

**East of Plymouth Development Infrastructure Study
Final Report
Part I**

Highways Agency
Plymouth City Council
Devon County Council

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1 Introduction



1 Introduction

1.1 Overview

Faber Maunsell has been commissioned by Plymouth City Council, Devon County Council and the Highways Agency to undertake the East of Plymouth Development Infrastructure Study.

The study area covers the two strategic access routes into eastern Plymouth, namely the A38 Expressway from Deep Lane Junction to the Manadon Interchange, including the A374 from the Marsh Mills junction into the city centre, and the A379 from Brixton.

The main aims of this study are to develop a strategy for the public transport and highway infrastructure requirements, which will enable sustainable development on the Eastern Corridor, and to provide a timetable of delivery for phased implementation of the strategy. The scope and coverage of the study area, and consequently the level of potential infrastructure investment, has determined the level of detail achieved at each stage. This work is therefore seen as a pre-feasibility study, providing an initial assessment of infrastructure needs.

1.2 Background Information

The Local Plan for Plymouth (1995 – 2011) has identified a number of development locations in and around the Eastern approaches of the City. The Devon Structure Plan (Policy TR17) has also highlighted improvements to the A379 / A374 - Plymouth, Laira Bridge corridor. These aspirations for development and improvement along and around the Eastern Approaches to Plymouth have been taken forward within the Local Development Framework (LDF) preferred options and Area Action Plans.

The developments to the East of Plymouth are very important to the growth and vitality of the City and the sub region as a whole. They also play a crucial role in realising the objectives of Policy SS3 of RPG10. Plymouth City Council is in support, in principle, of these developments and appreciates their impact on the City's transport network and the surrounding area. Thus, the highway authorities in the Plymouth sub region require an understanding of these impacts, which will inform the requirements for mitigation measures and provide greater confidence in the delivery of the Regional Spatial Strategy.

1.3 Objectives, Tasks, Methodology and Outputs

The study brief was provided to Faber Maunsell on 19 July 2006 and a proposed methodology developed to deliver the required outputs. The individual tasks, objectives and outputs are shown in the following tables.

Objective	Review previous study work and documents
Tasks	Review background literature
Methodology	The previous work already undertaken by the Movement Working Group and the background literature will be reviewed. We will aim to provide evidence which demonstrates that the aspirations for growth in homes and jobs can be delivered. The various other elements of this study will be used together with the previous work to provide the required information.
Outputs	
Document which provides a summary of the background literature (Section 2)	

Objective	Transport Implications of Growth and Proposed Developments
Tasks	<p>Identify proposed developments in the study area</p> <p>Determine person trip rates for the proposed developments</p> <p>Determine background traffic growth factors</p> <p>Update Plymouth ECS PARAMICS model to include all proposed developments</p>
Methodology	<p>The transport growth in transport for the area will be defined using background traffic growth forecasts and identifying development trip forecasts. This will require previous modelling work for the Plymouth ECS (PARAMICS Model) to be checked and updated where appropriate. This will enable solutions to mitigate against the implications of this transport growth to be outlined.</p>
Outputs	
Details of proposed developments in study area (Section 3)	
Background growth rates and person trip rates for proposed developments (Section 3)	
Revised forecast year Plymouth ECS PARAMICS model (Section 4)	

Objective	Highway and Public Transport Infrastructure Requirements
Tasks	<p>Identify the highway and public transport improvements</p> <p>Preliminary designs for highway infrastructure alterations</p> <p>Preliminary designs for public transport infrastructure alterations</p>
Methodology	<p>The highway and public transport infrastructure requirements for each proposed development along the Eastern Corridor will be identified. Detailed schematic diagrams will be produced for key junctions showing changes to layout and priority for specific transport modes.</p>
Outputs	
Assessment of the high quality public transport corridor within the study area (Section 5)	
Assessment of public transport corridor west of Laira Bridge (Section 5)	
Preliminary designs for proposed infrastructure (Section 5)	
Land use changes to accommodate required infrastructure (Section 5)	

Objective	Implementation of Infrastructure
Tasks	Identify phased programme to implement infrastructure Additional Plymouth ECS PARAMICS modelling Capacity assessments for key junctions in study area
Methodology	An outline programme will be developed which will define the phased implementation of infrastructure requirements relating to the emerging developments. The opening years and phased construction dates for the developments will be required to enable the impact of each development to be considered. The combined effect of the proposed developments will be used to determine the implementation years for the proposed highway and public transport infrastructure.
Outputs	
Outline phasing for the infrastructure requirements (Section 6)	
Capacity assessments for key junctions (Section 4)	
Cost estimates for highway and public transport infrastructure requirements (Section 5)	

