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# **Birmingham Eastern Fringe Bus Study**

## **Service Options and Financial Appraisal**

Prepared for  
**Birmingham City Council**

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# Executive Summary

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1. The proposed urban extensions at Langley and Peddimore are expected to deliver around 6,000 new dwellings and 80 hectares of employment land respectively. These developments will generate a demand for public transport services from those without access to other means of travel, which must be provided for. Additionally, there is a need to achieve a high non-car modal share of overall travel demand generated by the developments, and to reduce the car-driver modal share among existing trips, to mitigate highway congestion effects due to the developments.
2. The Langley and Peddimore transport strategy identifies three main axes of movement, with a different transport focus in each:
  - Local to the proposed development, including to Sutton Coldfield Town Centre, Minworth, Castle Vale, Walmley, Whitehouse Common and the local neighbourhoods between them – emphasis on walking and cycling, supported by improved public transport into Sutton Coldfield town centre.
  - To the City Centre, the Bromford Industrial Corridor and North Birmingham more widely – emphasis on public transport, supported by cycling for shorter-distance movements.
  - To East Birmingham and North Solihull, Staffordshire and Warwickshire – private car and goods vehicles are likely to be the pre-dominant mode.

The strategy focuses public transport resources in the first two axes of movement, in particular into the city centre, where there is greater opportunity to attract trips that would otherwise be made by car.

3. This study investigates the potential for bus services, including bus rapid transit, to support the delivery of the Langley and Peddimore developments, comprising:
  - A new 'Sprint' bus rapid transit service from Sutton Coldfield via Langley to Birmingham City Centre.
  - A new 'CityLink' bus service from Sutton Coldfield via Langley and Peddimore to Birmingham City Centre.
  - Re-routing and/or route extension of bus services between Sutton Coldfield and Solihull and between Sutton Coldfield and the Airport/NEC.
  - Revision of existing radial bus services to reflect the introduction of the Sprint and CityLink services into the Walmley – City Centre and Castle Vale – City Centre corridors.

Patronage forecasts and operating cost estimates have been prepared for an initial set of services proposals. Infrastructure required for the provision of the services has been identified and cost estimates produced.

4. Consultation was undertaken with the operators of existing local bus services in the area. This found support for the proposed development locations as being ones that were amenable to being well served by bus, if a highway network configuration for the new development is provided that enables integration with the existing network of services. Operators expressed concern regarding the effect of the proposed Sprint and CityLink on the commercial viability on other bus services in the same corridor. This consultation identified an existing service that could potentially be integrated with the proposed Sprint service.

5. Financial appraisal for the 2031 plan year finds that there would be sufficient patronage to commercially sustain the proposed Sprint and CityLink services. The commercial viability of other bus services in this corridor would be significantly affected by Sprint and CityLink and a modified service proposal is required; see point 6 below. In the East Birmingham and North Solihull corridor, commercial viability of the revised service is maintained, with development-generated travel offsetting patronage abstracted by the proposed new services. In the North Warwickshire and the Airport/NEC corridor, the study finds that commercial viability would not be achieved; however, a new pattern of service was introduced during the course of this study, and monitoring of the emerging situation is required.
6. Financial support required for services to Langley and Peddimore during the build-out period are estimated at £2.2m for services within the West Midlands Metropolitan County and between £2.8 and £3.1m for services operating into North Warwickshire. These support requirements were calculated on the basis of implementation in full of the new and revised services from the commencement of development; the sums could be reduced through a phased roll-out of the revised service.
7. A modified set of service proposals is required to promote the commercial viability of other bus services in the corridors that Sprint and CityLink would serve. Potential modifications to the service proposals that have been identified include:
  - Sprint could absorb existing local bus service that provides a link between Walmley and Birmingham city centre, and replace part of the CityLink route proposal.
  - CityLink could operate from Langley via Peddimore to Birmingham City Centre.
  - Between Castle Vale and the City Centre, there could be a coordinated service pattern that integrates the proposed Langley CityLink and a revised version of the current service.
8. The appropriate service proposal to provide a connection to/from North Warwickshire should be considered in conjunction with Warwickshire County Council.
9. It is recommended that public transport provision for the proposed Langley and Peddimore developments is based on Sprint bus rapid transit and CityLink bus for movements into Birmingham City Centre, the Bromford Industrial Corridor and Sutton Coldfield town centre, and revisions to existing local bus services to provide for other movements. Further work is required to optimise the pattern of retained bus services in the corridors that Sprint and CityLink would serve, and the service providing a connection with North Warwickshire.

# Introduction

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## 1.1 Study Brief

Birmingham City Council (BCC), as part of its Birmingham Development Plan, is proposing an urban extension at Langley and Peddimore, Sutton Coldfield, in order to meet expected increasing demand for housing and employment sites. Development in this location would potentially comprise residential sites for the provision of approximately 6,000 dwellings, and an additional 80 hectares of employment land close to the existing Minworth and Castle Vale employment areas.

In preparation of the Transport Evidence, CH2M HILL and Phil Jones Associates have been commissioned by BCC to investigate the feasibility of potential bus service proposals to facilitate access to the proposed urban extension and sustain an appropriate transport network and public transport accessibility in the local area.

## 1.2 Development Plan Context

The Birmingham Development Plan [BDP] 'Planning for sustainable growth' (Pre-submission Version) was published in December 2013. The document is an important step forward in planning the future of Birmingham. It recognises the challenge of how the city must accommodate the growth of 150,000 people with homes, jobs and the right built environment.

The plan takes a positive approach to planning good infrastructure and providing high quality built and natural environments in order to avoid overcrowding, worklessness and poor health. A part of this has been in identifying where new housing and employment development can realistically be accommodated. The strategy of the BDP is to meet the city's growth requirements within its boundary as far as possible, but there will be a requirement for some provision in adjoining areas to be made for both new housing and employment to meet Birmingham's needs.

Connectivity and the provision of new high quality transport links are fundamental to the success of the plan. The Birmingham Mobility Action Plan (BMAP) is the transport vision for the City. It develops a strategy for the use of existing infrastructure and a plan for new connections to be made. It recognises that investment in the transport network has to help residents reduce their car dependency. BMAP forms the overarching principles against which more detailed strategies contained in this plan have been prepared and are measured.

A part of the evidence base behind the BDP is the Infrastructure Delivery Plan, which identifies the key infrastructure projects necessary to support the City's growth aspirations, including transport schemes.

The BDP identifies two growth areas to the east of Sutton Coldfield:

- GA5 – Langley Sustainable Urban Extension; and
- GA6 – Peddimore employment development.

The extent of these growth areas is outlined below. The bus service proposals covered by this study address the combined movement needs of these two growth areas in particular.

BDP proposed growth area GA3 – Aston, Newtown and Lozells lies alongside the corridor linking GA5 and GA6 with the City Centre. Increased movement due to GA3 could support the public transport proposals covered in this study, and potential justify further desirable enhancements to them.

### 1.3 Langley Sustainable Urban Extension

Policy GA5 of the BDP identifies that land to the west of the A38 at Langley will be removed from the Green Belt to provide a sustainable urban extension of approximately 6,000 new homes. The area abuts the existing urban area to the west, at Webster Way, Thimble End Road and Springfield Road.

It is described as a destination for families wishing to live in Birmingham with well connected, integrated and sustainable transport links. It will have a range of supporting facilities including primary and secondary schools, health care facilities and local shops and services.

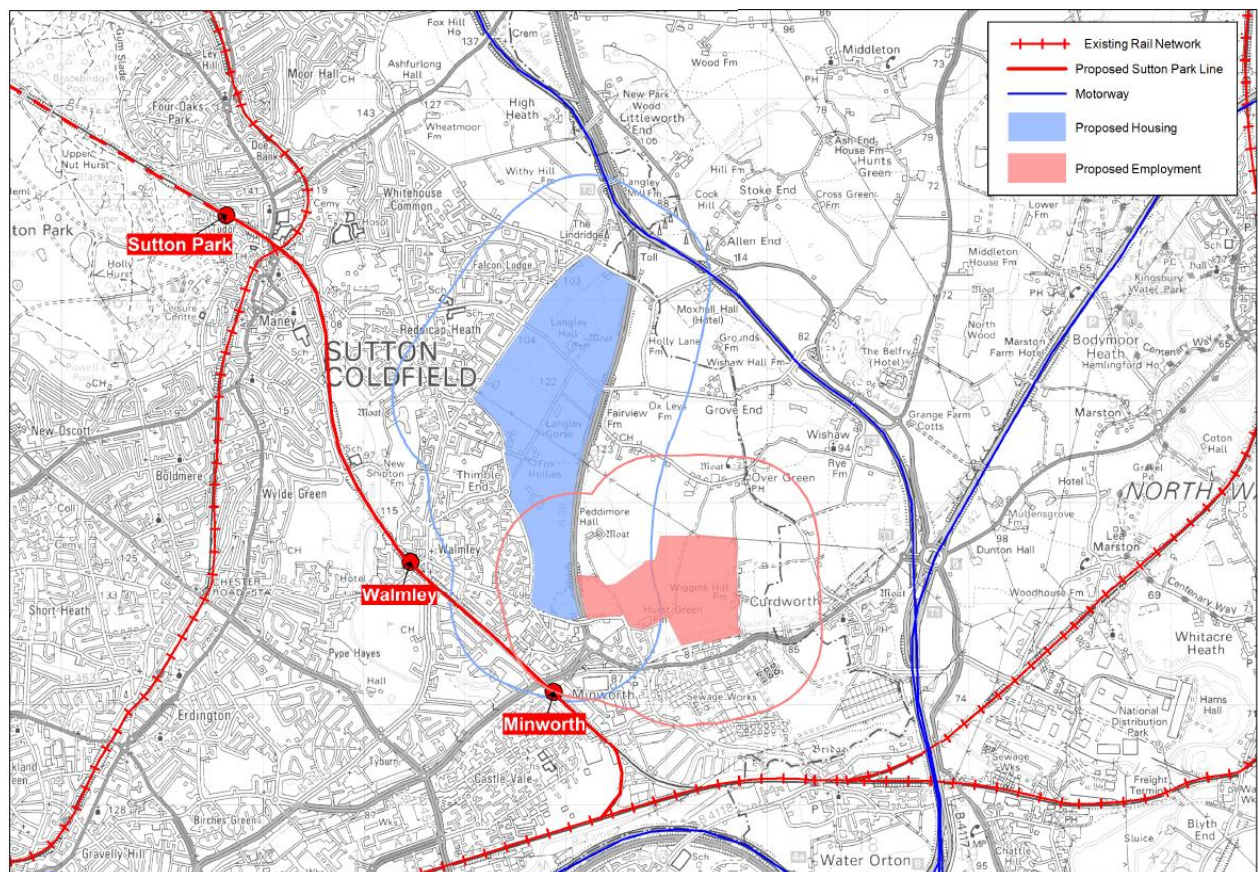
### 1.4 Peddimore employment development

Policy GA6 of the BDP identifies that land to the east of the A38 at Peddimore, Minworth will be removed from the Green Belt to provide 80 ha of new employment land.

It is described as high quality employment land to meet the needs of the expanding growth sectors in research and development, industry, warehousing and distribution. The development will benefit from a new junction with the A38, new bus connections, and links into the city’s expanding cycle network.

Figure 1.1 illustrates the proposed development area, in context with local transport infrastructure.

Figure 1.1 Proposed development area



# Study Methodology

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## 2.1 Scope of Study

The purpose of the study is to identify public transport service proposals that would provide a viable mitigation of the travel demands arising from the Langley and Peddimore development proposals. This means meeting several criteria:

- Provide for the travel accessibility and connectivity requirements of occupiers of the proposed developments.
- Adequately address adverse impacts on travel conditions for users of the transport network to/from existing development.
- Deliverability in terms of physical feasibility and public acceptability.
- Financial affordability.

This study aims to identify what bus service proposals would form a viable mitigation. It addresses in particular the financial affordability of the service proposals. Therefore it focuses on patronage forecasting and operating costs for the proposed services, and the required infrastructure for bus services and its capital cost. Optimisation of the service proposals would follow later in the development process; see Section 2.2.

## 2.2 Methodological Approach

The development of public transport services for the proposed development is inherently an iterative process: the findings of each stage of the transportation appraisal indicate the potential public transport travel demand, which informs the specification of appropriate public transport services; this in turn affects patronage levels and service appraisal. For this reason, the service proposals will evolve through a process of optimisation. However, it is appropriate to present proposals as they are developed, although they will be subject to revision, and to present study findings and recommendations for further development of the service proposals.

The over-arching process sequence applied in this study was:

- Consider the findings of the Langley and Peddimore Travel Demand Model, presented in the report 'Green Belt Development Movement Infrastructure Plan'.
- Adjust the service proposals presented in that report to take account of the anticipated high proportion of trip internalisation, which reduces the amount of travel from/to the proposed developments that has a journey length suitable for bus travel.
- Forecast patronage for the adjusted service proposals and calculate the bus resources required to operate the services.
- Consult with bus service operators providing services in the local area – see Section 2.3.
- Revise the service proposals based on patronage forecasting results and findings of the consultation.

It is due to this process sequence that there is a difference between the service proposals and variant options that are now presented, arising from process stage (e), and those for which patronage has been forecast, derived from process stage (c). Further stages of service development could forecast patronage based on the modified service proposals and variants now presented, or for other proposals that might arise out of the transport assessment process. In this way, optimisation of the service proposals can be achieved.



The study has made use of available data and the consultants' expertise from other commissions that are applicable in this study. This has included: the PRISM travel demand forecasting model, public bus timetables and the National Travel Survey; and infrastructure types and costs for comparable proposals from the Hagley Road Sprint BRT study.

## 2.3 Patronage Forecasting

Patronage on the proposed BRT and bus services would comprise:

- Existing trips that re-route from existing services to the proposed services;
- Trips generated by the proposed developments at Langley and Peddimore, which could use either existing or proposed services, or a combination of both; and
- Modal shift between private car and public transport among existing travel demand.

NB: in this context 'existing' refers to travel demand and to public transport services that would exist in 2031 without the proposed developments at Langley and Peddimore.

These sources of patronage were addressed as separate increments within the demand forecasting methodology, which is set out in Chapter 4 below.

## 2.4 Bus Operator Consultation

Bus service proposals were discussed with Centro prior to and following publication of the 'Green Belt Development Movement Infrastructure Plan'. Centro were asked to identify bus operators in the local area that it would be appropriate to consult with regarding the service proposals, and to make initial contact with those operators.

Consultation meetings and/or telephone calls were undertaken separately with:

- National Express Bus;
- Rotala, operator of Diamond Bus services;
- Central Buses; and
- Arriva Midlands.

Prior to each meeting / telephone call, consultees were pointed to the BDP website providing information setting out the development planning context for the Langley and Peddimore, and the report 'Green Belt Development Movement Infrastructure Plan', was emailed.

For the bus services developed prior to consultation, the routes, running times and departure frequencies, patronage forecasts and calculation of bus operating resources were provided to the operators in advance of discussion with them. Feedback obtained from the operators was taken account of in the appraisal of bus service proposals; in particular, modifications to the appraisal and proposals were made in two ways:

- **Operating Costs:** based on information provided regarding the observed running speeds of two existing services, the calculation of operating resources for proposed services was revised to provide a more prudent costing.
- **Service Proposals:** based on comments regarding current bus services that would be retained in current or revised form, a modified service option was devised.

Further information about how operator feedback was taken into account is included in the relevant report sections.

# Bus Network Development

## 3.1 Strategy and Principles

### 3.1.1 Transport Strategy

The emerging transport strategy for Langley and Peddimore is based around three broad axes of movement:

- Local to the proposed development, including to Sutton Coldfield town centre, Minworth, Castle Vale, Walmley, Whitehouse Common and the local neighbourhoods between them.
- To the City Centre, including national public transport connectivity, the Bromford Industrial Corridor and North Birmingham more widely.
- To East Birmingham and North Solihull, Staffordshire and Warwickshire, and national connectivity by road.

Public transport improvements are proposed as one of the main mitigations for increased travel flows to the City Centre and into the Bromford Industrial Corridor. Local to the proposed development and into Sutton Coldfield, public transport would play a supporting role to walking and cycling, which are the main mitigation for short-distance trips.

For the services to/from the City Centre and Sutton Coldfield town centre, a high frequency and long service day is proposed. This requires a variety of trip producers and attractors along the route in order to generate patronage in both directions of service throughout the operating periods. Therefore, these services are proposed to be routed via Star City, Nechells and Aston, not the Aston Expressway.

### 3.1.2 Service Planning Principles

Increased use of public transport would be primarily on bus and bus rapid transit [BRT]. There would be a substantial improvement of the core routes network in the sector between the A5127 corridor and the A47 corridor; both radial and orbital services would be revised.

For the two movement axes where public transport is the main mitigation, key principles adopted in the service planning are:

- Routeing – closely follow the ‘natural’ line-of-route that car drivers would choose.
- Frequency – six departures per hour along core corridors to main trip attractors in the weekday daytime period.
- Punctuality – highway infrastructure and traffic management to achieve consistent running times.

This results in proposals for substantial service revisions in the Bromford Corridor to the City Centre, and into Sutton Coldfield town centre. For the third movement axis, i.e. East Birmingham and North Solihull, Staffordshire and Warwickshire, service planning has been based on an incremental adaptation of existing services.

Other service features are also crucial to achieving modal shift to public transport, including:

- the on-board environment, e.g. seating comfort, noise level;
- at-stop facilities, e.g. shelter and seating;
- ticketing and tariff levels; and
- journey support, e.g. real-time information, customer care from staff.

These features of the customer experience are required irrespective of the service routeing and frequency, which are the main focus of this study.

### 3.1.3 Service Definition for Patronage Forecasting

The service proposals defined for patronage forecasting took account of the travel demand forecasts presented in the Section 2 of the 'Green Belt Development Movement Infrastructure Plan' report. Material considerations include:

- A high proportion of trip internalisation and localisation, which reduces the number of trips for which public transport is an appropriate choice; and
- Trip distribution, which forecasts the great majority of travel would be to/from the metropolitan conurbation with much lower travel volume to/from Staffordshire and Warwickshire.

Service proposals for patronage forecasting and operator consultation were devised to reflect this, resulting in their extent and nature being different to that previously presented in the 'Green Belt Development Movement Infrastructure Plan'. The routes of the services that were defined for patronage forecasting are presented in Appendix A.

Patronage forecasting for each proposed service was undertaken using the West Midlands' PRISM travel demand model; see Chapter 4 of this report. The PRISM public transport network model was most recently updated in 2013 and therefore the service proposals for testing through the model were based on adaptation of that network. This affected the service option that was coded in the model for the link with North Warwickshire – see section 3.2.4 below.

## 3.2 Service Options for Initial Assessment

### 3.2.1 Langley 'Sprint'

*Service Type:* bus rapid transit, with distinctive identity.

*Tariff and Ticketing:*

- Tariff: as for existing local bus services.
- Ticketing: off-board ticket vending at busy stops; on-bus vending might apply at quieter stops and/or times of day.

*Routeing:* Sutton Coldfield town centre – Falcon Lodge – Langley – Walmley – Eachelhurst Road – Pipe Hayes – Tyburn Road – Star City – City Centre. The service is presented as the purple route in Appendix A.

*Stopping Pattern:* Stops would be more widely spaced than for a typical bus service to improve running times. Between Star City and the City Centre, it would run non-stop. See Section 4.2.1 below for details of stops coded in the patronage modelling.

*Departure Frequency:*

- Weekday and Saturday – 6 departures per hour during peaks and the inter-peak period.
- Other service periods – 3 departures per hour.

*Traffic Characteristics - Essential:*

- Inter-peak commercial speeds:
  - Sutton Coldfield – Langley = as current bus services.
  - Langley and Walmley = 20km/h;
  - Walmley – City Centre = 30km/h.
- Peak period running times not more than 10% greater than inter-peak running times.
- Punctuality within 5 minutes of schedule on 95% of peak-period departures and 99% of inter-peak and off-peak departures.

- Section 4.2.1 sets out the running time specification for patronage modelling.
- Section 5.1 sets out proposed highway infrastructure and traffic management.

*Traffic Characteristics - Desirable:*

- Inter-peak commercial speeds:
  - Sutton Coldfield – Langley: improvement compared to current bus services, achieved by junction improvements and kerbside stopping/waiting controls.
  - Langley, within development: 30km/h, achieved by segregated route alignment.
- Peak period running times not more than 5% greater than inter-peak running times, achieved through additional bus priorities on existing highway sections, e.g. along Tyburn Road and at Ring Road junction.

*Vehicle Type and Passenger Accommodation:*

- Single deck, rigid vehicle 12.8m in length; an articulated vehicle would not be appropriate for this corridor.
- Increased seat pitch and comfort compared to standard bus.
- Interior ambience pack – air conditioning, lower noise levels, effective and comfortable illumination.
- Service information / communication:
  - External – front, rear and side route number and destination displays.
  - Interior – next stop display visible from all seats plus audible announcement.
  - Communications – free WiFi.
- Security:
  - CCTV with remote monitoring capability
  - Emergency help buttons
- Diesel-electric hybrid power train.

