LIST OF FIGURES

Figure 1: Indexed Growth for Dwellings, Daily Traffic, Public Transport Patronage and Cycling ................................................................. 7
Figure 2: Cardiff Mode of Travel to Work – Cardiff Council ‘Ask Cardiff Survey’ .................. 9
Figure 3: Travel to Work by Mode/by Electoral Division - Summary, 2001 Census ............ 9
Figure 4: Sustainable Travel vs. Distance Travelled to Work, 2001 Census ...................... 11
Figure 5: %age of Workforce vs. Distance Travelled to Work, 2001 Census .................. 11
Figure 6: Correlation Between %age Workforce and Distance Travelled to Work, 2001 Census ......................................................................................... 12
Figure 7: Distances from Home of Key Destinations by Trip Purpose ...................... 13
Figure 8: Weekly Mode Split 2011 & 2026 .................................................................... 13

ANNEX POLICY CONTEXT
INTRODUCTION

1.1 Overview

1.1.1 The purpose of this paper is to outline the Transport Strategy supporting the LDP Preferred Strategy. It explains the technical work supporting the strategy including analysis of existing transport trends, the transport modelling work and candidate site assessment. The paper evidences the need for advanced provision of sustainable transport infrastructure to mitigate the impacts of forecast growth and ensure developments are accessible by sustainable transport.

1.2 Transport Challenges

1.2.1 The development of Cardiff over the next decade and beyond will be a key determinant of how people will travel in the future. The location of new housing, employment and services will impact on the distance people travel daily, the routes they take, and the modes of transport they use.

1.2.2 The scale of development which Cardiff has to accommodate in the next two decades presents major transport challenges. National and regional policies and technical advice (summaries in the Annex to this paper) seek to support developments which help to reduce car use and maximise access by sustainable transport modes. In addressing the impacts of growth, the Transport Strategy supporting the LDP will also need to meet these policy requirements and to address the following transport issues:

1.2.3 Improving access to jobs and services – 30% of households in Cardiff do not have access to a car. People can’t always travel with ease where they want, when they want, how they want and at a price they can afford. Accessibility can be a particular problem for less mobile people with special travel needs, such as young people, older people, and people with disabilities or with young children.

1.2.4 Safer roads – Casualties in Cardiff have decreased by 40% since 1999 (Stats Wales 2012). However, the dangers associated with road traffic continue to pose a risk to the safety of pedestrians and cyclists and it discourages people from cutting their car use in favour of walking and cycling.

1.2.5 Better air quality – Road traffic is a major source of pollution that harms both air quality and people’s health. Long term exposure to air pollutants has been linked to serious health problems including heart disease, cancer risks and respiratory diseases in adults and children, such as asthma. Local road transport accounts for 24% of all carbon dioxide emissions in Cardiff. Emissions from road and air transport are also a major contributor to climate change.

1.2.6 Health problems due to car dependent lifestyles - the lack of daily exercise, associated with car-based lifestyles is a growing health problem, and has been linked to serious health conditions such as obesity, heart disease, stroke, cancer and

---

1 Department of Energy and Climate Change - Local and regional CO₂ emissions estimates for 2005-2009
diabetes. Only 24% of Cardiff residents meet physical activity guidelines and 51% of Cardiff residents are obese or overweight\(^2\). Reducing car dependency and enabling short trips to be made by walking and cycling can help more people undertake regular exercise and avoid the health problems which arise from sedentary behaviour.

1.3 **Cardiff’s Transport Vision**

1.3.1 The transport vision for Cardiff is: “a world class, integrated transport system that offers safe, efficient, and sustainable travel for all, and where public transport, walking and cycling provide real and desirable alternatives to car travel”.

1.3.2 The Transport Strategy to support delivery of the LDP embraces this vision and responds to the challenges associated with new development by setting out an approach aimed at minimising car travel, maximising access by sustainable transportation and improving connectivity between Cardiff and the wider region. This can be achieved by making the best use of the current network, reducing demand where possible and widening travel choices, as follows:

- **Network management** - Using a range of measures to make best use of the existing network and improve facilities and accessibility for all modes of travel and, in particular, for alternatives to the car;
- **Demand management** - Introducing a range of measures to reduce the demand for travel overall and limit car use where appropriate; and
- **Widening travel choices** - Ensure that a range of practical and attractive travel options are available for most trips and that people know about them.

1.4 **Transport Modelling**

1.4.1 A transport model of Cardiff was developed to assess the overall impact of the preferred strategy development sites on the highway network in Cardiff in 2026.

1.4.2 The model is based on the morning peak periods when pressures on the highway network are greatest. Peak period flows have been modelled on a 2010 base and then compared with 2026 based on the following increases in housing and employment:

- A 25% increase in housing (142,382 to 178,594)
- A 20% increase in jobs (from 198,400 to 238,400)

1.4.3 The 2026 model was based on the 2010 highway network and assumes no changes have been made to accommodate the additional vehicle movements from the development sites; this approach is known as a ‘business as usual’ scenario. This has enabled the impact of the LDP Preferred Strategy to be fully quantified. The key outcomes of the modelling exercise illustrate that:

- The demand for travel by car would increase by 41%;

\(^2\) Welsh Health Survey: Local Authority and Health Board Results 2009 and 2010
• 10% of new demand would be unable to travel on the highway network due to lack of capacity so there would be a 32% net increase in traffic;
• Average journey speeds would decrease; and
• Journey times would increase by approximately 41% or 7 minutes (average).

1.4.4 The LDP growth scenario therefore presents two significant transport challenges which the LDP must address if it is to be delivered successfully:

• Accommodation of significant additional trips on the highway network; and
• Ensuring that 50% of all trips on the transport network are made by sustainable modes (achieving this proportion is necessary to accommodate the additional vehicular trips on the highway network which will be generated by new development).