Objective	Develop Long-term Strategy
Tasks	Identify long-term strategy and phasing for developments
Methodology	A long-term strategy will be described which could be used to facilitate the delivery of the emerging developments within the Local Development Framework. The emerging developments within the LDF will be identified where possible. The long-term strategy will look at the processes that would be required to identify highway and public transport infrastructure for these developments. It will not be possible to identify the highway and public transport infrastructure requirements associated with the emerging developments in the LDF.
Outputs	
Document describing a long-term strategy for the study area (Section 7)	

Objective	Advise Steering Group
Tasks	Advise steering group on progress being made throughout the study
Methodology	Meetings and consultations will be made with the steering group throughout the study period. This will ensure that the Steering Group is aware of the progress being made throughout the study.
Outputs	
Attend meetings with steering group as identified in programme	

1.4

Study Area

The study area is the same study as that specified in the Eastern Corridor Study (2005) indicated in Figure 1. The following major developments will be included within the study are:

- **Sherford New Community**; a mixed use development, south of the A38 at Deep Lane. Consisting of 4000 - 5500 dwellings by 2016 accommodating an estimated 10,000 people;
- **Plymstock Quarry**; to the north of Plymstock consisting of mixed use development, with 1650 residential units by 2016, primary school, 10,000 sq m GFA of retail including an 1800 sq food store, and employment covering 2.5ha; and
- **Langage**; a continued expansion of a strategic employment site to the north of A38 Deep lane Junction and immediately to the east of the city boundary.

1.5 Report Sections

Section 2 – Literature Review

The documents identified in the study brief have been reviewed, a summary of the review is provided in this section.

Section 3 – Proposed Developments and Traffic Growth

The proposed developments in the study area have been identified, person trip rates have been calculated for these developments and background traffic growth has been defined.

Section 4 – Transport Modelling

A PARAMICS micro-simulation traffic model, which was developed for the Plymouth Eastern Corridor Study, has been utilised for this study. This section provides a summary of the activities undertaken.

Section 5 – Highway and Public Transport Infrastructure

The required highway and public transport infrastructure for the proposed developments have been identified, designed and assessed.

Section 6 – Implementation of Infrastructure

The outline phasing for the implementation of the required infrastructure has been defined. This provides the link between developments, infrastructure, time scale and cost.

Section 7 – Summary and Conclusions

Key points identified during this study have been summarised, conclusions and recommendations have also been provided in this final section.

1.6 Clarification of Required Outputs

Required Output: *Provide a full understanding of the infrastructure required and it's associated delivery timetable with various phases of development to the east of Plymouth so that we can start to negotiate costs per development, provide a delivery timetable showing what is required at each phase of development, and the associated 'trigger points'. This information to provide the input to the next study which is the Programme entry major scheme submission for the East of Plymouth line as contained in the RFA;*

The required infrastructure is described in section 5 and preliminary designs have been provided in the scheme layout drawings.

Required Output: *An assessment of the public transport infrastructure requirements along the whole eastern corridor including west of Laira Bridge;*

An assessment of the public transport infrastructure requirements has been described in sections 5 (design) and 6 (modelling).

Required Output: *Assessment of the high quality public transport route within the study area;*

The HQPT within the study area has been described and assessed in sections 5 (design) and 6 (modelling).

Required Output: *To liaise with the consultants, acting on behalf of developers on the eastern corridor, so that a robust forecast of trips generated is provided to determine the level of infrastructure required. This should include a clear explanation and justification of the method used for any development trip generation forecast. This should be also be based on person trips rather than vehicular/car trips.*

Developers consultants have been contacted, details of the developments and the generation of trips have been included within section 3.

Required Output: *Appropriate recommendations and justification for the location of junctions and preliminary designs for all of the proposed infrastructure measures;*

Recommendations and justifications for the required designs are included in section 5 and 6.

Required Output: *Provisional broad based construction, commuted maintenance funds, land and major service diversion costs, including relevant High Quality Transport priority proposals;*

A summary of the cost calculations is shown in section 5, whilst the detailed cost calculations are shown in Appendix A.

Required Output: *An outline of the necessary phasing needed to accommodate the land use proposals.*

An outline of the phasing is shown in section 6, whilst details of the development phasing is shown in section 3. However, it is noted within section 6 that the nature of the modelling package has prevented a detailed assessment of trigger points at key junctions. Further work is recommended on this area, at selected junctions and links.

Required Output: *Identify any changes of land use required to accommodate transport infrastructure; The study need not provide any detailed patronage forecasts of the public transport infrastructure or cost benefit analysis of either public transport or highways schemes;*

Land use changes requirements are shown on the outline designs.

