



**Transforming Cities Fund  
Application Form – Capital Schemes for Tranche 1  
(under £10m)**

Applications may be made for grants of up to £10m per city region for multiple schemes. **One application form must be completed per scheme.** Please include all relevant information with your completed application form.

**Applicant Information**

**City region name:** Derby & Nottingham

**Bid manager name and position:** Chris Carter, Head of Transport Strategy, Nottingham City Council

**Contact telephone number:** 0115 87 63940

**Email address:** Chris.Carter@nottinghamcity.gov.uk

**Postal address:** Nottingham City Council  
4<sup>th</sup> Floor  
Loxley House  
Station Street  
Nottingham  
NG2 3NG

**SECTION A – Scheme description and Corridor name**

**A1. Scheme name and location (please provide maps in an annex where necessary):**

Derby–Nottingham Public Transport Technology Package

Area covering Derby – Nottingham – East Midlands Airport/East Midlands Gateway development area.

**See B2a Strategic Case Area and Proposals Map**

**A2. Scheme description**

Using new technology to enhance the public transport passenger experience, improve bus reliability and reduce congestion for all traffic. This bid comprises four components:

(i) **Bus priority through key junctions and smart camera trial.** Bus priority at five key junctions along the A52 corridor will be installed. A pilot smart camera system will collect data to improve journey reliability, and reduce congestion in part of the same corridor.

(ii) **Public transport information system upgrade** involving the installation of new LCD screens at key bus stops at workplaces, and interchanges. Investment in a data brokerage system to expand use of the system.

(iii) **Smart public transport payments** that will enable the Robin Hood multi-operator smart ticketing (pay-as-you-go and seasons) to be purchased and used via smart phone, and a tram ticket machine upgrade to accept contactless payment.

(iv) **Electric charging at interchange hubs** to support an electric shuttle bus service at the East Midlands Gateway and expansion of electric car charging at park and ride sites.

The total scheme value is £5.695m. The total funding sought from Department for Transport is £5.045m.

## **SECTION B – The Business Case**

You may find the following DfT tools helpful in preparing your business case:

- [Transport Business Case](#)
- [Behavioural Insights Toolkit](#)
- [Logic Mapping Hints and Tips](#)

### **B1. Background (“What are the scheme objectives?”)**

Public transport technology improvements along key corridors linking Derby, Nottingham and East Midlands Airport/Gateway will improve connectivity and reliability, and encourage an increase in sustainable, low carbon trips. Smart ticketing upgrades will make traveling by bus and tram easier. The scheme will help deliver the following objectives:

#### **1. Deliver growth and drive up productivity**

The Midlands Engine identifies Derby-Nottingham as a priority area with potential to drive forward the Midlands economy. The city regions have attracted global businesses, and significant out-of-town employment growth hubs are emerging between the cities with supporting plans to build approximately 50,000 houses. Enhanced connectivity will cater for this economic growth, improve productivity and make the area more attractive to investors.

#### **2. Improve access to work**

Existing employers such as East Midlands Airport find it increasingly difficult to recruit locally and, over coming years, East Midlands Gateway and our Enterprise Zones will recruit substantially and will experience similar issues. Despite this, both cities have higher unemployment areas, where people need reliable work but who find it difficult to take opportunities in out-of-town locations. Improved public transport connectivity and reliability will improve access to these expanding workplaces.

#### **3. Tackle congestion, air pollution and carbon emissions**

It is estimated that there are over 425,000 daily commutes (with a forecasted increase of 11% by 2033), 55% in and out of the cities. These cause significant congestion, particularly during peak periods. In the AM peak the average speed falls by 13 mph, causing an average delay of 11.2 minutes towards Nottingham and 7.2 minutes towards Derby. This congestion is estimated to cost the East Midlands £825 million per annum with over half falling to business. Both cities have areas exceeding European air quality limits for nitrogen dioxide mainly due to traffic emissions. These issues will be tackled through encouraging an increase in journeys made by sustainable modes and supporting the take up of Ultra Low Emission Vehicles (EVs).

## **B2. Strategic Case - Scheme Rationale (“What does this scheme contribute to the programme objectives?”)**

### **Geography**

The strategic approach covers Derby and Nottingham conurbations and adjacent growth areas including the proposed HS2 East Midlands Hub Station (and proposed Innovation Campus) between and the East Midlands Airport/Gateway area. The area is approximately 1,600 km<sup>2</sup>, across local authorities: Amber Valley, Ashfield, Broxtowe, Derby, Erewash, Gedling, Nottingham, Rushcliffe and South Derbyshire and also partly within two county council boundaries (Derbyshire and Nottinghamshire). It is within the D2N2 Local Enterprise Partnership area and is a priority Midlands Engine economic growth hub. A Metro Dynamics study found this geography largely operates as an economic area with significant self-containment. A map showing the location of the area and the public transport improvement corridors is attached (**B2a Strategic Case Area and Proposals Map**).

The scheme aims to help connect these conurbations, employment sites, and areas of growth by improving links between the Derby-Nottingham-East Midlands Airport/Gateway triangle.

### **Scheme Components**

Derby and Nottingham City Councils’ have a track record of working closely with local public transport operators. Public transport use is continuing to grow with high levels of customer satisfaction. Transport operators are continuing to invest in improved services. As the area continues to grow, it is important as many journeys as possible are made by sustainable modes. This bid has focused on technology measures as a way of improving passenger experience, making bus and tram operations as efficient as possible without the need for new infrastructure. The scheme comprises four components, set out below:

#### **Component 1 - Bus priority through key junctions and smart camera trial**

##### **Element 1 – Bus priority through key junctions**

The first package of measures will upgrade the Derby and Nottingham/Nottinghamshire Traffic Control Centre systems (TCC) to allow traffic light priority for buses at key junctions along the A52 corridor between Derby and Nottingham. The system will accept existing real-time feeds without the addition of extra on-board equipment. Junctions to be improved are three in Nottingham and two in Derby on the approaches to the city centre on the local road network. Junction locations are shown on the proposals plan.

The area already has extensive bus lanes and junction priority will further benefit the operators in terms of the operation of reliable services. The system has already been successfully trialled in the A60 corridor in Nottingham and it is proposed to replicate this along the A52 corridor

##### **Element 2 – Smart camera trial**

A smart camera traffic management system will be trialled in the Nottingham Enterprise Zone and Nottingham University area SCOOT region. This will collect vehicle movement data in the western sector of Nottingham covering the A52 and A6005 corridors. This data will be used to inform decisions taken within the TCC aimed at improving bus reliability, traffic flow and reducing congestion for all vehicles.

## **Component 2 - Public transport information system upgrade**

### **Element 1 – Real-time information display upgrade**

This package of measures involves the roll out of 250 28" TFT colour LCD screens along Derby - Nottingham bus corridors which will provide better disruption information and marketing of bus services and ticketing products. There will also be 55" TFT screens installed at key employer, development and interchange locations, including the Queens Medical Centre, Nottingham University, Nottingham Trent University, Long Eaton, East Midlands Gateway, Derby Royal Hospital and Derby Pentagon Island.

### **Element 2 – Real-time data feed consolidation**

Investment in a data brokerage system will enable non-INIT realtime data feeds to be accepted into the system. Examples of the screens to be deployed are attached (**B2b Strategic Case Visuals**).

## **Component 3 - Smart public transport payments**

### **Element 1 – Robin Hood on mobile**

This will enable the Robin Hood multi-operator bus and tram smart ticketing (pay-as-you-go and seasons) to be purchased and used via smart phone and other mobile devices.

### **Element 2 – Contactless tram platform ticket machine upgrade**

All tram platform ticket vending machines across the tram network will be upgraded to accept contactless payment. Once this has been transferred to a Rambus / ITSO platform, it will also allow integration with the existing Robin Hood Journey Planner App.

These improvements will build on Nottingham's existing investment in integrated ticketing and the recently awarded allocation to support rollout of contactless payments.

## **Component 4 - Electric charging at interchange hubs**

### **Element 1 - East Midlands Gateway electric shuttle charging infrastructure**

The final package provides electric shuttle charging infrastructure at East Midlands Gateway, supporting seamless bus journeys by facilitating an internal electric shuttle bus service from the site's public transport interchange. This will allow employees to complete the last 1.7km of their journey within the site by electric bus, whilst also supporting the future operation of an autonomous shuttle. A plan of the East Midlands Gateway scheme is attached (**B2c Strategic Case EMG Plan**).

### **Element 2 - Park and Ride electric vehicle charging infrastructure**

Electric car charging hubs will also be expanded at bus and tram park and ride sites at Queen's Drive, Toton and Clifton. Supplementing chargepoints already being installed through the D2N2 Charge Point Network, a further 16 dual outlet and 2 rapid 50kW chargers will be installed across the three sites.

## **Economic and social context**

A shared industrial history and close proximity means Derby and Nottingham have developed complementary economies, worth over £30bn pa, rather than in competition. They have distinct high value sectors; Derby is a UK centre of excellence for transport equipment manufacturing accounting for 30% of its GVA, and Nottingham increasingly grows jobs in niche sectors such as lifesciences, digital and fintech. There are a range of business and professional services, with many in both cities. Lower productivity sectors (e.g. retail, health and care, visitor) provide significant employment and jobs growth is forecast over the next decade.

The area is experiencing significant growth, having been identified by the Midlands Engine as one of four priority areas with potential to drive forward the Midlands economy. The region has attracted global businesses and significant out-of-town employment growth hubs are emerging between the cities (i.e. HS2 East Midlands Hub Station and proposed Innovation Campus) with supporting plans to build approximately 50,000 houses.

To achieve effective connectivity, it is important to develop transport infrastructure and build on high quality public transport services such as Nottingham Express Transit and the SkyLink bus network. This means evolving the mass transit system and key bus corridors and capitalising on planned investments, i.e. A52 and A38 road improvements, Derby rail and bus station upgrades, with new flexible public transport and active travel links. Exploiting new technology in key corridors connecting existing urban areas with emerging growth, will improve reliability and passenger confidence.