*Stop Features:*

- Close-proximity, level boarding.
- Shelter and seating – configuration to be determined by local street environment.
- Real-time information
- Security:
  - CCTV with remote monitoring capability
  - Emergency help buttons

### **3.2.2 Langley and Peddimore ‘CityLink’**

*Service Type:* high-standard bus service, with distinctive identity.

*Tariff and Ticketing:*

- Tariff: as for existing local bus services.
- Ticketing: as for existing local bus services.

*Routeing:* Sutton Coldfield town centre – Reddicap Heath – Langley – Peddimore – Minworth – Castle Vale – Fort Dunlop – Star City – Aston station – Aston Cross – City Centre. The service is presented as the green route in Appendix A.

*Stopping Pattern:*

- Sutton Coldfield – Castle Vale: as typical for local bus services, stop spacing approximately 400m.
- Castle Vale – Star City: Fort Dunlop; Bromford Lane, interchange with Outer Circle bus service.
- Star City – City Centre: all local bus stops; positioning of some current stops could be revised.

*Departure Frequency:*

- Weekday and Saturday – 6 departures per hour during peaks and the inter-peak period.
- Other service periods – 3 departures per hour.

*Traffic Characteristics - Essential:*

- Inter-peak commercial speeds:
  - Sutton Coldfield – Langley = as current bus services;
  - Langley – Peddimore – Castle Vale = 20km/h;
  - Castle Vale – Star City = 25km/h; and
  - Star City – City Centre = 20km/h
- Peak period running times not more than 10% greater than inter-peak running times.
- Punctuality within 5 minutes of schedule on 95% of peak-period departures and 99% of inter-peak and off-peak departures.
- Section 4.2.1 sets out the running time specification for patronage modelling.
- Section 5.1 sets out proposed highway infrastructure and traffic management.

*Traffic Characteristics - Desirable:*

- Inter-peak commercial speeds:
  - Sutton Coldfield – Langley: improvement compared to current bus services, achieved by junction improvements and kerbside stopping/waiting controls
  - Langley, within development: 30km/h, achieved by segregated route alignment
  - Star City – City Centre = 25km/h
- Peak period running times not more than 5% greater than inter-peak running times, achieved through additional bus priorities on existing highway sections, e.g. traffic management changes along Lichfield Road to assist bus movement.

*Vehicle Type and Passenger Accommodation:*

- High-specification of typical buses available for urban service; and
- Single-deck or double-deck, to be determined following demand studies; single-deck if routed via Minworth.

*Stop Features:*

- Close-proximity, level boarding;
- Shelter and seating – configuration to be determined by local street environment; and
- Real-time information.

### 3.2.3 East Birmingham and North Solihull Link

*Service Type:* revision of current service 71 Sutton Coldfield – Castle Vale – Chelmsley Wood – Solihull re-routed through Langley and Peddimore; no changes proposed to short services between Chelmsley Wood and Solihull.

*Tariff and Ticketing:*

- Tariff: as for existing local bus services.
- Ticketing: as for existing local bus services.

*Routeing:* Sutton Coldfield town centre – Good Hope Hospital – Walmley Village – Langley, south – Peddimore – Castle Vale – Castle Bromwich – Chelmsley Wood – Solihull town centre. The service is presented as the orange route in Appendix A.

*Stopping pattern:* all stops.

*Departure Frequency:*

- Weekday and Saturday – 4 departures per hour during peaks and the inter-peak period through the proposed development.
- Other service periods – 2 departures per hour.
- Additional departures operate between Chelmsley Wood and Solihull that would not serve the proposed development.

*Traffic Characteristics - Essential:* as current service:

- End-to-end running times same as for current route of service 71.
- Highway infrastructure and traffic management: bus gate to connect Park Lane, Castle Vale, with Kingsbury Road.

*Traffic Characteristics - Desirable:* service 71 would benefit from the traffic management provided for CityLink service on their common route sections.

*Vehicle Type and Passenger Accommodation:*

- Standard urban bus; and
- Single-deck or double-deck, to be determined following demand studies; single deck if current routeing via Minworth is retained.

*Stop Features:* provided on new route sections in Langley and Peddimore, and desirable on existing route sections:

- Close-proximity, level boarding;
- Shelter and seating – configuration to be determined by local street environment; and
- Real-time information.

### 3.2.4 North Warwickshire and Airport/NEC Link

*Service Type:* revision of service 777 which operated until 31<sup>st</sup> May 2014. NB: This service was replaced by service 75 from 2<sup>nd</sup> June 2014; revision taken into account in study recommendations.

- Service 75 is a replacement for services 757 and 777 which were in operation until 31<sup>st</sup> May 2014.
- The initial service proposals for Langley and Peddimore were based around extension of service 777 from Hams Hall to Langley via Peddimore; this was the service proposal included in the demand forecasting process set out in Chapter 4 of this report.
- The current proposal is to revise service 75 as specified below.

*Tariff and Ticketing:*

- Tariff: as for existing local bus services.
- Ticketing: as for existing local bus services.

*Routeing:*

- Service 777 extension, specified in patronage modelling: Langley, south – Peddimore – Hams Hall – Coleshill Parkway station – Coleshill village – Birmingham Business Park – Birmingham International interchange. The service is presented as the dark blue route in Appendix A.

- Service 75 adaptation, now proposed to supersede the above: Sutton Coldfield town centre – Good Hope Hospital – Falcon Lodge – Walmley Village – Langley, south – Peddimore – Coleshill Parkway station – Coleshill village – Birmingham Business Park – Birmingham International interchange.

*Stopping Pattern:* all stops.

*Departure Frequency:*

- Weekday and Saturday – 2 departures per hour during peaks and the inter-peak period.
- No service in at other times.

*Traffic Characteristics:* as current service.

*Vehicle Type and Passenger Accommodation:* standard single-deck bus.

- Standard urban bus; and
- Single-deck.

*Stop Features:* provided on new route sections in Langley and Peddimore, and desirable on existing route sections:

- Close-proximity, level boarding;
- Shelter and seating – configuration to be determined by local street environment; and
- Real-time information.

## 3.2.5 Other Bus Services

### 3.2.5.1 Network Overview

The provision of the Sprint BRT and CityLink bus services make it appropriate to remove or revise some existing bus services. Those revisions in turn require one new service to address a consequent loss in bus travel connectivity. The proposed revisions are:

- 67 – withdraw service.
- 115 – re-route in Falcon Lodge.
- 904 – withdraw section between Falcon Lodge and Sutton Coldfield town centre.
- 914 – withdraw service.
- 967 – new service.

The description of each service below presents the specification that was tested in the PRISM modelling process. The results of the patronage modelling and the operator consultation have led to identification of alternative service specifications, which are set out below in Chapter 6 of this report.

It should be borne in mind that the proposed bus services are based on the network that was in place in 2014. It is likely that network revisions would take place in the period to 2031 irrespective of the proposed Langley and Peddimore developments; such revisions may lead to different proposals for other services compared to those set out below.

### 3.2.5.2 Service 67

This service would be withdrawn. It is superseded for the most part by the proposed Sprint BRT and CityLink bus service:

- CityLink provides a more direct connection between Castle Vale and the City Centre than the current 67, and runs along Lichfield Road through Aston on the current 67's line-of-route.
- Sprint serves Tyburn Road along the current 67's line-of-route to/from the City Centre.

The gap in bus network connectivity between Castle Vale and Tyburn Road would be addressed by proposed service 967.

### 3.2.5.3 Service 914

This service would be withdrawn. It is superseded for the most part by the proposed Sprint BRT service:

- Sprint serves Walmley village, Eachelhurst Road and Tyburn Road along the current service 914's line-of-route to/from the City Centre.
- Sprint serves Falcon Lodge and Good Hope Hospital along the current service 914's line-of-route to/from Sutton Coldfield town centre.

The gap in bus service along the inner section of Kingsbury Road would be addressed by proposed service 967. The reduction in service frequency on Springfield Road would be addressed by the increased frequency of service 115.

### 3.2.5.4 Service 904

This service would be withdrawn between Falcon Lodge and Sutton Coldfield town centre, as it is superseded for the most part by the proposed Sprint BRT service. The route of service 115 would be revised to serve those roads that the current 904 runs along. The route section between Sutton Coldfield town centre and the City Centre would be retained unchanged. Weekday daytime frequency was specified 4 departures per hour along the retained route section, as currently provided.

### 3.2.5.5 Service 115

This service would be re-routed through Falcon Lodge to serve roads that current service 904 runs along. The weekday daytime frequency was specified as increasing from the current 2 departures per hour increased to 4 departures per hour throughout, to compensate for the withdrawal of service 914 which currently provides 2 departures per hour on the common section between Walmley and Sutton Coldfield. The service is presented as the light blue route in Appendix A.

### 3.2.5.6 Service 967

This proposed service would run along the current service 67's route between Castle Vale and the Tyburn Road / Kingsbury Road junction; between there and the City Centre, it would run along the current service 914's route. The weekday daytime frequency was specified as 3 departures per hour. The service is presented as the pink route in Appendix A.



# Public Transport Demand Forecasting

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## 4.1 Approach to Patronage Forecasting

### 4.1.1 Categories of Patronage for Proposed Services

Patronage on the proposed BRT and bus services would arise from three sources:

- Re-routing of existing public transport travel demand from existing services to the proposed services;
- Public transport travel demand generated by the proposed developments at Langley and Peddimore, which could use either existing or proposed services, or a combination of both; and
- Modal shift between private car and public transport among existing travel demand.

NB: in this context 'existing' refers to travel demand and to public transport services that would exist in 2031 without the proposed developments at Langley and Peddimore.

These sources of patronage were addressed as separate increments within the demand forecasting methodology.

### 4.1.2 Methodological Approach to Forecasting

#### 4.1.2.1 Trip Re-Routeing

PRISM is a multi-modal travel demand model that Mott MacDonald has developed on behalf of the West Midlands transport authorities. PRISM's 2031 forecast year includes representations of:

- public transport travel demand between origins and destinations, i.e. trip matrices, for a 'standard' development scenario, i.e. without the proposed Langley and Peddimore development; and
- the public transport network of bus, train and metro services in 2013 plus committed public transport schemes.

By assigning the 2031 'standard' trip matrices to the 2031 committed network, PRISM provides a forecast of 2031 patronage on each public transport service in the forecast year. The forecasting of patronage for each service in the proposed network is described in Section 4.2 below.

#### 4.1.2.2 Development Trip Generation

Public transport travel demand generated by Langley and Peddimore has been forecast using a Travel Demand Model [TDM] developed specifically to represent the forecast travel for the proposed developments by all modes presented in the 'Green Belt Development Movement Infrastructure Plan'. The TDM forecasts the destinations/origins of generated travel and the modes of travel used, but not the route that trips would take. The methodology for forecasting development generated patronage on each service in the revised network is described in Section 4.3.

#### 4.1.2.3 Private/Public Transport Modal Shift

PRISM is being developed to have a capability to forecast modal shift between car and public transport in response to changes in public transport services. However, this modelling capability was not available at the time this patronage forecasting was being undertaken. Therefore, a proxy methodology using travel demand elasticity was applied, as described in section 4.4.

### 4.1.3 Forecasting Scenarios

Four combinations of travel demand and service network were modelled, and a fifth scenario derived by comparison.

Table 4.1 Patronage forecasting scenarios

Scenario	Public Transport Travel Demand	Public Transport Service Network	Modelled in PRISM
A	2031 standard development scenario, i.e. without Langley and Peddimore.	2013 base + committed changes.	Yes
B	2031 standard development scenario, i.e. without Langley and Peddimore.	2013 base + committed changes + Langley and Peddimore service revisions [see Section 4.2].	Yes
C	2031 standard development scenario plus Langley and Peddimore.	2013 base + committed changes + Langley and Peddimore service revisions [see Section 4.2].	Yes
D	2031 standard development scenario plus modal shift proxy [see Section 4.3].	2013 base + committed changes + Langley and Peddimore service revisions [see Section 4.2].	Yes
E	2031 standard development scenario plus Langley and Peddimore plus modal shift proxy [see Section 4.3].	2013 base + committed changes + Langley and Peddimore service revisions [see Section 4.2].	No; calculated from Scenarios B, C and D.

#### 4.1.4 PRISM Public Transport Network and Model Periods

The PRISM model has representation of three time periods:

- AM-peak 0700-0859
- Inter-peak 1000-1159
- PM-peak 1600-1759

The peak periods, when most travel-to-work occurs and during which bus services are more affected by highway congestion, were selected to forecast the effects of the proposed network revisions.

PRISM's existing 2031 network specification comprises bus, train and metro services that were in operation in February/March 2013 plus service changes to 2031 that were committed schemes at that time. Consequently, it does not include changes to bus services that have occurred in the intervening period to when the new service proposals were tested in the model.

Bus service running times in PRISM's 2031 do-minimum network coding are the same as those for the 2013 services.

## 4.2 Re-routing of existing public transport patronage

### 4.2.1 Revised Public Transport Network

Modelling of the revised public transport services was based around revisions to PRISM's 2031 public transport network. The service revisions that were included in the revised network are set out below. Mott MacDonald coded these revisions into revised PRISM networks in the peak time periods. The standard PRISM coding scheme was used, with particular features to represent the proposed services described below.

NB: The 2031 network included service 777, which was in operation at the time the existing services network coding was prepared during 2013. Therefore, the patronage modelling is based on a revision of this service rather than new service 75; see Section 3.2.4 above.

The modelling was undertaken in advance of the bus operator consultation so that the forecasting results could inform the discussions with operators.

#### Service Routes:

- Removed: current 67 and 914
- Revised:
  - Service 904 removed between Falcon Lodge and Sutton Coldfield town centre, thus curtailed to operate between Sutton Coldfield and City Centre.
  - Service 115 re-routed between Springfield Road and Sutton Coldfield town centre along same roads as current service 904.
  - Service 777 extended from Hams Hall to Langley via Curdworth.
- Added:
  - 967 – as 67 between Castle Vale and Tyburn Road / Kingsbury Road, as 914 between Castle Vale and Tyburn Road / Kingsbury and City Centre.
  - Sprint BRT – see Appendix A.
  - CityLink Bus – see Appendix A.

#### Stopping Patterns:

- Sprint BRT coded to serve selected stops:
  - Sutton Coldfield, Lower Parade
  - Rectory Road / Riland Road
  - Good Hope Hospital
  - Rectory Road / Whitehouse Common Road
  - Rectory Road / Carhampton Road
  - Falcon Lodge Churchill Parade
  - Langley, North
  - Langley, Central
  - Langley, Signal Hayes Road / Thimble End Road
  - Walmley local centre
  - Eachelhurst Road / Westlands Road
  - Bagot Arms, Chester Road
  - Tyburn Road / Kingsbury Road
  - Tyburn Road / Bromford Lane
  - Tyburn /Road / Stonehurst Road [proxy for Jarvis Way]
  - Star City, Watson Road
  - Millennium Point, Jennens Road
  - City Centre, Carrs Lane
- CityLink and other bus services coded to serve all existing stops on their line-of-route, plus stops for Peddimore and Langley as appropriate to their proposed routeing.

#### Service Frequency, Weekday Peaks, Each Direction:

- Sprint BRT: 6 departures/hour
- CityLink bus: 6 departures/hour
- 71: 4 departures/hour

- 115: 4 departures/hour
- 777: 2 departures/hour
- 904: 4 departures/hour
- 967: 3 departures/hour

#### Route Coding:

- Services were coded to run along existing highway infrastructure.
- Where new highway infrastructure is proposed as part of the Langley and Peddimore developments – that would provide a shorter route, the running time for the service[s] that would benefit were coded to reflect the shorter route.

#### Running Times:

- Sprint BRT coded with a 30km/h running speed between Walmley local centre and the City Centre; other sections similar to a standard bus service.
- CityLink bus coded with a 25km/h running speed between Chester Road, Castle Vale and Star City; other sections similar to a standard bus service.
- Other bus services were coded with the same running times as current bus services over sections common with them; new route sections calculated as for a standard bus service.
- The details of the running time calculations are set out in Appendix B.

#### Walk Access/Egress:

- Walk links between zone centroids and service stops were retained as coded in the 2031 no-revisions network.
- Walking was coded as an available mode along the highway links used by Sprint BRT, to provide connection with stops it would serve for zones connected to bus stops that it would pass through without stopping.

### 4.2.2 Route Assignment Results

The PRISM public transport model was run for two scenarios:

- Scenario A: 2031 standard trip matrix assigned to 2031 committed public transport network.
- Scenario B: 2031 standard trip matrix assigned to 2031 public transport network with proposed service revisions.

PRISM's 2031 standard public transport trip matrices are based on real 2011 land-used data projected forward to forecast 2031 land-use changes. The projections reflect where local authorities expect the growth is most likely to occur in their district area, and are controlled National Trip End Model growth forecasts at the district level. The trips matrices reflect forecast changes in highway congestion between 2011 and 2031.

The forecast patronage for each proposed new and revised service, and also for the withdrawn services, is presented in Appendix C. These results show that the Sprint BRT and CityLink bus services would have high passenger-boardings; service 71 and 108 would lose a significant proportion of their patronage; there would be an increase in patronage on service 115 and 777; and service 967 would not achieve a high patronage in relation to the departure frequency proposed. Service 904 would lose a high proportion of existing patronage, reflecting its curtailed route.

## 4.3 Development-Generated Public Transport Patronage

### 4.3.1 Trip Generation and Distribution

The Travel Demand Model [TDM] described in the report 'Green Belt Development Movement Infrastructure Plan' provided forecasts of peak-hour public transport trips for one-hour peak periods. The forecasts used were those based on the modal share targets for Langley and Peddimore. These were expanded to PRISM two-hour model periods using time-of-travel factors derived from the National Travel Survey 0501. The resultant peak-period public transport trip generations are:

- Langley to/from existing development areas:
  - AM-peak, 0700-0859 = 690 trip departures, 202 trip arrivals.
  - PM-peak, 1600-1759 = 555 trip departures, 841 trip arrivals.
- Peddimore to/from existing development areas:
  - AM-peak, 0700-0859 = 481 trip arrivals, 109 trip arrivals.
  - PM-peak, 1600-1759 = 98 trip arrivals, 575 trip arrivals.
- Langley, to/from Peddimore:
  - AM-peak, 0700-0859 = 66 trip departures, 19 trip arrivals.
  - PM-peak, 1600-1759 = 71 trip arrivals, 47 trip arrivals.

These public transport trip totals were provided to Mott MacDonald for incorporation into PRISM.

For Langley, trip distribution to/from other journey destinations/origins was based on the PRISM's travel demand model zone that represents Walmley. For Peddimore, distribution was based on the Minworth zone. The distributed Langley and Peddimore trips were added to the 2031 standard trip matrix to create a revised 2031 trip matrix including public transport travel demand generated by the proposed development.

### 4.3.2 Route Assignment Results

The PRISM public transport model was run for two scenarios:

- Scenario B: 2031 standard trip matrix assigned to 2031 public transport network with proposed service revisions.
- Scenario C: 2031 trip matrix including Langley and Peddimore trips assigned to 2031 public transport network with proposed service revisions.

The forecast patronage for each proposed new and revised service is presented in Appendix C. These results show that the Sprint BRT and CityLink bus services would gain substantial patronage from proposed developments; that service 71 would gain sufficient extra patronage to off-set that abstracted by other services, but service 108 would not; service 777 would have a high patronage gain from the development relative to that which it abstracts from other services, whereas the opposite is the case for service 115; and service 904 and 967 have relatively small patronage gains from the development.

## 4.4 Modal Shift Public Transport Patronage

### 4.4.1 Calculation of Modal Shift

The proposed service revisions would improve public transport connectivity for some existing journeys, e.g. where a more direct or more frequent service is provided, and worsen it for some existing journeys, e.g. where a direct service is withdrawn. In this context, 'existing journeys' means travel that would occur by car or public transport in 2031 in the absence of the proposed Langley and Peddimore development.

By comparing the overall travel time and expense for any origin-destination [OD] journey by public transport to that by car using a logit function, a modal split can be calculated for each OD. PRISM's modal share model is being developed to forecast the effects on changes in public transport services and in highway and parking conditions on the share of travel by car and by public transport.

This PRISM functionality was not available at the time in the timescale of this study; therefore, an alternative interim methodology was adopted. An elasticity function compares the overall travel time and expense, referred to as 'perceived journey time' [PJT], for the same mode for each OD in two different network scenarios. From the proportionate PJT change, it calculates for each OD the proportionate change in trips by that mode.

Elasticity models are not applicable where there is a substantial change in the level of service provision. They can be an acceptable proxy for modal split calculation where there is a moderate change in service provision.

For this study, the following elasticity function was applied:

- The elasticity model was applied to the 2031 standard trip matrix, i.e. not including Langley and Peddimore development-generated trips.
- Demand elasticity of -0.6 was applied, thus a 10% decrease in public transport PJT for an origin-destination movement would result in a 6% increase in the number of public transport trips making that movement.
- The change in public transport trips was capped at  $\pm 10\%$  for any one OD.