Required Output: *Identify/ quantify transport infrastructure requirements for all transport modes;*

Transport infrastructure requirements for all modes are shown in section 5.

Required Output: *Comment on any plans submitted by consultants for developments along the corridor*

Comments on plans submitted by developer consultants are included in sections 3 & 5.

Figure 1 - Study Area



2 Literature Review



2 Literature Review

2.1 Introduction

A key element of the study was to identify and build upon previous work undertaken within the study area. A significant amount of work and research has already been undertaken for the study area by transport consultants, local authorities and other organisations.

This section provides an overview of the previous work undertaken and the policy objectives for the area, together with the context from which to consider infrastructure options for the area. This review looks at a combination of regional and localised policy documents as well as studies which recommend how to overcome the problems identified. In many cases, the outcomes and recommendations from these studies are already incorporated within the existing policy.

This section is separated according to the type of document review:

- Regional Policy;
- Local Policy; and
- Local Transport Studies.

Each document is reviewed in turn and the key issues and constraints identified. The following documents have been consulted as part of the study:

- Regional Planning Guidance (RPG10 South West England)
- The Local Transport Plan (2) Plymouth City Council (2006);
- Transport Assessment for Plymstock Quarry (2006);
- Local Development Framework (North Plymstock Preferred Options Report (2005);
- Sherford Area Action Plan (AAP); Preferred Options Report, South Hams District Council (2005);
- North Plymstock (including Minerals) Area Action Plan (to be published late 2006);
- The Eastern Corridor Study, and supporting documents (Faber Maunsell (2005));
- The Eastern Gateway Study (Llewelyn Davis, 2004);
- Work undertaken by the Sherford movement working group;
- A38 Study (forthcoming 2006) Highways Agency

2.2 Regional Policy

The Regional Planning Guidance 10 is the adopted strategy for planning in the South West region. The Regional Spatial Strategy is currently being developed to replace this guidance, but is not yet officially adopted.

2.2.1 Regional Planning Guidance 10

The Regional Planning Guidance for the South West (RPG10) was published in September 2001. The RPG:

- sets out a broad development strategy for the period to 2016 and beyond; and
- provides the spatial framework for other strategies and programmes.

In relation to the east of Plymouth infrastructure, the RPG10 emphasises the importance of Plymouth as a significant area of economic growth. The city is identified as a Principal Urban Area (PUA) and because of its size and potential for sound economic growth, is large enough to act as the focus for future development. However this will place further pressures on the existing infrastructure, especially at key pinch points.

The RPG10 states that measures are needed to promote and support investment in the city and nearby towns and improve transport linkage, as is a clear programme to phase in new and expanding industries to reduce dependence on the Dockyard.

The report emphasises the need to accommodate as much of the city's growth needs as possible within the city through the development of brownfield land, conversions of existing buildings, the redevelopment of appropriate areas in a more efficient manner and development at significantly increased densities. The guidance states that where it is not possible to accommodate all development needs within the urban area, planned urban extensions should be developed adjacent to the existing urban area consisting of mixed developments in sustainable locations well served by public transport.

2.3 Local Policy Documents

This section reviews the local policy documents which are relevant to the development of the area. Development plans consider the wider economic, environmental and social development of a region. Transport plans can ensure that the appropriate transport infrastructure is planned, or already in place to cope with the increased travel demand generated by the developments proposed. This section will review local development and transport plans.

Plymouth's Local Development Framework will replace the existing Local Plan and is made up of a portfolio of local planning documents. These include Preferred Options Reports and Area Action Plans which must be published for each statutory LDF document. They set out the City Council's proposed policy directions, and highlight alternatives where possible. The Preferred Option Report for Plymstock Quarry and the Area Action Plan for the Sherford development will be reviewed in this section. The Transport Assessment prepared in support of the Plymstock Quarry development is also reviewed.

Plymouth's second Local Transport Plan contains a strategy that will deliver government targets and shared priorities. This will also be reviewed under the heading of local policy documents.

It is planned to provide at least 28,800 additional dwellings between 2001 and 2026, of which 18,532 will be within Plymouth's urban area. Areas for expansion could be accommodated within the city boundary, at North Plymstock, Sherford and at the 'Urban Fringe' at Newnham. These are considered to be the most sustainable locations, due to their proximity to existing transport networks and the vision to concentrate growth in and around Plymouth. Transport improvements will be an integral part of economic and population growth and that demand management measures may be required.

2.3.1 Proposed Developments

The key developments discussed in the Local Development Framework are:

- Sherford New Community;
- Plymstock Quarry Redevelopment; and
- Langage Business Park.

