

4 Option Assessment



4 Option Assessment

4.1 Overview

This section presents the outputs of the Stage One assessment of a range of public transport options, leading to the identification of the recommended package to be taken forward. A key stage in the development of a robust corridor based model, and its application to assess public transport investment options, is the clear definition of a do-minimum base model. It is not considered appropriate in this corridor study to generate a do-nothing scenario, as the new developments will fundamentally change the characteristics of the area. There are a number of important decisions and assumptions to be made in developing the do-minimum base model, and the assessment of individual options.

4.2 Do-Minimum Option Definition

4.2.1 Future Travel Demand

The forecast year to be used in assessing public transport options will be 2016. The following sections provide a summary of the main assumptions and data used within the do-minimum assessment.

General Traffic Growth

The 2016 forecast year needs to include the growth in traffic between 2005 and 2016 that will occur irrespective of the proposed new developments in the corridor. This has been assumed to be the NRTF low growth scenario and applied to the trip matrices within the Paramics model.

Development Assumptions

The proposed developments within the eastern corridor are also important, as is their size, formation and phasing. All available information has been used to generate the figures summarised below. The following developments will be included within the Do-Minimum scenario:

Sherford New Community (SNC): consisting of:

- 4000 residential units by 2016;
- 0.4 external trip rate prior to mode split effects, in line with previous estimates (1600 trips in the AM peak hour); and
- Trip distribution, derived from census journey to work data, as outlined in Table 4.1.

Table 4.1: Distribution from and to Sherford and Plymstock Quarry

Location	%
City Centre	15%
Plymouth Station	10%
Mount Gould	3%
Millbay/Barbican	10%
Prince Rock/St Judes	5%
Derriford	8%
A38 (W)	5%
A379	5%
A38 (E)	12%
Langage Business Park	9%
Plymstock West	8%
Plymstock East	5%
Plympton East	3%
Plympton West	3%

Note: city centre is split into three sectors: City Centre, Mount Gould, and Plymouth Station

Plymstock Quarry

- 1500 residential units;
- From Plymstock Quarry Draft TA (2005), 900 trips are outbound and 950 trips are inbound to the site in the AM peak hour;
- 10% of inbound trips originate from Sherford New Community; and
- 5% of outbound trips go to Sherford New Community.

Overall trip matrix totals AM peak

The development of the do-minimum model scenario for 2016 has been reviewed through consideration of key matrices and distributions. These are outlined in Table 4.2.

Table 4.2: Overall trips matrix in do-minimum for AM peak

	3 hour period	08:00 – 09:00	Cumulative Increase on base year
Base Year 2003	90806	44193	-
Base Year plus background growth	114880	55909	+26.5%
Sherford development (external trips to development only)	3616	1760	+30.5%
Plymstock Quarry	3801	1850	+34.7%

4.2.2

Assumed Do-minimum Highway Network Changes

The following sections provide a summary of the key highway network changes that are assumed to be in place by 2016. These assumptions are based on the best available information at the time of writing.

Sherford

Associated with the Sherford development proposals the following network changes have been assumed for the base network:

- New road constructed between Deep Lane junction, A38 and Haye Road, with speeds restricted to 20mph;
- New signalised junction Haye Road / A379 to give development access to A379;
- Existing alternative roads in Sherford area (e.g. Vinery Lane) restricted to 20mph in line with Sherford development proposals;
- Access from Sherford development onto A379 at Elburton only permitted via Haye Road junction; and
- Provision made for access to Deep Lane P&R site from A38 and Plympton.

Plymstock Quarry

Associated with the Plymstock Quarry development proposals we have assumed that the following network changes will be made to the base network:

- Pomphlett Roundabout signalised;
- Two new signalised junctions on A379 providing access to Plymstock Quarry development; and
- Eastern access/egress from development onto Colesdown Hill for movements north only to/from the development.