The elasticity value was taken from TRL Report 593, Table 7.23. This provides a range of elasticity values for different trip-maker income levels, trip purposes and travel modes. The selected elasticity was the mid-range value for a medium-income trip-maker making a home-work trip by bus. The calculation to apply the demand elasticity was undertaken within the PRISM public transport model.

#### 4.4.2 Route Assignment Results

The PRISM public transport model was run for two scenarios:

- Scenario B: 2031 standard trip matrix assigned to 2031 public transport network with proposed service revisions.
- Scenario D: 2031 trip matrix including modal shift assigned to 2031 public transport network with proposed service revisions.

The forecast patronage for each proposed new and revised service is presented in Appendix C. These results show that there are relatively small gains in patronage for most services due to modal shift effects; in the case of service 967, which replaces parts of service 67 and 914, there is modal shift away from public transport compared to the existing service network. NB: see section 4.4.1 above regarding the proxy methodology for modal shift modelling.

### 4.5 Patronage with Proposed Development and Modal Shift

Comparison of the PRISM results for each scenario enables calculation of service patronage for the combination of development-generated trips and modal shift among existing trips.

- Difference between forecast Scenarios C and B, presented in section 4.3.2, shows the patronage arising from the proposed Langley and Peddimore developments.
- Difference between forecast Scenarios D and B, presented in section 4.4.2, shows the patronage arising from modal shift among other, i.e. non Langley and Peddimore, travel.
- Adding these differences provides patronage for Scenario E, i.e. proposed development plus modal shift among existing trips in 2031.

The forecast patronage for each proposed new and revised service is presented in Appendix H. These results show that the Sprint BRT and CityLink bus services would have high peak-period patronage; that bus services 71 would have a small overall increase in peak-period patronage; and that bus service 777 would have a large increase in patronage relative to the existing patronage on the service. Bus service 108 would lose a relatively high proportion of patronage; service 967 would not achieve a high patronage in relation to the departure frequency proposed. Service 904 would lose a high proportion of existing patronage, reflecting its curtailed route.

## 4.6 Weekday Patronage Summary

### 4.6.1 Expansion to Weekday Patronage

The PRISM model provides service patronage for AM-peak and PM-peak two-hour periods. All the proposed services would operate throughout the weekday daytime period 7am to 7pm; some of them would start earlier and finish later in the day.

Peak period trips were expanded to a full weekday based on the proportion of trips starting in each weekday hour; this being obtained from National Travel Survey Table 0501. The expansion factors thus derived are presented below for services operating over different weekday time periods; operating time bands are expressed to the nearest hour.

- Services Operating 0500-2359
  - Sprint BRT, CityLink bus
  - Service 67 [withdrawn]
  - AM peak 2-hour to 0500-1359 = 3.03
  - PM peak 2-hour to 1400-2359 = 3.09
- Services Operating 0600-2259
  - Service 71
  - Service 904
  - Service 914 [withdrawn]
  - Service 967
  - AM peak 2-hour to 0600-1359 = 2.99
  - PM peak 2-hour to 1400-2259 = 3.04
- Services Operating 0700-1859
  - Services 115, 777 [superseded by 75 from June 2014]
  - AM peak 2-hour to 0700-1359 = 2.90
  - PM peak 2-hour to 1400-1859 = 2.40
- Services Operating in Peak periods only
  - AM peak 2-hour to 0700-0959 = 1.00
  - PM peak 2-hour to 1600-1859 = 1.41

NB: specific to service 108, the only peak-periods only service covered in the financial appraisal.

The peak period expansion factors set out above have been applied to the PRISM patronage forecasts to calculate weekday patronage for each proposed service; results presented in Table 4.2.

Table 4.2 Weekday bus patronage by forecasting scenario in 2031 forecasting year

Service [note 1]	Service Change	Boardings by Forecasting Scenario [2]					Change in Boardings			
		A	B	C	D	E	B-A	C-B	D-B	E-A
67	Withdrawn	5,100	0	0	0	0	-5,100	0	0	-5,100
71	Revised	8,839	7,980	9,347	8,032	9,399	-858	1,367	51	560
108	Retained	774	484	601	484	601	-290	117	0	-173
110	Retained	3,464	3,131	3,276	3,128	3,273	-333	145	-3	-191
115	Revised	1,947	2,510	2,738	2,553	2,782	562	228	44	834
116	Retained	1,362	1,211	1,301	1,216	1,307	-151	90	5	-55
904	Revised	4,571	3,093	3,231	3,096	3,234	-1,478	137	3	-1,338
914	Withdrawn	2,569	0	0	0	0	-2,569	0	0	-2,569
757	Retained	740	742	893	748	899	3	151	6	160
777	Revised	828	1,133	1,702	1,146	1,715	305	569	13	887
967	New	0	1,579	1,645	1,570	1,636	1,579	67	-9	1,636
Sprint BRT	New	0	8,525	13,456	8,675	13,606	8,525	4,931	150	13,606
CityLink bus	New	0	8,045	12,300	8,226	12,480	8,045	4,255	181	12,480

Notes:

1. Langley and Peddimore services, other withdrawn and new services, plus service 108.
2. The definition of each forecasting scenario is presented in Table 4.1.

## 4.6.2 Patronage on Proposed Services

### 4.6.2.1 Effect of Service Changes

A revised bus service network has been tested in a patronage forecasting model in which:

- Sprint BRT and CityLink bus services are introduced between Sutton Coldfield and the City Centre via Walmley.
  - Sprint running via Falcon Lodge and Walmley.
  - CityLink running via Minworth and Castle Vale.
- Bus services 67 and 914 are withdrawn and service 904 curtailed such that it no longer runs beyond Sutton Coldfield town centre to Falcon Lodge.
- New bus service 967 is introduced to serve roads on which services 67 and 914 are the current bus service to/from the City Centre.
- Bus service 115 increased in frequency to off-set withdrawal of services 914 and 67.
- Bus service 71 is re-routed between Castle Vale and Walmley via Peddimore instead of Minworth village.
- Bus service 777 is extended to Langley via Peddimore [NB: this service has been replaced by new service 75 since the patronage forecasting was undertaken].
- See Section 4.2 for description of modelled service changes.

Patronage forecasting results indicate that with these service changes in place the proposed Sprint and CityLink services would attract substantial patronage based on development patterns in 2031 even without the proposed Langley and Peddimore developments in place:

- The forecast patronage for Sprint is 8,500 passenger-boardings per weekday; and
- The forecast patronage for CityLink is 8,000 passenger boardings per weekday.



If these proposed services changes were introduced in the absence of the proposed Langley and Peddimore developments, there would be significant abstraction of patronage from several bus services. The reductions that have been identified in this study include:

- Service 71 – forecast reduction of 860 passenger-boardings per weekday [10% of no-change patronage].
- Service 108 – forecast reduction of 290 passenger-boardings per weekday [37% of no-change patronage].
- Service 904 – forecast reduction of 1,480 passenger-boardings per weekday [32% of no-change patronage].

NB: there would be abstractions from other services too; further analysis to follow any modification to the bus service proposals.

Proposed new service 967 is forecast to have 1,600 passenger-boardings per weekday.

There are forecast increases in the patronage of bus services 115 and 777 due to the modelled network changes, at 562 and 305 passenger-boardings per weekday respectively. NB: there would be patronage increases on other services too; further analysis to follow any modification to the bus service proposals.

#### 4.6.2.2 Effect of Langley and Peddimore Development

Public transport travel generated by the proposed developments was forecast using a bespoke travel demand model covering journeys all modes of travel from/to Langley and Peddimore; see Section 4.3. The development-generated public transport trips were added to the 2031 no-Langley-and-Peddimore trips and assigned to the revised public transport network model.

The modelling results show that forecast substantial additional patronage on the Sprint and CityLink services:

- Sprint – forecast development-generated patronage of 4,900 passenger-boardings per weekday; and
- CityLink – forecast development-generated patronage of 4,300 passenger-boardings per weekday.

Development-generated patronage on bus service 71 is forecast to be 1,400 passenger-boardings per weekday, which more than off-sets the patronage abstraction from the service due to network changes. For service 108 and 904, the development-generated patronage of 120 and 140 passenger-boardings per weekday respectively is insufficient to off-set abstraction to the new and revised services.

The revised services 115 and 777 would enjoy patronage increases generated by the proposed development, of 228 and 569 passenger-boardings per weekday respectively. There would be a small increase in the forecast patronage of new service 967, of 70 passenger-boardings per weekday.

#### 4.6.2.3 Effect of Modal Shift

A proxy methodology was used to forecast modal shift between car travel and public transport, using a generalised travel time elasticity method; see Section 4.4 above. The modal shift due to the proposed service changes was calculated only for non-Langley-and-Peddimore trips; the Langley and Peddimore public trip forecasts already include modal shift effects.

This methodology forecasts relatively modal shift effects for proposed new services that are small relative to the development-generated patronage:

- Sprint – forecast modal shift patronage of 150 passenger-boardings per weekday; and
- CityLink – forecast modal shift patronage of 180 passenger-boardings per weekday.

Small modal shift changes in patronage on other bus services are forecast too.

The use of a full logit-based modal split model might result in substantially different forecasts of modal shift for all services.

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# Infrastructure

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## 5.1 Proposed Infrastructure

### 5.1.1 Sprint BRT route

The proposals for a Sprint route from the development area to the city centre would require investment in supporting infrastructure, in order to provide a competitive journey time against the private car. The principals of the service are discussed in Chapter 3, along with a general description of the route and stopping patterns

The passenger facilities provided will be standard Sprint stops as being implemented by Centro for other Sprint services. Reflecting the higher standard of Sprint, the shelters and other stop infrastructure use higher quality materials and are comparable to Metro stops.

The use of intelligent transport systems forms a key part of providing prioritised journeys for Sprint services, however the implementation of physical priority measures are also proposed where land constraints are not an issue. For the Langley Sprint route, opportunities are taken to utilise areas of wide footways, verges or central reservations for selected carriageway widening on the approaches to known pinchpoints.

A list of specific interventions along the route is presented in Appendix D, and are shown on Figure 5.1. Sixteen Sprint stop clusters are proposed, thirteen intermediate stop pairs, the Star City Interchange and two terminal stops in Birmingham city centre and Sutton Coldfield town centre. A total of 1,650 metres of localised carriageway widening is recommended to provide bus lanes without impacting on highway capacity for general traffic.

The interventions have been identified in generic design terms appropriate to a preliminary infrastructure definition. This is reflected in the level of cost contingency provided; see Section 5.2.1 below.

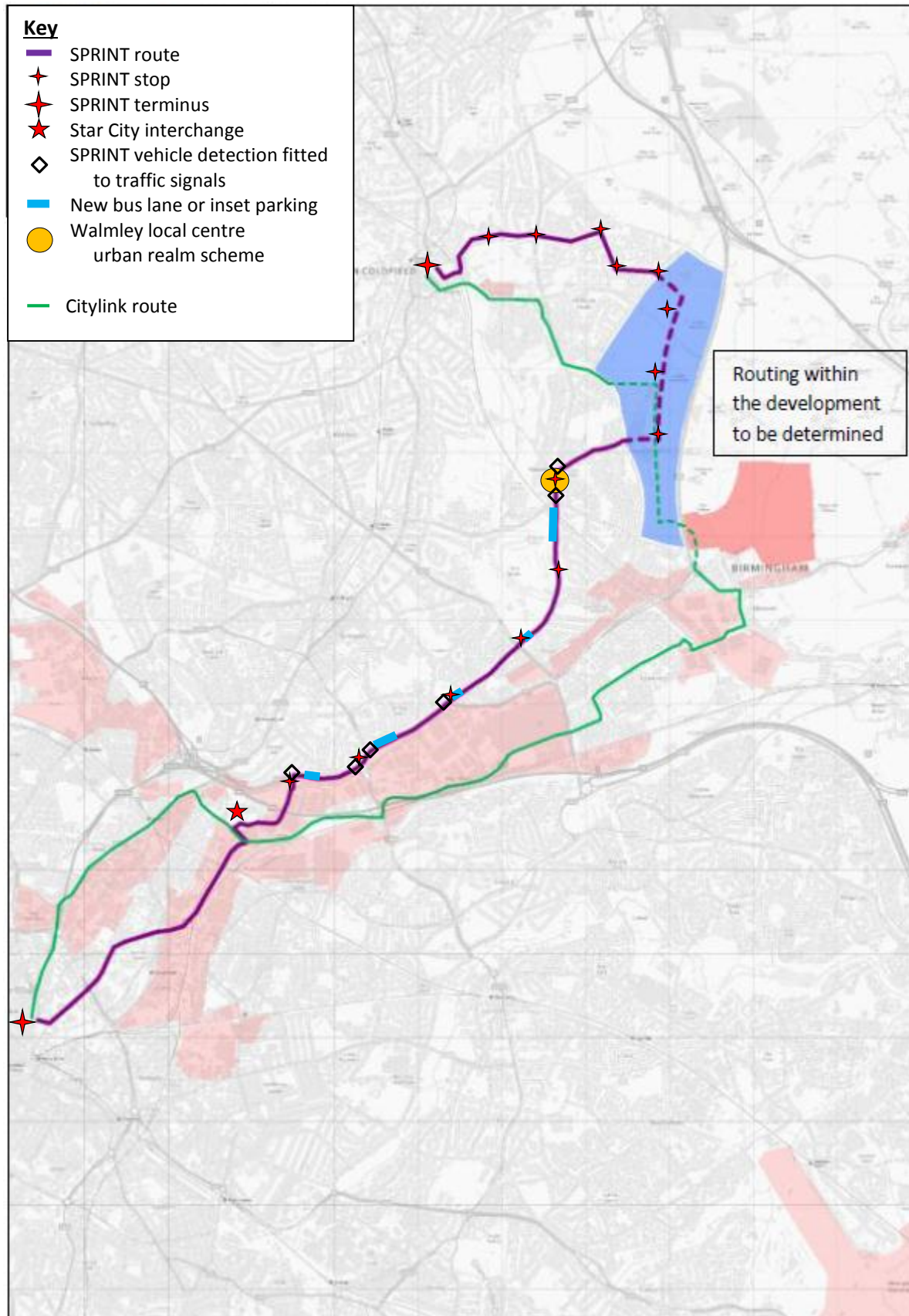
Infrastructure bespoke to this route is limited, with only two significant additional interventions proposed. The first is a new interchange at Star City, to act as a focal point for the Sprint and CityLink bus routes, as well as with other services already passing through the site and providing additional connections to the local area.

The second intervention is in Walmley local centre. Here it is proposed that a major urban realm scheme is provided as part of the implementation of the Sprint service. It is envisaged that the scheme would increase the attractiveness of the centre, and can also be used to ensure adequate parking spaces are provided for day-to-day functions as well as the optimal location of the necessary Sprint stops.

### 5.1.2 CityLink bus route

Providing a different style of service to the Sprint route, the proposed CityLink option is more closely aligned to a quality 'standard' bus route. As such specific additional highway interventions are not proposed, but advantage will be taken of any existing priority measures. Any new stops required will be to Centro's standard dependent on stop type and anticipated passenger numbers. Any existing stops expected to see a significant increase in passenger numbers due to the CityLink service will be considered for enhancement as appropriate.

Figure 5.1 Proposed Sprint interventions



## 5.2 Infrastructure costs

Using infrastructure unit costs from the Sprint schemes currently being implemented, outline costs have been calculated for the stops and other infrastructure proposed for the Sprint and Citylink services.

### 5.2.1 Sprint route

The list of interventions in Appendix D sets out the unit rates used to derive the anticipated cost of new infrastructure for the Sprint service. In summary this can be broken down as following:

• Stops (including Star City Interchange)	£2.20m
• Highway widening	£2.68m
• ITS (including traffic signal upgrades)	£0.22m
• Other interventions	£1.78m
• Contingency (50%)	£3.44m
• Design fees, temporary traffic management, Traffic Regulation Orders	£1.72m
<b>Total</b>	<b>£12.03m</b>

If the modified Sprint proposal set out in Section 6.5 of this report were pursued, an additional seven stop pairs would require upgrading. The cost of this would be £1.23m including contingency and design fees, temporary traffic management, and Traffic Regulation Orders. Thus, the total Sprint cost would be £13.25m.

### 5.2.2 CityLink route

As outlined above, it is assumed that the CityLink route will utilise existing infrastructure and as a result, investment for this route has not been fully determined at this stage. However, an estimate has been made as to the number of stops potentially requiring enhancement and an allowance has been made for limited highway interventions to provide small-scale bus priority where not already available.

It has been estimated that there are approximately 40 stop pairs along the route of the CityLink service. Assuming an average £10,000 spend per stop pair to upgrade the facilities, this gives a total of £400,000 for passenger facilities. It may be desired to provide slightly higher quality facilities at certain key interchange stops, so a further allowance of £100,000 is recommended for these specific local schemes.

Taking the unit rates from Sprint for minor highway widening works, a sum of £500,000 would allow for approximately 350m of intervention. This could be localised widening to provide inset parking to keep running lanes clear, or the provision of bus lanes to bypass queues at selected pinchpoints.

One specific intervention is a proposed new bus gate, linking Park Lane in Castle Vale with the A38 Kingsbury Road. This bus-only facility would allow services travelling to/from Minworth to access Castle Vale immediately to the west of the railway overbridge. The estimated costs are approximately £450,000 plus on-costs.

In summary it is recommended that **£2.6m** be safeguarded as a general enhancements fund for the CityLink route, comprising £1.5m for the measures outlined above and £1.0m for contingencies and fees etc. If any major highway interventions are required, such as the reconstruction of major junctions or the construction of significant lengths of priority lane, these should be costed separately and funding obtained specifically.

# Appraisal of Commercial Performance

## 6.1 Service Patronage and Revenue

### 6.1.1 Annual Patronage

Annual patronage has been calculated from the weekday patronage presented in Section 4.6.2.

The volume of trip making on weekend days relative to weekdays has been derived from National Travel Survey table 0504:

- Saturday, all-purposes all modes:  $133/146 = 0.911$ .
- Sunday, all-purpose all modes:  $105/146 = 0.719$ .

It is recognised that public transport mode share tends to be lower at weekends, e.g. due to increased availability of the household car and greater car sharing. Therefore, reductions in relative public transport trips numbers have been applied:

- Saturday, reduce public transport by one-fifth:  $0.80 * 0.911 = 0.73$ .
- Sunday, reduce public transport by two-thirds:  $0.33 * 0.719 = 0.24$ .

Weekdays that are Bank Holidays and those between Christmas and New Year are treated as having patronage similar to a Sunday. Thus, the number of patronage days is calculated as:

- Weekday patronage: multiply by 247 = (52 weeks \* 5 days) – (8 Bank Holidays + 5 Christmas to New Year days).
- Saturday patronage: multiply by 52 = 52 Saturdays.
- Sunday patronage: multiply by 65 = 52 Sundays + 8 Bank Holidays + 5 Christmas to New Year days.

Different annual expansion factors apply depending on whether a service operates on Sundays as well as Monday to Saturday. Combining the relative patronage factors and the number of patronage days per year:

- Weekday-to-Annual factor, for services operating Monday to Sunday:  
 $247 + (0.73 * 52) + (0.24 * 65) = 247 + 38 + 16 = 300$
- Weekday-to-Annual factor, for services operating Monday to Saturday:  
 $247 + (0.73 * 52) = 247 + 38 = 285$
- Weekday-to-Annual factor, for services operating Monday to Friday:  
 247

### 6.1.2 Annual Revenues

Ticket revenues have been calculated based on an average revenue per passenger boarding, rather than the fare for a single journey on each particular service. This seeks to reflect that many journeys are made on tickets and cards that permit the use of a network of services, and that many one-way journeys involve interchange between two or more services, i.e. several boardings for a single origin-to-destination journey.

An average revenue per passenger boarding of 90 pence has been assumed. Annual patronage and revenue for the proposed bus services is presented in Table 6.1.

Table 6.1 Annual bus patronage and revenue by service in 2031 forecast year

Service [note 1]	Service Change	Patronage by Forecasting Scenario / millions					
		2031 Existing [2]		2031 Proposed [3]		Difference	
		boardings	revenue	boardings	revenue	boardings	revenue
67	Withdrawn	1.53	£1.38	0.00	£0.00	-1.53	-£1.38
71	Revised	2.65	£2.39	2.82	£2.54	0.17	£0.15
108	Retained	0.19	£0.17	0.15	£0.13	-0.04	-£0.04
110	Retained	1.04	£0.94	0.98	£0.88	-0.06	-£0.05
115	Revised	0.55	£0.50	0.79	£0.71	0.24	£0.21
116	Retained	0.39	£0.35	0.37	£0.34	-0.02	-£0.01
904	Revised	1.37	£1.23	0.97	£0.87	-0.40	-£0.36
914	Withdrawn	0.77	£0.69	0.00	£0.00	-0.77	-£0.69
757	Retained	0.21	£0.19	0.26	£0.23	0.05	£0.04
777	Revised	0.24	£0.21	0.49	£0.44	0.25	£0.23
967	New	0.00	£0.00	0.49	£0.44	0.49	£0.44
Sprint BRT	New	0.00	£0.00	4.08	£3.67	4.08	£3.67
CityLink bus	New	0.00	£0.00	3.74	£3.37	3.74	£3.37

1. Langley and Peddimore services, other withdrawn and new services, plus service 108.

2. Scenario A:

- Public Transport demand: 2031 standard development pattern.
- Public Transport network: 2031 committed changes from 2013.