The compositions of these developments are described in the majority of the documents in this section. However rather than reiterate the same information, the form of the developments are described below:

Sherford New Community, consisting of mixed use development, south of the A38 at Deep Lane. Consisting of 4000-5500 dwellings by 2016 accommodating an estimated 10,000 people. In accordance with policy ST8 of the Devon Structure Plan it will be planned in such a way to allow for future development beyond 2026. The mixed use is being promoted to encourage internal trips. The Sherford development proposals promote a new bus-based Park and Ride site to serve the A38 close to the Deep Lane junction.

Plymstock Quarry, to the north of Plymstock consisting of mixed use development. The development could have 1650 residential units by 2016, a primary school of (315 pupils), 10,000 sq m GFA of retail including an 1800 sq m food store, and employment covering 2.5ha.

Access to the site is proposed to be from the A379 and also potentially from an eastern access link.

Langage Business Park, is located east of Plympton and north of the A38 Deep Lane junction. It has vehicular access on to Holland road to the north of the site and expansion of the site is proposed.

2.3.2 Plymstock Quarry Transport Assessment

The Plymstock Quarry Transport Assessment was developed in January 2006 by JUBB Consulting Engineers on behalf of the developer. The report advises on the development constraints associated with the re-development of the former Plymstock quarry.

Forecast Traffic

The TA outlines that there will be an additional 385 vehicles on the A379 in the AM Peak and an additional 380 at the Marsh Mills interchange. It is assumed that the outbound trips in the morning become inbound trips in the evening.

Public Transport

There is a comprehensive network of bus services linking Plymstock to most of the major employment, retail, leisure and public transport interchange destinations within the city. Eastbound services from the city centre also route through Plymstock to a number of South Ham's destinations.

Walking and Cycling

There are measures in place to ensure that the site is easily accessible for walking and cycling. This will include improved crossing facilities.

Modal Split

The journey to work trips and their modal split for Residents of Plymstock were obtained from the 2001 census, and are presented in Table 2.1.

Table 2.1: Mode split of Trips for TTW from Plymouth

Mode	%
Rail/Metro	0.13
Bus	11.24
Car Passenger	7.56
Motorcycle	2.87
Car Driver	65.24
Cycle	3.04
Pedestrian	9.18
Other	0.74

These figures are presented for information only, and may not completely reflect PSQ mode shares. Bus patronage is high, reflecting the number and frequency of services operating to, from and through the Plymstock area.

Destinations

The main movements that take place are within Plymstock, Radford and into St Peter and the Waterfront, which is the location of the central business district and major economic activity. Over 45% of Plymstock residents work within these wards.

2.3.3 North Plymstock Area Action Plan

The North Plymstock Area Action Plan was written by Plymouth City Council in 2006. This Area Action Plan forms part of a portfolio of documents called the Local Development Framework. The Core Strategy sets out the key high level principles for development and transport in Plymouth, and these are expanded in the Area Action Plans to provide more specific detail on the opportunities within key areas.

This Area Action Plan has been developed alongside South Hams District Council's Sherford Area Action Plan, because of the cross border nature of Sherford and its relationship to Plymouth.

The eastern corridor of Plymouth, between Plymstock and Plympton, is an area that will undergo significant change in the coming years. The change is driven by the need to plan for development that responds to Plymouth's changing population characteristics and housing needs. The location of development relates to the significant brownfield redevelopment opportunities at Plymstock Quarry, following the closure of the Blue Circle cement works. There is a major opportunity in this area to create a sustainable mixed-use neighbourhood.

The North Plymstock Area Action Plan sets out the vision for the area and sets out the different objectives, policies and plans for the area. This review will discuss the objectives which relate to the development of the area.

The Vision

To create high quality, locally distinctive and sustainable mixed-use neighbourhoods in North Plymstock. The significant development focus in this area will provide major new sustainable infrastructure, particularly a High Quality Public Transport (HQPT) system and facilities to support a high quality of life. Other development opportunities in the area will be coordinated to create successful relationships between different uses. Mineral reserves in the area will be safeguarded to meet current and future needs. The character of the area will be strongly influenced by significant new recreational opportunities in the form of a countryside park, green space links and sports facilities. The relevant objectives have been summarised below:

Objective 1.

Create a high quality sustainable new neighbourhood at Plymstock Quarry.