1.5 Candidate Site Assessment – Advance Provision of Sustainable Transport Infrastructure

1.5.1 The results of the modelling have informed the Council’s transport assessment of the candidate site submissions. These have shown that all the major development sites will need to be supported by significant new transport infrastructure and improvements to existing transport facilities.

1.5.2 Through measures set out in the LDP, together with other non land-use based initiatives, the Plan seeks to achieve a 50:50 split between car-based and non car-based travel. This is not simply a policy aspiration; local knowledge of the transportation network and research of travel behaviour, patterns and trends in combination with modelling work carried out by the Council has shown that achieving this ratio is necessary for the transport network to accommodate movements associated with the growth envisaged within this plan.

1.5.3 It is essential that sustainable transport is provided in advance of developments, as set out in Section 4 of this paper, and available from the first date that they become occupied or operational. This will enable sustainable travel patterns to become established and embedded during the early days of a development’s lifetime.
2.0 EXISTING TRANSPORT TRENDS & KEY DATA

2.1 Overview

2.1.1 In order to determine the impacts of the proposed candidate sites on Cardiff’s transport network, a detailed appraisal of the existing network and transport trends has been undertaken and is presented below.

2.2 Road Traffic

2.2.1 The volume of vehicles on Cardiff’s roads grew by 19% between 1998 and 2008 (Cardiff Council Annual Surveys – 5yr Rolling Averages). The recession and fuel price rises have contributed to a reduction in the rate of traffic growth over the last four years. However, between 2000 and 2010, traffic on Cardiff’s road network grew by 12%. The recent reductions in flows and congestion at peak times represent a temporary respite from the steady upward trend which is very likely to resume during the LDP plan period.

2.3 Mode Share

2.3.1 The annual trends in 12 hour weekday travel within Cardiff by mode (based on manual cordon and patronage surveys) are illustrated in Figure 1 below. This shows that patronage on services to and from Cardiff railway stations increased considerably between 2001 and 2011. These patterns are confirmed by rail operators’ own passenger monitoring.

Figure 1: Indexed Growth for Dwellings, Daily Traffic, Public Transport Patronage and Cycling
2.3.2 The rise in rail travel over the last decade mirrors an increase in petrol prices during the same period. Car travel in the City Centre has declined, whilst cycle use in this area over the same period has increased. Travel by bus has remained more or less static over this period.

2.4 **Travel to Work**

2.4.1 Whilst travel to work accounts for only a quarter of daily personal trips, it is a major factor in peak time congestion on the road network. Between 2007 and 2011, the use of the private car for travel to work generally decreased in favour of more sustainable modes, particularly walking, cycling and rail travel. Bus use for work trips over this period has experienced little change, as shown in Figure 1.

2.4.2 As of 2011 (Ask Cardiff Survey 2011 – see Figure 2 below), 43% of Cardiff residents travel to work by sustainable modes; with 16% walking, 14% travelling by bus, 6% by bicycle, 5% by rail and 2% by other modes. The remaining 57% travel by car.

2.5 **Travel to Work by Area**

2.5.1 The split between car and non-car modes for travel to work varies considerably between different areas of Cardiff as shown below in Figure 3. It is significant that the share of work travel by car is higher in some of the more peripheral areas of Cardiff – Lisvane (81%), Creigiau St Fagans (83%), Pontprennau Old St Mellons (78%) – where candidate site submissions propose significant development on green field sites.

2.5.2 These variations in travel behaviour reflect marked contrasts in the ‘transport geography’ of different areas of Cardiff (the key factors which affect travel choice including: distance from the city centre; levels of car ownership; proximity to/accessibility of public transport facilities; availability/frequency/quality of public transport service and proximity to/accessibility of services and community facilities).
Figure 2: Cardiff Mode of Travel to Work – Cardiff Council ‘Ask Cardiff Survey’

Figure 3: Travel to Work by Mode/by Electoral Division - Summary, 2001 Census

Travel to Work (source: Census 2001)
2.6 Inbound and Outbound Work Trips

2.6.1 As of 2010 there are 198,400 people working in Cardiff, of which 124,200 (63%) are from within Cardiff with 74,200 (or 37%) having travelled from outside. 67,300 of the 74,200 travel from within the South East Wales region. It is estimated that the increase of 40,000 jobs in Cardiff, as set out in the Preferred Strategy will increase the numbers of people commuting to work in Cardiff by approximately 20%.

2.6.2 The projected increase in jobs over the LDP plan period is based on the Council's analysis of Cardiff's economy, local employment and labour markets. The analysis has assumed that the percentage of total working residents in Cardiff (those working within Cardiff or commuting out) relative to the total number of jobs in the city (referred to as the commuting ratio) will remain fixed at 77%. This is based on the 9 year trend indicated by Statistics on Commuting in Wales from 2001 to 2010. It is possible that the ratio between the number of jobs in the city and the numbers of working residents will vary over time due to changes in the local economy and labour markets. Given the transport implications of any change, this will be closely monitored over the lifetime of the LDP.

2.6.3 10% of all Cardiff workers originate from the Vale of Glamorgan, with a further 9% travelling from Rhondda Cynon Taf; 5% from Caerphilly, and 3% each from Newport and Bridgend. Approximately 80% of work trips from outside of Cardiff are by private car (Source: Statistic on Commuting in Wales 2010).

2.6.4 There are 28,800 people typically commuting out of Cardiff daily, with 18% travelling each to Newport and Rhondda Cynon Taf, 16% travelling to the Vale of Glamorgan, and 11% to Caerphilly.

2.7 Work Trips: Travel Distance & Mode Share

2.7.1 The relationship between journey distance and sustainable travel is illustrated in Figures 4-6 below. These show that sustainable travel is more prevalent amongst short distance (local) trips below 5km, and also features prominently for the longest distance trips over 60km (typically travelling to destinations outside the Sewart region). In Cardiff a higher proportion of trips are by sustainable modes than in neighbouring authorities.