With increased growth comes the need for more journeys. The transport network is already strained with high levels of congestion witnessed at peak times, resulting in journey unreliability and costs to the economy. This is set to increase along with growth if we do not intervene with reliable, sustainable alternatives to the car. Transport infrastructure investment must join up economic and housing development to improve existing conditions and unlock transformational growth and productivity, including access to learning and health provision.

A large percentage of residents work, and employees live, in the area; by providing a connected network of public transport and walking/cycling routes, a sustainable transport solution can be provided for most transport needs.

Large percentages of unemployment are also prevalent in some areas. With increased work opportunities arising through the Enterprise Zones and business parks, it is crucial we provide the means for these people to access employment. Many people do not have access to a car so enabling them to use alternative modes is essential.

Health and life expectancy in the area is below average, with both cities having significantly lower than England averages across all four life expectancy indicators.

The 'window of need' gap between life and healthy life expectancy is marked; in Nottingham, males spend an average of 27% and females 30% of their lives in poor health. For each preventable cause, Derby and Nottingham consistently have the highest preventable mortality rates in the East Midlands. These are areas associated with the highest levels of deprivation in the region and people living here are more likely to suffer ill health and die prematurely. Health and life expectancy is increased through physical activity which is synonymous with traveling by public transport. Providing the ability for people to incorporate exercise into their daily lives through improved public transport links, and reduced carbon emissions through less vehicle trips, will provide personal health benefits and wider benefits through the improvements to air quality triggered by increased public transport use.

These scheme measures would therefore benefit the following people:

- Existing commuters within the region, by providing an alternative to the car
- Unemployed people in the region, by improving the bus reliability, journey time, and providing more ticketing options, allowing better access to work opportunities
- Those living in deprived areas, improving access to emerging opportunities for communities
- People in poor health or are at risk of poor health, by providing exercise opportunities through the ability to access work, education, shopping etc and for leisure purposes, whilst reducing nitrogen dioxide through reduced carbon emissions
- Businesses by improving productivity by reducing car-borne trips and therefore congestion for freight transport; better recruitment potential; reduced absenteeism; and better use of land allocations through reduced parking requirements
- Bus operators, by enabling a more reliable network thus reducing the need for additional peak vehicle requirement (PVR) and increasing revenue through additional patronage.
- Owners of electric vehicles, by offering charging facilities to support their use of public transport into the urban core during peak periods as an option along bus priority corridors.

Key statistics underpinning this section, are set out below:

- Workday population: 1.4 million - fifth largest urban area outside London and in European top 50.
- Predominantly urban (89% population) with approximate urban density of 2,000 people per km.
- High proportion of young people largely due to three highly rated universities (76,000 students).
- Over 600,000 jobs.
- 55% jobs located within the Derby and Nottingham administrative boundaries.
- 635,000 residents are in work (72% of 16-64s).
- 82% of residents work and 83% of employees live in the area.
- Overall unemployment rate 2.1% but ranges from 5.7% (Aspley in Nottingham and Cotmanhay in Erewash) to 0.2% (South West Parishes in Amber Valley).
- 72% of residents have at least 5 GCSEs grade A\* to C or equivalent compared to 75% nationally.
- 33% of people are qualified to degree level compared with 38% nationally but figures vary. In Ashfield, 59% of working age people have 5 GCSEs, and 18% a degree. Rushcliffe and Gedling have the highest proportions with 5 GCSEs and Rushcliffe, Broxtowe and Gedling the highest with a degree.
- Over 8% of projected population increase by 2029 with working age population to fall as a percentage of total.
- Up to an additional 50,000 houses are required over the next ten years.
- Urban-rural divide in life expectancy. Derby and Nottingham significantly lower than England averages across all four life expectancy indicators. Males in the least deprived Derby areas live 12 years, and females 8 years, longer than those in the most deprived areas.
- The 'window of need' gap between life and healthy life expectancy is marked, in Rutland, males spend an average of 13%, and females 17%, of their lives in poor health. In Nottingham, this equates to 27% of males and 30% of females on average.
- For each preventable cause, both cities consistently have the highest preventable mortality rates in the East Midlands. These are areas associated with the highest levels of deprivation in the region and people living here are more likely to suffer ill health and die prematurely.

## **Transport Barriers**

Although the region has good road links connecting the cities and out-of-town employment hubs, these are congested in the peak times. This is estimated to cost the East Midlands £825 million per annum with over half falling to businesses. The recently upgraded Derby-Nottingham transport model forecasts 11% increase in trips to 2033. With the level of growth planned for the region, we must provide the public with the ability to travel by more sustainable modes, otherwise congestion will increase resulting in poorer air quality and an increased cost to the local economy. The current road system is not sufficient to enable the growth which is anticipated. Providing priority through junctions will provide quicker, more reliable bus journeys making this mode more attractive compared to the car.

With high unemployment and low car ownership in certain areas of the region, it is important that we connect these areas with new out-of-town employment areas. This scheme contributes to a wider set of actions to improve the key bus and mass transit corridors, key interchanges, and ease of travel, providing a sustainable connected network available to all.

Whilst public transport accessibility is generally very good, beyond the urban edges it is variable. Smart card ticketing systems operate but are fragmented and separate with no single integrated ticket. Many Nottingham residents do not own or have car access (0.76 cars per person) reflective of high public transport use. Derby has higher ownership (1.06 cars per person) and lower public transport use per head. The Nottingham tram system now carries over 18 million passengers/year but is confined to just two cross-city routes. Derby operates a predominantly hub and spoke public transport model that can result in long journey times, including interchange, for cross-city journeys particularly to out-of-town locations.

The use of electric vehicles is increasing, which benefits the environment, but the lack of charging infrastructure prevents growth in this area. Providing electric vehicle charging at public transport interchanges will help support the growth in use of electric vehicles whilst sustaining the public transport network and reducing car-borne trips for part of the journey.

### **Exploring options and strategic alternatives**

The schemes form part of a package of deliverables which have been developed as part of a wider strategy for delivering a connected sustainable transport network. These particular schemes have been selected based on the ability to deliver them within the timescales of the Tranche 1 funding, and of which consents and, where applicable, match funding has been secured. The decision to focus on technological driven solutions to improve bus priority, connectivity and accessibility is borne out of the historic investment in physical priority measures such as bus lanes and bus gates across the Derby – Nottingham area.

Nottingham, for example, has 35km of bus lanes along 12 high frequency bus corridors but only 6 junctions that are able to provide traffic light priority for late running buses. Investment in technologically driven solutions has lagged behind that in physical measures. It is felt that investment to optimise late running buses' interaction with traffic signals not only represents a quick win but will also optimise the benefits that can be drawn from the network of bus lanes and bus gates that proliferate the region.

The real-time information system that stretches across the Derby – Nottingham City region and beyond, has, on the whole, been warmly received by both passengers and bus operators, but the existing 28" LED stretch displays have limited functionality. Passengers are increasingly expecting more accurate and higher quality information on their services and disruption, both via mobile phones and at bus stops. There is a need, therefore, to futureproof the real-time display network as part of the package of measures outlined in this bid to make bus travel smarter. Investment in 28" Colour TFT displays will modernise the

appearance of interchanges and bus stops along the key high frequency bus corridors identified and allow ageing signs that are approaching the end of their life and suffering reliability problems, to be replaced. Critically, operators will be able to market their services more effectively, provide more detailed disruption information including maps, and make bus travel even more accessible by supporting simpler connectivity to other bus services and modes of public transport. This improved accuracy and detail will take the quality of real-time travel information to the next level. In addition to the above, 55" Displays at key interchange points will also offer touch screen journey planning information alongside social media feeds and other content.

Further development of the Robin Hood Multi-Modal, Multi-Operator ticket on mobile phones and devices dovetails into and complements work underway to deliver contactless payment (Bank cards, Apple Pay et al.) across bus and tram services.

Investment in electric charging infrastructure at both East Midlands Gateway and park and ride sites will further support seamless low emission multi-modal journeys delivering a direct linkage with the Go Ultra Low Programme and Air Quality Plans being implemented.

The package outlined above, along with existing initiatives including significant investment in low and ultra-low emission buses, will help to improve bus provision to the key regional growth hubs and open up access to job opportunities beyond the urban fringe.

### **Exploring impacts of interventions**

The economic appraisal presented in the Economic Case for this programme forecasts that the package of measures will result in a total of:

- 106 fewer car trips per day, which convert to public transport trips.
- 2,219 fewer vehicle kilometres travelled per day.
- 173 fewer vehicle travelled hours and 212 fewer public transport passenger hours travelled per day, resulting from journey time savings linked to smartphone enabled public transport fare payments and smart traffic control system upgrades that will deliver more effective and widespread public transport priority via traffic signals.

A total of £20.78m of monetised economic benefits are estimated to be generated by full delivery of the package of schemes; yielding a Benefit Cost Ratio (BCR) of 4.24. The value of benefits breaks down as follows:

- 35% of total benefits accrue to public transport passengers through journey time savings associated with the Robin Hood smartphone fare payment option, enhanced pay-as-you-go top-up availability, and (primarily) from better journey time reliability and time-savings resulting from the smart traffic cameras and signal controlled/physical priority measures for buses at key junctions along 'high-value' growth corridors.
- 30% of forecast benefits are projected to arise through the enhanced real time information system, which will significantly improve both the quality and robustness of in-journey information for the people who make 17.6m bus trips along the Derby Road corridor each year. Once deployed the underlying technology will also make the extension of enhanced RTI easier and cheaper for other public transport corridors.
- 17% of the benefits arise through reductions in private car use and switching to public transport trips that are anticipated to result from the placement of EV charging facilities at Park & Ride locations in Greater Nottingham, and the delivery of a smart EV shuttle bus that will link the East Midlands Gateway public transport interchange with occupied employment sites on this major regional employment site.
- 11% of the benefits reflect valued time savings for car drivers benefitting from reduced delays and more reliable journey times during the AM and PM peak as a result of smart

traffic camera and public transport priority measures, which are expected to optimise traffic flow through key junctions and along the main growth corridors.

