: unlimited travel by public transport through Holland', Available from: [Holland Travel Ticket: unlimited travel by public transport through Holland - Holland.com](https://www.holland.com/en/transport/tickets/holland-travel-ticket), [05 Oct. 22].

38 Transport Ticketing Global (2021), 'The future of Moscow's ticketing system', Available from: [The future of Moscow's ticketing system - Transport Ticketing Global 2023 \(transport-ticketing.com\)](https://www.transport-ticketing.com/en/news/the-future-of-moscows-ticketing-system), [05 Oct. 22].

39 Land Transport Authority (2021), 'LTA Annual Report 2020/21', Available from: [LTA_AR2021.pdf](https://www.lta.gov.sg/files/Assets/Annual-Report-2020-21).

40 Holland.com (n.d.), 'Holland Travel Ticket: unlimited travel by public transport through Holland', Available from: [Holland Travel Ticket: unlimited travel by public transport through Holland - Holland.com](https://www.holland.com/en/transport/tickets/holland-travel-ticket), [05 Oct. 22].

- In London, over 90% of passengers found the new ABT system to meet or exceed expectations.⁴¹
 - This level of customer satisfaction correlates to a customer survey that was conducted to measure the impact and acceptance for open payments on transit. Two major findings were revealed:⁴²
 1. One payment source for everyday use is preferred by customers
 2. Customers prefer to use mobile payments for public transport.
- III. Fares not locked in accounts for lost/stolen cards
- Misplaced cards do not mean loss of funds, which improves reliability of the service and offers an assurance against this risk.
 - In 2022, Transport for London confirmed that £167.6 million is still left on inactive Oyster cards and more than 55.6 million cards were inactive in the previous 5-years.⁴³ Allowing a switch to bank card and mobile payments could mean avoiding this loss.
- IV. Best rates available
- Best fares can be applied to contactless payments to incentivise travel and ensure that travelling by contactless payment is not more expensive than using the existing travel Leap Card.
 - The OMNY system in New York introduced a program where each passenger can pay as they go, on a single device, until they reach 12 paid trips where they will then receive free trips for the remainder of the week.⁴⁴
 - Milan's Transport Authority, Azienda Trasporti Milanesi (ATM), similarly introduced a way of charging passengers the best fare possible, if passengers use the same bank card or smart payment device, upon the launch of their contactless payment system for the Metro.
 - In 2021, the Department of Transport in Moscow introduced a loyalty system where passengers could accumulate tokens on their 'Troika' cards to pay for travel or city services such as at retail stores.⁴⁵
- V. Health Benefits
- By creating a more convenient and flexible public transport system, a greater uptake in public transport may be attained and usage of other modes (e.g., private vehicle use) may decrease.
 - The convenience of using the same method of payment across different modes of transport in support of Mobility-as-a-Service (MaaS), encourages a greater active travel uptake.
 - Sustainable modes of travel (cycling, walking, public transport) bring numerous health benefits such as a reduction in air pollution, noise pollution and an increase in physical activity levels. A review study on the effect of public transport use on physical activity found that an extra 8 to 33 minutes of additional physical activity was linked to public transport use, with a number

41 CUBIC (2022), 'Case Study New York OMNY'.

42 Khaled Zamer (2018), 'Account Based Ticketing: The Benefits and Drivers for Transit Operators', Journal of Transportation Technologies.

43 My London. Available from: <https://www.mylondon.news/news/cost-of-living/tfl-reveals-mind-blowing-amount-25571325>, [22 November, 2022].

44 MTA (n.d.), 'OMNY', Available from: [Say hello to tap and go, with OMNY \(mta.info\)](https://www.mta.info/say-hello-to-tap-and-go-with-omny), [29 Sep. 22].