3. Scenario E:

- Public Transport demand: 2031 with Langley and Peddimore developments.
- Public Transport network: as Scenario A plus Langley and Peddimore service changes.

## 6.2 Section 6.2 Operating Resources and Costs

### 6.2.1 Operating Cost Rates

The costing has been based on the two categories of vehicle deployment:

- Core service period: deploying a vehicle Weekday and Saturday 0700-1900 – this cost covers the fixed cost of the having vehicle in the fleet plus the running costs during this period of service; and
- Marginal service period: deploying a vehicle at additional times on Weekdays and Saturdays, earlier and later than the core service period, plus on Sundays – this covers the incremental running costs during this period of service.

Unit costs for core service and marginal time vehicle deployment used in the calculations were:

- Standard bus – per vehicle deployed: core service - £140k/year; marginal service - £25.00/hour.
- CityLink bus – per vehicle deployed: core service - £140k/year, i.e. 5% greater than Standard bus; marginal service - £25.00/hour.
- Sprint BRT – per vehicle deployed: core service - £162k/year, i.e. 10% greater CityLink bus; marginal service - £27.50/hour, i.e. 10% greater CityLink bus.

NB: The annual core service cost per vehicle includes vehicle capital costs, i.e. financing and depreciation.

The marginal service period would vary between services, depending on the times of operation outside the core service period. Five service period types were used and the marginal service hours calculated for each:

- A – Weekday and Saturday = 0500-2359, Sunday = 0700-2259.
  - proposed Sprint and CityLink; withdrawn 67.
- B – Weekday and Saturday = 0600-2259, Sunday = 0900-2059.
  - new 967, revised 71, 115 and 904; withdrawn 914.
- C1 – Weekday and Saturday = 0700-1859, Sunday = 0900-1859.
  - no proposed services in this category
- C2 – Weekday and Saturday = 0700-1859, Sunday = no service.
  - revised 777.
- D – Weekday peaks only.
  - retained 108 – see Chapter 7 regarding modified network option.

Based on these marginal operating periods, the marginal operating hours for each service period were calculated; see Appendix F.

Applying the core and marginal cost rates, annual operating costs were calculated for vehicles deployed in the core service period only and for vehicles deployed additionally in the marginal service period; see Appendix G. The resultant vehicle deployment unit costs are presented in Table 6.2:

Table 6.2 Bus operating cost rates

Service Type	Service Day [note 1]	Core Service Period [note 2] Annual Cost per Vehicle / £k	Marginal Service Period [note 2]			Core + Marginal Service Annual Cost per Vehicle / £k
			Annual Hours	Cost per Vehicle £/hour	Annual Cost £/vehicle	
Sprint	A	162	3,079	27.50	85	247
CityLink	A	147	3079	25.00	77	224
Standard	A	140	3079	25.00	77	217
Standard	B	140	2233	25.00	56	196
Standard	C1	140	531	25.00	13	153
Standard	C2	140	0	25.00	0	140
Standard	D	140	-2142	25.00	-54	86

Notes:

1. Service operating periods are:

- A: Monday - Saturday 0500-2359 and Sunday 0700-2259
- B: Monday - Saturday 0600-2259 and Sunday 0900-2059
- C1: Monday - Saturday 0700-1859 and Sunday 0900-1759
- C1: Monday - Saturday 0700-1859 and Sunday no service
- D: Monday - Friday 0700-0950 and 1600-1859
- nb: Bank Holiday service same as Sunday; Christmas Day no service.

2. Core Service Period is Monday - Saturday 0700-1859; all other is Marginal Service Period.

## 6.2.2 Operating Resources

For this appraisal, the unit of operating resource for each bus service has been defined as the number of vehicles that need to be deployed in traffic to operate the service. The vehicle deployment is a function of the route round time, i.e. running time plus end-of-route layover for both directions added together, and the departure interval. Vehicle deployment is usually greatest during weekday peak periods, due to

the running times and departure intervals compared to other times, and is referred to as the 'peak vehicle requirement' [PVR].

Running times for proposed services were calculated from the running times of current bus services, and assumed running speeds over new route sections.

- Sections common with current bus services: use worst running time from current peak timetables.
- New route sections within Langley and Peddimore, and Langley <> Walmley local centre and Peddimore <> Minworth Island – 20km/h.
- Sprint between Walmley and City Centre – 25km/h [nb: initial calculations based on 30 km/h; reduction to 25km/h made following operator consultation].
- CityLink between Castle Vale and Star City – 20km/h [nb: initial calculations based on 25 km/h; reduction to 20km/h made following operator consultation].
- CityLink between Star City and Lichfield Road, Aston – 15km/h [nb: initial calculations based on 20 km/h; reduction to 15km/h made following operator consultation].

The calculation of running times for the initial service proposals is presented in Appendix B.

For each service, end-of-route layover has been provided at roundly 10% of the running time for both directions combined. Adding the layovers to the running times, the PVR for proposed new, revised and withdrawn services has been calculated; see Appendix E. Inter-working of vehicles between services has been allowed for. Compared to the running speeds that were initially assumed, the revised running speeds used following the operator consultation resulted in an increase in PVR of one vehicle for the Sprint service and of one vehicle for the CityLink service.

For each service, vehicle deployment has been calculated in two categories:

- Monday-Saturday core service period: based on the peak vehicle requirement [PVR] for the service, i.e. prudent assumption that the number of vehicles deployed in Weekday inter-peak and Saturday is the same as in the Weekday peak.
- Marginal service period: based on vehicle deployment being half that in the Weekday peak, on a departure frequency half of that in the Weekday peak and prudent assumption that running times are the same.

The peak vehicle requirement for each service is presented in Table 6.3. The lesser number of vehicles that would operate outside the core daytime service period is taken into account in the service costing.

NB: For consistency with the patronage modelling, the costing of the North Warwickshire – Airport/NEC Link service is based around extension of service 777 rather than an increased frequency on service 75; see Section 4.2.1 above. However, the incremental core service vehicle deployment is the same in both cases, and there would be nil marginal service hours for both service proposals. Thus, the change in operating costs would be the same for both service variants.



Table 6.3 Vehicle deployment by service – for new, revised and withdrawn services

Service	AM Peak			PM Peak			Peak Vehicle Requirement
	Round Time / minutes	Departure Interval / minutes	Vehicles Deployed	Round Time / minutes	Departure Interval / minutes	Vehicles Deployed	
<b>New and Revised Services</b>							
Sprint	120	10	12	120	10	12	12
CityLink	140	10	14	140	10	14	14
967	80	20	4	80	20	4	4
revised 71	210	15	14	210	15	14	14
revised 115	138	15	9.2	140	15	9.33	
revised 904	87	15	5.8	85	15	5.67	
115&904			15			15	15
revised 777	120	30	4	120	30	4	4
All Services:							63
<b>Services Withdrawn [or replaced by revised version]</b>							
67	80	8	10	88	8	11	11
71 [revised]	210	15	14	210	15	14	14
108	Retained in initial service proposal; peak vehicle requirement = 3.						
115 [revised]	126	30	4.2	126	30	4.2	
914	114	30	3.8	114	30	3.8	
115&914			8			8	8
904 [revised]	120	15	8	120	15	8	8
777 [revised]	60	30	2	60	30	2	2
All Services:							43
Increase in Vehicle Deployment							20

### 6.2.3 Operating Costs by Service

The unit costs in Table 6.3 were applied to the vehicle deployment in Table 6.2 to calculate the annual operating for each proposed service and the saving in operating costs for each service to be withdrawn; see Appendix G. The resultant costs are presented in Table 6.4.

Table 6.4 Annual operating costs for new, revised and withdrawn services

Service	Operating Period	Core Service Period			Marginal Service Period			Total Cost /£k Core + Marginal
		Vehicles Deployed	Unit Cost /£k	Operating Cost /£k	Vehicles Deployed	Unit Cost /£k	Operating Cost /£k	
<b>New and Revised Services</b>								
Sprint	A	12	162	1,944	6	85	508	2,452
CityLink	A	14	147	2,058	7	77	539	2,597
967	B	4	140	560	2	56	112	672
revised 71	B	14	140	1,960	7	56	391	2,351
revised 115	B							
revised 904	B							
115&904	B	15	140	2,100	8	56	447	2,547
revised 777	C2	4	140	560	0	0	0	560
All Services:								11,179
<b>Services Withdrawn [or replaced by revised version]</b>								
67	A	11	140	1,540	6	77	462	2,002
71 [revised]	B	14	140	1,960	7	56	391	2,351
108	D	Retained in initial service proposal; no operating cost saving.						
115 [revised]	C							
914	B							
115&914	B	8	140	1,120	4	56	223	1,343
904 [revised]	B	8	140	1,120	4	56	223	1,343
777 [revised]	C2	2	140	280	0	0	0	280
All Services:								7,319
Change in Annual Operating Costs / £k								3,860

## 6.3 Financial Performance

### 6.3.1 Appraisal Period Methodology

The financial appraisal is based on the period 2016 to 2031, i.e. a 15 year build-out period. Appraisal has been undertaken at current prices.

Patronage extrapolation from the 2031 forecast year to the 2016 starting year was undertaken using factors particular to each category of patronage, as identified in section 4.1.1 above.

- Existing public transport patronage re-routed between services:
  - Bus passenger trips numbers were extracted from the National Trip End Model for Birmingham in 2016 and 2031.
  - The ratio of bus trip origins and of trip destinations in 2016 c.f. 2031 were used to calculate the proportionate change between the two years, and thus a trend factor for each year relative to 2031 was derived.
  - The year-factors were applied to the 2031 model year forecasts from Scenario B – see Table 4.1 – to calculate the patronage in each appraisal year.
- Development-generated public transport patronage:
  - The difference in patronage between Scenarios C and B – see Table 4.1 – was calculated to identify the development generated patronage on each service.
  - A constant build-out rate was assumed of one-fifteenth of the development completed in each year.

- Thus, development generated patronage in 2016 was calculated as zero; in 2017 as 6.67% of 2031 in 2018 as 13.3% of 2031, and so on to 100% in 2031.
- Model shift public transport patronage:
  - The difference in patronage between Scenarios D and B – see Table 4.1 – was calculated to identify the modal-shift patronage on each service.
  - To derive the patronage trend, the same methodology was applied as for re-routeing of existing public transport patronage but using all-mode trip numbers from National Trip End Model.
  - The year-factors were applied to the 2031 model year forecast differences between Scenarios D and B to calculate the patronage in each appraisal year.

The in-year patronage from each demand source was added together to calculate the combined patronage on each service. The average revenue per boarding – see Section 6.1.2 above – was applied to calculate passenger revenue for each service in each year 2016 to 2031.

The changes in operating resources and costs have been applied in full from 2016 onwards. This assumes that all the service changes would be implemented from the start of the development.

### 6.3.2 Langley and Peddimore Services

For each of the services that would run through Langley and Peddimore, the forecast passenger revenues and estimated operating costs in 2031 have been compared to calculate a financial surplus / deficit; see Table 6.5. The extrapolation of revenues and costs is presented in Appendix J.

NB: The financial appraisal is based on a revised version of former service 777 providing the North Warwickshire – Airport/NEC link, rather than new service 75; the latter is not included in the PRISM network model – see Section 4.2.1 above. Forecast incremental revenue to service 757, which is also replaced by new service 75, is also taken into account.

- Sprint BRT
  - Break-even forecast in 2017.
  - Cumulative deficit to break-even year = £81k.
  - Substantial annual surplus in 2031, equivalent to 33% of revenue.
- CityLink bus
  - Break-even forecast in 2021.
  - Cumulative deficit to break-even year = £997k.
  - Substantial annual surplus in 2031, equivalent to 23% of revenue.
- Service 71
  - Break-even forecast in 2023.
  - Cumulative deficit to break-even year = £597k.
  - Annual surplus in 2031, equivalent to 8% of revenue.
- Service 777
  - Break-even not achieved by 2031.
  - Cumulative deficit to 2031 = £3.06m.
  - Annual deficit in 2031 of £120k, equivalent to 27% of revenue.
  - Taking account of forecast change in service 757 revenue, the change in annual deficit compared to the no-change situation is reduced to £50k.

Considering all services in the West Midlands Metropolitan County and aggregating the deficits in each year, the cumulative deficit over the period 2016 to 2031 is forecast to be £2.18m. This does not include the use of any surpluses in later years to off-set deficits in earlier years, on the basis that there might be no mechanism to capture such surpluses.

The service proposal developed to provide a link onto North Warwickshire shows a deficit of between £2.81m and £3.06m. However, since the patronage forecasting model was prepared, a new service 75 has replaced previous services 757 and 777. A modified service proposal is required to reflect this recent change; see Section 6.5 below.

NB: The calculation of these cumulative deficits is based on all service changes being introduced from the commencement of development. The financial appraisal assumed that the service changes would occur in 2016. A phased implementation could result in a reduced cumulative deficit.

Table 6.5 Financial surplus/deficit by service in 2031 forecast year

Service [note 1]	Service Change	2031 Proposed [2] / £m			Difference c.f. 2031 Existing [3]		
		Fare Revenue	Operating Costs	Surplus /Deficit	Fare Revenue	Operating Costs	Surplus /Deficit
67	Withdrawn	£0.00	£0.00	£0.00	-£1.38	-£2.00	£0.62
71	Revised	£2.54	£2.35	£0.19	£0.15	£0.00	£0.15
108	Retained				-£0.04	£0.00	-£0.04
110	Retained				-£0.05	£0.00	-£0.05
115	Revised	£0.71					
904	Revised	£0.87					
914	Withdrawn	£0.00					
115&904&914	Revised	£1.59	£2.55	-£0.96	-£0.84	-£0.14	-£0.70
116	Retained				-£0.01	£0.00	-£0.01
757	Retained				£0.04	£0.00	£0.04
777	Revised	£0.44	£0.56	-£0.12	£0.23	£0.28	-£0.05
757&777	Revised				£0.27	£0.28	-£0.01
967	New	£0.44	£0.67	-£0.23	£0.44	£0.67	-£0.23
Sprint BRT	New	£3.67	£2.45	£1.22	£3.67	£2.45	£1.22
CityLink bus	New	£3.37	£2.60	£0.77	£3.37	£2.60	£0.77

1. Langley and Peddimore services, other withdrawn and new services, plus service 108.

2. Scenario E:

- Public Transport demand: 2031 with Langley and Peddimore developments.
- Public Transport network: as Scenario A plus Langley and Peddimore service changes.

3. Difference compared to Scenario A, i.e.:

- Public Transport demand: 2031 standard development pattern.
- Public Transport network: 2031 committed changes from 2013.

### 6.3.3 Other Bus Services

For each of the services that would be modified as a result of the proposed services through Langley and Peddimore, the forecast passenger revenues and estimated operating costs in 2031 have been compared to calculate a financial surplus / deficit; see Table 6.5. The extrapolation of revenues and costs is presented in Appendix J. The change in revenues has also been identified for service 108, which has been identified having a high proportion of its patronage abstracted by the proposed Sprint service.

- Service 967
  - Break-even not achieved by 2031.

- Cumulative deficit to 2031 = £3.77m.
- Annual deficit in 2031 of £230k, equivalent to 52% of revenue.
- Service 115/904
  - These services are treated in aggregate due to schedule inter-working.
  - Break-even not achieved by 2031.
  - Cumulative deficit to 2031 = £15.99m.
  - Annual deficit in 2031 of £960k, equivalent to 61% of revenue.
- Service108 – relative to 2031 ‘no-change’ situation
  - Annual surplus in 2016 worsened by £65k.
  - Annual surplus in 2031 worsened by £38k.

### 6.3.4 Findings of Financial Appraisal

The results show that when the proposed development is fully in place the proposed services connecting to the City Centre and Bromford Industrial Corridor, Sprint and CityLink, would be commercially viable and the revised service to East Birmingham and North Solihull, service 71, would be commercially viable.

The proposed service connecting to North Warwickshire and the Airport/NEC, based on former service 777, is found not to be commercial viable in the form modelled. However, a revised service was introduced during the course of this study, service 75, which provides a through link to Walmley and Sutton Coldfield though at a lower frequency than that proposed in this study. A revised appraisal could follow the establishment of patronage volumes and patterns on this new service.

The proposals for new service and revised services into the City Centre would not be commercially viable in the form modelled in the patronage forecasting. Recommendations for development of alternative service proposals are presented in Section 6.5 below.

## 6.4 Operator Consultation

Consultation was undertaken with local bus service operators through a combination of meetings, telephone and emails. Operators were provided with patronage forecasting results specific to their services. They were also consulted regarding the calculation of required operating resources and operating cost rates. The key findings from the consultation in relation to the planning and appraisal of bus services are set out below.

**Development Location:** Operators were supportive of Langley and Peddimore as being locations that in principle could be readily served by bus, due to proximity to the existing urban area and established dense network of frequent services.

**Development Layout and Highway Configuration:** Operators were keen that the developments have an internal road layout conducive to easy movement of buses, and external highway connections that enable the development to be served by services on through routes that are integrated with the established urban area.

**Development Configuration:** Operators were concerned that the developments have an internal configuration that gives good bus service catchment on foot.

Service-specific feedback:

- Service 71:
  - The proposed CityLink service in the form consulted on could lead to a reduction in frequency of this service between Castle Vale and Sutton Coldfield.

- The current routeing via Minworth village might be better retained, depending on a detailed analysis of current journey patterns on the service.
- Service 108:
  - Scope exists to grow patronage on this service at present, if an increase in vehicle capacity could be provided.
  - The proposed Sprint service in the form consulted on would undermine the commercial viability of this service.
- Service 110:
  - The Sprint service in the form consulted on would abstract a significant volume of patronage.
  - The operator has plans in place for implementation in 2014 that are expected to increase patronage on this service.
- Service 115: The Sprint and CityLink services in the form consulted on means that the proposed increase in frequency of this service is unlikely to be justified.
- Service 967: The proposed CityLink service in the form consulted on means that this service is unlikely to be justified at the departure frequency proposed.
- Services 757 and 777:
  - These services are being replaced by service 75 [change implemented on 2<sup>nd</sup> June 2014]; any revision to improve the connectivity between Langley, Peddimore, Coleshill and the Airport/NEC must take this into account.
  - The new service 75 will be supported by Warwickshire CC until 2017; revised service could be introduced after then.

This feedback on the consultation proposals was used in combination with the financial appraisal results to devise the potential modifications to the service proposals.

## 6.5 Potential Modifications to Bus Service Proposals

### 6.5.1 Langley 'Sprint'

#### *Reasons for Modification:*

- Service 108 serves New Hall valley in Reddicap Heath and Walmley residential areas to the east of the local centre; it runs along the proposed Sprint corridor between Langley and the City Centre, sharing a common line-of-route between Walmley local centre and Gravelly Hill.
- The operator believes that an increase the capacity of vehicles deployed on this service could tap into latent demand for the service from existing residential neighbourhoods.
- The Sprint service is forecast to abstract a significant proportion of service 108's patronage, such that it may no longer be commercially viable in its current as a service running in parallel and additional to the Sprint service.

#### *Potential Modification Compared to Initial Proposal:*

- Service between Langley and Sutton Coldfield town centre via Reddicap Heath to be provided by Sprint instead of CityLink, in effect absorbing the current bus service 108.
- CityLink service to terminate within Langley – see section 6.5.2 below.

#### *Routeing Modification:*

- Core Route: Langley –Walmley – Eachelhurst Road – Pipe Hayes – Tyburn Road – Star City – City Centre;

- Falcon Lodge branch: Sutton Coldfield – Falcon Lodge – Langley, from there via core route to city centre.
- Reddicap Heath branch: Sutton Coldfield – Reddicap Hill or New Hall Valley – Langley, from there via core route to city centre; could run through the southern part of Langley to join the existing highway network at Webster Way, and use Walmley Ash Road to reach Eachelhurst Road.

*Stopping Pattern:* the stops on the Reddicap Heath could be spaced similarly to those for current service 108.

*Departure Frequency:* during the peaks and inter-peak period, at least:

- Core Route, Langley – Walmley – City Centre: 8 departures per hour;
- Falcon Lodge branch: 4 departures per hour; could be increased if justified by patronage volume.
- Reddicap Heath branch: 4 departures per hour.

*Other Characteristics:* Same as initial proposal.

## 6.5.2 Langley ‘CityLink’

*Reasons for Modification:*

- Modified Sprint service would provide the link between Langley and Sutton Coldfield town centre via Reddicap Heath.
- Modified Sprint service would provide a link between the southern part of Langley and the City Centre.
- Coordinate CityLink service with proposed service 967 to provide an integrated timetable between Castle Vale and City Centre – see section 6.5.3 below.

*Routeing Modification:*

- Terminate route in Langley, rather than run through to Sutton Coldfield town centre.
- Variant option would run directly between Peddimore and Castle Vale via Kingsbury Road and a new bus gate with Manby Road, instead of via Minworth village; see section 7.3.4 regarding service 71.
- Potentially follow current service 67 route via Chester Road and Tyburn Road between Castle Vale and Gravelly Hill, thence via Star City to Lichfield Road, Aston, instead of route via Fort Parkway and Heartlands Parkway.