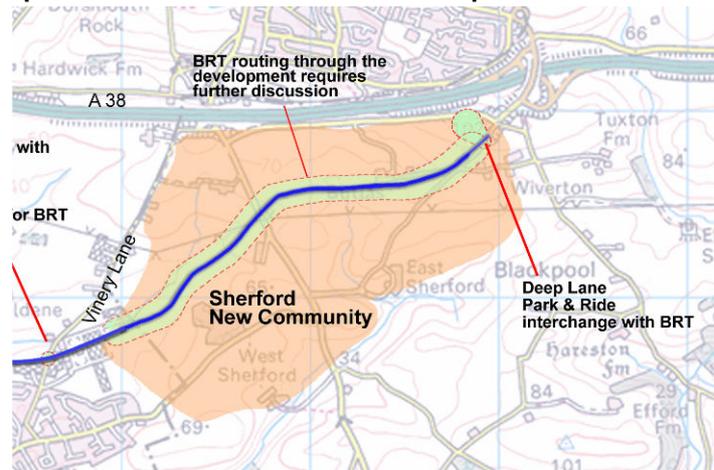
4.2.3

Assumed Do-minimum Public Transport Enhancements

Also included in the do-minimum will be a range of improvements to public transport services, considered necessary to the operation of the network in 2016, but excluding any major investment options. The assessment of these wider options represents the main element of work within the Eastern Corridor Study. However, a base service level can be determined for 2016, which is low cost and would provide service coverage to the new development sites.

Park and Ride at Deep Lane serving A38

A Park and Ride facility has been proposed as part of the Sherford development, adjacent to the A38 at its junction with Deep Lane (Figure 4.1), as is considered by the developer to be a key factor in the ability of the eastern corridor to accommodate future traffic movements. The intended role of the Deep Lane Park and Ride is to abstract trips from the A38 westbound, creating spare capacity which can be utilised by Sherford development trips, thus reducing the highway impact of the development. The site is not defined for use by residents of Sherford and no capacity has been pre-defined; the modelling exercise will determine the appropriate capacity, with no constraints introduced in the do-minimum.

Figure 4.1: Example of Park and ride location at Deep Lane

A major consideration for this P&R facility is the routing of the services from the P&R site to the city centre, and whether it would be more practical to utilise the A38 and Embankment Road rather than on-carriageway measures through the Sherford New Community.

Given the assumption that speeds through the Sherford development will be restricted to 20mph for private vehicles and public transport, it has been assumed in the do-minimum that the Deep Lane P&R service would utilise the A38 and Embankment route to access the city centre.

Additional Bus Services

Given that the Deep Lane P&R service is being routed via the A38, it has been assumed that an additional bus service will be required to specifically serve the Sherford development for trips to the city centre. This has been routed through the development at 20mph, starting at the Deep Lane Interchange then stopping at the north Sherford primary school, Sherford Central, and the south Sherford secondary school. The service is then assumed to access the A379, via the Haye Road main access junction, and continue on to the city centre, additionally stopping on the A379 adjacent to the Plymstock Quarry development. It has been assumed that the service has a 20 second dwell time at each stop. Further enhancements assumed are:

- Plympton - Derriford bus service extended to incorporate the Sherford development; and
- Plymstock – Plympton – City Centre bus service routed through the Sherford development with half hourly frequency.

Car Parking

The existing car parking charges within the centre of Plymouth are on average £3.80 per day based on a £80 monthly permit, while the cost of a return trip from the Coypool Park and Ride is £1.90. Furthermore, a return bus journey from the eastern corridor to the city centre costs £2.50 based on a seven day Plymouth pass (£12.50). In the do-minimum scenario, with the Deep Lane Park and Ride in place, the following charges and costs have been assumed in the mode choice model:

- Park and Ride charges at Deep Lane: £3.00 return;
- Car parking charges in central Plymouth: £4.75; and
- Bus fare return to city centre: £2.50.