45 Transport Ticketing Global (2021), 'The future of Moscow's ticketing system', Available from: [The future of Moscow's ticketing system - Transport Ticketing Global 2023 \(transport-ticketing.com\)](https://www.transport-ticketing.com/the-future-of-moscow-s-ticketing-system), [05 Oct. 22].

of these reviewed studies reporting a range of 12 to 15 minutes of additional physical activity ⁴⁶

- A 2019 study by Visa and Stanford University found that cash-reliance, complicated fares and a lack of interoperability were at the heart of rider frustrations. On average, respondents felt use of services would increase by 27% if it were easier to pay for public transport.⁴⁷
- Since Transport for London first introduced bank card payments on public transport in December 2012, more than 2.5 billion bus journeys have been made using contactless bank card, mobile or smart watch pay as you go. TfL's world-leading contactless payment system currently makes up around 70% of pay as you go journeys on London buses. ⁴⁸

Transport Operator Benefits

There are a number of benefits accruing to transport operators, with four listed below.

I. Removal of cash from vehicles

- A study conducted by Tirachini in 2011 demonstrated that cash payments have the highest impact in increasing total dwell times, while off-board payments (payments made outside vehicles) were shown to be the quickest forms of payment, closely followed by contactless.⁴⁹

II. Driver Safety

- Since Covid-19, cash handling on buses became a growing issue for bus drivers who are less willing to handle cash and interact with the passengers in fear of Covid-19 infection. In 2020, the bus workers trade union asked for cash payments to be removed on all buses in the UK to reduce the risk of Covid-19 transmission.⁵⁰ NGT introduces benefits for driver safety, including reduced risk of infection.
- Removing the interaction between bus drivers and passengers will also improve drivers' personal safety and security. The risk of potential attacks on drivers with the aim of stealing cash is reduced and facilitates providing drivers with a safe workplace.

III. Journey Insights and information

- The NGT will introduce the requirement to tag off the bus as well as tagging on. Subject to data-sharing requirements and arrangements, this could provide a new avenue of transportation data that is generated from electronic payment systems, potentially saving a significant amount of cost and time on travel information by route, giving insights into route capacity for transport planning.
- TfL use similar data to predict impacts on the transport network during road or line closures and to customise advice to passengers. This firstly informs

⁴⁶ Rissel C, Curac N, Greenaway M, Bauman A. (2012), 'Physical Activity Associated with Public Transport Use—A Review and Modelling of Potential Benefits', Available from: *International Journal of Environmental Research and Public Health*.

⁴⁷ Little Pay (2024). Available from: <https://littlepay.com/how-contactless-transit-payments-can-unlock-long-term-benefits/>

⁴⁸ Transport for London (2022). Available from: <https://tfl.gov.uk/info-for/media/press-releases/2022/december/tfl-celebrates-a-decade-of-contactless-payment-on-london-s-buses>

⁴⁹ Alejandro Tirachini (2011), 'Bus dwell time: The effect of different fare collection systems, bus floor level and age of passengers', Available from: [2013TransportmetricaA_busDwellTimes\(1\).pdf](#), [29 Sep. 22].

⁵⁰ The Knowledge Exchange (2020), 'The dash from cash: can public transport providers balance the needs of staff and customers?', Available from: [The dash from cash: can public transport providers balance the needs of staff and customers? | The Knowledge Exchange Blog](#), [10 Oct. 22].

passengers of how they will be affected and secondly recommends alternative routes. For certain passengers less obvious routes were suggested to avoid overcrowding of the most popular alternatives. TfL uses similar data for other purposes such as network redesigns and analysing trends in deaths and serious injuries on the roads.⁵¹

IV. Targeted and Automatic Fares

- The bus operator / ticket salesperson does not need to calculate the fare as the system will do it automatically and charge the customer accordingly. This improves accuracy and efficiency in fare calculation.
- According to Go-Ahead Buses in the UK, Model 1-style transactions are estimated to take at least 12 seconds, whereas tap-on, tap-off transactions take substantially less time.⁵² This plays a large role in reducing bus dwell time.

National Transport Authority Benefits

Four specific benefits to the NTA are identified, associated with reducing transaction costs of collecting revenue and aligning with sustainable material use associated with their activities.

V. Simple fare updating process

- Operators are not responsible for updating fareboxes if/when fares change. For example, removing the fare on the day of a one off event (a sporting match) to and from the location. This will allow the NTA to test fare structures and modify them more quickly and easily.