- 7% of valued benefits are reflected in cash handling and operational cost savings for public transport operators, which are linked to the boarding time reductions and lessened need for cash handling resulting from Robin Hood smartphone payment capability.

The appraised benefits are sensitive to expected behavioural response outcomes linked to public transport and highway journey time reliability improvements, and real time information amenity values. Even when the forecast behavioural responses are reduced to 25% of their appraised impact level (assumptions which are informed by behavioural responses and out-turn impacts from schemes delivered locally and elsewhere), the BCR remains positive at 1.7.

The following potential costs and benefits have not been quantified, but could reasonably be anticipated in the context of the package of measures proposed:

- The social value of the EV shuttle service being introduced, which may be offset by operational costs and externalities (energy consumption / infrastructure maintenance) and any opportunity cost associated with people using the shuttle who might otherwise have walked to their place of work from the public transport interchange at East Midlands Gateway.
- Potential mode shift impacts (from private car trips to public transport use) along the major growth corridors as a result of the journey time savings and improved reliability for public transport trips, and any associated valued journey time savings for new public transport users.
- More intensive occupation of employment sites along the growth corridors owing to higher levels of public transport use for journeys to work, and better use of land allocations through reduced parking requirements.
- The impact of improved bus and tram fare products, potentially unlocked through smartphone payment (e.g. geo-fenced fare pricing and account-based payment).
- Corridor-wide productivity benefits through reductions in public transport journey times, resulting from lower levels of 'with scheme' car use.
- Value of time savings for people achieving faster journeys as a result of switching modes to cycling when travelling at peak times.

Wider economic benefits associated with the more-sustainable and accelerated delivery of housing and economic growth along the Derby – Nottingham – East Midlands Airport/Gateway Triangle corridors are considered likely, but have not been appraised. It is reasonable to anticipate some degree of further Gross Value Added uplift as a result of the journey time savings and improved public transport offer for trips between new homes and jobs linked to HS2, East Midlands Airport and the 'East Midlands Gateway' Strategic Rail Freight Interchange, and major Enterprise Zones in both Derby and Nottingham.

#### **Aligning with wider local plans and objectives**

- The approach is strongly linked to wider long term plans and spatial strategies around housing, local growth, productivity and air quality. Improving access to East Midlands Airport and development of the HS2 Connectivity Strategy are two clear priorities of **Transport for the East Midlands**.
- It is consistent with the **Government's Industrial Strategy, Transport Investment Strategy** and **Road to Zero Strategy** as it will greatly improve local transport provision, improve productivity and help to rebalance the UK economy, improve competitiveness and local housing delivery. It will also support the uptake in Ultra Low Emission Vehicles.

- It supports the **Midlands Engine and associated Midlands Connect Transport Strategy** in strengthening economic performance by bringing economic activity closer together, and widening access to labour markets, supply chains and customers.
- The **D2N2 Strategic Economic Plan** identifies that investment in infrastructure will help unlock around 20,000 new jobs, 13,000 new homes and around £800m additional GVA by 2023. It also identifies connectivity as one of the key factors differentiating locations for investment.
- The scheme will help accelerate delivery of housing and employment sites set out in **local development plans**.
- The scheme is consistent with objectives for integrated transport set out in **Local Transport Plans**, and supports projects contained in the **D2N2 Local Cycling and Walking Investment Plan**.
- Working with public transport operators will be undertaken within the framework of strengthened partnership arrangements consistent with new bus powers.

In addition, the schemes link to the following plans:

- **Contactless Payment plan**
- **Public Transport Integration programme**
- **Advance Quality Partnership Scheme**
- **Derby Connected/Keeping Nottingham Moving transport communications**
- **Nottingham Air Quality Plan/Low Emission City Prospectus**
- **Emerging Derby Air Quality Plan.**

#### **Wider evidence and stakeholder views**

Transport for the East Midlands has brought together local authorities, including County Councils, to provide collective leadership on strategic transport issues for the region. It works to identify the transport priorities that will improve the region's economy and wellbeing of its people and to influence key delivery bodies.

Local leadership and vision is also being provided through the East Midlands HS2 Strategic Board that is overseeing the development of the East Midlands HS2 Growth Strategy that also supports the Midlands Connect Strategy and Midlands Engine.

A Growth Board has been established which is an alliance of leading businesses, universities and local authorities to provide the power and profile to achieve our economic aims. They will develop and lead pioneering proposals and build dynamic cross-sector relationships to enable the area to make the step change in the prosperity it has the potential to achieve. They are committed to working with Government and providing resources if we are successful in this process. Members of the Board also sit on the D2N2 Local Enterprise Partnership Board and Midlands Engine structures, this will ensure strong challenge and championing of the strategic fit with wider initiatives.

These stakeholders are committed to the provision of an integrated, connected sustainable transport solution and fully support this scheme.

A recent bus/tram survey (November 2018) identified the following trends and passengers demands and comments which demonstrate a direct correlation with the infrastructure interventions proposed by this bid. Of the 2,165 responses received 80% were linked to bus use. The relevant feedback and comments from this survey are outlined below:

#### **Questions**

**What would encourage you to use the bus/tram more often?**

Better timetabling	16.6%
Bus/tram closer to home/destination	18.4%
Cheaper fares	32.4%
More regular service	20.9%
Circular routes (e.g. east to west)	0.5%
Don't need more encouragement	2.8%
Integrated ticketing / contactless	0.6%
Larger / more buses at rush hour	0.8%
Void	7%

**Why do you choose to travel by bus/tram?**

Cheapest option	18.2%
Ease of access	30.4%
Environmental reasons	14.5%
No other option	12.4%
To avoid traffic / congestion	20%
I don't travel by bus / tram	0.2%
Alcohol consumption	0.65%
Bad Weather	0.16%
Don't or can't drive	0.48%
Parking costs / issues	1.32%
Void	1.71%

**Free text comments**

The comments below were linked to the questions "What would encourage you to use the bus / tram more?" and "Any other comments":

**Derby - Nottingham connectivity**

"Easy access to Nottingham and beyond"

**Smart Ticketing**

"I'd like to see more real time bus signs, a flat fare across all bus operators & tram. Plus contactless payment"

**Reliability**

"There is still an inconsistency in reliability."

**Bus priority**

"Buses should be given priority at major road junctions into and out of the city and road layouts changed to make room for buses. Broadmarsh Bus Station needs to be redeveloped as a matter of priority, the replacement shelters provided do not provide cover against inclement weather, are poorly lit, litter strewn, lack of adequate seating and smoking should be banned as it was in the bus station prior to its demolition. Cycling on pavements past bus stops should be addressed which is highly dangerous."

“Need more bus lanes and bus priority”

“Install smart traffic lights at major junctions giving buses priority.”

**Real time information**

“I’d like to see more real time bus signs, a flat fare across all bus operators & tram. Plus contactless payment”

“Please make the real-time displays more reliable!”

“The available apps for timetabling are rubbish. The information screens are intermittent/often blank or wrong. Bus drivers are very inconsiderate of cyclists (I cycle as well as catch the bus).”

“The electronic and paper timetables could also be improved as they are generally incorrect or not working.”

“The destination boards are too unreliable and break regularly.”

**Electrification**

“There needs to be better NCT Bus routes around wollaton, especially down the torvil and dean estate. Buses should all be switched to biogas or electric.”

“I’d like to see the no.35 as the next fully biogas route & the no.30 as the next electric route, e.g. like the electric "L" route services. Outside of London, our public transport network is the best in the UK but we mustn't rest on our laurels!”

“Love the electric buses, great for my asthma and the environment. Like the ten minute availability.”

<b>Objective</b>	<b>Impacts</b>
<i>TCF objectives met</i>	1. Support the local economy and facilitate economic development by improving access to employment and reducing congestion.  2. Reduce carbon emissions by increasing the volume and proportion of journeys made by low carbon, sustainable modes.  In addition, the following cross-cutting objectives are met:-  3. Deliver wider social and economic benefits through accessibility and social inclusion.  4. Improve air quality through reduced car-borne emissions and electrification of buses.  5. Drive up productivity, improve access to work and deliver growth through improved connectivity.
<i>Geographic corridor targeted</i>	Derby – Nottingham – East Midlands Airport/Gateway triangle
<i>Primary user</i>	<ul style="list-style-type: none"> <li>• Commuters</li> </ul>

<i>segment(s) targeted</i>	<ul style="list-style-type: none"> <li>• Unemployed</li> <li>• Visitors</li> <li>• General population</li> <li>• Businesses</li> <li>• Bus operators</li> </ul>
<i>Other benefits (environmental, social etc.)</i>	<ul style="list-style-type: none"> <li>• Health benefits through improved air quality and increased exercise associated with public transport use.</li> <li>• Reduction in isolation and social exclusion.</li> <li>• Social benefits through connectivity.</li> <li>• Environmental benefits through a reduction in carbon emissions.</li> <li>• Economic benefits by providing better access to work opportunities.</li> <li>• Wider economic benefits such as providing safer routes for travel, and value of time savings.</li> </ul>

### **B3. Economic Case – Value for Money**

The proposed public transport improvements along targeted growth corridors of the Nottingham – Derby – East Midlands Airport/Gateway Triangle are forecast to deliver a number of quantifiable and qualitative positive impacts over a 20-year appraisal period, running from 2019 to 2038. These include:

- Improving the reliability of bus and car driver journey times through key junctions and along approaches to busy intersections (using a combination of smart camera technology and upgrades to the Derby and Nottingham/Nottinghamshire Urban Traffic Control System) along four separate routes in Nottingham and Derby, will deliver journey time savings for existing travellers as well as new residents and employees of the metro area’s Enterprise Zones and growth areas.
- The addition of smartphone payment options for Robin Hood fares in Greater Nottingham, and extension of at-stop payments to the NET Tram network, will deliver further time savings for bus passengers as well as cost savings for bus operators, who will need to handle fewer cash transactions and will be able to operate services with less boarding delay.
- Extending Robin Hood payment options to smartphones is also forecast to result in additional public transport trips being made, with some passengers switching modes from car-based trips. This trend has been observed since the smartcard scheme’s introduction in early 2016.
- Upgrading to smart Real Time Information displays at stops along the A52 (Derby Road) and A453 (Queens Drive/Clifton Lane) corridors will enhance journey quality for passengers, improve the reliability of existing systems and enable a wider range of local public transport operators to share their real-time data feeds.
- Expanded EV charging for private vehicles at Park & Ride locations in Nottingham is expected to help increase the interception of EV drivers to complete their journeys into the city by public transport. It will also help to accelerate the decarbonisation of private transport in the area, contributing to localised improvements in air quality through reducing emissions from private vehicles.
- Delivering EV charging facilities for a first/last mile shuttle bus service at the East Midlands Gateway site will accelerate the delivery of this service and help to ensure that the target for 10% of employees travelling to the site by public transport is achieved. The resultant mode-choices will result in a reduction in private car vehicle kilometres travelled.

#### **Description of key impacts and benefits**

The range of forecast impacts (listed above) has been summarised in **Table B3.1** and was estimated using a range of approaches from within the WebTAG toolkit. The approach to forecasting impacts, range of assumptions applied and application of standard TAG data book values has been described in-line with calculations in the appended economic model spreadsheet entitled '**Nottm-Derby-Metro\_TCF-bid\_PT-Economic-Model\_201218**'. The number of appraisal components, and time available for preparing an economic case, meant that it was only possible to consider a single appraisal scenario. However, a small number of sensitivity tests have been applied to illustrate the impact of changes to assumed/forecast levels of impact associated with individual components of the package (discussed later in this section).

The completed Scheme Impact Proforma (included within the appended MS Excel file) indicates that the package of measures is forecast to result in a total of:

- 106 fewer car trips per day, which convert to public transport trips.
- 2,219 fewer vehicle kilometres travelled per day.
- 173 fewer vehicle travelled hours and 212 fewer public transport passenger hours travelled per day, resulting from journey time savings linked to smartphone enabled public transport fare payments and smart traffic control system upgrades that will deliver more effective and widespread public transport priority via traffic signals.

In addition to these benefits, the focus of the schemes on 'high-value' commuter and logistics corridors that link Derby, Nottingham and East Midlands Airport/Gateway with each other, and with the area's Enterprise Zones and other key housing and employment growth locations, is anticipated to deliver wider Gross Value Added and Additionality benefits associated with accelerated economic growth.

#### **Data used to underpin the estimated scheme impacts**

A range of baseline data sources were used to inform the 'without scheme' position for the purposes of economic appraisal. These are clearly documented in the accompanying MS Excel spreadsheet file (Nottm-Derby-Metro\_TCF-bid\_PT-Economic-Model\_201218), but can be summarised as follows:

- The additional number of bus/tram passenger trips recorded in the first 12 months following the launch of the Robin Hood smartcard and fare products (250,000). From this we inferred the potential impact of the additional smartphone payment option that will be delivered through Tranche 1 of the Transforming Cities fund.
- The total cash-handling costs for all local bus operators in 2017. From this we estimated the potential for operational savings to be made as a result of the reduction in on-vehicle and at-stop cash fare purchases.
- The average journey time saving per cash fare transaction (2.5 seconds, derived from DfT's smart and integrated ticketing research report) and the number of cash fare transactions in the Robin Hood travel area in 2016/17 (7.56 million). From this we inferred a proportion of cash transactions that may be saved from the introduction of smartphone ticketing.
- A similar calculation was made using the number of Pay-As-You-Go top-up transactions at Robin Hood ticket vending machines (134,275 from June 2016 – June 2017) and the time it takes to complete a top-up transaction (120 seconds on average). This was used to estimate the valued time saving to a portion of Robin Hood Smartcard users who it is anticipated will switch to using the pay by smartphone option which will be delivered.
- The average journey time saving per cash fare transaction, and number of cash fare transactions on buses and at tram stops was also combined with average bus loading data (derived from DfT's latest Bus and Light Rail statistics) to estimate the benefits to

all passengers resulting from on-board cash fare reductions (through the possibility for reduced dwell times).

- The recorded number of bus trips along the Derby Road corridor (17.6m in 2017/18) against which an amenity value of five pence per trip for enhanced Real Time Information was applied to a portion of the journeys (up to 75%) being made along the corridor.
- Average Annual Daily Traffic flows (sourced from a combination of DfT's monitoring data and Nottingham City Council's recent Ring Road improvement and NET Tram extension impacts monitoring activities) were combined with average journey time and delay data (extracted from the Trafficmaster dataset and Google Maps' driving directions and journey time sample) to calculate the total minutes of AM peak journey times affected by congestion impacts and average delay extents. An average reduction in traffic delay (-18.9%) derived from TRL research into the impact of smart traffic control systems (SCOOT) was applied to the extent of routes covered (15%) through which the traffic flow could be enhanced. Value of time savings were then calculated from the resulting numbers, using the journey time reliability factor of 0.4 specified in ITS Leeds and Accent's research into the value of travel time savings and reliability on behalf of DfT.
- The average journey delay saving of 2.5 mins per passenger in the AM/PM peak (calculated from TRL research report 409) was multiplied by the number of bus trips made along the Derby Road corridor in 2017/18 (17.6m) and factored to reflect the portion of daily trips that are completed under AM/PM peak conditions (40%), and the portion of route delays that are likely to be addressed through the intervention (10%). Value of time savings were then calculated from the resulting numbers, using the journey time reliability factor of 1.4 specified in ITS Leeds and Accent's research into the value of travel time savings and reliability on behalf of DfT.
- The average number of charge cycles recorded across Nottingham's existing EV charging network (three per day, recorded through the Nottingham Go Ultra Low programme) was multiplied by the number of additional parking spaces at Park & Ride locations that will benefit from EV charging capabilities. We conservatively assumed that 75% of vehicle trip arrivals at Park & Ride locations resulted in a bus or tram trip into Nottingham and applied the average vehicle occupancy of 1.57 (derived from the latest WebTAG data book) and 220 working days per annum as a basis for calculating the estimated number of round trips and car vehicle kilometres that could be substituted from EV to public transport trips into the centre of Nottingham and key employment destinations along the Park & Ride corridors.
- We used data from the East Midlands Gateway Travel Plan as a basis for assuming that only 5% of the 7,500 employees who will ultimately be based at this key growth location would travel by public transport without the delivery of a first/last mile EV shuttle that integrates with bus-based public transport services (to the entrance of the business park) to reduce the up to 1.7km walk from the public transport interchange. After applying a further assumption that 50% of these people might use the EV shuttle service (with the remainder assumed to walk), we then factored-in anticipated site build-out and occupation rates, which enabled us to estimate the reduced numbers of car commuter trips and total distances travelled (applying the TAG data book national average of 13.8km per car trip). These vehicle Km savings were then multiplied by the WebTAG marginal external cost values to calculate a traffic reduction benefit associated with the service's introduction.

## Sources of benefits

The value of benefits associated with the appraised package of smart public transport interventions (presented in **Table B3.1**) is distributed as follows:

- 35% of total benefits accrue to public transport passengers through journey time savings associated with the Robin Hood smartphone fare payment option, enhanced pay-as-you-go top-up availability, and (primarily) from better journey time reliability and time-savings resulting from the smart traffic cameras and signal controlled/physical priority measures for buses at key junctions along 'high-value' growth corridors.
- 30% of forecast benefits are projected to arise through the enhanced real time information system, which will significantly improve both the quality and robustness of in-journey information for the people who make 17.6m bus trips along the Derby Road corridor each year. Once deployed the underlying technology will also make the extension of enhanced RTI easier and cheaper for other public transport corridors.
- 17% of the benefits arise through reductions in private car use and switching to public transport trips that are anticipated to result from the placement of EV charging facilities at Park & Ride locations in Greater Nottingham, and the delivery of a smart EV shuttle bus that will link the East Midlands Gateway public transport interchange with occupied employment sites on this major regional employment site.
- 11% of the benefits reflect valued time savings for car drivers benefitting from reduced delays and more reliable journey times during the AM and PM peak as a result of smart traffic camera and public transport priority measures, which are expected to optimise traffic flow through key junctions and along the main growth corridors.
- 7% of valued benefits are reflected in cash handling and operational cost savings for public transport operators, which are linked to the boarding time reductions and lessened need for cash handling resulting from Robin Hood smartphone payment capability.