*Stopping Pattern:* Stops along Tyburn Road that are omitted by the Sprint service could be served by CityLink if it adopted the current service 67 route via Chester Road and Tyburn Road.

*Departure Frequency:*

- 4 departures per hour during the peaks and inter-peak period, rather than 6 departures per hour in the initial proposal.
- Coordinate CityLink service with proposed service 967 to provide an integrated timetable between Castle Vale and City Centre – see section 6.5.5 below.

*Other Characteristics:* Same as initial proposal.

## 6.5.3 East Birmingham and North Solihull Link

Service 71 – East Birmingham and North Solihull Link:

- *Routeing:* a variant option would retain the existing route via Minworth village; see section 7.3.2 above regarding Langley CityLink service.

## 6.5.4 North Warwickshire and Airport/NEC Link

Service 75 – North Warwickshire Link:

- *Routeing:* the modified proposal would be based on the current route of new service 75, which replaced service 777 in June 2014.
- *Departure Frequency:* 2 departures per hour during the peaks and inter-peak period over the whole route between Sutton Coldfield town centre and Birmingham International, compared to 1 departure per hour in the current timetable.
- NB: This proposal is subject to continuation of new service 75; otherwise a revised means to provide connectivity in the North Warwickshire and Airport/NEC would be devised.

## 6.5.5 Other Bus Services

### 6.5.5.1 Service 967

*Reasons for Modification:*

- Patronage forecasting for initial proposal shows that the proposed frequency of this service is not attractive compared to the proposed CityLink service between Castle Vale and City Centre.
- The different departure frequency for service 967 and CityLink inhibit effective integration into a coordinated timetable between Castle Vale and City Centre.

*Modification Compared to Initial Proposal:*

- *Service Type:* CityLink standard.
- *Departure Frequency:* 4 departures per hour during the peaks and inter-peak period, rather than 3 departures per hour in the initial proposal; coordinated timetable with Langley CityLink service.
- *Other Characteristics:* Same as initial proposal.

### 6.5.5.2 Service 115

The appropriate frequency of this service would be further reviewed following appraisal of revised proposals for the Sprint and CityLink services. There may be opportunities to vary the route or introduce a variant route to increase the service's catchment.

### 6.5.5.3 Service 108

This service would be withdrawn if the modified Sprint proposal were adopted; see section 6.5.1 above.



# Findings and Recommendations

## 7.1 Study findings

A network of new and revised bus services was devised to serve the proposed developments at Langley and Peddimore. Four services would run through the proposed developments:

- Sprint bus rapid transit: Sutton Coldfield – Langley – Walmley – Pype Hayes – Star City – City Centre.
- CityLink bus: Sutton Coldfield – Langley – Peddimore – Castle Vale – Star City – City Centre.
- Service 71: Sutton Coldfield – Walmley – Langley – Peddimore – Castle Vale – Chelmsley Wood - Solihull.
- Service 75: Sutton Coldfield – Walmley – Langley – Peddimore – Coleshill – Airport/NEC.

Revisions to other bus services would take account of the travel connectivity and likely patronage abstraction effects of the proposed Langley and Peddimore services. The routes of the new and revised services are shown in Figure 7.1.

Operating costs for the new and revised bus services have been calculated based on current bus operating costs plus an allowance for higher cost rates for Sprint and CityLink service types. The savings in operating costs for withdrawn services have also been calculated.

Patronage forecasts for the new and revised services have been prepared for the 2031 forecast year. The forecasts take into account re-routing of trips between existing and proposed services, additional trips generated by Langley and Peddimore, and potential modal shift between car and public transport.

These forecasts show that the proposed new **Sprint** and **CityLink** services would have high patronage. Around two-thirds of patronage on these services would come from existing development and around one-third from Langley and Peddimore. Estimated fare revenues for these services would cover their operating costs by a substantial margin.

**Service 71** would gain new patronage from the proposed developments that would be sufficient to offset patronage that would be abstracted by new services. The required operating resources for this service are projected to be unchanged, so there would be no increase in operating cost.

The patronage and revenue for **Service 75** could not be forecast as the service was introduced during the course of the study and the patronage forecasting model was based on the bus network in place in 2013. Patronage forecasts for an extended version its predecessor, service 777, suggest that it would gain a large volume of patronage in relation to the 'no development, no-change' scenario, but insufficient for the increase in fare revenue to cover the additional operating cost.

An appraisal of financial performance of other buses has been carried out, covering **new Service 967, retained service 108 and revised services 115 and 904**. This appraisal shows that these services would not be commercially viable in the form that they were specified in the patronage forecasting, due to abstraction of patronage by the proposed Sprint and CityLink services.

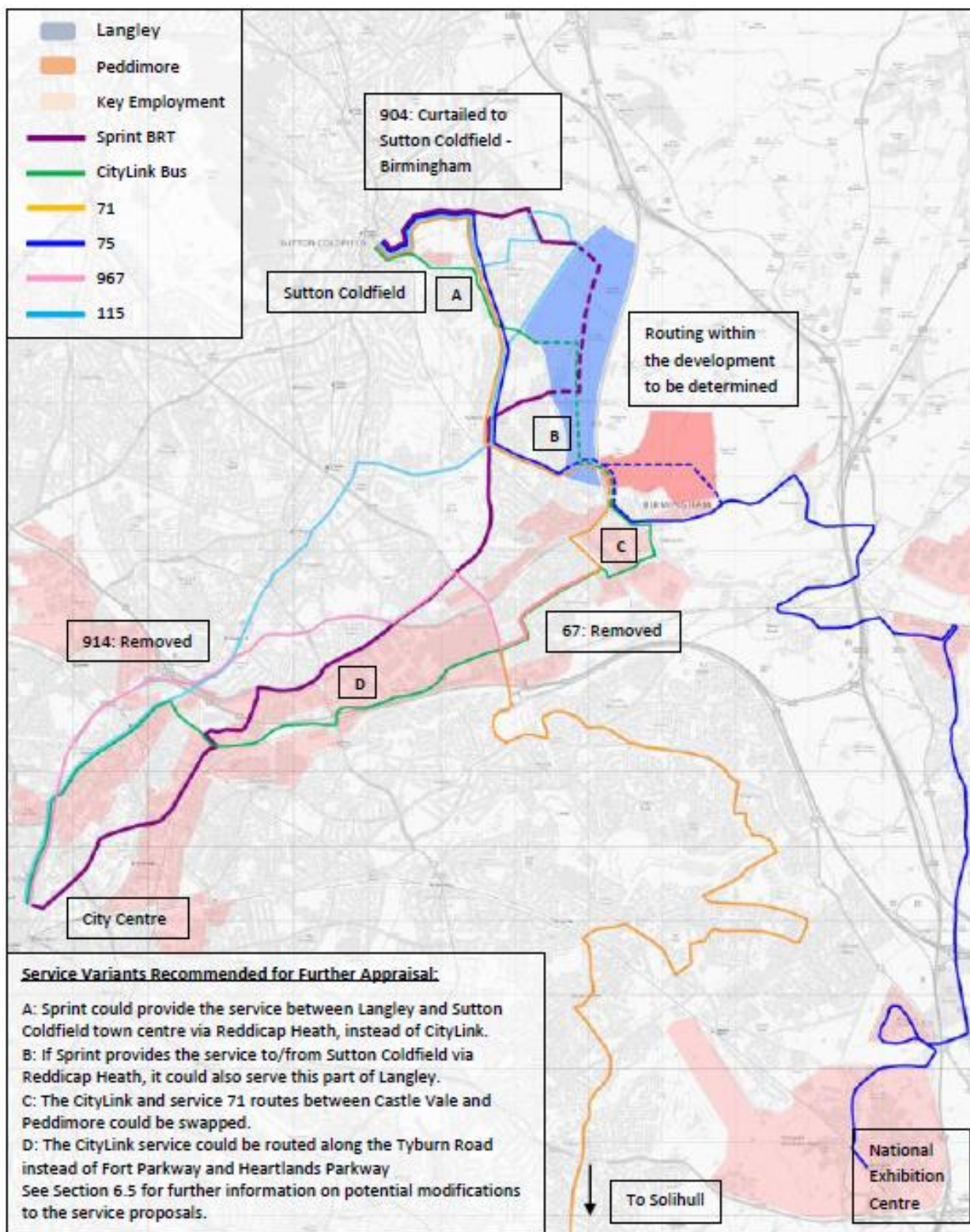
**Potential modifications** to all the proposals for services between Sutton Coldfield, Walmley, Castle Vale and the City Centre have been developed; these are identified on Figure 7.1. Further analysis of projected future travel patterns, revised patronage forecasting, and operating costs calculations for the modified service pattern, would enable optimisation of the pattern of services in this corridor.

The optimal routeing in the Minworth area of service 71, which provides the link to East Birmingham and North Solihull, would be determined from detailed analysis of existing travel patterns on the service in combination with forecast development-generated patronage.

The service pattern for the link to North Warwickshire and the Airport/National Exhibition Centre would be determined following a review of the actual commercial performance of new service 75.

The proposed services are forecast to require financial support of £2.2m for services in the West Midlands Metropolitan County. Services into Warwickshire could require support of up to £3.1m; recent service changes might reduce this amount. A phased introduction of the proposed services may be appropriate and could reduce the required financial support.

Figure 7.1 Langley and Peddimore bus service proposals



## 7.2 Recommendations

Recommendations are presented below for the further development and appraisal of the public transport network to serve Langley and Peddimore. The recommendations also cover other services which would be modified to take account of the introduction of the proposed Langley and Peddimore services.

It should be borne in mind that the proposed bus services are based on the network that was in place in 2014. It is likely that network revisions would take place in the period to 2031 irrespective of the proposed Langley and Peddimore developments; such revisions may lead to different service proposals than those set out below being appropriate to serve Langley and Peddimore.

**Recommendation 1 - Public Transport Network: Sprint bus rapid transit [BRT], CityLink bus and revisions to existing local bus services should form the public transport network for the proposed developments.** BRT and bus services are able to provide good connectivity and appropriate capacity in the forecast main public transport movement axes. Recommendations for development of each of the services are presented below.

**Recommendation 2 – Sprint Bus Rapid Transit: Sprint BRT should be the core service connecting Langley with the City Centre via the Bromford corridor, and with Sutton Coldfield town centre.** An investigation should be conducted of the patronage potential for a service that branches in Langley to connect to Sutton Coldfield via Falcon Lodge and via Reddicap Heath. Potential alignments within Langley should be established that maximise the walk-in catchment within the proposed development and from adjacent already developed neighbourhoods, and which provide an attractive running time through the development.

Further investigations should be conducted into potential patronage and fare revenues, tariff and ticketing systems, capacity requirements, operating resources and costs, route alignments and infrastructure capital costs.

**Recommendation 3 – CityLink Bus Service: CityLink bus should be carried forward as the core service connecting Langley with those parts of the Bromford Industrial Corridor that would be outside the Sprint BRT walk-catchment, and connecting Aston and Nechells with Peddimore.** CityLink might provide a link between Sutton Coldfield town centre and Peddimore, depending on the routeing of Sprint services, and the pattern of service between North Warwickshire and Sutton Coldfield. Potential alignments should be established within Langley, within Peddimore and between Peddimore and Langley that combine an attractive running time through the development with a high walk-in catchment. An investigation should be conducted into routeing between Peddimore and Castle Vale in conjunction with development of bus service 71; see Recommendation 4.

Further investigations should be conducted into potential patronage and fare revenues, operating resources and costs, and infrastructure capital costs.

**Recommendation 4 – East Birmingham and North Solihull Link: Service 71 should be carried forward as the core service connecting Langley and Peddimore to East Birmingham and North Solihull.** An investigation should be conducted into routeing between Peddimore and Castle Vale in conjunction with development of the CityLink bus service; see Recommendation 3. An investigation of the appropriate service frequency between Castle Vale and Sutton Coldfield should be carried out in conjunction with the development of other bus service revisions in the Walmley, Reddicap Heath and Falcon Lodge neighbourhoods.

**Recommendation 5 – North Warwickshire and Airport/NEC Link: Service 75 should be subject to further investigation to determine its potential role as the core service connecting Langley and Peddimore to Coleshill, Birmingham Business Park, the National Exhibition Centre and Birmingham International Station and Airport.** Further investigations should be conducted into the potential patronage that the service could gain from the Langley and Peddimore developments. In conjunction with Warwickshire CC, which financially supports this service, the patronage on the service should be reviewed during its first year of operation. If service 75 is discontinued, alternative bus connectivity options should be developed.

**Recommendation 6 – Service 967 and 115: The proposals for new service 967 and revised service 115 should be modified in light of any revisions to the Sprint, CityLink and other services through Langley and Peddimore.** The provision of service 967 to CityLink standard and timetable coordination with the Langley CityLink service should be considered. The development of modified service proposals should draw on the findings of the PRISM patronage forecasting carried out to date, and the further patronage forecasts resulting from Recommendation 7.

**Recommendation 7 – Patronage Forecasting: Patronage forecasts for the revised service proposals arising from Recommendations 2 to 6 should be prepared using an integrated travel demand and network model.** Forecasts of overall future year travel demand should be developed that reflect the Birmingham Development Plan as a whole. Initial patronage appraisal could be conducted using PRISM's public transport sub-model. The forecasting should be enhanced subsequently to include trip distribution and private / public transport modal split modelling.

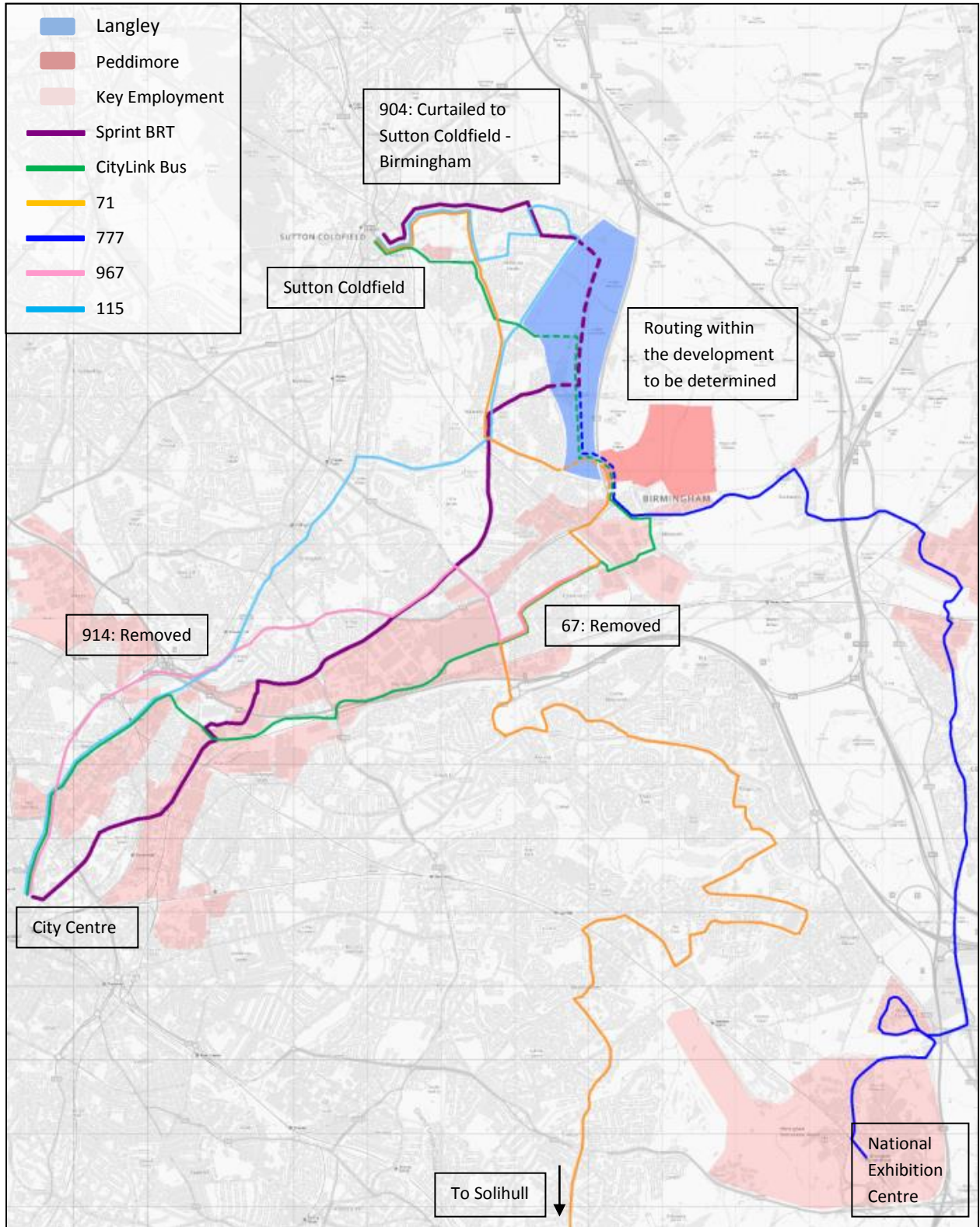
**Recommendation 8 – Appraisal: The revised bus service proposals should be appraised in terms of public transport network accessibility, connectivity and capacity provided, reductions in private car travel in future years, and financial viability.** The appraisal of transport connectivity and capacity should consider how the service proposals could support the Birmingham Development Plan as a whole, as well as the proposed developments at Langley and Peddimore. The financial viability appraisal should consider how the future operating profits of proposed services and developer contributions could contribute to the costs of implementing the proposed services.

**Recommendation 9 – Phasing of Service Changes: A migration plan should be developed for the phased introduction of the service revisions.** The plan should reflect the phasing of development at Langley and Peddimore, other land-use changes along the corridors served, and other transport interventions implemented independently of Langley and Peddimore.

**Recommendation 10 – Realisation of Services: An organisational plan should be developed for realising the proposed service in a coordinated and integrated form.** The plan should be based on investigation and evaluation of partnership, contract and concession options that could be used to specify and deliver the preferred service pattern. The plan should address integration of different service types proposed for Langley and Peddimore and those operating across the metropolitan and neighbouring authority areas.