VI. Innovation

- Technology continues to evolve and advance, with innovations in the form of new functionality. There are benefits to the NTA of capitalising on opportunities in the digital economy and data-driven management of public transport. While technological progression presents opportunity, it also raises the stakes. Choosing to opt out of modernisation means that your customer-facing technology can become dated or obsolete. Customers using public transport systems such as those reviewed in this case study are increasingly expecting the same functionality in every major city.

VII. Cost savings

- As many customers already own a contactless bank card or smart device, there will be a decrease on the rate of travel card issuance, which is a considerable operating cost for service providers.
- There may also be a reduction in capital costs such as those required to install ticketing infrastructure, and maintenance overheads to maintain equipment and provide personnel for customer queries and support. Ticketing machines and personnel will still be needed within the transit system for those who do not have access to bank accounts, however, the demand for these services will be less.
- According to TfL around 70 per cent of all pay as you go journeys on London buses are made using contactless payment cards or mobile devices.⁵³ This

⁵¹ Intelligent Transport, (2016). Available from: <https://www.intelligenttransport.com/transport-articles/19635/tfl-big-data-transport-services/>

⁵² Passenger Tech, 2023. Available from: <https://passenger.tech/news/unlocking-dwell-time-with-shift-between-contactless-models/>

⁵³ TfL, 2022. Available from: <https://tfl.gov.uk/info-for/media/press-releases/2022/december/tfl-celebrates-a-decade-of-contactless-payment-on-london-s-buses>

means there is far less reliance on the creation of closed-loop cards, and the installation of ticketing machines.

VIII. Supports mobility and sustainability objectives

- Other than cost and time savings, the introduction of virtual cards is also beneficial to the environment. Removing the necessity to produce plastic travel cards would reduce waste associated with ticketing.
- Providing safer work conditions for public transport workers aligns with NTA's social corporate governance, while improving conditions and desirability to work in the sector.
- Easier payment methods would encourage greater use of public transport which is aligned to government's sustainability goals. A study conducted by Visa and Stanford University showed that respondents felt easier payment methods for public transport would increase the use of public transport services by around 27%.⁵⁴

⁵⁴ Little Pay (2024). Available from: <https://littlepay.com/how-contactless-transit-payments-can-unlock-long-term-benefits/>

Appendix 15: Transport and Accessibility Appraisal



TAA_NTA
NGT_GDA_FBC v3 20:

Appendix 16: MCA Scoring Detail

The options under consideration for the Greater Dublin area NGT are shown in Table 24.

Table 24: MCA Option Overview

Options	Description
Do Minimum	The Do Minimum scenario assumes the existing card-based ticketing Leap scheme is maintained as the primary mechanism for fare payment.
Do NGT	This option is the implementation of the Next Generation Ticketing throughout the GDA. This system aims to leverage cashless technology, allowing for payments to be made using cEMV (contactless credit and debit cards), mobile phones and tokens, all linked to a payment account. NGT will be implemented across Public Transport modes including Metro, Luas and rail allowing for a seamless multimodal trip.

Individual tables for each criterion are presented in Section 7.3.2 with a brief explanation as to the reasoning for the score each criterion was given.

MCA Scoring

Objective – Deliver one of the key NTA initiatives, referred to as “Just the Ticket”

The Do Minimum will not include transitioning to ‘Just the Ticket’, keeping the current payment process at points of payment. NGT will help enable open loop payments for cashless ticketing with minimal driver interaction on bus services reducing the delays caused by the current payment system process⁵⁵. Therefore, Do Minimum scored a neutral 4 and NGT scored a moderate positive 5.

Table 25: ‘Just the Ticket’ MCA Score

	Do Minimum	Do NGT
MCA Score	4	5

Objective - Address the fact that the current ticketing equipment for cash payment in buses is obsolete, and the level of equipment failures is of concern

Currently there have been some issues reported with the Leap card system, such as card faults, as some users have experienced problems with faulty cards that fail to be recognized by validators. Near Field Communications (NFC) issues have been reported also, as this is when multiple cards are close together, such as a bank card and a Leap card, causing the validator to not recognise the Leap card. Finally, there are occasionally validator issues as the card validator itself may malfunction leading to difficulties in reading Leap cards⁵⁶. The Do Minimum scored a neutral 4 as it will improve old and/or damaged equipment by replacing it with newer equipment however there will be no

⁵⁵ Abdoli, S., Burke, M. and Leung, A., 2022, September. Cashless Payments for Public Transport: equity and exclusion issues. In *Australian Transport Research Forum 2022 Proceedings*.