2.7.2 Figure 4 demonstrates that around 58% of the workforce in Cardiff, who travel less than 2km to work, travel by sustainable modes (excluding those that work from home). It also shows that 32% of the workforce travelling between 2km and 5km to work travel by sustainable modes. Figure 5 shows that 58% of the workforce in Cardiff travel less than 5km and 29% travel less than 2km (including 7% who work from home). The proportion of the workforce travelling further than 10km is lower in Cardiff than neighbouring local authorities. Only 8% of Cardiff workers travel between 10km and 20km to work compared with 26% in Caerphilly.

2.7.3 Figure 6 demonstrates that for all but the shortest distance trips, the proportion of the workforce travelling to work follows a close to linear relationship with the distance travelled in the South East Wales region. The proportion of the workforce travelling diminishes as travel to work distance increases.

2.7.4 This evidence demonstrates that the closer housing is located in relation to where people want to travel, the more likely it is that they will make sustainable travel
choices. It is therefore necessary to ensure that key destinations and residential areas are in close proximity and connected by sustainable travel networks, so that they provide attractive alternatives to travelling by car.

Figure 4: Sustainable Travel vs. Distance Travelled to Work, 2001 Census

Figure 5: %age of Workforce vs. Distance Travelled to Work, 2001 Census
2.8 Daily Travel Behaviour – Work and Non-Work Trips

2.8.1 Travel behaviour research in Cardiff and Penarth was undertaken in 2011 by Sustrans and Socialdata for the Welsh Government funded Personalised Travel Planning Project.

2.8.2 The results show that travel to work represents only 24% of all car trips, and that most personal travel by car is for leisure (28%), shopping and personal business (26%) or other purposes (22%). The data also reveals that for approximately 55% of car trips in Cardiff and Penarth, the car is chosen in preference to sustainable travel alternatives purely for subjective reasons (e.g. lack of information or poor perceptions of travel time, costs, comfort and infrastructure) rather than necessity. Furthermore it suggests that of these car trips:

- 31% could be made by public transport,
- 37% could be made by cycling, and
- 13% could be made on foot.

2.8.3 The results also indicate that large proportions of the population live within 3km of their destinations (see Figure 7) - distances which could potentially be travelled on foot or by bicycle.

2.8.4 The results also show that the current weekly travel mode split (2011) is 64%:36% car based:non-car based (see Figure 8). To achieve a mode split of 50:50 in 2026 for all trips on Cardiff’s transport network including transport movements from new development envisaged within the LDP Preferred Strategy, it will be necessary to achieve a significant modal shift in movements (all trip purposes) generated by the existing settlement/population.
Figure 7: Distances from Home of Key Destinations by Trip Purpose

Percentage of Trips by Journey Purpose and Distance from Home

Figure 8: Weekly Mode Split 2011 & 2026

LDP pressures will require delivery of a 50:50 modal split

2.9 Existing Transport Trends & Key Data: Implications for LDP Preferred Strategy

2.9.1 A number of conclusions can be drawn from the analysis of transport trends and data above:

- Traffic on much of Cardiff’s road network (outside the City Centre) has grown significantly over the last decade;
- This upward trend is likely to resume during the LDP plan period;
- Cardiff’s highway network remains under considerable strain, with a number of key junctions and roads either at or approaching capacity at peak times;
- A large proportion of Cardiff’s workforce (37%) travel into Cardiff from outside; 80% of inbound commuter movements are by car;
- 57% of work trips in Cardiff are by car, but a higher proportion of all weekly travel for both work and non work purposes is by car (64%);
- Shorter distance work trips are more likely to be made by sustainable modes;
- Large proportions of the Cardiff population live within 3km of their destinations; and
- Many short trips are currently made by car, but could easily be made by sustainable modes.

2.9.2 These conclusions have important implications for the LDP and the transport measures that will be required to support new development. These include:

- Any significant urban expansion must be supported by measures to facilitate and encourage a shift from the car to sustainable modes of travel;
- Developments envisaged within the LDP Preferred Strategy must be fully integrated with the transport network and supported by attractive and practical sustainable travel options which make it easy for car trips to be replaced with public transport, walking and cycling;
- To achieve a mode split of 50:50 in 2026 for all trips on Cardiff’s transport network, it will be necessary to achieve a significant modal shift in movements (all trip purposes) generated by the existing settlement/population; and
- The provision of some additional road capacity will also be required where the scale of development makes this is unavoidable.
3.0 TRANSPORT MODELLING AND CANDIDATE SITE ASSESSMENT

3.1 Transport Modelling Methodology

3.1.1 A transport model for Cardiff has been developed to assess the potential impacts of the LDP future growth options, the candidate site submissions and to be a tool in the identification and testing of the infrastructure required to accommodate the forecast growth.

3.1.2 The model has been used to assess the overall impact of the LDP Preferred Strategy development sites on the highway network in Cardiff in the morning peak period, when pressures are greatest.

3.1.3 The modelling carried out in OmniTRANS\(^3\) to assess the impact of projected growth assumes a 25% increase in housing (from 142,382 to 178,594) and a 20% increase in jobs (from 198,400 to 238,400).

3.1.4 This section provides a summary of the modelling methodology used in this exercise. The model was informed by:

- **Existing data sources:** (e.g. Census 2001),
- **Evidence on existing modal split by electoral ward from the Census and Ask Cardiff Survey:** TRICS\(^4\) was used to derive person trip rates for each of the candidate development sites, based on their land use composition (housing, employment etc) and specific geographic location (for the purpose of modelling, the trip rates were aligned with TEMPRO\(^5\) predicted forecast growth from the National Trip-End Model\(^6\)), and;
- **Cardiff Council Annual survey data:** This formed the basis for establishing, calibrating and validating the Base OmniTRANS Strategic Highway Model.