This will be a mixed use, but mainly residential neighbourhood. It will be an exemplar of sustainable urban design and reinforce local distinctiveness. It will be designed to meet the daily needs of residents locally and provide a good quality of life. These will include:

- A new local centre containing local shops, commercial services and leisure facilities;
- A public transport interchange on the High Quality Public Transport network;
- A network of well designed streets, spaces, walking and cycle routes between homes schools, local centres and other facilities, which are safe, pleasant and convenient to use;
- New public facilities, such as a school, indoor and outdoor sports facilities, community facilities and health services to meet local needs;
- New employment opportunities;
- Safe places for young children to play;
- Space and facilities for older children and teenagers to gather, socialise and exercise;
- A range of housing accommodation to meet the needs of all sections of the community;
- An urban form that is easy to understand and memorable;
- A built form that provides diversity and can accommodate future adaptation;
- Streets and urban spaces with a clear definition between public and private space and good natural surveillance; and
- Access to high quality natural green space.

Objective 2

Contribute to creating a neighbourhood at Sherford that integrates effectively with the wider Plymouth urban area.

This will be a mixed use, but mainly residential neighbourhood, integrating seamlessly with the rest of the Sherford settlement. It will be an exemplar of sustainable urban design and reinforce local distinctiveness. In order to create an inclusive sustainable local economy, it will be designed to meet the daily needs of residents locally and provide a good quality of life. These will include:

- A high quality public transport interchange on the edge of Elburton that is accessible to everyone;
- A new high quality public transport and highway link serving Sherford and providing a link to the A379 and A38;

- A network of well designed streets, spaces, walking and cycle routes between homes, schools, local centres and other facilities, that are joined to the wider network within Plymstock and are safe, pleasant and convenient to use;
- The development of a sustainable travel strategy, in line with the rest of the Sherford neighbourhood development, including travel planning for residents, businesses and schools;
- A sports hub for the east of Plymouth, with indoor and outdoor facilities, including a new swimming pool to meet local needs. This will incorporate and compensate for any impacts on King George V playing fields;
- New employment opportunities;
- Safe places for young children to play;
- Space and facilities for older children and teenagers to gather, socialise and exercise;
- A range of housing accommodation to meet the needs of all sections of the community;
- An urban form that is easy to understand and memorable;
- A built form that provides diversity and can accommodate future adaptation; and
- Streets and urban spaces with a clear definition between public and private space and good natural surveillance.

This new neighbourhood will also be complemented by potential additional growth post 2016 to the north of Elburton.

Objective 3

Create an integrated sustainable transport network including a High Quality Public Transport (HQPT) system serving new urban areas in the eastern corridor and the A38 Park and Ride, and improve existing services in Plymstock.

The development of a sustainable transport network will include all modes of transport and therefore a range of works, to reduce reliance on the motor vehicle. It will provide attractive viable alternative modes of transport, in the creation of sustainable linked communities. A sustainable transport network will include cycling and walking measures, a HQPT system serving the eastern corridor and local transport and highway improvements.

Objective 5

Provide a new high quality 'eastern gateway' into the city, with a strong sense of place and local distinctiveness particularly on key road & water frontages.

The design of new development and the countryside park will create a high quality approach and introduction to the city from the east, particularly where it is visible from key routes (A379, A38, A374) and in waterfront locations. Key views should be protected and enhanced.

2.3.4

Sherford Area Action Plan

The Sherford Area Action Plan was published in June 2006 and establishes the planning framework for the proposed Sherford development. The report focuses on the design and implementation of the Sherford new community, providing an important mechanism for ensuring development of an appropriate scale, mix and quality.

The Sherford new community proposal is located four miles by road from the centre of Plymouth and is in close proximity to the major strategic employment site at Langage, the latter includes 25 hectares of proposed employment land in the adopted South Hams Local Plan with a further extension of 17 hectares under consideration. The Sherford new community site is bounded by the A38 to the north and Elburton and Plymstock to the south.

Sherford is being planned and designed at a time when the world community is increasingly concerned with climate change. In this respect a key consideration is how to reduce carbon emissions. The design must therefore meet the following objectives:

- Minimise the need to travel by car;
- Maximise opportunities for alternatives: foot, bicycle and public transport; and
- Minimise the overall need for travel by maximising community self sufficiency and accessibility to daily needs.

The sustainability of Sherford will be supported by a range of measures including:

- High Quality Public Transport (HQPT);
- Travel plans;
- Personalised travel plans; and
- Travel and parking strategies within Plymouth as well as Sherford.