# A Network Diagram for Services Coded into PRISM Model

**Appendix A: Bus Service Proposals for Patronage Modelling and Operator Consultation**



## **B Bus Service Running Time Calculation**

**Phil Jones Associates Ltd**

**Birmingham Green Belt Eastern Fringe: Bus Network Resources - Running Times**

Version: 0'4l

Date: 05-Jun-14

By: TKH

<b>Sprint 'Purple'</b>	Basis	Speed / km/h	Distance / km	Running Time / minutes
<u>AM Inbound</u>				
Sutton Coldfield -> Springfield Road stop: Falcon Lodge, Fowler Rd	as current 914 worst time			12
Springfield Road -> Langley -> Walmley	@ 20 km/h	20	4.0	12
Walmley -> Star City	@ 25 km/hr	25	6.5	16
Star City -> City Centre	@ 25 km/hr	25	4.5	11
Total:				51
<u>AM Outbound</u>				
City Centre -> Star City	@ 25 km/hr	25	4.5	11
Star City -> Walmley	@ 25 km/hr	25	6.5	16
Walmley -> Langley -> Springfield Road	@ 20 km/h	20	4.0	12
Springfield Road -> Sutton Coldfield stop: Falcon Lodge, Fowler Rd	as current 914 worst time			17
Total:				56
<u>PM Inbound</u>				
Sutton Coldfield -> Springfield Road stop: Falcon Lodge, Fowler Rd	as current 914 worst time			12
Springfield Road -> Langley -> Walmley	@ 20 km/h	20	4.0	12
Walmley -> Star City	@ 25 km/hr	25	6.5	16
Star City -> City Centre	@ 25 km/hr	25	4.5	11
Total:				51
<u>PM Outbound</u>				
City Centre -> Star City	@ 25 km/hr	25	4.5	11
Star City -> Walmley	@ 25 km/hr	25	6.5	16
Walmley -> Langley -> Springfield Road	@ 20 km/h	20	4.0	12
Springfield Road -> Sutton Coldfield stop: Falcon Lodge, Fowler Rd	as current 914 worst time			17
Total:				56



CityLink 'Green'	Basis	Speed / km/h	Distance / km	Running Time / minutes
<u>AM Inbound</u>				
Sutton Coldfield -> Langley section routeing: - Sutton Coldfield, Lower Parade to Walmley Road / Reddicap Hill: as current service 604; and - Walmley Road / Reddicap Hill to Springfield Road: as current service 757. Sutton Coldfield -> Langley sectional timing based on service 168:				
Sutton Coldfield -> Springfield Road stop: Reddicap Heath, opp Springfield Rd	current 168			8
Springfield Road -> Langley [FH Rd/SH Rd]	@ 20 km/h	20	1.1	3
Langley -> Peddimore -> Minworth Island stop: Minworth, aft Minworth Island	@ 20 km/h	20	3.2	10
Minworth Isld -> Castle Vale -> Chester Rd stop: Bromford, adj Tangmere Drive	current 71 worst			10
Chester Road -> Star City	@ 20 km/h	20	4.7	14
Star City -> Lichfield Road	@ 15 km/hr	15	0.9	4
Lichfield Road / Cuckoo Road -> City Centre stop: Salford Bridge, adj Cuckoo Road	current 67 worst			14
Total:				63
<u>AM Outbound</u>				
City Centre -> Lichfield Road / Cuckoo Road stop: Salford Bridge, adj Salford Stadium	current 67 worst			12
Lichfield Road -> Star City	@ 15 km/h	15	0.9	4
Star City -> Chester Road stop: Bromford, opp Tameside Drive	@ 20 km/hr	20	4.7	14
Chester Rd -> Castle Vale -> Minworth Isld stop: Minworth, bef Minworth Island	current 71 worst			13
Minworth Island-> Peddimore -> Langley	@ 20 km/h	20	3.2	10
Langley [FH Rd/SH Rd] -> Springfield Road	@ 20 km/h	20	1.1	3
Langley -> Sutton Coldfield section routeing: - Springfield Road to Walmley Road / Reddicap Hill: as current service 757; and - Sutton Coldfield, Lower Parade to Walmley Road / Reddicap Hill: as current service 604. Langley -> Sutton Coldfield sectional timing based on service 168:				
Springfield Road -> Sutton Coldfield stop: Reddicap Heath, opp Springfield Rd	current 168			8
Total:				64

CityLink 'Green'	Basis	Speed / km/h	Distance / km	Running Time / minutes
<u>PM Inbound</u>				
Sutton Coldfield -> Langley section routeing: - Sutton Coldfield, Lower Parade to Walmley Road / Reddicap Hill: as current service 604; and - Walmley Road / Reddicap Hill to Springfield Road: as current service 757.				
Sutton Coldfield -> Langley sectional timing based on service 168:				
Sutton Coldfield -> Springfield Road stop: Reddicap Heath, opp Springfield Rd	current 168			8
Springfield Road -> Langley [FH Rd/SH Rd]	@ 20 km/h	20	1.1	3
Langley -> Peddimore -> Minworth Island stop: Minworth, aft Minworth Island	@ 20 km/h	20	3.2	10
Minworth Isld -> Castle Vale -> Chester Rd stop: Bromford, adj Tangmere Drive	current 71 worst			12
Chester Road -> Star City	@ 20 km/hr	20	4.7	14
Star City -> Lichfield Road	@ 15 km/hr	15	0.9	4
Lichfield Road / Cuckoo Road -> City Centre stop: Salford Bridge, adj Cuckoo Road	current 67 worst			14
Total:				65
<u>PM Outbound</u>				
City Centre -> Lichfield Road / Cuckoo Road stop: Salford Bridge, adj Salford Stadium	current 67 worst			12
Lichfield Road -> Star City	@ 15 km/h	15	0.9	4
Star City -> Chester Road stop: Bromford, opp Tameside Drive	@ 20 km/hr	20	4.7	14
Chester Rd -> Castle Vale -> Minworth Isld stop: Minworth, bef Minworth Island	current 71 worst			11
Minworth Island-> Peddimore -> Langley	@ 20 km/h	20	3.2	10
Langley [FH Rd/SH Rd] -> Springfield Road	@ 20 km/h	20	1.1	3
Langley -> Sutton Coldfield section routeing: - Springfield Road to Walmley Road / Reddicap Hill: as current service 757; and - Sutton Coldfield, Lower Parade to Walmley Road / Reddicap Hill: as current service 604.				
Langley -> Sutton Coldfield sectional timing based on service 168:				
Springfield Road -> Sutton Coldfield stop: Reddicap Heath, opp Springfield Rd	current 168			8
Total:				62

**Phil Jones Associates Ltd**

**Birmingham Green Belt Eastern Fringe: Bus Network Resources - Running Times**

Version: 0'4l

Date: 05-Jun-14

By: TKH

<b>New 967</b>		
From:	To:	Running Time:
Castle Vale terminus	Tyburn Road / Kingsbury Road	as current 67
Tyburn Road / Kingsbury Road	City Centre terminus	as current 914

<b>Revised 115</b>		
From:	To:	Running Time:
Sutton Coldfield, Lower Parade	Falcon Lodge Crescent / Churchill Road	as current 904
Falcon Lodge Crescent / Churchill Road	City Centre terminus	as current 115

<b>Revised 71</b>		
From:	To:	Running Time:
Solihull railway station	Castle Vale neighbourhood centre	as current 71
Castle Vale neighbourhood centre	Walmley Ash Road / Webster Way	same running time as current 71 via revised route: - from Farnborough Road / Park Lane jcn, north to Kingsbury Road bus gate [new infrastructure]; - thence to Minworth Island, calling at stop pair at road-over-canal bridge [westbound stop exists; eastbound stop new]; - Minworth Island -> Peddimore on new highway, new stop pair located approx. at Walmley Ash Lane / Peddimore Lane jcn; - Peddimore -> Webster Way via new link road and A38 jcn, new stop pair in Langley located west of A38 jcn; - Langley to Walmley Ash Road via Webster Way, calling at existing stop pair named 'Walmley, before / after Walmley Ash Road'.
Walmley Ash Road / Webster Way	Sutton Coldfield, Lower Parade	as current 71

<b>Extended 777</b>		
From:	To:	Running Time:
Birmingham International	Hams Hall	as current 777
Hams Hall	A446 / Faraday Avenue jcn	as current Arriva 115
A446 / Faraday Avenue jcn	Minworth Island	as current 757
Minworth Island	Fox Hollies Road / Signal Hayes Road	<p>new route section:</p> <ul style="list-style-type: none"> <li>- Minworth Island -&gt; Peddimore on new highway, to new stop pair located approx. at Walmley Ash Lane / Peddimore Lane jcn {i.e. same as revised 71};</li> <li>- Peddimore -&gt; Webster Way via new link road and A38 jcn, new stop pair in Langley located west of A38 jcn {i.e. similar to revised 71; in reality, route could turn north at a point within the development to the east of Webster Way};</li> <li>- new highway link within Langley to a terminus at current Fox Hollies Road / Signal Hayes Road jcn @ 20km/h running speed.</li> </ul>

## C Peak Period Patronage Forecasts

Phil Jones Associates Ltd

Birmingham Development Plan - Eastern Fringe: Bus Service Financial Appraisal

Version: 0'3

Date: 09/06/2014

By: TKH

Service	2031 Status	Passenger-boardings, both directions combined, for two hour model periods:										AM-peak = 0700-0859				PM-peak = 1600-1759			
		Scenario A		Scenario B		Scenario C		Scenario D		Scenario E		B-A		C-B		D-B		E-A	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
67	Withdrawn	799	867	0	0	0	0	0	0	0	0	-799	-867	0	0	0	0	-799	-867
71	Revised	1,247	1,681	1,147	1,497	1,353	1,744	1,154	1,507	1,360	1,754	-100	-184	206	247	7	10	113	73
108	Retained	324	319	213	192	254	246	213	192	254	246	-111	-127	41	54	0	0	-70	-73
110	Retained	519	629	481	557	505	581	481	556	505	580	-38	-72	24	24	0	-1	-14	-49
115	Revised	309	438	363	607	397	661	369	618	403	672	54	169	34	54	6	11	94	234
116	Retained	290	217	267	182	294	187	268	183	295	188	-23	-35	27	5	1	1	5	-29
904	Revised	698	795	513	498	541	515	514	498	542	515	-185	-297	28	17	1	0	-156	-280
914	Withdrawn	362	489	0	0	0	0	0	0	0	0	-362	-489	0	0	0	0	-362	-489
757	Retained	255	0	256	0	308	0	258	0	310	0	1	0	52	0	2	0	55	0
777	Revised	163	148	216	211	317	326	218	214	319	329	53	63	101	115	2	3	156	181
BDP 967	New	0	0	227	296	232	313	226	294	231	311	227	296	5	17	-1	-2	231	311
BDP BRT	New	0	0	1,246	1,537	1,873	2,518	1,272	1,560	1,899	2,541	1,246	1,537	627	981	26	23	1,899	2,541
BDP CityLink	New	0	0	1,261	1,367	1,830	2,186	1,286	1,401	1,855	2,220	1,261	1,367	569	819	25	34	1,855	2,220

## **D BRT and Bus Infrastructure Costs**

Section	Item	Quantity	Unit	Rate	Total	Comment
<b>Sprint - City centre - Langley - Sutton Coldfield</b>						
Sutton Coldfield to Langley						
	Sutton town centre terminus stop	1	single	100,000	£100,000	
	Seven stop pairs (Langley-Falcon Lodge-Sutton Coldfield)	5	pair	100,000	£500,000	
	Seven stop pairs (Langley-Reddicap Heath-Sutton Coldfield)	7	pair	100,000	£700,000	
Within Langley						
	Assumed 5 bus gates etc	5	unit	10,000	£50,000	
	Three stop pairs	3	pair	100,000	£300,000	
Fox Hollies Road - Walmley local centre						
	Stopping restrictions along Fox Hollies Road (signs + lines)	800	linear m	300	£240,000	
	Deanery Primary School additional parking within school site	30	per space	2,500	£75,000	
	SVD for Fox Hollies Road/Walmley Road signals	1	unit	25,000	£25,000	
	New stops just south of Walmley Road signals (build-outs etc)	1	pair	100,000	£100,000	
Walmley local centre - Eachelhurst Road / Westlands Road						
	SVD for Walmley Ash Road signals	1	unit	25,000	£25,000	
	Localised widening and urban realm improvements at Walmley local centre	250	linear m	5,000	£1,250,000	
	NB widen into central reservation to provide 2 lanes + bus lane to railway bridge	400	linear m	1,500	£600,000	Incl clearance etc
	New stops (upgrade/extend existing - issue NB with drive spacings)	1	pair	100,000	£100,000	
Eachelhurst Road / Westlands Road - Eachelhurst Road / Tyburn Road, Bagot Arms						
	Localised widening on eastern side to create Sprint turning point (short workings)	20	linear m	1,500	£30,000	
	New stops at RAB	1	pair	100,000	£100,000	
	SB widen into verge alongside Bagot Arms, to provide stop and bus lane to RAB with bus gate exit (85m)	85	linear m	1,500	£127,500	Incl clearance etc
		1	unit	50,000	£50,000	
Eachelhurst Road - Tyburn Road, Bagot Arms - Tyburn Road, immediately N of Kingsbury Road						
	New stops - upgrade existing	1	pair	100,000	£100,000	
	Enforce parking restrictions to ensure peak flow and access to stops	1	CEO	25,000	£25,000	
	SB partially inset on-street parking to allow SPRINT to pass and access stop? (80m)	80	linear m	1,500	£120,000	Incl clearance etc
Tyburn Road, immediately N of Kingsbury Road - Tyburn Road, after Bromford Lane						
	Upgrade existing stops	1	pair	100,000	£100,000	
	SCOOT for corridor	1	unit	50,000	£50,000	
	SVD for Kingsbury Road lights	1	unit	25,000	£25,000	
	SVD for Bromford Lane lights	1	unit	25,000	£25,000	
	SB widen into central reservation from Kingsbury Rd to Bromford La, to provide 2 lanes + bus lane	600	linear m	1,500	£900,000	Incl clearance etc
Tyburn Road, after Bromford Lane - Jarvis Way / Standard Way						
	SCOOT + SVD	1	unit	65,000	£65,000	
	Re-mark Jarvis Way to retain one lane each way plus SPRINT stops	100	linear m	300	£30,000	Burn off and re-mark
	New stops	1	pair	100,000	£100,000	
	SB widen into central reservation from Wheelwright Rd to Jarvis Way, to provide 2 lanes + bus lane	600	linear m	1,500	£900,000	Incl clearance etc
Jarvis Way / Standard Way - Star City, Watson Road						
	Re-profile speed bumps	6	unit	10,000	£60,000	
	New mini-interchange at Star City with associated changes to access	1	unit	500,000	£500,000	
Star City, Watson Road - City Centre						
	New stop pair on Jennens Road	1	pair	100,000	£100,000	
	New city centre terminus stop, location TBC. Cost includes TRO alterations etc	1	single	100,000	£100,000	
					<b>Sprint Subtotal</b>	<b>£7,572,500</b>
				Contingency	50%	£3,786,250
				Design fees	10%	£757,250
				Temporary traffic management, TROs etc	15%	£1,135,875
					<b>Sprint total</b>	<b>£13,251,875</b>
<b>CityLink/71</b>						
	New bus gate on A38 Kingsbury Road, from Park Lane (Castle Vale) to A38 northbound	150	linear m	1,500	£225,000	Incl clearance etc
	New bus gate on A38 Kingsbury Road, from A38 southbound to Park Lane (Castle Vale)	100	linear m	1,500	£150,000	Incl clearance etc
	Allowance for localised highway widening, as required along route	340	linear m	1,500	£510,000	Incl clearance etc
	Signals upgrade at existing Kingsbury Road/Park Lane ped crossing, including SVD	1	unit	75,000	£75,000	
	Stop upgrades along route	40	pair	10,000	£400,000	
	Enhanced facilities at selected interchange stops	10	pair	10,000	£100,000	
	New city centre terminus stop, location TBC. Cost includes TRO alterations etc	1	single	50,000	£50,000	
					<b>Citylink Subtotal</b>	<b>£1,510,000</b>
				Contingency	50%	£755,000
				Design fees	10%	£151,000
				Temporary traffic management, TROs etc	15%	£226,500
					<b>Citylink total</b>	<b>£2,642,500</b>
					<b>Infrastructure Total</b>	<b>£15,894,375</b>
<b>Breakdown of infrastructure costs</b>						
		<b>Sprint</b>	<b>Citylink</b>	<b>Total</b>		
	Stops	£2,900,000	£550,000	£3,450,000		
	Highway widening	£2,677,500	£885,000	£3,562,500		
	ITS	£215,000	£75,000	£290,000		
	Other interventions	£1,780,000	£0	£1,780,000		
	Contingency, fees etc	£3,786,250	£755,000	£4,541,250		
	Fees, temporary traffic management, TROs etc	£1,893,125	£377,500	£2,270,625		
	<b>TOTAL</b>	<b>£11,358,750</b>	<b>£2,265,000</b>	<b>£15,894,375</b>		



## **E Vehicle Deployment by Service**

Phil Jones Associates Ltd

Birmingham Green Belt Eastern Fringe: Bus Network Resources

Version: 0'4l

Date: 05-Jun-14

By: TKH

**BRT and Bus Service Additions**

		New and Revised Services: Initial Service Proposal																
Service	Route	Round Time - AM-peak / minutes							Round Time - PM-peak / minutes							Overall		
		In	Drop-back	Out	Drop-back	Total	Head-way	PVR	In	Drop-back	Out	Drop-back	Total	Head-way	PVR	PVR		
Sprint 'Purple'	Sutton Coldfield - Falcon Lodge - Langley - Walmley - Tyburn Road - Star City - City Centre	51	7	56	6	120	10	12	51	7	56	6	120	10	12	12		
CityLink 'Green'	Sutton Coldfield - Reddip Heath- Langley - Peddimore - Castle Vale - Star City - City Centre	63	6	64	7	140	10	14	65	7	62	6	140	10	14	14		
new 967	Castle Vale - Bagot Arms - The Norton - Kingsbury Road - Gravelly Hill - Aston Expressway - City Centre	36	6	29	9	80	20	4	35	5	37	3	80	20	4	4		
revised 71	as current 71 but revised Castle Vale - Peddimore - Walmley	98	7	98	7	210	15	14	98	7	99	6	210	15	14	14		
revised 115	as current 115 but revised in Falcon Lodge, Springfield Road - Churchill Parade - Good Hope Hospital	64	5	62	7	138	15	9.2	62	5	64	9	140	15	9.33			
revised 904	curtailed route: Sutton Coldfield <-> City Centre only	41	5	34	7	87	15	5.8	34	5	37	9	85	15	5.67			
	Combined 115 + 904							15							15	15		
extended 777	Increased frequency between Sutton Coldfield and NEC/Airport	56	4	55	5	120	30	4	56	4	55	5	120	30	4	4		
Resources for Proposed Services									63								63	63

**BRT and Bus Network Subtractions**

		Withdrawn Services: Initial Service Proposal																
Service	Description	Round Time - AM-peak / minutes							Round Time - PM-peak / minutes							Overall		
		In	Drop-back	Out	Drop-back	Total	Head-way	PVR	In	Drop-back	Out	Drop-back	Total	Head-way	PVR	PVR		
67	Removed; replaced by CityLink and 967.	38	3	34	5	80	8	10	36	5	43	4	88	8	11	11		
71	Revised route; unchanged round time.	98	7	98	7	210	15	14	98	7	99	6	210	15	14	14		
108	Retained. retained - PVR not counted in resource saving	38						3			36				3	3		
115	Revised route in Falcon Lodge, increased frequency.	61	2	59	4	126	30	4.2	59	2	61	4	126	30	4.2			
914	Removed; replaced by Sprint.	55	2	51	6	114	30	3.8	53	2	57	2	114	30	3.8			
	Combined 115 + 914.							8							8	8		
904	Revised to Sutton Coldfield <-> Birmingham only.	62	4	48	6	120	15	8	59	4	51	6	120	15	8	8		
777	Revised to provide increased frequency.	26	6	25	3	60	30	2	26	6	25	3	60	30	2	2		
Resources Saved									42								43	43
Net Change in Resources									21								20	20

## **F Operating Cost Rates by Service Type and Service Period**

**Phil Jones Associates Ltd**  
**Birmingham Green Belt Eastern Fringe: Bus Network Resources**

Version: 0'4l  
 Date: 05-Jun-14  
 By: TKH

**Bus Operating Cost Rates**

Service Type	Service Day	Core Service £/PVR	Marginal Service Hours	Marginal Service Vehicle £/Hour	Marginal Service Cost £/vehicle	Core + Marginal £/vehicle	Mean of Core & Core + Marginal
Sprint	A	162,000	3,079	27.50	84,673	246,673	204,336
CityLink	A	147,000	3,079	25.00	76,975	223,975	185,488
Standard	A	140,000	3,079	25.00	76,975	216,975	178,488
Standard	B	140,000	2,233	25.00	55,825	195,825	167,913
Standard	C1	140,000	531	25.00	13,275	153,275	146,638
Standard	C2	140,000	0	25.00	0	140,000	140,000
Standard	D	140,000	-2,142	25.00	-53,550	86,450	113,225

**Core Time Service**

Weekday	0700-1859	<all in Marginal time
Saturday	0700-1859	
Sun+BH	none	
No Service	-	

**Marginal Time Service - hours per year:**

Service Day A	AM hours	PM hours	Hours/Day	Number	Hours/Yr
Sprint Weekday	0500-0659 2	1900-2359 5	7	253	1,771
and Saturday	0500-0659 2	1900-2359 5	7	52	364
CityLink Sun+BH	0700-2259 16		16	59	944
No Service			0	1	0
				365	3,079

Service Day B	AM hours	PM hours	Hours/Day	Number	Hours/Yr
Weekday	0600-0659 1	1900-2259 4	5	253	1,265
Saturday	0600-0659 1	1900-2259 4	5	52	260
Sun+BH	0900-2059 12		12	59	708
No Service			0	1	0
				365	2,233

Service Day C1	AM hours	PM hours	Hours/Day	Number	Hours/Yr
Weekday			0	253	0
Saturday			0	52	0
Sun+BH	0900-1759 9		9	59	531
No Service			0	1	0
				365	531

Service Day C2		AM	hours	PM	hours	Hours/Day	Number	Hours/Yr
	Weekday		0		0	0	253	0
	Saturday		0		0	0	52	0
	Sun+BH					0	59	0
	No Service					0	1	0
							365	0

Service Day D		AM	hours	PM	hours	Hours/Day	Number	Hours/Yr
	Weekday	(1000-1259)	-3	(1300-1559)	-3	-6	253	-1,518
	Saturday	{0700-1859}	-12			-12	52	-624
	Sun+BH					0	59	0
	No Service					0	1	0
							365	-2,142

## G Operating Costs by Service

Phil Jones Associates Ltd

Birmingham Green Belt Eastern Fringe: Bus Network Resources

Version: 0'4l  
 Date: 05-Jun-14  
 By: TKH

**BRT and Bus Network Additions**

		New and Revised Services: Initial Service Proposal								
Service	Route	Operating Period	Core Service Period			Marginal Service Period			Total Cost /£	Total Cost / Peak Vehicles
			Vehicles Deployed	Unit Cost / £	Operating Cost / £	Vehicles Deployed	Unit Cost / £	Operating Cost / £	Core + Marginal	
Sprint 'Purple'	Sutton Coldfield - Falcon Lodge - Langley - Walmley - Tyburn Road - Star City - City Centre	A	12	162,000	1,944,000	6	84,673	508,035	2,452,035	204,336
CityLink 'Green'	Sutton Coldfield - Reddicap Heath- Langley - Peddimore - Castle Vale - Star City - City Centre	A	14	147,000	2,058,000	7	76,975	538,825	2,596,825	185,488
new 967	Castle Vale - Bagot Arms - The Norton - Kingsbury Road - Gravelly Hill - Aston Expressway - City Centre	B	4	140,000	560,000	2	55,825	111,650	671,650	167,913
revised 71	as current 71 but revised Castle Vale - Peddimore - Walmley	B	14	140,000	1,960,000	7	55,825	390,775	2,350,775	167,913
revised 115	as current 115 but revised in Falcon Lodge, Springfield Road - Churchill Parade - Good Hope Hospital	B								
revised 904	curtailed route: Sutton Coldfield <-> City Centre only.	B								
	Combined 115 + 904	B	15	140,000	2,100,000	8	55,825	446,600	2,546,600	169,773
extended 777	current route plus Hams Hall - Peddimore - Langely	C2	4	140,000	560,000	0	0	0	560,000	140,000
Costing for Proposed Services			63		9,182,000	30		1,995,885	11,177,885	177,427