3.1.5 A number of model scenarios were developed and tested:

- Construction of a **2010 Base Highway Model** to represent existing conditions;
- Establishment of a **2026 Do-Minimum situation** (representing a future year scenario in the event that the Preferred Strategy strategic candidate sites were not developed as a basis for comparing options); and
- Establishment of a **2026 Do-Something Preferred Strategy Model**, including all Strategic Development Candidate Sites of the Preferred Strategy (but with no changes to the highway network).

---

\(^3\) Software for strategic transport modelling – see http://www.omnitrans-international.com/en

\(^4\) TRICS The UK and Ireland’s national system of trip generation analysis, containing over 6,300 directional trans

\(^5\) TEMPRO Trip End model presentation program, is designed to allow detailed analysis of pre-processed trip-end, journey mileage, car ownership and population/workforce planning data from the National Trip End Model (NTEM) and present this either on screen or to file/printer for distribution via hardcopy. The pre-processed data is itself the output from a series of models developed and run by the team division of DfT. TEMPRO can also be used to provide summaries of traffic growth using data from the National Transport Model (NTM).

\(^6\) See footnote 4 above and http://www.dft.gov.uk/tempro/intro.php
3.1.6 The Do-Something scenario tested the delivery of approximately 36,212 new homes from 2010 (or 46,000 between 2006 and 2026), and 40,000 new jobs included in the Preferred Strategy. The LDP Growth Option B is based on 45,400 new homes and 40,000 new jobs.

3.1.7 A number of infrastructure and mode split scenarios were investigated in the model as potential mitigation of the impact of the proposed development sites. These scenarios may require further testing during the master planning process. However, the indicative tests highlighted the significant travel demand that would be generated by the strategic sites, indicating the need for employing other measures to manage travel demand, including, for example, Personalised Travel Planning (PTP) and parking controls.

3.2 Transport Modelling: Key Findings

3.2.1 The modelling process has produced a number of findings which have major implications for the LDP Preferred Strategy and the significant transport interventions required to respond to future development needs:

- Cardiff’s key corridors are currently operating at or close to capacity;
- Strategic corridors would be significantly congested in the peak periods with an average 41% increase in vehicle travel times for journeys within Cardiff;
- Projected development would result in a 41% increase in vehicle demand;
- 10% of the vehicle demand generated by new development could not be assigned to the modelled network due to network congestion;
- There would therefore be a 32% net increase in traffic;
- Forecast growth in vehicle trips will increase congestion, reducing the average journey speeds from approximately 13mph in 2010 to 11mph in 2026;
- Journey times would increase by approximately 41% from an average of approximately 17 minutes to 24 minutes.

3.2.2 The (2010) 1 hour AM Peak modal split is 61:39 car:sustainable travel. The transport model was used to test the impact of a 50:50 car:sustainable travel modal split (of which 33% were car drivers and 17% car passenger - an average car occupancy of 1.5). The modelling shows that achieving a 50:50 ratio between car-based and non car-based travel is essential to accommodate additional peak hour travel demand.

3.3 Site Assessment

3.3.1 The results of the modelling have informed the Council’s transport assessment of the candidate site submissions which has fed into the overall candidate site assessment process outlined in LDP Technical Paper 8.

3.3.2 The candidate sites have been assessed following a two stage process.

- **Stage 1: Sub Factor Assessment:** assessment of strategic sites against two transportation sub factors:
- **Transportation Context:** impact on transportation network and key corridors taking account of trip generation, distribution, mode share, and potential for mitigation.
• **Potential for Sustainable Transportation Solutions:** potential of proposal to effectively deliver sustainable transportation solutions that positively encourage non-car usage and minimise the impact on existing congestion.

• **Stage 2: Assessment of strategic sites against LDP Vision and Objectives:** Assessment of LDP’s stated vision and objectives relating to transport/movement and the transportation sub factors.
4.0 CANDIDATE SITE ASSESSMENT - ADVANCE PROVISION OF TRANSPORT INFRASTRUCTURE

4.1 Overview

4.1.1 Major developments are proposed on green field sites situated on the periphery of the city, close to the M4 motorway and the local strategic road network. These include site 46 (Land north of M4 Junction 33), site 102 (Land South of Creigiau), site 82 (North West Cardiff), site 112 (North East Cardiff), site 72 (Land to the east of the A4232 Pentwyn Link Road) and site 106 (Cardiff Parkway) on land to the east of St Mellons. The assessment of these sites has shown that they are currently not well served by sustainable transport infrastructure.

4.1.2 Sites 46, 72, 102 and 106 have been assessed as having more significant issues and constraints than the other major sites. Accordingly, their assessment reflects the material differences compared with other more central sites in terms of site location, accessibility and potential for sustainable transport access (details of the assessment and scoring is contained in Background Technical Paper No. 8).

4.1.3 The modelling and candidate site assessments have shown that all the major development sites will need to be supported by significant new transport infrastructure and improvements to existing transport facilities. It is essential that sustainable transport is provided in advance of developments and available from the first date that they become occupied or operational. This will enable sustainable travel patterns to become established and embedded during the early days of a development’s lifetime.

4.2 North West Cardiff

4.2.1 Site 82 North West Cardiff would result in a major urban expansion (up to 7,500 houses) on green field land west of Fairwater and Pentrebane. The indicative master plan included in the candidate site submission proposes a segregated public transport corridor running centrally through the site and providing a rapid and direct public transport connection to the City Centre and Cardiff Bay areas. A number of constraints at the southern end of the corridor must be overcome in order to develop this facility. However, the development offers the potential for the corridor to be extended further along the line of a disused railway which runs northwest of Site 82, towards M4 Junction 33, where it could form a connection with Sites 46 and 102 north of junction 33.