Local Roads, particularly those linking Plympton St Maurice, Elburton and Brixton, will require sensitive traffic management treatment to ensure a minimal impact from changes in travel patterns and volumes, with the possibility of providing walking, cycling and public transport only connections where appropriate. Dealing effectively with transport movements within the site and to off site destinations is thus a key issue. Infrastructure needed within and to and from Sherford are likely to include:

- At a strategic level, appropriate road connections to the A38 and A379 are required from the outset of development, to achieve the provision of a HQPT linking through Sherford to destinations in Plymouth and Langan.
- An integral part of the HQPT network will be a Park and Ride and public transport interchange at the Deep Lane junction. This will provide the opportunity for transport users on the existing network to change mode and make use of the new public transport links. It will also remove pressure of trips on the A38 and other road networks by switching to public transport.
- The environment for pedestrians and cyclists will be enhanced throughout the development. The existing public rights of way network linking to and through the development will be maintained, enhanced and supplemented and measures will be implemented to maximise off site permeability to the wider footpath, cycle and bridleway network neighbouring the site.

As a mixed use development, Sherford will generate enhanced connectivity between residential and non residential development and this will lead to much higher levels of internalisation of trips than in most recent developments. There will still be significant vehicular trips that will travel externally to the wider network and into the surrounding communities, including Sherford Road and Haye Road (Elburton), Red Lion Hill (Brixton) and Plympton Hill (Plympton St Maurice).

However, careful design of the network hierarchy and appropriate mitigation measures will be utilised to minimise the impact on these communities. Improvements to the Deep Lane and Stanborough Cross junctions will enhance the strategic network and minimise the impact on the local road network.

2.3.5 Plymouth Local Transport Strategy 2

Plymouth's second LTP was published in March 2006 by Plymouth City Council. The challenge of the Local Transport Plan is to devise a strategy that will deliver government targets and shared priorities, incorporate the visionary growth for the city and support planned development

The movement of business to out of town locations, where access is easier by car, has resulted in a decline in city centre economic prosperity. Improved accessibility to central locations, particularly when aligned with the proposed developments, is the key to the regeneration of the city.

Mixed use development sites are preferred since they provide the opportunity for people to live and work in the same area, potentially reducing the need to travel as exemplified by the master planning process being used for Millbay, Plymstock Quarry and Sherford new community. However not all growth can be met within the city and some will be met through urban extensions and a new settlement. Transport will play a key part in facilitating and managing this growth. The LTP strategy aims to:

- Improve access;
- Widen choice; and
- Manage demand.

Plymouth City Council and Devon County Council are working together on cross boundary transport issues such as the eastern corridor. A joint statement published by the councils

emphasises the importance of appropriate cross boundary transport infrastructure to link the Sherford new community and the city, to ensure that travel demand can be accommodated in a sustainable manner. A summary of the strategy elements related to the proposed developments is presented in Table 2.2 (Sub regional transport strategy). The following strategic objectives are being pursued through the LTP2:

- High quality unimpeded public transport between the new community, the strategic employment site at Langage and major centres within Plymouth, such as the City Centre and Derriford at a 10 minute headway;
- High containment of trips by quality local facilities and walkable home zone style neighbourhoods including appropriate controls on parking at local centres;
- Strategic Park and Ride/interchanges, both at Deep Lane junction with A38 and a smaller site on the A379; (this latter site was not supported by the ECS report);
- Major improvement to A38 Deep Lane junction;
- Enhancement of local public transport facilities;
- Unimpeded access onto the A379 from the new community for public transport;
- Links to national cycle network and public rights of way network;
- Sustainable travel measures, including School and Employer Travel Plans, personalised travel planning and a Community Travel Coordinator;
- Appropriate traffic management measures to avoid unwanted traffic in the surrounding villages and communities; and
- Appropriate car parking management and control in Plymouth city centre to encourage maximum transfer to public transport for movement to and from city from periphery.

These objectives have been considered throughout the design and analysis processes, leading to the study recommendations.