**BRT and Bus Network Subtractions**

		Withdrawn Services: Initial Service Proposal								
Service	Description	Operating Period	Core Service Period			Marginal Service Period			Total Cost /£	Total Cost / Peak Vehicles
			Vehicles Deployed	Unit Cost / £	Operating Cost / £	Vehicles Deployed	Unit Cost / £	Operating Cost / £	Core + Marginal	
67	Removed; replaced by CityLink and 967.	A	11	140,000	1,540,000	6	76,975	461,850	2,001,850	181,986
71	Revised route; unchanged round time.	B	14	140,000	1,960,000	7	55,825	390,775	2,350,775	167,913
108	Retained. <input type="checkbox"/> retained - PVR not counted in resource saving	D	3							
115	Revised route in Falcon Lodge, increased frequency.	C								
914	Removed; replaced by Sprint.	B								
	Combined 115 + 914.	B	8	140,000	1,120,000	4	55,825	223,300	1,343,300	167,913
904	Falcon Lodge <-> Sutton Coldfield <-> Birmingham.	B	8	140,000	1,120,000	4	55,825	223,300	1,343,300	167,913
777	Extended route.	C2	2	140,000	280,000	0	0	0	280,000	140,000
Costing for Resources Saved			43		6,020,000	21		1,299,225	7,319,225	170,215

Net Change in Resources and Costs			20		3,162,000	9		696,660	3,858,660	
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# H Patronage 2016-2031 by Forecasting Scenario



**Phil Jones Associates Ltd**

**Birmingham Development Plan - Eastern Fringe: Bus Service Financial Appraisal**

Version: 0'3  
 Date: 09/06/2014  
 By: TKH

**2031 Standard PT Travel Demand, assigned to Current bus network.**

**[A]**

Service Boardings (/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	1.530	1.551	1.550	1.548	1.547	1.545	1.544	1.543	1.541	1.540	1.538	1.537	1.536	1.534	1.533	1.531	1.530
71	2.652	2.688	2.686	2.683	2.681	2.678	2.676	2.674	2.671	2.669	2.666	2.664	2.661	2.659	2.656	2.654	2.652
108	0.191	0.194	0.194	0.193	0.193	0.193	0.193	0.193	0.193	0.192	0.192	0.192	0.192	0.192	0.191	0.191	0.191
110	1.039	1.054	1.053	1.052	1.051	1.050	1.049	1.048	1.047	1.046	1.045	1.044	1.043	1.042	1.041	1.040	1.039
115	0.555	0.563	0.562	0.562	0.561	0.561	0.560	0.560	0.559	0.559	0.558	0.558	0.557	0.557	0.556	0.555	0.555
116	0.388	0.393	0.393	0.393	0.392	0.392	0.392	0.391	0.391	0.391	0.390	0.390	0.390	0.389	0.389	0.388	0.388
904	1.371	1.390	1.389	1.388	1.387	1.385	1.384	1.383	1.382	1.380	1.379	1.378	1.376	1.375	1.374	1.373	1.371
914	0.771	0.781	0.781	0.780	0.779	0.778	0.778	0.777	0.776	0.776	0.775	0.774	0.774	0.773	0.772	0.771	0.771
757	0.211	0.214	0.213	0.213	0.213	0.213	0.213	0.213	0.212	0.212	0.212	0.212	0.212	0.211	0.211	0.211	0.211
777	0.236	0.239	0.239	0.239	0.239	0.238	0.238	0.238	0.238	0.237	0.237	0.237	0.237	0.237	0.236	0.236	0.236
BDP 967	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BDP BRT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BDP CityLink	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total</b>	<b>8.944</b>	<b>9.067</b>	<b>9.059</b>	<b>9.051</b>	<b>9.043</b>	<b>9.034</b>	<b>9.026</b>	<b>9.018</b>	<b>9.010</b>	<b>9.001</b>	<b>8.993</b>	<b>8.985</b>	<b>8.977</b>	<b>8.968</b>	<b>8.960</b>	<b>8.952</b>	<b>8.944</b>

**2031 Standard PT Travel Demand, assigned to Proposed bus network.**

**[B]**

Service Boardings (/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71	2.394	2.427	2.425	2.423	2.421	2.418	2.416	2.414	2.412	2.410	2.407	2.405	2.403	2.401	2.399	2.396	2.394
108	0.119	0.121	0.121	0.121	0.121	0.121	0.121	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.119
110	0.939	0.952	0.952	0.951	0.950	0.949	0.948	0.947	0.946	0.945	0.945	0.944	0.943	0.942	0.941	0.940	0.939
115	0.715	0.725	0.724	0.724	0.723	0.722	0.722	0.721	0.720	0.720	0.719	0.718	0.718	0.717	0.717	0.716	0.715
116	0.288	0.292	0.292	0.292	0.291	0.291	0.291	0.291	0.290	0.290	0.290	0.289	0.289	0.289	0.289	0.288	0.288
904	0.928	0.941	0.940	0.939	0.938	0.937	0.936	0.936	0.935	0.934	0.933	0.932	0.931	0.931	0.930	0.929	0.928
914	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
757	0.212	0.215	0.214	0.214	0.214	0.214	0.214	0.213	0.213	0.213	0.213	0.213	0.212	0.212	0.212	0.212	0.212
777	0.323	0.327	0.327	0.327	0.326	0.326	0.326	0.326	0.325	0.325	0.325	0.324	0.324	0.324	0.323	0.323	0.323
BDP 967	0.474	0.480	0.480	0.479	0.479	0.478	0.478	0.477	0.477	0.477	0.476	0.476	0.475	0.475	0.474	0.474	0.474
BDP BRT	2.557	2.593	2.590	2.588	2.586	2.583	2.581	2.579	2.576	2.574	2.571	2.569	2.567	2.564	2.562	2.560	2.557
BDP CityLink	2.413	2.447	2.445	2.442	2.440	2.438	2.436	2.433	2.431	2.429	2.427	2.425	2.422	2.420	2.418	2.416	2.413
<b>Total</b>	<b>11.363</b>	<b>11.520</b>	<b>11.510</b>	<b>11.499</b>	<b>11.489</b>	<b>11.478</b>	<b>11.468</b>	<b>11.457</b>	<b>11.447</b>	<b>11.436</b>	<b>11.426</b>	<b>11.415</b>	<b>11.405</b>	<b>11.394</b>	<b>11.384</b>	<b>11.374</b>	<b>11.363</b>

**2031 Langley & Peddimore PT Travel Demand, assigned to Proposed bus network.**

**[C-B]**

Service Boardings (/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71	0.410	0.000	0.027	0.055	0.082	0.109	0.137	0.164	0.191	0.219	0.246	0.273	0.301	0.328	0.355	0.383	0.410
108	0.029	0.000	0.002	0.004	0.006	0.008	0.010	0.012	0.014	0.015	0.017	0.019	0.021	0.023	0.025	0.027	0.029
110	0.043	0.000	0.003	0.006	0.009	0.012	0.014	0.017	0.020	0.023	0.026	0.029	0.032	0.035	0.038	0.041	0.043
115	0.065	0.000	0.004	0.009	0.013	0.017	0.022	0.026	0.030	0.035	0.039	0.043	0.048	0.052	0.056	0.061	0.065
116	0.026	0.000	0.002	0.003	0.005	0.007	0.009	0.010	0.012	0.014	0.015	0.017	0.019	0.021	0.022	0.024	0.026
904	0.041	0.000	0.003	0.005	0.008	0.011	0.014	0.016	0.019	0.022	0.025	0.027	0.030	0.033	0.036	0.038	0.041
914	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
757	0.043	0.000	0.003	0.006	0.009	0.011	0.014	0.017	0.020	0.023	0.026	0.029	0.032	0.034	0.037	0.040	0.043
777	0.162	0.000	0.011	0.022	0.032	0.043	0.054	0.065	0.076	0.086	0.097	0.108	0.119	0.130	0.141	0.151	0.162
BDP 967	0.020	0.000	0.001	0.003	0.004	0.005	0.007	0.008	0.009	0.011	0.012	0.013	0.015	0.016	0.017	0.019	0.020
BDP BRT	1.479	0.000	0.099	0.197	0.296	0.394	0.493	0.592	0.690	0.789	0.888	0.986	1.085	1.183	1.282	1.381	1.479
BDP CityLink	1.276	0.000	0.085	0.170	0.255	0.340	0.425	0.511	0.596	0.681	0.766	0.851	0.936	1.021	1.106	1.191	1.276
<b>Total</b>	<b>3.595</b>	<b>0.000</b>	<b>0.240</b>	<b>0.479</b>	<b>0.719</b>	<b>0.959</b>	<b>1.198</b>	<b>1.438</b>	<b>1.678</b>	<b>1.917</b>	<b>2.157</b>	<b>2.397</b>	<b>2.637</b>	<b>2.876</b>	<b>3.116</b>	<b>3.356</b>	<b>3.595</b>

**2031 Modal Shift PT Travel Demand, assigned to Proposed bus network.**

**[D-B]**

Service Boardings (/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71	0.015	0.014	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
115	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
116	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002
904	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
914	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
757	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
777	0.004	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
BDP 967	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
BDP BRT	0.045	0.042	0.042	0.043	0.043	0.043	0.043	0.043	0.043	0.044	0.044	0.044	0.044	0.044	0.045	0.045	0.045
BDP CityLink	0.054	0.051	0.051	0.051	0.052	0.052	0.052	0.052	0.052	0.053	0.053	0.053	0.053	0.054	0.054	0.054	0.054
<b>Total</b>	<b>0.131</b>	<b>0.123</b>	<b>0.124</b>	<b>0.124</b>	<b>0.125</b>	<b>0.125</b>	<b>0.126</b>	<b>0.126</b>	<b>0.127</b>	<b>0.127</b>	<b>0.128</b>	<b>0.128</b>	<b>0.129</b>	<b>0.130</b>	<b>0.130</b>	<b>0.131</b>	<b>0.131</b>

**2031 Overall PT Travel Demand, assigned to Proposed bus network.**

[E]

Service Boardings (/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71	2.820	2.442	2.467	2.492	2.517	2.542	2.568	2.593	2.618	2.643	2.668	2.694	2.719	2.744	2.769	2.794	2.820
108	0.148	0.121	0.123	0.125	0.127	0.128	0.130	0.132	0.134	0.136	0.137	0.139	0.141	0.143	0.145	0.147	0.148
110	0.982	0.952	0.954	0.956	0.958	0.960	0.962	0.964	0.966	0.968	0.970	0.972	0.974	0.976	0.978	0.980	0.982
115	0.793	0.737	0.741	0.744	0.748	0.752	0.755	0.759	0.763	0.767	0.770	0.774	0.778	0.782	0.785	0.789	0.793
116	0.372	0.351	0.353	0.354	0.356	0.357	0.358	0.360	0.361	0.363	0.364	0.365	0.367	0.368	0.370	0.371	0.372
904	0.970	0.942	0.944	0.945	0.947	0.949	0.951	0.953	0.955	0.957	0.959	0.961	0.962	0.964	0.966	0.968	0.970
914	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
757	0.256	0.216	0.219	0.221	0.224	0.227	0.229	0.232	0.235	0.237	0.240	0.243	0.246	0.248	0.251	0.254	0.256
777	0.489	0.331	0.341	0.352	0.362	0.373	0.383	0.394	0.404	0.415	0.426	0.436	0.447	0.457	0.468	0.478	0.489
BDP 967	0.491	0.478	0.478	0.479	0.480	0.481	0.482	0.483	0.484	0.485	0.486	0.486	0.487	0.488	0.489	0.490	0.491
BDP BRT	4.082	2.635	2.731	2.828	2.924	3.021	3.117	3.214	3.310	3.406	3.503	3.599	3.696	3.792	3.889	3.985	4.082
BDP CityLink	3.744	2.498	2.581	2.664	2.747	2.830	2.913	2.996	3.079	3.162	3.245	3.329	3.412	3.495	3.578	3.661	3.744
<b>Total</b>	<b>15.147</b>	<b>11.701</b>	<b>11.931</b>	<b>12.161</b>	<b>12.390</b>	<b>12.620</b>	<b>12.849</b>	<b>13.079</b>	<b>13.309</b>	<b>13.539</b>	<b>13.768</b>	<b>13.998</b>	<b>14.228</b>	<b>14.457</b>	<b>14.687</b>	<b>14.917</b>	<b>15.147</b>

**2031 Difference in PT Travel Demand, assigned to Proposed bus network.**

[E-A]

Service Boardings (/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	-1.530	-1.551	-1.550	-1.548	-1.547	-1.545	-1.544	-1.543	-1.541	-1.540	-1.538	-1.537	-1.536	-1.534	-1.533	-1.531	-1.530
71	0.168	-0.247	-0.219	-0.191	-0.164	-0.136	-0.108	-0.081	-0.053	-0.026	0.002	0.030	0.057	0.085	0.113	0.140	0.168
108	-0.043	-0.073	-0.071	-0.069	-0.067	-0.065	-0.063	-0.061	-0.059	-0.057	-0.055	-0.053	-0.051	-0.049	-0.047	-0.045	-0.043
110	-0.057	-0.102	-0.099	-0.096	-0.093	-0.090	-0.087	-0.084	-0.081	-0.078	-0.075	-0.072	-0.069	-0.066	-0.063	-0.060	-0.057
115	0.238	0.174	0.178	0.183	0.187	0.191	0.195	0.200	0.204	0.208	0.212	0.217	0.221	0.225	0.229	0.234	0.238
116	-0.016	-0.042	-0.040	-0.039	-0.037	-0.035	-0.033	-0.032	-0.030	-0.028	-0.026	-0.025	-0.023	-0.021	-0.019	-0.017	-0.016
904	-0.401	-0.449	-0.446	-0.442	-0.439	-0.436	-0.433	-0.430	-0.427	-0.423	-0.420	-0.417	-0.414	-0.411	-0.408	-0.405	-0.401
914	-0.771	-0.781	-0.781	-0.780	-0.779	-0.778	-0.778	-0.777	-0.776	-0.776	-0.775	-0.774	-0.774	-0.773	-0.772	-0.771	-0.771
757	0.045	0.002	0.005	0.008	0.011	0.014	0.017	0.020	0.022	0.025	0.028	0.031	0.034	0.037	0.040	0.043	0.045
777	0.253	0.092	0.102	0.113	0.124	0.135	0.145	0.156	0.167	0.178	0.188	0.199	0.210	0.221	0.231	0.242	0.253
BDP 967	0.491	0.478	0.478	0.479	0.480	0.481	0.482	0.483	0.484	0.485	0.486	0.486	0.487	0.488	0.489	0.490	0.491
BDP BRT	4.082	2.635	2.731	2.828	2.924	3.021	3.117	3.214	3.310	3.406	3.503	3.599	3.696	3.792	3.889	3.985	4.082
BDP CityLink	3.744	2.498	2.581	2.664	2.747	2.830	2.913	2.996	3.079	3.162	3.245	3.329	3.412	3.495	3.578	3.661	3.744
<b>Total</b>	<b>6.203</b>	<b>2.634</b>	<b>2.872</b>	<b>3.110</b>	<b>3.348</b>	<b>3.585</b>	<b>3.823</b>	<b>4.061</b>	<b>4.299</b>	<b>4.537</b>	<b>4.775</b>	<b>5.013</b>	<b>5.251</b>	<b>5.489</b>	<b>5.727</b>	<b>5.965</b>	<b>6.203</b>

# I Revenue 2016-2031 by Forecasting Scenario

Phil Jones Associates Ltd

Birmingham Development Plan - Eastern Fringe: Bus Service Financial Appraisal

Version: 0'3

Date: 09/06/2014

By: TKH

2031 "Do Minimum" Standard PT Travel Demand Service Revenue, assigned to Current bus network.

[A]

Service Revenue (£/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	£1.377	£1.396	£1.395	£1.393	£1.392	£1.391	£1.390	£1.388	£1.387	£1.386	£1.385	£1.383	£1.382	£1.381	£1.380	£1.378	£1.377
71	£2.386	£2.419	£2.417	£2.415	£2.413	£2.411	£2.408	£2.406	£2.404	£2.402	£2.400	£2.397	£2.395	£2.393	£2.391	£2.389	£2.386
108	£0.172	£0.174	£0.174	£0.174	£0.174	£0.174	£0.174	£0.173	£0.173	£0.173	£0.173	£0.173	£0.173	£0.172	£0.172	£0.172	£0.172
110	£0.935	£0.948	£0.947	£0.946	£0.946	£0.945	£0.944	£0.943	£0.942	£0.941	£0.940	£0.940	£0.939	£0.938	£0.937	£0.936	£0.935
115	£0.499	£0.506	£0.506	£0.505	£0.505	£0.505	£0.504	£0.504	£0.503	£0.503	£0.502	£0.502	£0.501	£0.501	£0.500	£0.500	£0.499
116	£0.349	£0.354	£0.354	£0.353	£0.353	£0.353	£0.353	£0.352	£0.352	£0.352	£0.351	£0.351	£0.351	£0.350	£0.350	£0.350	£0.349
904	£1.234	£1.251	£1.250	£1.249	£1.248	£1.247	£1.246	£1.245	£1.243	£1.242	£1.241	£1.240	£1.239	£1.238	£1.237	£1.235	£1.234
914	£0.694	£0.703	£0.703	£0.702	£0.701	£0.701	£0.700	£0.699	£0.699	£0.698	£0.697	£0.697	£0.696	£0.696	£0.695	£0.694	£0.694
757	£0.190	£0.192	£0.192	£0.192	£0.192	£0.192	£0.191	£0.191	£0.191	£0.191	£0.191	£0.191	£0.190	£0.190	£0.190	£0.190	£0.190
777	£0.212	£0.215	£0.215	£0.215	£0.215	£0.215	£0.214	£0.214	£0.214	£0.214	£0.214	£0.213	£0.213	£0.213	£0.213	£0.213	£0.212
BDP 967	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
BDP BRT	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
BDP CityLink	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
<b>Total</b>	<b>£8.049</b>	<b>£8.161</b>	<b>£8.153</b>	<b>£8.146</b>	<b>£8.138</b>	<b>£8.131</b>	<b>£8.123</b>	<b>£8.116</b>	<b>£8.109</b>	<b>£8.101</b>	<b>£8.094</b>	<b>£8.086</b>	<b>£8.079</b>	<b>£8.072</b>	<b>£8.064</b>	<b>£8.057</b>	<b>£8.049</b>

2031 Standard PT Travel Demand, assigned to Proposed bus network.

[B]

Service Revenue (£/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
71	£2.155	£2.184	£2.182	£2.180	£2.179	£2.177	£2.175	£2.173	£2.171	£2.169	£2.167	£2.165	£2.163	£2.161	£2.159	£2.157	£2.155
108	£0.108	£0.109	£0.109	£0.109	£0.109	£0.109	£0.109	£0.108	£0.108	£0.108	£0.108	£0.108	£0.108	£0.108	£0.108	£0.108	£0.108
110	£0.845	£0.857	£0.856	£0.856	£0.855	£0.854	£0.853	£0.852	£0.852	£0.851	£0.850	£0.849	£0.849	£0.848	£0.847	£0.846	£0.845
115	£0.644	£0.653	£0.652	£0.651	£0.651	£0.650	£0.650	£0.649	£0.648	£0.648	£0.647	£0.647	£0.646	£0.645	£0.645	£0.644	£0.644
116	£0.259	£0.263	£0.263	£0.262	£0.262	£0.262	£0.262	£0.261	£0.261	£0.261	£0.261	£0.261	£0.260	£0.260	£0.260	£0.260	£0.259
904	£0.835	£0.847	£0.846	£0.845	£0.844	£0.844	£0.843	£0.842	£0.841	£0.841	£0.840	£0.839	£0.838	£0.837	£0.837	£0.836	£0.835
914	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
757	£0.190	£0.193	£0.193	£0.193	£0.193	£0.192	£0.192	£0.192	£0.192	£0.192	£0.191	£0.191	£0.191	£0.191	£0.191	£0.191	£0.190
777	£0.291	£0.295	£0.294	£0.294	£0.294	£0.294	£0.293	£0.293	£0.293	£0.292	£0.292	£0.292	£0.292	£0.291	£0.291	£0.291	£0.291
BDP 967	£0.426	£0.432	£0.432	£0.431	£0.431	£0.431	£0.430	£0.430	£0.429	£0.429	£0.429	£0.428	£0.428	£0.427	£0.427	£0.427	£0.426
BDP BRT	£2.302	£2.333	£2.331	£2.329	£2.327	£2.325	£2.323	£2.321	£2.319	£2.316	£2.314	£2.312	£2.310	£2.308	£2.306	£2.304	£2.302
BDP CityLink	£2.172	£2.202	£2.200	£2.198	£2.196	£2.194	£2.192	£2.190	£2.188	£2.186	£2.184	£2.182	£2.180	£2.178	£2.176	£2.174	£2.172
<b>Total</b>	<b>£10.227</b>	<b>£10.368</b>	<b>£10.359</b>	<b>£10.349</b>	<b>£10.340</b>	<b>£10.330</b>	<b>£10.321</b>	<b>£10.311</b>	<b>£10.302</b>	<b>£10.293</b>	<b>£10.283</b>	<b>£10.274</b>	<b>£10.264</b>	<b>£10.255</b>	<b>£10.246</b>	<b>£10.236</b>	<b>£10.227</b>