**Table B3.1: Quantitative impacts of scheme benefits  
(20-year appraisal period 2019-2038, NPV in 2010 prices and values)**

	Intervention	UNIT	Scheme impact estimate
<b>Time savings for local PT users</b>	Total bus passenger hours saved through boarding efficiencies	HOURS	530,696
	NPV of total bus passenger value of time-saving	£	2,863,956
	Total passenger hours saved through reduction in TVM top-ups	HOURS	25,512
	NPV of total bus passenger value of time-saving	£	137,679
	Total passenger hours saved through bus journey time reliability improvement + priority measures	HOURS	595,266
	NPV of total bus passenger value of time-saving	£	4,602,384
	<b>Total bus passenger valued time saving benefits (£ Present Value Benefits, 2010 prices)</b>	<b>£</b>	<b>7,604,019</b>
<b>RTI amenity value for local PT users</b>	Estimated number of bus trips along the Derby Rd Corridor benefitting from enhanced RTI	TRIPS	252,545,830
	<b>Total amenity value for bus passengers (£ Present Value Benefits, 2010 prices)</b>	<b>£</b>	<b>6,346,027</b>
<b>Time savings for car drivers</b>	Estimated AM/PM peak trips benefitting from smart traffic camera + PT priority measures	TRIPS	372,883,061
	Estimated AM/PM peak journey time savings for car drivers from reduced delay/variability	HOURS	48,283,407
	<b>Total value of time saving benefits for car drivers (£ Present Value Benefits, 2010 prices)</b>	<b>£</b>	<b>2,317,001</b>
<b>WebTAG mode-shift benefits linked to EV charging infrastructure + EV shuttle bus facilities</b>	Net change in Bus and Tram trips	TRIPS	1,150,290
	Net change in Car trips	TRIPS -	1,419,749
	Reduced Car km travelled	KM	14,123,700
	Congestion (£)	£	3,606,916
	Infrastructure (£)	£	9,494
	Accident (£)	£	284,821
	Local Air Quality (£)	£	1,460
	Noise (£)	£	18,988
	Greenhouse Gases (£)	£	41,185
Indirect Taxation (£)	£ -	217,641	
	<b>Marginal External Benefits from reduced car travel (£ Present Value Benefits, 2010 prices)</b>	<b>£</b>	<b>3,745,223</b>
<b>Carbon and Air Quality</b>	Change in CO2e - arising from reduction in car KM travelled	TONNES -	519
<b>Cost savings for bus operators</b>	Reduction in cash handling costs for operators (£ NPV)	£	991,750
	Total bus operating hours saved	HOURS -	29,909
	Total bus operating km saved	KM -	478,552
	Saving to bus operators through reduced operating km (£ NPV)	£	430,354
	<b>Total cost savings for bus operators (£ Present Value Benefits, 2010 prices)</b>	<b>£</b>	<b>1,422,104</b>
<b>Total</b>	Total benefits 2019-2038 (2010 prices)	£	21,434,372
	Match funding contributions	£	650,000
	<b>Total Benefits 2019-2038 (£ Present Value Benefits, 2010 prices)</b>	<b>£</b>	<b>20,784,372</b>
<b>Costs</b>	Estimated cost of scheme, including Optimism Bias uplift	£	5,695,000
	Re-valued to 2010 prices	£	4,900,079
	<b>Total Net Present Costs (£) &amp; BCR</b>		<b>4.24</b>

The following potential costs and benefits have not been quantified, but could reasonably be anticipated in the context of the package of measures proposed:

- The social value of the EV shuttle service being introduced, which may be offset by operational costs and externalities (energy consumption / infrastructure maintenance) and any opportunity cost associated with people using the shuttle who might otherwise have walked to their place of work from the public transport interchange at East Midlands Gateway.
- Potential mode shift impacts (from private car trips to public transport use) along the major growth corridors as a result of the journey time savings and improved reliability for public transport trips, and any associated valued journey time savings for new public transport users.
- More intensive occupation of employment sites along the growth corridors owing to higher levels of public transport use for journeys to work, and better use of land allocations through reduced parking requirements.
- The impact of improved bus and tram fare products, potentially unlocked through smartphone payment (e.g. geo-fenced fare pricing and account-based payment).

- Corridor-wide productivity benefits through reductions in public transport journey times, resulting from lower levels of 'with scheme' car use.
- Value of time savings for people achieving faster journeys as a result of switching modes to cycling when travelling at peak times.

### **Distributional analysis of forecast benefits**

The benefits identified in **Table B3.1** will accrue primarily to public transport passengers and highway users travelling along the Derby Road/A52, A6005, A6200 and Queens Drive/A453 corridors which link the Nottingham-Derby-East Midlands Gateway growth areas. The routes are sufficiently integral to the whole areas transport networks that these improvements are expected to benefit a wide range of people, but their geographic locations and proximity to strategic growth sites means benefits are most likely to accrue to:

- People commuting between home and work locations along the A52/Derby Road corridor that connects Nottingham city centre, Queens Medical Centre, University of Nottingham, Toton HS2 Station Growth zone, Derby City Centre.
- Residents, businesses, employers, and other facility owners located along this corridor.
- Public transport operators with routes serving the A52/Derby Road.
- Residents, business occupiers and employees of the East Midlands Gateway Strategic Rail Freight interchange situated between M1 J24 and East Midlands Airport.
- New and existing electric vehicle owners driving into Nottingham and using the Park & Ride facilities.
- All highway users in Derby City Centre and Nottingham City Centre who will benefit from the enhanced smart traffic camera and UTMC system upgrades.

No attempt has been made to appraise the wider economic benefits associated with the more-sustainable and accelerated delivery of housing and economic growth along the Derby – Nottingham – East Midlands Gateway Triangle corridors. Given these corridors link some of the region's primary economic centres and growth hubs, it is reasonable to anticipate some degree of further Gross Value Added uplift as a result of the journey time savings and improved public transport offer for trips between new homes and jobs linked to HS2, East Midlands Airport and the 'East Midlands Gateway' Strategic Rail Freight Interchange, and major Enterprise Zones in both Derby and Nottingham.

### **Value for Money assessment**

As shown in **Table B3.1**, and underpinned by the appended economic appraisal spreadsheet and Scheme Impact Proforma, the project impacts were evaluated over a 20-year appraisal period, with all values and prices adjusted to 2010 levels, and all future benefits discounted by 3.5% per annum in line with WebTAG guidance to account for social time preference. The economic appraisal shows an indicative Benefit-Cost Ratio (BCR) of 4.24 which suggests the appraised programme of 'quick win' public transport projects sits at the higher end of DfT's High Value threshold.

This 'Very High' level of value for money is consistent with that typically delivered through lower-cost interventions of this nature which have potential to improve journey time reliability and achieve modest daily time savings for a large number of beneficiaries. Annex A has been completed as fully as is possible, with supplementary spreadsheets provided so that DfT's scheme appraisal team can explore the underlying assumptions and input values, as desired.

### **Key risks and uncertainties**

Derby and Nottingham City Councils, and their delivery partners, have significant experience of delivering public transport priority and UTMC system improvements as part of their ongoing delivery of Local Transport Plan and Bus Quality Partnership undertakings. Given that a number of the proposed schemes have already been designed and are ready to be delivered, subject to funding, and in view of the limited timescales for delivery we have included an average 15% level of Optimism Bias within the scheme costs (25% for schemes with a technology component, and 10% for all other projects). This should ensure that an adequate contingency budget is provided in the event of any unforeseen risks.

As noted in the Commercial Case section of this bid form, the delivery of the projects being proposed can be readily procured through existing arrangements that Derby and Nottingham City Councils have in place.

In terms of impact on scheme BCR, the most significant risk associated with the proposed package of projects is the assumed level of journey time savings and real time information amenity benefits delivered through the programme. A sensitivity test at half the level of assumed journey time savings and RTI amenity benefits was performed, which yielded a BCR of 2.38. This is still 'high value' in DfT value for money assessment terms, and was reflected by the proportion of these benefits reducing to 66% of all appraised benefits (from a current level of 76% of all benefits). Further halving these behavioural responses (thereby placing them at 25% of their appraised value), which is considered unrealistic given they are based on sound evidence from previously delivered interventions in the local area and documented in DfT research, yields a BCR of 1.7. This is still considerably better than a break-even BCR of 1:1.

The appended economic appraisal file, which includes DfT's Scheme Impact Proforma table that is linked through to the underlying data and assumptions (which can be manipulated) can be used to undertake further sensitivity tests in respect of different levels of behavioural impact, as desired

### **B4. Financial Case – Scheme**

All costs associated with the Public Transport Technology Package are expected to commence in the 2018/19 financial year, with some elements of delivery over-hanging into the 2019/20 financial year. The Package value break down is:

**Total scheme cost (£m) including third party match contributions:** £5.695m

**Total DfT (TCF) funding contribution (£m):** £5.045m

**Total public sector contribution (£m):** £0.000m

**Total local and/or private contribution (£m):** £0.650m (£250k Tramlink, £100k Smart traffic camera contribution, £250k East Midlands Gateway developer contribution, £50k Chargemaster EV charging provider). Match funding is available from bus operators to support the Smart Junction Priority Element which will take the form of investment in the Auto Vehicle Location equipped ticket machines (NB As yet this has not been quantified and is additional to the local contributions set out in this submission).

These costs have been discounted to 2010 real prices in order to facilitate the value for money assessment, and break down as follows:

**Total scheme cost (£m, 2010 prices):** £4.900m

**Total DfT (TCF) funding contribution (£m, 2010 prices):** £4.341m

**Total public sector contribution (£m, 2010 prices):** £0.000m

**Total local and/or private contribution (£m, 2010 prices): £0.559m**

A full breakdown of the Scheme Costs is set out in **Table B4.1** below:

**Table B4.1: Public Transport Technology Package Scheme Costs**

Scheme Costs					
DfT funding sought (£m)	5.045				
Match contribution (£m)	0.650				
	<b>5.695</b>	includes Optimism Bias			
Scheme Measures	Estimated Cost	Optimism Bias %	Estimated Cost (2019 prices)	Match funding (third parties)	Total Cost (incl match)
<b>Component 1: Smart Traffic System Control and Public Transport Priority</b>					
1. UTC and Junction Priority improvements Nottingham	0.500	25%	0.625	0.000	<b>0.625</b>
2. Derby City to A52 Junction Priority Improvements	0.400	25%	0.500	0.000	<b>0.500</b>
3. Smart Traffic Camera Trial (Nottingham Enterprise Zone A6005 and A52 corridors)	0.100	25%	0.125	0.100 Smart Camera Contribution	<b>0.225</b>
<b>Component 2: Smart Public Transport Information Systems</b>					
1. Real-time Information Display Upgrade	2.300	10%	2.530	0.000	<b>2.530</b>
2. Real-time data feed consolidation	0.100	10%	0.110	0.000	<b>0.110</b>
<b>Component 3: Smart Public Transport Payments</b>					
1. Robin Hood on Mobile	0.300	10%	0.330	0.000	<b>0.330</b>
2. Contactless Tram platform ticket machine upgrade	0.250	10%	0.275	0.250 Tramlink	<b>0.525</b>
<b>Component 4: Smart Public Transport Hubs</b>					
1. East Midlands Gateway Electric Shuttle Charging Infrastructure	0.250	10%	0.275	0.250 Roxhill EMG	<b>0.525</b>
2. Park and Ride EV Charging Infrastructure	0.250	10%	0.275	0.050 Chargemaster	<b>0.325</b>
	<b>4.450</b>		<b>5.045</b>	<b>0.650</b>	<b>5.695</b>
	Cost excluding Optimism Bias		Total DfT Funding Sought	Total Third Party Match Funding	Total package value incl third party match funding (2019 prices)

The bid proposals represent good value for money and are fully scalable.