4.3

Public Transport Options

This section provides a summary of the options considered within the Stage One work, leading into the identification of the recommended package. Table 4.3 provides a summary of the public transport options tested.

Table 4.3: Summary of Public Transport Options Tested

Option Description	Conventional bus service	Segregated service	Conventional vehicle type	BRT vehicle type	Services per hour	Stops	On -Road Priority	Route	Running Speed (mph)				Journey time (min) (Deep Lane to city centre)		
									Speed Limit	Mean Vehicle Running Speed	Speed Limit	Mean Vehicle Running Speed			
Conventional bus	✓		✓		6	P&R Sherford N Sherford Mid Sherford S Plymstock Quarry S	On -Road Priority	Route	Deep Lane to Haye Road	Haye Road to The Ride	Deep Lane to Sherford North stop	Sherford North stop to Sherford Mid stop	Sherford North stop to Sherford South stop	Sherford South stop to Plymstock Quarry	22.2
Segregated Bus route A379 Corridor (option A)		✓	✓		12	P&R Sherford N Sherford Mid Sherford S Plymstock Quarry S	Bus priority through Sherford development. Bus lanes along A379 to Embankment Road Buses re-join main traffic flow prior to junctions	On road from P&R to southern Sherford exit A379 to city centre	20	50	21	10	10	35	18.7
Segregated Bus route A379 Corridor (option B)		✓	✓		12	P&R Sherford N Sherford Mid Sherford S Plymstock Quarry S	Bus lane across Laira Bridge until Embankment Road Assumed priority on-road through Sherford	On road from P&R to southern Sherford exit Southern segregated route from exit of Sherford to the Ride	50	50	22	12	12	50	16.9
Segregated Bus Route Northern Route		✓	✓		12	P&R Sherford N Sherford Mid Plymstock Quarry N	Bus lane across Laira Bridge until Embankment Road Assumed priority on-road through Sherford	On road from P&R to mid Sherford segregated route to the Ride via north of Plymstock Quarry	20	50	-	-	-	-	17.6
Bus Rapid Transit (BRT)		✓		✓	12	P&R Sherford N Sherford Mid Sherford S Plymstock Quarry S	Bus lane across Laira Bridge until Embankment Road	Segregated route from P&R through Sherford to the Ride via southern route	50	50	29	17	17	50	14.8

4.3.1

Assessment Outputs

The key outputs of the option assessment are presented in Table 4.4, for the AM peak. The results show that demand for a potential Park and Ride site at Deep Lane increases through the options, resulting in a maximum peak hour demand of approximately 320 vehicles. This would be served by 12 Bus Rapid Transit vehicles, using the segregated southern route. The northern route, following a path from Sherford Central to the north of Plymstock Quarry, also generates a Park and Ride demand in excess of 250 in the AM peak hour, representing trips abstracted from the A38. However, with reference to the present Sherford Masterplan, any northern route would only stop twice within the Sherford development, at the north Sherford primary school, Sherford centre, and subsequently at Plymstock Quarry. As a consequence, the overall demand for public transport services would be lower than the southern segregated routes, and would result in a revenue deficit.

The northern route bus journey time would also be slightly longer than the southern routes, which will discourage some drivers and passengers from using the services. With regard to journey times from Deep Lane into the city centre, there would be a step change in public transport services following the introduction of BRT. This would, in part, be a consequence of the enhanced off-bus ticketing arrangements and better vehicle specification.

The journey times from Sherford Central to the city centre demonstrate the benefits of operating a fully segregated route, at a higher operating speed. The bus services would experience journey times lower than private cars, a consequence of the priority afforded by a segregated route, and the traffic flows on the main highway routes. The northern bus route is again slightly different, as the lower forecast patronage would result in higher traffic flows and therefore longer car journey times. The BRT option would provide in excess of 6 minutes time savings for public transport services compared to the 2016 do-minimum, comparative car savings would be 0.6 minutes. A lower potential time saving is forecast for bus trips from Plymstock Quarry to the city centre, estimated as 1.6 minutes between the do-minimum and the BRT.