Table 2.2

Sub regional transport strategy			
Timescale	Strategy Element	Description	Comments
Within 5 years/Short	Develop a High Quality Public Transport Network	Line 1: Linking multi modal interchanges at the Sherford new community and the city centre.	It is important that Line 1 of the HQPT is provided before the first occupancy of the new community as this will give the service the best opportunity for success and provide the new residents and commuters to the area a realistic travel choice.
		Line 2: Linking Sherford multi modal interchanges through Langage to Coypool Park and Ride site and onwards to employment sites north of the city.	
Short Term	Provide multi modal interchanges within the new Sherford community	Provide two multi modal interchanges within the new Sherford community	<p>Both interchanges will be served by the HQPT, and must be easily and safely accessible by bicycle, motorcycle and car.</p> <p>The northern interchange must be easily accessible by road from the Deep Lane junction of the A38 and the southern interchange from a junction at an appropriate location on the A379. A P&R site was not considered feasible or justifiable on forecast traffic flows.</p> <p>The provision of parking facilities at the interchanges will also improve access to the city for parts of the population who live in rural, or more distant areas.</p>
Short Term	Integrate feeder/shuttle bus services with HQPT routes	Prior to the introduction of the HQPT, negotiate changes to local bus services that will maximise their integration allowing bus services to feed to or from the HQPT.	Ensure that shuttle services to and from Plympton and Plymstock are integrated with HQPT lines 1 and 2.
Short Term	Implement pedestrian and cycle schemes linked to multi modal interchanges at Sherford	<p>Provide safe pedestrian and cycle links to the multi modal interchanges from local settlements prior to the HQPT</p> <p>Provide safe pedestrian and cycle links to multi modal interchange from within the new community as construction is completed.</p>	Links to national pedestrian and cycle networks will help to encourage sustainable tourism.
Short term	Support the use of national coach services for inter urban travel	Make provision for national coach services to pick up and set down at Sherford new community northern MMI.	The provision is currently not publicised. If it were it could increase the attractiveness of travel by coach.

2.4 Local Transport Studies

The remaining document reviews are related to studies which have been undertaken to assess the impact of developments on the existing infrastructure and what measures should be considered to alleviate that impact.

2.4.1 A38 Study

The A38 Plymouth Corridor Study was published in July 2006, by Parsons Brinckerhoff on behalf of the Highways Agency. The aim of the study is to provide the HA with sufficient information to develop a strategy for improvements along the section of A38 from Voss Farm junction to Carkeel Roundabout for accommodating future planned development in Plymouth and the surrounding area.

This will enable the HA to respond to planning applications to identify the most sustainable locations for developments and to work together with the relevant authorities and developers to deliver the development.

The purpose of the study is to inform the HA on the current operation and future operation of the A38 through Plymouth, focussing on journey time reliability and highlighting any operational or development issues.

Table 2.3: Traffic Impact of Major Developments

Site	Inbound	Outbound
Plymstock Quarry	911	1,018
Sherford New Community	2,328	2,775
Langage	670	84
Derriford	3,109	488
Southway	53	179
Plymouth Airport	34	113
Forder Valley	49	165

Of the proposed developments the Sherford New Community is the primary traffic generator producing in excess of 5,100 two way trips in the AM peak (Table 2.3).

The volume of traffic in 2005, along this section of the A38 trunk road, is at its highest to the east of the study area indicating approx 4,500 vehicles (2way) during the AM peak period at Deep Lane. The volume of flow then decreases as it approaches the Manadon roundabout to approx 3,200 vehicles, and further again to 3,100 (2way) at Tamar bridge.

The 2016 forecast shows a similar pattern to that indicated in 2005, where the volume of traffic decreases as it approaches the western part of the study area. At Deep Lane the 2016 flow is approx 6,000 (2way), 4,000 (2way) at Manadon Roundabout and 3,500 vehicles at Tamar bridge. The impact of additional vehicle trips upon the operation of Deep Lane and Marsh Mills junctions are outlined below.

Deep Lane Junction

This junction represents a major link to the Sherford New Community, Langage Business Park and Langage Plus (increased development of the business park). Key issues for consideration include:

- Provision must be made for bus routes, cyclists and pedestrians
- Concerns were expressed that the trip rates specified by Sherford developers could not be accommodated for by the existing infrastructure hence a system of metered access control could be required; and
- Junction improvements should take into consideration the possible closure of Voss Farm junction.

Options include:

- grade separated roundabout;
- interim solution – signalisation;
- displaced crossover intersection;
- parallel bridges; and

- combined design incorporating Voss Farm Bridge.

Of the designs tested, none are capable of coping with the future traffic flows without extensive increases to a number of lanes on both entries and exits. The forecasted flows obtained from predicted growth at both Langage Business Park and the new Sherford Community are more than the local road network can manage. It is therefore important to ensure these developments restrict the amount of traffic growth through the creation of robust travel plans and the use of HQPT. Nevertheless, improvements will need to be made to the junction to make provision for the HQPT routes, to improve safety and to make the best attempt at increasing the capacity of the junction.

Marsh Mills Roundabout

Marsh Mills is the busiest junction along the study route, with a limited footprint for expansion, and as such will require careful demand management. The use of Intelligent Transport Systems will give the HA greater control of traffic on the A38 trunk road.