## **B5. Management Case – Delivery and Risk Management**

Nottingham City Council will be the accountable body for the Derby-Nottingham Active Travel Package. The Council has a proven track record for delivery of large transport schemes through effective partnership working with a range of organisations across the public, private and third sectors. Evidence of successful partnership delivery includes the Access Fund and Go Ultra Low Nottingham programme (both of which involve Derby City Council). The Council has worked with private sector organisations through delivery of major infrastructure projects including NET Line One, the development of NET Phase Two and the Nottingham Station redevelopment.

These examples demonstrate the significant knowledge and expertise the in-house teams hold in delivery of both large-scale infrastructure and specialist service improvements.

All projects are planned to commence in March 2019, pending approval from the Department for Transport in February 2019. Once project finances have been accepted and approved in March 2019, all project elements will commence with schemes implemented and all completed by November 2019.

A gantt chart setting out the delivery timescales is attached in document entitled **B5 Management Case Delivery**. A summary of the key milestones is set out in **Table B5.1**.

### **Risk Management Strategy**

Risks are tracked in accordance with the Council's corporate risk management principles, which draw upon the PRINCE2 methodology. This strategy requires the identification and recording of risks, an evaluation of their likelihood and any mitigation actions. This approach ensures that all risks are captured and processed in a consistent manner. Without mitigation, these could result in increased costs to the programme, reductions in the quality of outputs and slippages in timelines, all affecting the overall benefits and outcomes the business case seeks to deliver. Ownership of the risk register falls with the Programme Manager. These risks will be subject to on-going monitoring and mitigated through effective programme management and partnership working. Attached **B5 Management Case Risks** sets out the key risks associated with the Public Transport Technology package measures.

### **Component 1 - Bus priority through key junctions and smart camera trial**

#### **Element 1 – Bus priority through key junctions**

The move away from a locally triggered traffic light priority system to a central system with a direct data feed into the TCC has been identified as part of the D2N2 Real-time Information review.

As well as the required system upgrades to the Derby and Nottingham TCCs, junctions on the A52 corridor between Nottingham and Derby have been identified for the extended pilot, prior to mass roll-out.

#### Risks

TCC systems management – resources be required to manage the data feeds from operators and the UTC system. Conversations have already begun with bus operators and Via traffic signal design (Notts) and Nottingham and Derby UTCs, and is likely to be low risk and manageable.

Works clash with existing A52 improvements in and around Derby – initial discussions with contractors have established that small scale physical works can be programmed to avoid clashes. Low risk

Match funding – available from bus operators in the form of investment in the Auto Vehicle Location equipped ticket machines (NB As yet this has not been quantified and is additional to the local contributions set out in this submission).

#### Timeframe

Feb – Apr 19: Specification for UTC upgrades and bus operator data feeds finalised  
May 19: Order placed

Jun – Sep 19: UTC system implemented and commissioned; junction upgrades rolled out; operator data feeds commissioned from existing real-time data.  
Oct – Nov 19: Go live

## **Element 2 – Smart camera trial**

Smart camera traffic management system covering the Nottingham Enterprise Zone/Nottingham University area SCOOT region. The system will collect transport data in the western sector of Nottingham covering the A52 and A6005 corridors. This data will be used to inform decisions taken within the Traffic Control Centre aimed at improving bus reliability, traffic flow and reducing congestion for all traffic.

### Risks

Data provided to UTC will be inaccurate / trigger unintended consequences – before using data on the live UTC system, it will be modelled in a test environment. Low/medium risk.

Match funding – low risk. £100k already allocated from local transport plan to support project.

TCC staff / signal design team skills – training will be bought in from supplier to ready staff for roll-out if required. Low risk.

### Timeframe

Feb – Mar 19: Order placed with Vivacity

Apr – Jul 19: System implemented and commissioned; camera installs rolled out

Aug 19: Go Live

## **Component 2 - Public transport information system upgrade**

### **Element 1 – Real-time information display upgrade**

Roll out of 28" TFT colour LCD screens along Derby - Nottingham bus corridors, supporting the provision of better disruption information and marketing of bus services and ticketing products. 55" TFT screens installed at key employer, development and interchange locations.

Provision and development of integrated real-time public transport information has been identified as a key workstream of Derby and Nottingham's public transport integration programmes and via the D2N2 Real-time Information review.

### Risks

Compatibility with existing LED screen estate – minor risk; expansion of EPI4 content management system for TFT screens is not expected to impact on the performance of the wider display network or put extra pressure on data communications systems.

Increase electrical consumption of new displays – not expected to be a major issue at stops not located in the proximity of ticket vending machines; feeder pillars can be installed to remedy problems if required.

Display installation – core installation team will need to be expanded to meet timescales. Extra resource has been identified so not expected to delay the project.

Procurement – displays can be procured from an existing Nottinghamshire County Council framework which Nottingham City Council is able to call upon. Therefore, no risks are associated with a protracted public procurement exercise.

#### Timeframe

Feb – Mar 19: Order placed

Apr – Sep 19: Rolling Install, Commissioning and Go Live

#### **Element 2 – Real-time data feed consolidation**

Investment in a data brokerage system will enable non-INIT realtime data feeds to be accepted into the realtime system.

Provision and development of integrated realtime public transport information has been identified as a key workstream of Derby and Nottingham’s public transport integration programmes and via the D2N2 Realtime Information review.

#### Risks

Ticket Machine Supplier Application Programming Interfaces (APIs) create conflicts for consolidation of data – low risk. Pilot project and market engagement with 21<sup>st</sup> Century to preferred data brokerage supplier and competing ticket machine suppliers suggest that any blockages are unlikely to prevent full data feed consolidation.

#### Timeframe

Feb – Mar 19: Order placed

Apr – Jul 19: System implementation

August 19: Go Live

#### **Component 3 - Smart public transport payments**

##### **Element 1 – Robin Hood on mobile**

Existing Robin Hood Multi-Operator Pay-As-You-Go and Season Ticket smart tickets will be available on mobile phones and other devices and integrated with the existing Robin Hood app and journey planner.

This has been identified as a key aspect of the public transport integration programme and has natural synergy with the contactless payment project, has buy in from the Robin Hood Operators Group and is a central tenet of the Nottingham City Council ticketing channel shift programme. Match funding from public transport operators has been secured. Learning from this project can be applied to the roll-out of Derby’s Spectrum smart ticket on to mobile phones and devices at some point in the future.

#### Risks

Robin Hood Operator’s group are yet to formally sign-off – minimal risk given this forms a central part of the council’s channel shift programme and Robin Hood Operator’s group are supportive of development to smart ticketing and contactless payment initiatives.

#### Timeframe

Feb – Mar 19: Specification developed; order placed

Mar – Jun 19: Implementation

Jun – Jul 19: Commissioning and Testing  
Aug 19: Roll out and Go Live

## **Element 2 – Contactless tram platform ticket machine upgrade**

Contactless Payment upgrade will allow tram only and Robin Hood Multi-operator tickets to be purchased, and smart card top-ups to be paid for, through contactless means.

This has been identified as a key aspect of the public transport integration programme and has natural synergy with the contactless payment project, has buy-in from the Robin Hood Operators Group and is a central tenet of the Nottingham City Council ticketing channel shift programme. Match funding from public transport operators has been secured.

### Risks

Resource available for required mechanical engineering – minor risk as works can be planned with existing refurbishment works planned for existing contactless payment project.

### Timeframe

Feb – Mar 19: Specification developed; order placed  
Mar – Jun 19: Implementation  
Jun – July 19: Commissioning and Testing  
Aug 19: Roll out and Go Live

## **Component 4 - Electric charging at interchange hubs**

### **Element 1 - East Midlands Gateway electric shuttle charging infrastructure**

Infrastructure will support seamless bus journeys through the delivery of an internal shuttle bus service from the site public transport interchange, enabling employees to complete the last 1.7km of their journey within the site by electric bus, whilst also supporting the future operation of an autonomous shuttle.

### Risks

Negotiations with other local authorities not completed – as site sits within North-West Leicestershire scheme partnership details have not been fully ironed out, formal consent from North West Leicestershire for Derby – Nottingham to lead has not yet received. But discussions at the site development meetings indicate this is a minor concern regarding risk to delivery.

Availability of suitable electrical connections – new site with good power resource and a number of substations indicates this is a low risk. Of bigger concern is arranging the connection to the grid within the timescales via the Distribution Network Organisation (DNO) but good links established with Western Power through partnership working on Derby – Nottingham's Go Ultra Low Programme, can be used to mitigate this risk which is thought to be low/medium.