⁵⁶ [Why is my TFI Leap Card not working? - Leap Card](#)

additional features meaning most equipment will not change. The NGT scored a minor positive 5 as more modern equipment will replace the existing equipment allowing it to support more modern payment methods.

Table 26: Address the fact that the current ticketing equipment for cash payment in buses is obsolete, and the level of equipment failures is of concern MCA Score

	Do Minimum	Do NGT
MCA Score	4	5

Objective - Improve the customer experience by addressing some of the limitations and weaknesses in the current system

The Do Minimum will not involve addressing any of the existing issues and limitations of the current system in place, meaning there will be no impact on customer experience in this option. Therefore, the Do Minimum scored a neutral 4. Do NGT will involve addressing some of these issues, giving customers greater choice, convenience and value. Providing a digital alternative removes the need to queue, enhances journey planning and makes the overall route from purchasing a ticket to using public transport more efficient. Smart ticketing can also give customers the reassurance that they may need to travel with confidence, knowing that they've been offered the most cost-effective fare and that they will be automatically reimbursed in the event of delays⁵⁷. Therefore, NGT scored a moderate positive 6.

Table 27: Improve Customer Experience by addressing some of the limitations and weaknesses in the current system MCA Score

	Do Minimum	Do NGT
MCA Score	4	6

Objective - Customer experience and acceptance

The Do Minimum does not link Dublin Bus and Go Ahead with NGT, this will negatively impact customer experiences as ticketing will be inconsistent across public transport systems. It therefore scored a moderate negative 2. NGT will link public transport services across rail, commuter and bus services ensuring customers will be able to benefit from the best fares available. For users, the development of NGT is a critical step toward making public transport more efficient, affordable, and accessible. The keywords here are integration and interoperability. By allowing multiple transport systems to share payment information across an entire network, NGT technology is making it much easier for commuters to access all forms of public transport⁵⁸. It therefore scored a moderate positive 6.

Table 28: Customer experience and acceptance MCA Score

	Do Minimum	Do NGT
MCA Score	2	6

Objective - System testing and extension template

⁵⁷ <https://www.intelligenttransport.com/transport-articles/147610/how-smart-ticketing-revolutionising-public-transport-empowering-operators/>

⁵⁸ [The ticket to a better ride: How can Automated Fare Collection improve urban transport?](#)

The Do Minimum will not involve a system testing, meaning there will be no impact in this option. Therefore, it scored a neutral score of 4. The NGT will allow for this testing, demonstrating the system’s capabilities and potential issues. Some of the most common challenges during cashless payments are technical disturbances such as servers not responding, money being debited but not received and lost internet connection during transactions⁵⁹. NGT will allow for testing of the platform and to address any issues that might arise, therefore scored a moderate positive 6.

Table 30: System Testing and extension template MCA Score

	Do Minimum	Do NGT
MCA Score	4	6

Objective - Value for Money

The Do Minimum will not include expansion of NGT or integration with any other transport projects and therefore has no impact on value for money and scored a neutral 4. The NGT extension to GDA will benefit the integration across other projects. Cashless systems reduce the need for physical fare collection and handling, which can lower operational costs significantly. For example, the Washington Metropolitan Area Transit Authority (WMATA) estimated savings of over \$4.4 million from reducing fare collection and card provisioning costs between 2021 and 2029. Other benefits include data-driven improvements, as cashless systems provide valuable anonymized data on passenger usage patterns, which can help public transport operators optimise routes and schedules, leading to more efficient and cost-effective operations⁶⁰. Considering these benefits, NGT provides good value for money and therefore scored a minor positive 5.