4.2.2 Sites 46 and 102 are in locations which are currently not well served by public transport. Site 46 would have direct access onto the M4 motorway, therefore, the connection of these sites to a segregated/partly segregated public transport corridor (via Site 82) will be essential in order to provide a sustainable means of access from this area to central Cardiff and to facilities within the new community proposed on Site 82. The specific transport infrastructure requirements for these sites would be determined through detailed master planning, but could potentially include:

- Provision of a strategic Park & Ride/Share facility accessed from Junction 33 of the M4 and Llantrisant Road (A4119);
• Development of a segregated/partly segregated public transport corridor utilising the former disused railway line south east of M4 Junction 33 in conjunction with the proposed development area west of Pentrebane and through to the city centre;
• Enhanced public transport linkages to areas beyond the county boundary of Cardiff into Rhondda Cynon Taff;
• Major improvements to M4 Junction 33 and Culverhouse Cross Interchange (although access to/from the site off Junction 33 may need to be restricted to maximise the effectiveness of other sustainable travel measures); and
• Other measures to minimise travel demand such as on site walking, cycling and community facilities.

4.3 North East Cardiff

4.3.1 Site 112 includes proposals for a major urban expansion (6,000 houses) on green field land between Lisvane and Pontprennau. The development of this site will require significant public transport improvements. Such improvements could potentially include the development of bus corridors and rapid public transport services to the city centre serving both the eastern and western portions of the site. A development of this scale would also need to be served by new public transport services to provide effective east-west connections with adjacent suburbs and key employment areas such as Ty Glas in Llanishen. The site will nevertheless generate significant additional vehicular movements which are likely to require major highway works to tackle additional pressures upon junction 30 of the M4 and access to the Cardiff Gate Business Park.

4.3.2 The development of Site 72 would provide in the region of 2,000 dwellings on a green field site situated to the east of the Pentwyn Link Road. The site potentially has very good access to the M4 motorway and the strategic highway network, but existing public transport links are limited and access to the nearest community facilities is constrained by the severance of the site by the A4232 dual carriageway. Overcoming the severance effect of the road will be key to ensuring that the site is integrated with the existing settlement and the residents are not dependent on their cars for access to local services and destinations further afield. It will also ensure sustainable transport provision for those without access to a car.

4.3.3 Initial investigation of solutions as part of the transport modelling and assessment work has shown that highway works necessary to accommodate the development would need to be integrated with the highway solution(s) for site 112. Transport measures would need to be provided in advance of the development and occupation of the site. Highway works and bus infrastructure would need to be integrated with the highway solutions/bus network improvements for the site west of Pontprennau. Furthermore, this solution would enable bus network improvements provided as part of site 112 to be integrated with site 72, thus helping to overcome the site’s relative isolation. Other measures will however be required to tackle the severance of effect of the A4232 upon this site, as residents are likely to be reliant upon existing and proposed community facilities west of the A4232 and will require safe, attractive and convenient walking and cycling access between the site and these facilities.
4.4 **Land at East Cardiff**

4.4.1 Site 106 (Cardiff Parkway) includes proposals for a major strategic employment site on land south of St Mellons Business Park. The location of the site near the strategic road network and the nature of the proposed development is likely to generate a large number of trips from outside the area in addition to those from neighbouring residential areas of St Mellons. Addressing the impacts of these movements and minimising the proportion of them which would be made by car would require extensive provision of sustainable transport infrastructure, the details of which would need to be determined through site master planning. Measures could potentially include:

- Additional bus services between the site and city centre including express/limited stopping services, and
- Improvements to walking and cycling links to integrate the site with the surrounding settlement;

4.4.2 The technical and financial feasibility and deliverability of a new rail station at St Mellons served from relief lines would also require detailed investigation.

4.5 **Accessibility**

4.5.1 Provision of new and improved transport infrastructure will play a major role in mitigating adverse transport impacts. However, the design and layout of developments and the community facilities they include will have a profound influence on the patterns of travel generated by both large and small development sites.

4.5.2 The Council will seek to secure major residential developments which contain all essential community facilities, make walking and cycling possible for all short trips and are well connected by public transport. These requirements will be addressed through the master planning process for larger sites (both residential and non-residential) and LDP policies (and/or Supplementary Planning Guidance, where appropriate) setting out criteria with regard to design and layout, community facility provision and accessibility by sustainable transport modes.

4.6 **Accessibility Requirements: Smaller Sites**

4.6.1 Residential development is proposed on a large number of smaller sites. These developments range in size from 1 or 2 dwelling units to over 300 homes. The modelling assessment has shown that the smaller sites generate fewer trips than the larger strategic sites, but their cumulative impact upon the road and wider transport networks could be significant.

4.6.2 One reason for this is that unlike larger strategic sites, smaller scale developments are less likely to incorporate new local community facilities and therefore most daily trips will be off-site. Sites which are remote from community facilities and services or can not be well served by sustainable transport are unlikely to be included within the plan. The accessibility standards which apply to these sites will be defined within LDP policies and, where necessary, Supplementary Planning Guidance (SPG).
5.0 TRANSPORT INTERVENTIONS AND FUNDING

5.1 Overview

5.1.1 In order to deliver the LDP preferred strategy, all major development sites will need to be supported by significant new transport infrastructure as set out below:

5.2 Widening Sustainable Travel Choices

5.2.1 This will include significant new/improved sustainable transport to provide attractive sustainable travel options to the private car and behaviour change programmes to ensure that people know what sustainable travel choices are available and how to use them. Interventions that will be required in a synchronised manner in advance of developments include:

- Development of the Strategic Bus Network including express Bus Rapid Transit infrastructure and services on key corridors providing sustainable connections to existing and new suburban strategic development sites. Bus corridors will be designed to extend out to the sub region encouraging modal shift outside the city boundary;
- Development of segregated public transport corridor(s) providing improved connectivity between new and existing areas;
- Expansion of the existing bus network (including bus priority measures and local interchange hubs) – to fill in existing gaps, enabling cross city movements to be made more easily and provide sustainable travel options for a wider range of local journeys – linked to Smarter Choices Measures;
- Development of the Strategic Cycle Network – designing development layouts in a way which maximises their permeability by cycling and provides linkage with the core strategic cycle network;
- Rail and road based Park and Ride facilities (inside and outside Cardiff);
- Improvements that take advantage of Great Western main line and Valley Lines rail electrification and other planned/committed improvements to rail network capacity and quality including measures associated with the Cardiff Metro concept;
- Improvements to access and facilities at local rail interchanges including interchange with buses;
- Development of a multi-modal transport interchange hub at Cardiff Central serving Cardiff and the wider region;
- Creation of compact developments which are well served by essential community facilities within easy walking or cycling distance;
- Ensuring that the design and composition of developments maximises the opportunity for walking and cycling access to local facilities; and
- Smarter Choices Programme including Workplace/School Travel planning, area-based personalised travel planning projects, marketing and promotion of sustainable travel choices – local and regional, Car Clubs and Cycle Training.

5.3 Network Management Solutions

5.3.1 This will require modifications to the existing highway network and provision of additional highway capacity, where necessary. Interventions will need to include:
• Selected expansion of road capacity/provision of new links in conjunction with strategic sites;
• Selected junction/interchange improvements;
• Integrating road network improvements with bus priority measures; and
• Smart management of network to address peak time conditions and help prioritise sustainable movements (linked to demand management).

5.4 Demand Management Solutions

5.4.1 Effective demand restraint measures to achieve the step change in modal shift required. Interventions include:

• Revision of car parking standards for new development: minimising parking provision where possible;
• Civil Parking Enforcement: through targeted deployment of Council teams; and
• The Council’s modelling assessment indicates that travel demand must be significantly restrained in order to minimise network pressures, effect modal shift and support sustainable travel.

5.5 Integration with Regional Infrastructure Improvements

5.5.1 Cardiff Council will continue to work closely with neighbouring authorities and Sewta to secure infrastructure improvements which can help to achieve modal shift and alleviate pressure on Cardiff’s road network and improve connectivity within the city-region. A number of key projects in the Sewta Regional Transport Plan and the Welsh Government’s National Transport Plan and Wales Infrastructure Investment Plan will be of particular benefit in this regard namely:

Rail
• Additional platforms at Pontypridd, Caerphilly and Barry - to facilitate frequency and capacity enhancement on Taff Vale, Rhymney and Barry lines - by 2015;
• Additional carriages to peak time services and new station at Energlyn on the Rhymney Valley Line to facilitate frequency and capacity enhancement on the Rhymney line – by 2015;
• Additional services on the lines from Pontypridd and Caerphilly to Cardiff – increase service frequencies into Cardiff – by 2015;
• Electrification of South Wales Valley Lines – including new rolling stock: provides basis of future Cardiff Metro network – by circa 2020; and
• Electrification of Great Western Main Line – to Cardiff and Swansea – by 2017.
• Investigation of a Newport to Cardiff Tram Train Service.

Bus
• Development of bus priority measures on the A470 corridor between Pontypridd and central Cardiff – by circa 2014;
• Development of bus priority measures on the A469 corridor within Cardiff – (timescale to be determined) will be need to be integrated with development in North East Cardiff;
• Development of bus priority measures on the A48 Western corridor – initial improvements to Cowbridge Road East/West complete – further phases planned – by circa 2015; and
• Development of bus priority measures on the A4119 Western corridor – initial improvements in Llandaff area planned – further improvements to be integrated with development in North West Cardiff.

Interchanges
• Development of strategic park and ride/park and share sites, where feasible outside the County Boundary in Vale of Glamorgan, Rhondda Cynon Taff and Caerphilly – small extensions to rail park and ride facilities on stations in Rhymney Valley recently completed; Rail Park and Ride at Barry Waterfront completed in 2011-12;
• Further sites for Park and Ride and Park and Share being sought in Vale of Glamorgan, Rhondda Cynon Taff and Caerphilly areas. – timescales to be determined;
• Improvements to Cardiff local rail interchanges – rolling programme of improvements to access, information and passenger facilities – by circa 2015;
• Investigation of the technical and financial feasibility, and deliverability of a new rail station at St Mellons served from relief lines; and
• Investigation of the technical and financial feasibility, and deliverability of tram train solutions.

5.5.2 The transport infrastructure required during the LDP plan period will be identified within an Infrastructure Plan which the Council will develop in tandem with the Deposit LDP. This will include the costs of critical infrastructure and set out a programme for its delivery taking account of development phasing issues and the availability of funding from different sources referred above and other potential sources. The Council will also develop a parallel programme of non-physical transport interventions relating to demand management for example Smarter Choices.

5.6 Funding Issues

5.6.1 The scale of development which Cardiff has to accommodate in the next two decades presents major transport challenges and will require provision of extensive new transport infrastructure. Funding from traditional means such as Welsh Government grants are unlikely to be sufficient to finance the improvements required, so other potential funding sources will need to be found to deliver the transport infrastructure and other measures necessary to support the projected growth.

5.6.2 Work undertaken in 2003/2004 indicated that investment of around £500 million would be required to address Cardiff’s infrastructure deficit. This funding gap is now, arguably, much greater given recent population projections which underpin the LDP Growth strategy and there is no doubt that significant funding will be required to secure the transport infrastructure needed to support the LDP delivery.