The public transport mode split for trips between Sherford Central and the city centre range from 35% in the do-minimum, to a peak of 48% in the northern segregated route. The modal split for all segregated routes is encapsulated between 45% and 50%. The modal split for bus between Plymstock Quarry and the city centre ranges between 36% (do-minimum) and 49% (northern route).

Table 4.5 provides a summary of the forecast costs. It is important to note that these are estimated costs, and further detailed site visits and engineering inspections are required before precise costs are determined. This would be undertaken within any major scheme submission. Some of the improvements identified have been included in the do-minimum scenario in the sensitivity test within the economic assessment, as these costs have been assumed to be met through developer funding. The greater costs associated with the southern segregated route, in comparison to the northern route, is a consequence of the land quality and works that would be required. All costs have an additional 44% Optimism Bias in line with DfT guidance for studies where quantified risk assessment has yet to be undertaken.

Taking all issues into account, a recommended package of the fully southern segregated route, with some additional bus priority along the A379 is recommended. This would make an operating revenue surplus of approximately £82,000 per annum, and would require a capital investment of approximately £24,700,000. This option is outlined in more detail in Section 5.

Table 4.4: Summary of public transport options

	Do-minimum	Conventional Bus	Segregated South Option A	Segregated South Option B	Segregated North	BRT
Deep Lane P&R to city centre	Demand	63	215	253	269	320
	Mode split	6%	11%	12%	14%	17%
	PT journey time	16.8 (A38) 22.2 (A379)	18.7	16.9	17.6	14.8
	Car journey time	19.5	17.2	16.7	18.3	18.1
Sherford to city centre	Demand	280	339	357	329	362
	Mode split	39%	45%	47%	48%	47%
	PT journey time	18.4	15	13.7	13.8	12.5
	Car journey time	22.7	19.8	19.7	20.7	19
Plymstock Quarry to city centre	Demand	92	107	106	107	108
	Mode split	43%	49%	47%	49%	48%
	PT journey time	10.1	9.6	9.7	10.2	8.9
	Car journey time	18.5	17.8	16.9	18.8	16.3
Operating Cost	£353,000	£661,000	£1,194,000	£1,140,000	£1,382,000	£1,344,000
Revenue	£613,000	£748,000	£1,176,000	£1,282,000	£1,268,000	£1,426,000
Revenue Surplus	-£260,000	£87,000	-£18,000	£142,000	-£114,000	£82,000

Table 4.5: Summary of capital costs

	Do-minimum	Conventional Bus	Segregated South Option A	Segregated South Option B	Segregated North	BRT
Deep Lane P&R		£1,500,000	£1,500,000	£1,500,000	£1,500,000	£1,500,000
Nearside bus lane A379		£700,000	£700,000	£700,000	£700,000	£700,000
5 signalised junctions A379		£1,000,000	£1,000,000	£1,000,000	£1,000,000	£1,000,000
Lanes within Sherford		£5,800,000				
Elburton – Laira Bridge route			£11,500,000	£9,000,000		£9,000,000
Sherford Route			£5,800,000	£8,700,000		£8,700,000
Northern route					£17,300,000	
Bus priority Laira Bridge Road, Embankment Road, Exeter Street		£1,900,000	£1,900,000	£1,900,000	£1,900,000	£1,900,000
Laira Bridge Widening & Strengthening		£700,000	£700,000	£700,000	£700,000	£700,000
Works on Old Railway Bridge		£700,000	£700,000	£700,000	£700,000	£700,000
Total		£12,900,000	£24,400,000	£24,700,000	£24,400,000	£24,700,000

Note:

Costs in table include 44% Optimism Bias in line with DfT guidance for studies where quantified risk assessment has yet to be undertaken. An additional Preparation cost equal to 12% of the construction cost has been included in economic assessment.