Table 32: Value for Money MCA Score

	Do Minimum	Do NGT
MCA Score	4	5

⁵⁹ [Cashless Payments - Benefits, Challenges, Trends, and Opportunities](#)

⁶⁰ [The Benefits and Drawbacks of a Cashless Public Transit System | Kittelson & Associates, Inc.](#)

Appendix 17: Economic Appraisal Sensitivity Analysis

MCA sensitivity analysis from Section 7.3.3 is detailed in this appendix. The scenarios are explained below:

- **Scenario 1 – Public Transport Operations:** In this scenario, the optimisation of public transport operations takes centre stage. The objectives, including simplifying interchanges, enhancing clarity in bus destinations, optimising existing transport corridors, improving customer experiences, and integrating technology for more efficient operations, are prioritised with double weight.
- **Scenario 2 – Policy Integration:** This scenario revolves around aligning policies to meet climate action targets and support the goals outlined in Project Ireland 2040. The objectives involve harmonising regulations and procedures to create a unified policy framework addressing environmental sustainability and long-term development objectives. Notably, the prioritised objectives are double-weighted.
- **Scenario 3 – Social Benefits:** The central theme of this scenario is anticipating and meeting future public transport demand. Objectives, including prioritising the reduction of car dependency to enhance community well-being, improving customer experience through technology integration, ensuring safety and security, optimising journey times and reliability, and enhancing overall accessibility, are all double-weighted.
- **Scenario 4 – Environmental:** This scenario centres on mitigating car dependency and aligning with climate action targets outlined in Project Ireland 2040. The prioritised environmental objectives are given double weight to underscore their significance.

Table 33 displays the weights assigned to each scenario where the relative importance of each criterion is indicated by a value between 1 and 2 for each scenario.

Table 33: Criterion weight for each sensitivity analysis scenario

	Scenario 1: Public Transport Operations	Scenario 2: Policy Integration	Scenario 3: Social Benefits	Scenario 4: Environmental
'Just the Ticket'	2	1	1	1
Improving current ticketing equipment	2	1	1	2
Improving customer experiences	1	1	2	1
Integration with NGT Dublin Bus	2	2	1	1
Testing the NGT system's multi-modal functionality and experience	2	1	1	1
Value for Money	1	2	1	1

From Section 7.5, Table 34 displays the main calculations to obtain the sensitivity analysis on the EA section.

Table 34: Economic Appraisal Sensitivity Analysis

Item		Sensitivity	Do Minimum	Do NGT
Baseline Scenario		Net flow (undiscounted)	€158.9m	€139.5m
		ENPV (4% discount rate) [A]	€108.9m	€109.0m
		Effectiveness: MCA Score (out of 42) [B]	22.0	33.0
		CER [A/B]	€5.0m	€3.3m
		Cost-effectiveness as %	100%	67%
MCA	Scenario 1: Public Transport Operations	Net flow (undiscounted)	€158.9m	€139.5m
		ENPV (4% discount rate) [A]	€108.9m	€109.0m
		Effectiveness: MCA Score (out of 42) [B]	33.0	55.0
		CER [A/B]	€3.3m	€2.0m
		Cost-effectiveness as %	100%	60%
	Scenario 2: Policy Integration	Net flow (undiscounted)	€158.9m	€139.5m
		ENPV (4% discount rate) [A]	€108.9m	€109.0m
		Effectiveness: MCA Score (out of 42) [B]	26.0	44.0
		CER [A/B]	€4.2m	€2.5m
		Cost-effectiveness as %	100%	59%
	Scenario 3: Social Benefits	Net flow (undiscounted)	€158.9m	€139.5m
		ENPV (4% discount rate) [A]	€108.9m	€109.0m
		Effectiveness: MCA Score (out of 42) [B]	26.0	44.0
		CER [A/B]	€4.2m	€2.5m
		Cost-effectiveness as %	100%	59%
	Scenario 4: Environmental	Net flow (undiscounted)	€158.9m	€139.5m
		ENPV (4% discount rate) [A]	€108.9m	€109.0m
		Effectiveness: MCA Score (out of 42) [B]	27.0	43.0
		CER [A/B]	€4.0m	€2.5m