5.6.3 The Community Infrastructure Levy being developed in parallel with the LDP will provide an essential funding source to support provision of essential infrastructure. Given the scale of need, Community Infrastructure Levy will need to be supplemented by funding sources in addition to funding from Welsh Government Grants etc. Therefore, other potential mechanisms for financing the delivery of transport infrastructure will need to be considered.
5.6.4 Previous work undertaken by the Council has shown that road user charging could potentially provide a significant revenue stream for re-investment in transport infrastructure. The introduction of road user charging would need to be supported by a compelling business case. If this were to be considered in the future, such a case would need to weigh the potential benefits of a charging regime in terms of easing pressures upon the transport network and generating investment in new transport infrastructure, against the extent of any potentially negative impacts.

5.6.5 Any future charging regime would also need to be considered against a range of other financial mechanisms which could potentially provide the necessary funding. All potential funding options will need to be investigated in detail.

5.6.6 The funding and delivery of transport infrastructure in Cardiff will also need to be closely integrated with transport planning and developments across the wider South East Wales region. Continued partnership working with Welsh Government, Sewta and its constituent local authorities will be essential in this regard. Delivery will also need to be aligned with the emerging City Region agenda and potential changes in regional planning mechanisms and governance, as well as Welsh Government requirements for closer collaboration between local authorities on transport delivery, including operational and maintenance issues.
6.0 CONCLUSION

6.1.1 The technical work outlined in this paper has highlighted the central role of transport in delivering the LDP. Furthermore, achievement of many of the Plan’s key objectives will be dependent upon developments being integrated with the provision of extensive and high quality sustainable transport infrastructure.

6.1.2 Some of this infrastructure will be of a large scale, such as new corridors for public transport. Other elements will be smaller and more local, but no less important: walking and cycling links; shared spaces; road layouts which give priority to people on foot, cyclists and disabled people and permit access to community facilities without the need for a car.

6.1.3 The assessment work carried out indicates that all the major development sites will need to be supported by significant new transport infrastructure and improvements to existing transport facilities. Furthermore, it is considered that all transport infrastructure (including sustainable transport infrastructure) which is essential to support developments must be provided in advance of the development and its beneficial occupation.

6.1.4 Prior provision of sustainable transportation infrastructure will be essential to ensure that sustainable travel patterns become established and embedded from the first occupation of new developments. It will also be necessary to achieve a 50:50 modal split.

6.1.5 Developers will need to be firmly committed to the provision of transport infrastructure in advance of developments and, where it will be necessary to make this happen, to actively collaborate with other developers.
ANNEX: POLICY CONTEXT

1.1. Overview

1.1.1. This Annex sets out the national, regional and local policy context framing the strategy.

1.2. National Strategies and Plans

1.2.1. Wales Transport Strategy - Welsh Government (2008) - the Welsh Government’s over-arching transport strategy. It identified 5 priorities that provide strategic direction for delivery. They are:

1.2.2. • Reducing greenhouse gas emissions and other environmental impacts from transport;
• Integrating local transport;
• Improving access between key settlements and sites;
• Enhancing international connectivity; and
• Increasing safety and security.

1.2.3. National Transport Plan – Welsh Government (2011) – this sets out the Welsh Government’s “approach to putting transport onto a carbon reduction pathway, whilst at the same time ensuring that it can continue to support sustainable economic development and social inclusion”. The Plan sets out priorities and timescales for Welsh Government's delivery of key national transport infrastructure including major rail schemes affecting Cardiff (see details in Section 7.0 below).

1.2.4. Wales Infrastructure Investment Plan – Welsh Government (2012) – this sets out the Welsh Government’s approach to resourcing the development of critical infrastructure. Section 2.3 states: “The Welsh Government has prioritised the National Transport Plan which has brought forward investment that will make the transport system in Wales work better to help tackle poverty, increase well-being and assist economic growth. Through the prioritised National Transport Plan we will bring forward investment which removes barriers to economic growth and tackles the issues faced by people living in poverty.”

1.2.5. Wales Spatial Plan (WSP): Strategy for the Capital Region – Welsh Government (2008) – this provides a strategic framework to guide future development and policy interventions across Wales. The WSP sets out a long term vision for the ‘South East – Capital Network’. This vision sees South East Wales as: ‘networked city region of strong, sustainable and interdependent communities spreading the prosperity of Cardiff and Newport to the neighbouring valleys’. It envisages Cardiff’s continuing development as a European capital city and major events venue and the expansion of its role as a regional economic driver and prime location of high value development “befitting a regional capital area”.
1.2.6. Section 13 of the WSP addresses Sustainable Accessibility and states: “Citizens must be able to access job opportunities and public services - health, social services, education, etc - if equality of opportunity is to be successfully promoted in Wales. This is of particular concern for those who face barriers to accessibility, such as people on low incomes, young and old people, disabled people and those living in rural areas. Likewise, businesses need improved access to markets to create new job opportunities and secure these in the longer term.”

1.2.7. Planning Policy Wales (PPW, Edition 4) – Welsh Government (2011) – Paragraph 8.1.1 of PPW4 sets out the Welsh Government’s overarching policy objectives in relation to land use planning and transport: “The Assembly Government aims to extend choice in transport and secure accessibility in a way which supports sustainable development and helps to tackle the causes of climate change by: encouraging a more effective and efficient transport system, with greater use of the more sustainable and healthy forms of travel, and minimising the need to travel. This will be achieved through integration:

- within and between different types of transport;
- between transport measures and land use planning;
- between transport measures and policies to protect and improve the environment; and
- between transport measures and policies for education, health, social inclusion and wealth creation”.

1.2.8. Section 8.6 - “Development plans provide the main means for achieving integration between land use and transport. They must provide an explanation of the authority’s transport aims and the way in which the transport policies support the other objectives of the plan. Development plans should provide the means for:

- examining the relationship between transport and land use planning;
- promoting the integration and co-ordination of transport and land use planning; and
- promoting strategies to reduce the need to travel”.