### Timeframe

Feb – May 19: Site scoping; orders placed  
Jun – Jul: Civil works  
Aug - Sep: Electrical connections and charging points installs  
Sep – Oct: Charge points commissioned  
Oct 19: Go live

## **Element 2 - Park and Ride electric vehicle charging infrastructure**

A number of charge points are planned for the Nottingham bus and tram park and rides. The plan has been tempered in order to manage wide coverage of chargers across the 16 local authority areas that comprise the D2N2 network. Additional Transforming Cities Funding would enhance charge point provision.

### Risks

Scoping - studies identifying adequate power capacity complete and agreements in place with Western Power (DNO) which can be called upon as the sites have already been identified within the existing Derby – Nottingham Go Ultra Low programme. Low / Medium risk

### Timeframe

March 19: Orders placed  
March – April 19: Civils and electrical connections  
March – April 19: Charge point installs  
April 19: Chargepoint commissioned  
End April 19: Go live

## **B6. Management Case – Governance**

Do you have governance processes in place to deliver the scheme?

Yes       No

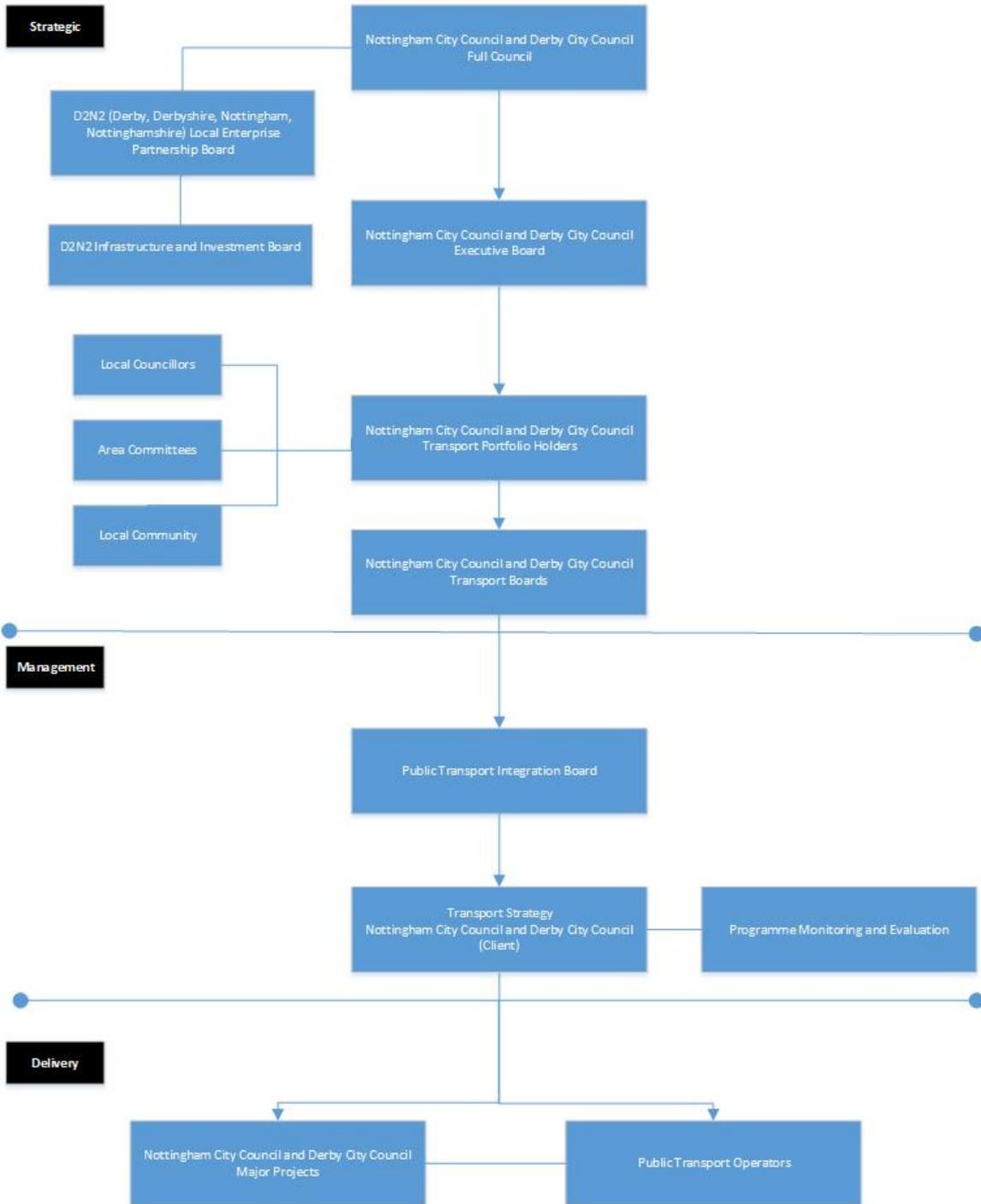
Please provide the name and position of the Senior Responsible Owner:

Chris Henning, Director, Development and Growth, Nottingham City Council

### **Governance Structure**

The organogram below details the governance structure for the delivery of the bus improvement packages. Derby City Council and Nottingham City Council will act as the Client and Project Manager. The Project Management Team and Senior Responsible Officer will meet regularly with the Public Transport Integration Board to update on progress against project timescales. Project implementation will be led by the Senior Responsible Officer with technical support and input from Bus Operator IT / Engineering teams and each of the local authority's, Major Projects, Public Transport and Traffic sections.

## Transforming Cities Public Transport Programme Governance



### Roles and Responsibilities

#### Strategic bodies

The Council Leaders and Portfolio Holders will represent the programme at a strategic Derby-Nottingham Metro Growth Board who will provide oversight and scrutiny of the

programme to ensure it stays on track in meeting its deliverables and wider local policy objectives.

The roles and responsibilities of the Transport Delivery Boards will be to provide leadership, drive a robust approval and sign off process and guide delivery in respect to other transport strategies and wider portfolio priorities. Project Managers will attend transport delivery boards to provide updates on the progress of the programme in turn providing updates to the transport portfolio holders, raising with them any appropriate changes to the risks and issues of the programme in addition to securing any decisions that are required.

Programme progress against the deliverables will be shared with the D2N2 board, Infrastructure and Investment Board and technical officer group who will provide additional assurance against the deliverables.

### **Management and delivery**

The **Senior Responsible Owner (SRO)** (Corporate Director of Development and Growth, Nottingham City Council) will have overall decision making responsibility for ensuring the programme meets its wider objectives and delivers against the desired outcomes. Overseeing the programme to time, budget and quality, the SRO is responsible for the success of the proposals and owns the business case, provides leadership, manages relationships with partners/stakeholders and recommends opportunities to optimise cost/benefits.

The existing **Transport Boards** will hold primary responsibilities for providing overall direction, management and assurances including Quality, Business, User and Supplier. The Board acts as the overarching programme management governance for all transport programmes developing and informing the emerging transport vision for Nottingham and surroundings. Membership of the Board includes: Portfolio Holder for neighbourhood Transport, Corporate Directors for Development and Communities, Directors for Traffic and Transport and Commercial and Neighbourhood Services, Director Major Programmes, Transport Strategy Manager, Head of Finance and others as required, including legal and procurement representation.

A nominated **Programme Manager (PM)** (based within Major Projects, Nottingham City Council) will manage the day to day delivery of the programme on behalf of the Transport Board, ensuring it delivers to the required quality standards and within the specified tolerances of time, costs and resources. The PM oversees the change control and risk management functions, is responsible for commissioning activities with the internal DLO and other Contractors, financial monitoring, reporting of progress to the Board and other stakeholders, coordinating communications activities and undertaking evaluation activities.

The **project delivery team** consists of specialist skilled staff responsible for the delivery of the specified initiatives within the programme and of reporting project deliverables and other outputs to be fed into the overall evaluation activities. For significant divergences to timescales, costs or any other variations, these changes are captured by the PM and where necessary escalated to the Board for resolution. Both Councils' have dedicated experienced support for communicating progress/updates to the public and wider stakeholders, which will be pulled in as the Schemes require.

## B7. Commercial Case

Procurement of the required goods and services can be delivered through existing procurement frameworks or through permissions to direct award. Market engagement has already been completed in regard to the investment in real-time information as part of the regional real-time information review, a position that is replicated with regards to smart public transport payment, smart traffic systems and electric charging infrastructure elements.

Nottingham City Council will be responsible for all financial management, monitoring and authorisation of all transactions and contractual arrangements between internal and external organisations to ensure compliance with all relevant legal and financial regulations relating to the procurement and commissioning of goods and services.

The procurement strategy for each individual element of the bus packages is outlined below:

Package component	Element	Procurement Strategy
<b>Smart Traffic Systems Controls and Public Transport Priority</b>	UTC and Junction Priority Nottingham	Urban Traffic Control System upgrades and SCOOT detection equipment can be procured via Nottingham City Council's existing framework with Siemens, enabling all orders for works to be placed without the need for a full procurement exercise.
	A52 Junction Priority Derby (Red Arrow)	Civil engineering works will be procured through existing Derby City Council procurement framework, enabling the works to begin promptly.
	Smart Traffic Camera Trial	OJEU procurement threshold not exceeded. Internal council approval will be sought to direct award to Vivacity who have been identified as the preferred partners for this pilot project given their success in rolling out the system in Greater Manchester.
Smart Public Transport Information systems	Realtime Display Upgrades and Data Feed Consolidation	Displays and Data Feed Brokerage system can be procured from an existing Nottinghamshire County Council framework which Nottingham City Council is able to call upon, thus negating the need for a protracted procurement exercise.
Smart Public Transport Payment Mechanism	Robin Hood on Mobile	Full OJEU procurement not required as the supplies and services to be purchased are below the current threshold of £181,302. This will enable the project to be delivered swiftly. Monies above the threshold of the grant applied for will be used to meet internal project management costs.
	Contactless Payment Tram Platform Ticket Machine Upgrade	Full OJEU procurement not required. A grant funding arrangement will be put in place between Nottingham City Council and Tramlink. This will allow Tramlink to use one of their existing frameworks to deliver the required upgrades.