**2031 Langley & Peddimore PT Travel Demand, assigned to Proposed bus network.**

**[C-B]**

Service Revenue (£/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
71	£0.369	£0.000	£0.025	£0.049	£0.074	£0.098	£0.123	£0.148	£0.172	£0.197	£0.221	£0.246	£0.271	£0.295	£0.320	£0.344	£0.369
108	£0.026	£0.000	£0.002	£0.003	£0.005	£0.007	£0.009	£0.010	£0.012	£0.014	£0.016	£0.017	£0.019	£0.021	£0.023	£0.024	£0.026
110	£0.039	£0.000	£0.003	£0.005	£0.008	£0.010	£0.013	£0.016	£0.018	£0.021	£0.023	£0.026	£0.029	£0.031	£0.034	£0.036	£0.039
115	£0.059	£0.000	£0.004	£0.008	£0.012	£0.016	£0.020	£0.023	£0.027	£0.031	£0.035	£0.039	£0.043	£0.047	£0.051	£0.055	£0.059
116	£0.023	£0.000	£0.002	£0.003	£0.005	£0.006	£0.008	£0.009	£0.011	£0.012	£0.014	£0.015	£0.017	£0.019	£0.020	£0.022	£0.023
904	£0.037	£0.000	£0.002	£0.005	£0.007	£0.010	£0.012	£0.015	£0.017	£0.020	£0.022	£0.025	£0.027	£0.030	£0.032	£0.035	£0.037
914	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
757	£0.039	£0.000	£0.003	£0.005	£0.008	£0.010	£0.013	£0.015	£0.018	£0.021	£0.023	£0.026	£0.028	£0.031	£0.034	£0.036	£0.039
777	£0.146	£0.000	£0.010	£0.019	£0.029	£0.039	£0.049	£0.058	£0.068	£0.078	£0.088	£0.097	£0.107	£0.117	£0.126	£0.136	£0.146
BDP 967	£0.018	£0.000	£0.001	£0.002	£0.004	£0.005	£0.006	£0.007	£0.008	£0.010	£0.011	£0.012	£0.013	£0.014	£0.016	£0.017	£0.018
BDP BRT	£1.331	£0.000	£0.089	£0.178	£0.266	£0.355	£0.444	£0.533	£0.621	£0.710	£0.799	£0.888	£0.976	£1.065	£1.154	£1.243	£1.331
BDP CityLink	£1.149	£0.000	£0.077	£0.153	£0.230	£0.306	£0.383	£0.460	£0.536	£0.613	£0.689	£0.766	£0.842	£0.919	£0.996	£1.072	£1.149
<b>Total</b>	<b>£3.236</b>	<b>£0.000</b>	<b>£0.216</b>	<b>£0.431</b>	<b>£0.647</b>	<b>£0.863</b>	<b>£1.079</b>	<b>£1.294</b>	<b>£1.510</b>	<b>£1.726</b>	<b>£1.941</b>	<b>£2.157</b>	<b>£2.373</b>	<b>£2.589</b>	<b>£2.804</b>	<b>£3.020</b>	<b>£3.236</b>

**2031 Modal Shift PT Travel Demand, assigned to Proposed bus network.**

**[D-B]**

Service Revenue (£/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
71	£0.014	£0.013	£0.013	£0.013	£0.013	£0.013	£0.013	£0.013	£0.013	£0.013	£0.014	£0.014	£0.014	£0.014	£0.014	£0.014	£0.014
108	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
110	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001	-£0.001
115	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011	£0.011
116	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001
904	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001
914	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
757	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001	£0.001
777	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003	£0.003
BDP 967	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002	-£0.002
BDP BRT	£0.040	£0.038	£0.038	£0.038	£0.038	£0.039	£0.039	£0.039	£0.039	£0.039	£0.039	£0.040	£0.040	£0.040	£0.040	£0.040	£0.040
BDP CityLink	£0.049	£0.046	£0.046	£0.046	£0.046	£0.047	£0.047	£0.047	£0.047	£0.047	£0.048	£0.048	£0.048	£0.048	£0.048	£0.049	£0.049
<b>Total</b>	<b>£0.118</b>	<b>£0.111</b>	<b>£0.111</b>	<b>£0.112</b>	<b>£0.112</b>	<b>£0.113</b>	<b>£0.113</b>	<b>£0.114</b>	<b>£0.114</b>	<b>£0.115</b>	<b>£0.115</b>	<b>£0.116</b>	<b>£0.116</b>	<b>£0.117</b>	<b>£0.117</b>	<b>£0.118</b>	<b>£0.118</b>

**2031 "Do Something" Overall PT Service Revenue, assigned to Proposed bus network.**

[E]

Service Revenue (£/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
71	£2.538	£2.198	£2.220	£2.243	£2.265	£2.288	£2.311	£2.333	£2.356	£2.379	£2.402	£2.424	£2.447	£2.470	£2.492	£2.515	£2.538
108	£0.134	£0.109	£0.111	£0.112	£0.114	£0.116	£0.117	£0.119	£0.120	£0.122	£0.124	£0.125	£0.127	£0.129	£0.130	£0.132	£0.134
110	£0.884	£0.856	£0.858	£0.860	£0.862	£0.864	£0.866	£0.867	£0.869	£0.871	£0.873	£0.875	£0.876	£0.878	£0.880	£0.882	£0.884
115	£0.713	£0.663	£0.666	£0.670	£0.673	£0.677	£0.680	£0.683	£0.687	£0.690	£0.693	£0.697	£0.700	£0.703	£0.707	£0.710	£0.713
116	£0.335	£0.316	£0.317	£0.319	£0.320	£0.321	£0.323	£0.324	£0.325	£0.326	£0.328	£0.329	£0.330	£0.331	£0.333	£0.334	£0.335
904	£0.873	£0.847	£0.849	£0.851	£0.853	£0.854	£0.856	£0.858	£0.859	£0.861	£0.863	£0.865	£0.866	£0.868	£0.870	£0.871	£0.873
914	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
757	£0.231	£0.194	£0.197	£0.199	£0.202	£0.204	£0.206	£0.209	£0.211	£0.214	£0.216	£0.219	£0.221	£0.223	£0.226	£0.228	£0.231
777	£0.440	£0.298	£0.307	£0.317	£0.326	£0.336	£0.345	£0.355	£0.364	£0.373	£0.383	£0.392	£0.402	£0.411	£0.421	£0.430	£0.440
BDP 967	£0.442	£0.430	£0.431	£0.431	£0.432	£0.433	£0.434	£0.435	£0.435	£0.436	£0.437	£0.438	£0.439	£0.439	£0.440	£0.441	£0.442
BDP BRT	£3.674	£2.371	£2.458	£2.545	£2.632	£2.719	£2.805	£2.892	£2.979	£3.066	£3.153	£3.239	£3.326	£3.413	£3.500	£3.587	£3.674
BDP CityLink	£3.370	£2.248	£2.323	£2.398	£2.472	£2.547	£2.622	£2.697	£2.771	£2.846	£2.921	£2.996	£3.071	£3.145	£3.220	£3.295	£3.370
<b>Total</b>	<b>£13.632</b>	<b>£10.531</b>	<b>£10.738</b>	<b>£10.944</b>	<b>£11.151</b>	<b>£11.358</b>	<b>£11.565</b>	<b>£11.771</b>	<b>£11.978</b>	<b>£12.185</b>	<b>£12.391</b>	<b>£12.598</b>	<b>£12.805</b>	<b>£13.012</b>	<b>£13.218</b>	<b>£13.425</b>	<b>£13.632</b>

**2031 Difference in PT Service Revenue.**

[E-A]

Service Revenue (£/m)	2031	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
67	-£1.377	-£1.396	-£1.395	-£1.393	-£1.392	-£1.391	-£1.390	-£1.388	-£1.387	-£1.386	-£1.385	-£1.383	-£1.382	-£1.381	-£1.380	-£1.378	-£1.377
71	£0.151	-£0.222	-£0.197	-£0.172	-£0.147	-£0.122	-£0.098	-£0.073	-£0.048	-£0.023	£0.002	£0.027	£0.052	£0.077	£0.101	£0.126	£0.151
108	-£0.038	-£0.065	-£0.064	-£0.062	-£0.060	-£0.058	-£0.056	-£0.055	-£0.053	-£0.051	-£0.049	-£0.047	-£0.046	-£0.044	-£0.042	-£0.040	-£0.038
110	-£0.052	-£0.092	-£0.089	-£0.086	-£0.084	-£0.081	-£0.078	-£0.076	-£0.073	-£0.070	-£0.068	-£0.065	-£0.062	-£0.060	-£0.057	-£0.054	-£0.052
115	£0.214	£0.157	£0.161	£0.164	£0.168	£0.172	£0.176	£0.180	£0.183	£0.187	£0.191	£0.195	£0.199	£0.203	£0.206	£0.210	£0.214
116	-£0.014	-£0.038	-£0.036	-£0.035	-£0.033	-£0.032	-£0.030	-£0.028	-£0.027	-£0.025	-£0.024	-£0.022	-£0.020	-£0.019	-£0.017	-£0.016	-£0.014
904	-£0.361	-£0.404	-£0.401	-£0.398	-£0.395	-£0.393	-£0.390	-£0.387	-£0.384	-£0.381	-£0.378	-£0.375	-£0.373	-£0.370	-£0.367	-£0.364	-£0.361
914	-£0.694	-£0.703	-£0.703	-£0.702	-£0.701	-£0.701	-£0.700	-£0.699	-£0.699	-£0.698	-£0.697	-£0.697	-£0.696	-£0.696	-£0.695	-£0.694	-£0.694
757	£0.041	£0.002	£0.005	£0.007	£0.010	£0.012	£0.015	£0.018	£0.020	£0.023	£0.025	£0.028	£0.031	£0.033	£0.036	£0.038	£0.041
777	£0.227	£0.082	£0.092	£0.102	£0.111	£0.121	£0.131	£0.140	£0.150	£0.160	£0.169	£0.179	£0.189	£0.198	£0.208	£0.218	£0.227
BDP 967	£0.442	£0.430	£0.431	£0.431	£0.432	£0.433	£0.434	£0.435	£0.435	£0.436	£0.437	£0.438	£0.439	£0.439	£0.440	£0.441	£0.442
BDP BRT	£3.674	£2.371	£2.458	£2.545	£2.632	£2.719	£2.805	£2.892	£2.979	£3.066	£3.153	£3.239	£3.326	£3.413	£3.500	£3.587	£3.674
BDP CityLink	£3.370	£2.248	£2.323	£2.398	£2.472	£2.547	£2.622	£2.697	£2.771	£2.846	£2.921	£2.996	£3.071	£3.145	£3.220	£3.295	£3.370
<b>Total</b>	<b>£5.583</b>	<b>£2.370</b>	<b>£2.585</b>	<b>£2.799</b>	<b>£3.013</b>	<b>£3.227</b>	<b>£3.441</b>	<b>£3.655</b>	<b>£3.869</b>	<b>£4.083</b>	<b>£4.298</b>	<b>£4.512</b>	<b>£4.726</b>	<b>£4.940</b>	<b>£5.154</b>	<b>£5.368</b>	<b>£5.583</b>

## **J Financial Surplus/Deficit by Service**





North Warwickshire - NEC/Airport Link

[E]

Service 777 - Absolute	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	
Passenger Revenue	£0.298	£0.307	£0.317	£0.326	£0.336	£0.345	£0.355	£0.364	£0.373	£0.383	£0.392	£0.402	£0.411	£0.421	£0.430	£0.440	
Operating Cost	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	£0.560	
Surplus /Deficit	-£0.262	-£0.253	-£0.243	-£0.234	-£0.224	-£0.215	-£0.205	-£0.196	-£0.187	-£0.177	-£0.168	-£0.158	-£0.149	-£0.139	-£0.130	-£0.120	
Deficit Years	-£0.262	-£0.253	-£0.243	-£0.234	-£0.224	-£0.215	-£0.205	-£0.196	-£0.187	-£0.177	-£0.168	-£0.158	-£0.149	-£0.139	-£0.130	-£0.120	
Cumulative Deficit to Break-Even Year	-£3.060															Surplus/Deficit:Revenue in 2031	-27%

[E-A]

Service 777 & 757 - Change c.f. Existing	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Passenger Revenue	£0.268	£0.000	£0.000	£0.000	£0.000	£0.000	£0.085	£0.097	£0.109	£0.121	£0.134	£0.146	£0.158	£0.170	£0.183	£0.195
Operating Cost	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280	£0.280
Surplus /Deficit	-£0.012	-£0.280	-£0.280	-£0.280	-£0.280	-£0.280	-£0.195	-£0.183	-£0.171	-£0.159	-£0.146	-£0.134	-£0.122	-£0.110	-£0.097	-£0.085
Deficit Years	-£0.012	-£0.280	-£0.280	-£0.280	-£0.280	-£0.280	-£0.195	-£0.183	-£0.171	-£0.159	-£0.146	-£0.134	-£0.122	-£0.110	-£0.097	-£0.085
Cumulative Deficit to Break-Even Year	-£2.814															

All Langley and Peddimore Services - Financial Deficits

Service Deficit by Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Langley Sprint BRT	-£0.081	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
Langley CityLink bus	-£0.349	-£0.274	-£0.199	-£0.125	-£0.050	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
Service 71 - Absolute	-£0.222	-£0.197	-£0.172	-£0.147	-£0.122	-£0.098	-£0.073	-£0.048	-£0.023	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
Service 777 - Absolute	-£0.262	-£0.253	-£0.243	-£0.234	-£0.224	-£0.215	-£0.205	-£0.196	-£0.187	-£0.177	-£0.168	-£0.158	-£0.149	-£0.139	-£0.130	-£0.120
All Services:	-£0.914	-£0.724	-£0.614	-£0.506	-£0.396	-£0.313	-£0.278	-£0.244	-£0.210	-£0.177	-£0.168	-£0.158	-£0.149	-£0.139	-£0.130	-£0.120
Cumulative Deficit	-£5.240															

Services in Metropolitan County - Financial Deficits

Service Deficit by Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Langley Sprint BRT	-£0.081	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
Langley CityLink bus	-£0.349	-£0.274	-£0.199	-£0.125	-£0.050	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
Service 71 - Absolute	-£0.222	-£0.197	-£0.172	-£0.147	-£0.122	-£0.098	-£0.073	-£0.048	-£0.023	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
All Services:	-£0.652	-£0.471	-£0.371	-£0.272	-£0.172	-£0.098	-£0.073	-£0.048	-£0.023	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000	£0.000
Cumulative Deficit	-£2.180															

Other Bus Services

[E]

Service 967	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	
Passenger Revenue	£0.430	£0.431	£0.431	£0.432	£0.433	£0.434	£0.435	£0.435	£0.436	£0.437	£0.438	£0.439	£0.439	£0.440	£0.441	£0.442	
Operating Cost	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	£0.672	
Surplus /Deficit	-£0.242	-£0.241	-£0.240	-£0.239	-£0.239	-£0.238	-£0.237	-£0.236	-£0.235	-£0.235	-£0.234	-£0.233	-£0.232	-£0.231	-£0.231	-£0.230	
Deficit Years	-£0.242	-£0.241	-£0.240	-£0.239	-£0.239	-£0.238	-£0.237	-£0.236	-£0.235	-£0.235	-£0.234	-£0.233	-£0.232	-£0.231	-£0.231	-£0.230	
Cumulative Deficit to Break-Even Year	-£3.773															Surplus/Deficit:Revenue in 2031	-52%

[E]

Service 115+904+914 - Absolute	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	
Passenger Revenue	£1.511	£1.516	£1.521	£1.526	£1.531	£1.536	£1.541	£1.546	£1.551	£1.556	£1.561	£1.566	£1.571	£1.576	£1.581	£1.587	
Operating Cost	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	£2.547	
Surplus /Deficit	-£1.036	-£1.031	-£1.026	-£1.021	-£1.016	-£1.011	-£1.006	-£1.001	-£0.996	-£0.990	-£0.985	-£0.980	-£0.975	-£0.970	-£0.965	-£0.960	
Deficit Years	-£1.036	-£1.031	-£1.026	-£1.021	-£1.016	-£1.011	-£1.006	-£1.001	-£0.996	-£0.990	-£0.985	-£0.980	-£0.975	-£0.970	-£0.965	-£0.960	
Cumulative Deficit to Break-Even Year	-£15.969															Surplus/Deficit:Revenue in 2031	-61%

[E-A]

Service 115+904+914 - Change c.f. Existing	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Passenger Revenue	-£0.950	-£0.943	-£0.936	-£0.928	-£0.921	-£0.914	-£0.907	-£0.899	-£0.892	-£0.885	-£0.877	-£0.870	-£0.863	-£0.855	-£0.848	-£0.841
Operating Cost	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140	-£0.140
Surplus /Deficit	-£0.810	-£0.803	-£0.796	-£0.788	-£0.781	-£0.774	-£0.767	-£0.759	-£0.752	-£0.745	-£0.737	-£0.730	-£0.723	-£0.715	-£0.708	-£0.701
Deficit Years	-£0.810	-£0.803	-£0.796	-£0.788	-£0.781	-£0.774	-£0.767	-£0.759	-£0.752	-£0.745	-£0.737	-£0.730	-£0.723	-£0.715	-£0.708	-£0.701
Cumulative Deficit to Break-Even Year	-£12.089															

[E-A]

Service 108 - Change c.f. Existing	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Passenger Revenue	-£0.065	-£0.064	-£0.062	-£0.060	-£0.058	-£0.056	-£0.055	-£0.053	-£0.051	-£0.049	-£0.047	-£0.046	-£0.044	-£0.042	-£0.040	-£0.038
Operating Cost	no change															
Surplus /Deficit	-£0.065	-£0.064	-£0.062	-£0.060	-£0.058	-£0.056	-£0.055	-£0.053	-£0.051	-£0.049	-£0.047	-£0.046	-£0.044	-£0.042	-£0.040	-£0.038
Deficit Years	-£0.065	-£0.064	-£0.062	-£0.060	-£0.058	-£0.056	-£0.055	-£0.053	-£0.051	-£0.049	-£0.047	-£0.046	-£0.044	-£0.042	-£0.040	-£0.038
Cumulative Deficit to Break-Even Year	-£0.830															

[E-A]

Service 110 - Change c.f. Existing	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Passenger Revenue	-£0.092	-£0.089	-£0.086	-£0.084	-£0.081	-£0.078	-£0.076	-£0.073	-£0.070	-£0.068	-£0.065	-£0.062	-£0.060	-£0.057	-£0.054	-£0.052
Operating Cost	no change															
Surplus /Deficit	-£0.092	-£0.089	-£0.086	-£0.084	-£0.081	-£0.078	-£0.076	-£0.073	-£0.070	-£0.068	-£0.065	-£0.062	-£0.060	-£0.057	-£0.054	-£0.052
Deficit Years	-£0.092	-£0.089	-£0.086	-£0.084	-£0.081	-£0.078	-£0.076	-£0.073	-£0.070	-£0.068	-£0.065	-£0.062	-£0.060	-£0.057	-£0.054	-£0.052
Cumulative Deficit to Break-Even Year	-£1.147															

[E-A]

Service 116 - Change c.f. Existing	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Passenger Revenue	-£0.038	-£0.036	-£0.035	-£0.033	-£0.032	-£0.030	-£0.028	-£0.027	-£0.025	-£0.024	-£0.022	-£0.020	-£0.019	-£0.017	-£0.016	-£0.014
Operating Cost	no change															
Surplus /Deficit	-£0.038	-£0.036	-£0.035	-£0.033	-£0.032	-£0.030	-£0.028	-£0.027	-£0.025	-£0.024	-£0.022	-£0.020	-£0.019	-£0.017	-£0.016	-£0.014
Deficit Years	-£0.038	-£0.036	-£0.035	-£0.033	-£0.032	-£0.030	-£0.028	-£0.027	-£0.025	-£0.024	-£0.022	-£0.020	-£0.019	-£0.017	-£0.016	-£0.014
Cumulative Deficit to Break-Even Year	-£0.416															