		Cost-effectiveness as %	100%	63%
Costs	Increase in CAPEX by 15%	Net flow (undiscounted)	€162.8m	€149.5m
		ENPV (4% discount rate) [A]	€111.7m	€118.4m
		Effectiveness: MCA Score (out of 42) [B]	22.0	33.0
		CER [A/B]	€5.1m	€3.6m
		Cost-effectiveness as %	100%	71%
	Increase in OPEX by 15%	Net flow (undiscounted)	€178.9	€147.0
		ENPV (4% discount rate) [A]	€122.5	€114.1
		Effectiveness: MCA Score (out of 42) [B]	22.0	33.0
		CER [A/B]	€5.6m	€3.5m
		Cost-effectiveness as %	100%	62%

Appendix 18: Tender Report



B. Next Generation
Ticketing - Tender Eva

Appendix 19: Economic Appraisal - Sensitivity Analysis on Incremental Approach

1. Executive Summary

As outlined in the Final Business Case (FBC), Next Generation Ticketing (NGT) in Greater Dublin Area (GDA) is a priority project for the National Transport Authority (NTA) as the current ticketing system on public transport is becoming obsolete which creates significant delivery risks for the NTA, both in terms of the ability to maintain the service and source equipment, which is becoming more difficult each year, and in relation to revenue collection for bus services across the country.

The project will transform and modernise the system for ticketing and payments on Irish public transport by transitioning to an Account-Based Ticketing (ABT) system which incorporates open payments (mobile and card-based) and secure tokens. The project will make public transport more attractive and encourage more people to use sustainable transport options thereby aligning with national planning, climate and transport strategies. NGT will also play a key role in promoting public transport as Ireland moves towards achieving its net zero.

The FBC for *NGT – GDA* project undertakes an Economic Appraisal on an incremental basis which assessed a Do Minimum scenario where the Leap system is maintained to the end of the appraisal period against a Do NGT scenario that does not include Leap costs as they are a cost under the Do Minimum scenario. This applied to both benefits and costs (see Section 7.4.1 of the FBC for further details).

Following external review for the *NGT – BusConnects Dublin* project FBC, it was recommended that a sensitivity analysis be undertaken including the costs of the Leap system within the Do NGT scenario to see what impact this had on the overall assessment. This approach has been maintained for the NGT GDA FBC.

The purpose of this note is to outline this assessment which considers the combination of overall costs associated with the implementation of the NGT project alongside the transition phase, defined as a 7-year transition period where the Leap system is maintained (from starting appraisal year 2025 until year 2031).

For the purpose of this sensitivity analysis, the annual Leap OPEX costs have been profiled in the Do NGT scenario i.e. €102.6m Leap costs annualised to €5.1m and multiplied by 7 to give us transition costs in the OPEX for Do NGT of €35.9m (2023 prices). No change has been made to the Multi Criteria Analysis (MCA) outlined in the Economic Appraisal.

The sensitivity analysis (refer to Table 35 below) demonstrates that Do NGT still remains the most cost effective notwithstanding the inclusion of the Leap costs. This reflects the robustness of the project against a Do Minimum scenario which also captures the benefits of Leap, which if included in the Do NGT scenario, would further improve the cost effectiveness of the project.

Table 35: CEA Results

CEA (excluding VAT and inflation)		Do Minimum	Do NGT with transition
Economic Net Present Value (ENPV) (4% discount rate) [A]		€108.9m	€149.1m
Effectiveness: MCA Score [B]		22	33
Evaluation	Cost Effectiveness Ratio (CER) - the lower, the more effective [A/B]	€5.0m	€4.5m
	Cost-effectiveness as %, baseline Do Min	100%	91%
	Ranking	2nd	1st

2. Economic Appraisal Sensitivity Options

Details of the options under consideration for this sensitivity are shown in Table 36. Following assumptions in the Economic Appraisal chapter in FBC, the appraisal started in year 2025.