Recommendations

The study of the A38 Plymouth corridor has identified various elements of an integrated package, which will facilitate development in the Plymouth region without having a detrimental impact on the operation of the A38 trunk road network. It is essential that the following strategy is delivered alongside demand management measures to ensure the safe and efficient operation of the trunk road network:

- support Plymouth with their demand management policies from their LTP2;
- work in partnership with the key employment locations and Plymouth City Council on developing and implementing a robust travel plan to manage the impact of these key employment sites on the operation of the trunk road;
- utilise VMS to pre-warn drivers of any delays on the trunk road junctions through Plymouth to allow drivers to reroute and avoid any unnecessary delay;
- consider the use of HOV lanes;
- consider the use of access control for traffic coming out of the key developments such as Sherford and Langage;
- direct refusal on planning applications which do not contain robust travel plans and parking strategies; and
- combined parking management policy for Plymouth areas for both existing and new employment sites, irrespective of local authority boundaries.

It is anticipated that neither Sherford nor the Langage extension could come forward in their entirety without major improvements to the A38 Deep Lane junction.

2.4.2

Plymouth Eastern Gateway Vision

The Plymouth Eastern Gateway Vision report was written in March 2004 by Llewelyn Davies for Plymouth City Council. The eastern gateway area is a focus for one of the major regeneration initiatives in the city. The study is one of the series of measures aimed at improving the east end.

The overriding aim of the study was to identify and evaluate solutions to the transport, development and environmental issues within the study area. It primarily focused on the physical infrastructure measures that could be implemented in the eastern part of the City.

There are currently significant transport problems in the area that if left unattended or inappropriately tackled, are likely to become extreme as traffic flows increase. The study shows that only a high interventionist approach can deal with the transport problem which is not only local but has city wide implications.

The Plymouth Eastern Gateway Vision report focuses on travel into the city centre from the east. The eastern approach to the city is characterised by two main busy roads, the A374 and A379. These roads act as a barrier between communities and peak hour congestion contributes to the poor quality environment, which in turn has deterred significant levels of investment in the area.

The study established that there is no value in options which involved through traffic continuing to be routed along its current routes through the east end communities. Therefore, of the do minimum, intermediate and do maximum options, only the do maximum was recommended to be pursued, as this option alone meets the multiple long term requirements of the area.

The transport philosophy that underpins the Do maximum solution is one geared towards public transport. The preferred option has two major elements:

- Building a new urban avenue from Embankment Road to the east of the city centre;
- This route is extended across the river Plym on a new bridge providing direct routes from Plymstock to the city centre via Embankment Road to the A38 junction at Marsh Mills.

The infrastructure proposed is aimed primarily to assist in putting in place a more sustainable approach to the city and relieving the existing impacts on local communities.

2.4.3

Plymouth Eastern Corridor Study

The Plymouth Eastern Corridor Study was published by Faber Maunsell on behalf of Plymouth City Council in March 2006. The study involved an assessment of the travel needs and transport options to serve the eastern corridor into Plymouth.

The study considered the Sherford New Community and Redevelopment of Plymstock Quarry.

There are many indications in the study that the proposed developments will exacerbate an already congested area of Plymouth. The Plymouth area is considered poorly integrated in terms of public transport, thereby discouraging use for selected trips and there are capacity constraints, for example river crossings and the A386 corridor running north/south through the city.

The traffic flow on Embankment Road south of Marsh Mills is assumed to increase by 24% (2016) and the flow entering the network across Laira Bridge is assumed to increase by 37% (2016). There are low car ownership levels giving a potential for an increase.

Table 2.4: Trip Distribution, from/to Sherford and Plymouth

City Centre (centre, Plymouth Station, Mount Gould)	28%
Millbay/Barbican	10%
Prince rock/St Judes	5%
Derriford	8%
A38 E	12%
A38 W	5%
A379	5%
Langage business park	9%
Plymstock West	8%
Plymstock East	5%
Plympton East	3%
Plympton West	3%

From/To Plymstock Quarry 10% trips originate from Sherford and 5% of outbound trips go to Sherford.

The recommendation package from the study centres on a Bus Rapid Transit service from the Deep Lane junction to the city centre, via the Sherford new community and Plymstock quarry, the A379 carriageway at The Ride, and Laira Bridge.

Recommendations for infrastructure improvements include:

- P&R site at Deep Lane (1,000 spaces)
- Bus priority measures on A379 (bus lanes and junction enhancements)
- Enhanced facilities for pedestrians and cyclists

Conclusion

The documents that have been reviewed in this section highlight the strategic importance of the proposed developments, in a regional as well as a local context. It is evident that infrastructural and demand management measures will be necessary to manage the increased demand of the network. There are key messages that are common throughout the policy documents. The predominant message is of sustainability and reducing the need to travel. The proposed developments have been planned so that residents can live and work in the same area. The importance of cross boundary working has been stressed throughout the documents.