1.2.9. Technical Advice Note (TAN) 18 Transport (2007) – provides detailed advice explaining how the Welsh Government’s transport objectives and policies set out in PPW should be expressed and applied within development plans and decision making on development proposals. Section 2 of TAN 18 stresses the importance of integrating land use planning and transport provision in combating the adverse effects of road traffic and effecting more sustainable patterns of travel. Paragraph 2.3 states: “Integration of land use planning and development of transport infrastructure has a key role to play in addressing the environmental aspects of sustainable development, in particular climate change and the outcomes identified in the Assembly Government’s Environment Strategy. Integration can help the Assembly Government achieve these environmental outcomes, together with its wider sustainable development policy.”
1.3. Regional Strategies and Plans

1.3.1. South East Wales Regional Transport Plan (2010) - Sewta (South East Wales Transport Alliance) is the regional transport consortium for south east Wales. The Sewta Regional Transport Plan sets out the transport priorities for the South East Wales region. The vision is for ‘A modern, accessible, integrated and sustainable transport system for South East Wales which increases opportunity, promotes prosperity for all and protects the environment; where walking, cycling, public transport, and sustainable freight provide real travel alternatives’.

1.3.2. Achieving sustainable accessibility is a central aim of the plan. One of the wider goals of the plan is to: “Promote social inclusion and equality, by providing a transport system that is safe, accessible, and affordable to all sections of the community”. Key objectives of the plan include:

- Connectivity and Accessibility;
- To improve access for all to employment opportunities, services, healthcare, education, tourism and leisure facilities;
- To improve connectivity by sustainable transport between South-East Wales and the rest of Wales, the UK and Europe;
- Land Use and Regeneration;
- To ensure developments in South East Wales are accessible by sustainable transport; and
- To make sustainable transport and travel planning an integral component of regeneration schemes.

1.3.3. Section 4 of the RTP sets out policies relating to land use planning:

- **Planning Policy 3:** Sewta will seek to ensure that Local Development Plans, supplementary planning guidance and development control processes establish a pattern of land use that reduces the need to travel and maximises the potential for sustainable transport infrastructure and services (including car-free housing developments), secure contributions towards improvements to the transport network and ensure that all significant development proposals are accompanied by effective travel plans.

- **Planning Policy 4:** Sewta opposes land use proposals which will adversely affect transport networks, or which will conflict with the objectives, policies and proposals of the RTP.

1.4. Local Strategies and Plans

1.4.1. One Planet City – Vision and Delivery Plan (Draft for Consultation 2012) - states that “With partners we’re continuing to work in schools and workplaces across the city to promote cycling through the Bike It project and Cardiff Cycle Challenge, and have developed a strategic cycle network plan for the city.

- We’ll be supporting the electrification of the Valleys lines – and ultimately the development of a Cardiff and South Wales Metro – to create a sustainable transport system for the 80,000 people who come in to Cardiff each day.

- We are continuing investment in infrastructure to improve bus journey times and service reliability on Cardiff’s main Strategic Bus Corridors, and are developing Bus Rapid Transport routes within the city.”
1.4.2. **Cardiff Corporate Plan 2012-14** - under “Cardiff is a great place to live, work and play”, states that sustainable travel choices will be delivered by:

- Increasing the range and choice of sustainable travel options through alternative travel choices and the further development of the sustainable travel city initiative;
- Delivering improvements to the transport infrastructure; and
- Improving the transport links between Cardiff and the region by progressing the delivery of schemes identified within the Sewta Regional Transport Plan.

1.4.3. **What Matters – Delivery Plan 2010 – 2020** - this is the overarching strategy that is shaping how Cardiff moves forward to 2020. It has been developed over the last year by a range of public, private and third sector partners, focusing on outcomes for the city across organisational boundaries, delivering what matters most to people. Under “Cardiff is great place to live, work and play” this states that we will:

- Improve Cardiff’s connectivity with other cities in the UK; and
- Develop a 2020 vision for Cardiff’s transport system which identifies the balance between different transport modes and delivers a smart city infrastructure by 2011.

1.4.4. **Sustainable Travel City – Future Strategy document** - In March 2009, the Welsh Government announced that Cardiff through a joint venture with Cardiff Council would be Wales’ first Sustainable Travel City. Cardiff’s vision is for an integrated transport system that offers safe, efficient and sustainable travel for all, and where public transport, walking and cycling provide real and desirable alternatives to car travel. To deliver the vision Cardiff Council’s key priorities are:

- **Widening Travel Choices** – ensuring that a range of real and alternative travel options are available for most trips and that people know about them;
- **Managing Demand** – introducing a range of measures to reduce the demand for travel overall and restrain the use of the car, where appropriate; and
- **Network Management** – using a range of measures to make best use of the existing network and improve facilities and accessibility for all modes of travel and, in particular, for alternatives to the car.

1.4.5. **Cardiff Strategic Cycle Network Plan (2011)** - The Plan defines a strategic network of core cycle routes (known as Enfys) and a 5 year programme for their delivery. The Plan is accompanied by a Cycle Design Guide based on good practice which sets out standards for the design and delivery of all cycling infrastructure including measures provided as part of highway schemes.

1.4.6. **Cardiff Health, Social Care and Well Being Operational Plan 2011 – 2014** – This three year plan describes the strategic vision and direction for the Council and the local health board and builds on progress already made to effect health improvements and reduce health inequalities. It aims to ensure that residents of Cardiff are able to enjoy a healthy, active and long life, with prompt access to appropriate health and social care services when needed. It states, under Core theme 3: Healthy Urban Design that “Cardiff will focus on
healthy urban planning, healthy transport and healthy urban design in order to create an environment that supports healthy lifestyles through:

- Healthy Urban Design;
- Strategic Planning; and
- Healthy Urban Planning.