Table 36: Option Description

Options	Description
Do Minimum	The Do Minimum scenario assumes the existing card-based ticketing Leap scheme is maintained as the primary mechanism for fare payment.
Do NGT with transition	The Do NGT scenario assumes implementation of the Next Generation Ticketing element in GDA <u>alongside the continuation of Leap for until 2031 in a 7-year transition phase</u> (i.e., the annual Leap OPEX costs under the Do Minimum scenario have been profiled in the Do NGT scenario).

3. Cost Figures

To perform the sensitivity analysis, Leap OPEX costs until 2031 have been included in the Do NGT scenario. These costs are captured within the OPEX (undiscounted) calculations below along with the total costs for the sensitivity analysis.

Table 37: Undiscounted Cost and Economic Net Present Value (ENPV)

Cost Figures (2023 prices, excluding VAT and inflation)	Do Minimum	Do NGT with transition
CAPEX (undiscounted)	€19.6m	€69.0m
OPEX (undiscounted)	€102.6m	€74.2m
Shadow Cost – Shadow Price of Public Funds (undiscounted)	€36.7m	€43.0m
Net flow (undiscounted)	€158.9m	€186.2m
ENPV (4% economic discount rate)	€108.9m	€149.1m

4. CEA Sensitivity Analysis Results

The sensitivity analysis re-affirms that Do NGT results in a better economic impact than implementing the Do Minimum, despite the inclusion of the additional Leap costs. For Do NGT, each additional score in the MCA costs approximately €3.3m to deliver compared to €4.0m for the Do Minimum, demonstrating that Do NGT performs better in terms of cost, the impacts it will deliver and the combined cost effectiveness.

Table 38: Summary CEA Results

CEA (excluding VAT and inflation)		Do Minimum	Do NGT with transition
Evaluation	CER - the lower, the more effective	€5.0m	€4.5m
	Cost-effectiveness as %, baseline Do Min	100%	91%
	Ranking	2nd	1st

Appendix 20: Project Execution Plan



NGT PEP - Ver
2.0.pdf

Appendix 21: Go Ahead Ticketing Report



Go-Ahead Ireland
Executive Summary Re

11 Disclaimer

11.1 Important Notice

If you are a party other than the National Transport Authority ('NTA'), KPMG:

- 1 owes you no duty (whether in contract or in tort or under statute or otherwise) with respect to or in connection with the attached report or any part thereof; and
- 2 will have no liability to you for any loss or damage suffered or costs incurred by you or any other person arising out of or in connection with the provision to you of the attached report or any part thereof, however the loss or damage is caused, including, but not limited to, as a result of negligence.

If you are a party other than NTA and you choose to rely upon the attached report or any part thereof, you do so entirely at your own risk.

11.2 Limitations

The responsibility for determining the adequacy or otherwise of our terms of reference is that of NTA. Our terms of reference comprise an advisory engagement which is not subject to Irish, or any other, auditing or assurance standards and consequently no conclusions intended to convey assurance are expressed. Further, as our terms of reference do not constitute an audit or review in accordance with Irish auditing standards, they will not necessarily disclose all matters that may be of interest to NTA or reveal errors and irregularities, if any, in the underlying information. In preparing this report, we have had access to information provided by NTA and publicly available information. The findings and recommendations in this report are given in good faith but, in the preparation of this report, we have relied upon and assumed, without independent verification, the accuracy, reliability and completeness of the information made available to us in the course of our work and have not sought to establish the reliability of the information by reference to other evidence.

Any findings or recommendations contained within this report are based upon our reasonable professional judgement based on the information that is available from the sources indicated. Should the programme elements, external factors and assumptions change then the findings and recommendations contained in this report may no longer be appropriate. Accordingly, we do not confirm, underwrite or guarantee that the outcomes referred to in this report will be achieved.

We have not compiled, examined or applied other procedures to any prospective financial information in accordance with Irish, or any other, auditing or assurance standards. Accordingly, this report does not constitute an expression of opinion as to whether any forecast or projection of the programme will be achieved, or whether assumptions underlying any forecast or projections of the programme are reasonable. We do not warrant or guarantee any statement in this report as to the prospects of the programme. There will usually be differences between forecast or projected and actual results as events and circumstances frequently do not occur as expected or predicted, and those differences may be material.