Smart Public Transport Hubs	East Midlands Gateway Electric Shuttle Charging Infrastructure	Developer to procure the infrastructure.
	Park Ride Electric Car Charging Infrastructure	Charge points, civil engineering works and electrical connections will all be commissioned via the existing D2N2 Charge Point Network Concession Contract to be delivered by Chargemaster.

### B8. Equality Analysis

Has any Equality Analysis been undertaken in line with the Equality Duty?

Yes       No

See B8 Equality Analysis PT attached.

## SECTION C – Monitoring, Evaluation and Benefits Realisation

### C1. Monitoring

An **Annual Monitoring Report (AMR)** should be prepared following the completion of each year of the project. This will report on the outputs achieved each year for each individual project contained in the full package, including:

- Project update
- Financial spend
- Outputs achieved from each element of the project
- Reporting of any changes to the format of the project, and update on the risk register
- Overall summary of project progress

The AMR will be prepared by September of each year, reporting on the preceding financial year's activity. Hence, the first AMR would be prepared in September 2019 reporting on 2018/19.

Do you agree to undertake this monitoring?

Yes       No

### C2. Evaluation

Each scheme over £5m should be evaluated in line with the DfT's Monitoring and Evaluation Framework (2012). This requires the preparation of a monitoring and evaluation plan, to be signed off by the Department, as well as 1-year and 5-year post-completion evaluation reports. The evaluation should aim to identify to what extent schemes achieved their main objectives, and what value for money was achieved. In cases of innovative, complex or controversial projects, the evaluation should also explore what challenges the scheme implementation encountered and how it dealt with these challenges.

Do you agree to undertake this evaluation?

Yes       No

### **Evaluation Approach for the Scheme**

An Evaluation Plan will be developed in accordance with the requirements of the Transforming Cities Fund for schemes of this value. A first step in designing the evaluation will be to develop, and agree with key stakeholders, a logic map which clearly explains the consensus as to how the scheme is expected to meet the objectives outlined in this application form. This will build on the scheme rationale already provided in this document by articulating in more detail how, why and when the desired change will occur thus mapping each step on the causal pathway from scheme implementation to the desired longer term impacts after five years post implementation.

Within this framework indicators will be identified that are capable of monitoring progress toward each objective over the evaluation period. A baseline for these will be established and the indicators tracked throughout the evaluation period where appropriate.

Potential indicators to be monitored along the corridors subject to the improvements could include:

- Bus patronage
- Bus journey times and reliability
- Bus and Tram mode share,
- Average travel times for general traffic,
- Modelled changes to NO<sub>2</sub>, particulate and Carbon emissions
- Inward investment indicators
- Inward investment case studies
- Bus User surveys
- Surveys of local businesses to understand how they are have responded to the scheme.
- Electric vehicle charge points usage
- Employment levels

In addition to the above it will be important to estimate actual changes in productivity based on available time series data and the evaluation team will work with the DfT to determine the most appropriate method to achieve this. The indicators will also be analysed with a view to assessing Value for Money of the scheme. This will include an analysis of the outrun costs.

The change observed in these indicators will be subject to further research to take into account exogenous changes which could impact the ability of the scheme to meet its objective and thus to determine if the observed changes can truly be attributed to this scheme. While this will need to be considered more carefully in the Evaluation Plan, techniques that could be employed to achieve this for a scheme of this nature could be as follows:

1. A quasi experimental approach whereby indicators in the area subject to this scheme are compared to those from other similar urban areas or other parts of the D2N2 area isolated from the scheme.
2. Time series analysis – subject to data ability it could be possible to use a simple time series model to establish a statistical link between a relevant dependent variable and other independent variables including one which acts as an intervention variable.
3. Direct interview surveys of public transport users whereby they are asked if they have changed their travel behaviour over the evaluation period and why. This will be essential to

evidence improved access to employment and attribute any observed mode switch to the scheme.

4. A comparison of actual change with change expected according to the logic map.

The evidence from one or more of the above research methods, together with the changes to the indicators will be triangulated to generate robust conclusions as to whether the scheme has met its objectives and communicated via the annual monitoring reports and a final five year evaluation report.

### **C3. Cross-area evaluation**

The Department will lead on a cross-area evaluation, aimed at answering questions about the success of the Fund as a whole. This will involve case studies on identified topics of interest. Do you agree to take part in case study interviews and data collection if your area should be selected?

Yes       No

## **SECTION D - Declarations**

### **D1. Senior Responsible Owner Declaration**

As Senior Responsible Owner for Derby-Nottingham Public Transport Technology Package I hereby submit this request for approval to DfT on behalf of Derby-Nottingham and confirm that I have the necessary authority to do so.

I confirm that Derby-Nottingham will have all the necessary statutory powers in place to ensure the planned timescales in the application can be realised.

Name: Chris Henning

Signed:

Position: Corporate Director, Development and Growth, Nottingham City Council



### **D2. Section 151 Officer Declaration**

As Section 151 Officer for Nottingham City Council I declare that the scheme cost estimates quoted in this bid are accurate to the best of my knowledge and that Derby-Nottingham:

- has allocated sufficient budget to deliver this scheme on the basis of its proposed funding contribution;
- accepts responsibility for meeting any costs over and above the DfT contribution requested, including potential cost overruns and the underwriting of any funding contributions expected from third parties;
- accepts responsibility for meeting any ongoing revenue and capital requirements in relation to the scheme;
- accepts that no further increase in DfT funding will be considered beyond the maximum contribution requested and that no DfT funding will be provided after 2022/23;
- Confirms that the authority has the necessary governance and assurance arrangements in place and the authority can provide, if required, evidence of a stakeholder analysis and communications plan in place.

Name: Laura Pattman

Signed:



### **Submission of Bids**

The deadline for bids is: **6pm on Friday, 4 January 2019.**

An electronic copy (including supporting material) should be submitted to [tcfproposals@dft.gov.uk](mailto:tcfproposals@dft.gov.uk)

However, if you must send hard copies of papers, please provide three copies to:

Charles Small  
Head of English Devolution Team  
Transforming Cities Fund Business Cases

London  
SW1P 4DR

## Annex A: Summary of Data Assumptions

The economic appraisal and value for money assessment summarised in the funding application form, and which underpins this bid, is documented in an MS Excel spreadsheet [Nottm-Derby-Metro\_TCF-bid\_PT-Economic-Model\_201218] that documents all of the appraisal assumptions and input values.

Documentation is in-line with key assumptions and include a 'Factors and Data' tab that references and sources relevant data from the TAG data book, WebTAG guidance and other appropriate transport research. As such the table below has been completed with the most relevant assumptions applied and references their sources.

Topic	Issue	Figure Used	Data Source / Evidence
<b>General</b>	Appraisal Period	20 years	AMAT default
	Decay Rate	3.5%	WebTAG guidance / AMAT data book
	Number of Days	220	Reflects locations of schemes near new housing/employment sites and likely bias towards commuter trips.
	Percentage of journeys that are return journeys	100%	Assumed in relation to public transport trips along the Derby Road corridor.
<b>Highway trips</b>	Number of highway journeys in do nothing scenario/without project	85,241 / weekday	Derby Road Corridor AADT data. Nottingham City Council ring road data. Number of EV charges per charge point/day.
	Number of highway journeys in the do something scenario/with project	85,135 / weekday	Baseline position less calculated mode-switching attributable to: <ul style="list-style-type: none"> <li>EV shuttle bus service at East Midlands Gateway (based on Travel Plan Targets)</li> <li>Introduction of Robin Hood Smartphone app payment (derived from previous trip generation and mode-shift response to Robin Hood smartcard introduction).</li> </ul>
	Total vehicle travelled time in the do nothing/without project	16,005 Hours / weekday	Trafficmaster route segment transit time and delay data for select links near to locations set to benefit from junction/signal priority.
	Total vehicle travelled time in the do something/with project	15,832 Hours / weekday	Baseline minus indicative journey time delay saving (18.9%) derived from TRL/ITS research evidence on SCOOT systems, and estimated proportion (15%) of select links covered by new smart traffic controls.
	Total vehicle travelled distance in the do nothing/without project	321,681 Km / weekday	Number of vehicle trips multiplied by the distances of select links used to estimate the AADT and journey time baseline.

	Total vehicle travelled distance in the do something/with project	319,462 Km / Weekday	Baseline minus reduced number of vehicle trips resulting from: <ul style="list-style-type: none"> <li>• Introduction of the East Midlands Gateway EV shuttle bus service.</li> <li>• Half of anticipated new public transport users making trips as a result of Robin Hood smartphone payment (evidenced from prior impact of Robin Hood smartcard launch).</li> </ul>
<b>Bus</b>	Number of bus journeys in do nothing scenario/without project	230,904 Trips / weekday	Number of bus trips along the Derby Road/A52 corridor, as recorded and collated by operators on behalf of Derby and Nottingham City Council.
	Number of bus journeys in the do something scenario/with project	231,010 Trips / weekday	Baseline plus additional bus trips estimated as a result of: <ul style="list-style-type: none"> <li>• Introduction of the East Midlands Gateway EV shuttle bus service.</li> <li>• New public transport trips as resulting from of Robin Hood smartphone payment (evidenced from prior impact of Robin Hood smartcard launch).</li> </ul>
	Average length bus journey	6.3km	Average for Greater Nottingham derived from Better Bus Areas project data.
	Average bus speed	16 km/hr	Average calculated for the Greater Nottingham Better Bus Areas report.
	% of new bus users that would otherwise use a car	50%	Assumed based on previous monitoring of additional Robin Hood trips by new Pay-as-you-go smartcard holders.