

# **Bus Based Park & Ride**

## **- A Pilot Scheme**

**A Report to:**

**Dublin Transportation  
Office**

**October 2002**



**THE TAS PARTNERSHIP LIMITED**

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**SPECIALIST CONSULTANTS IN PUBLIC TRANSPORT**



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# 1

## Introduction and Methodology

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### 1.1 STUDY BRIEF

1.1.1 The TAS Partnership were commissioned by the Dublin Transportation Office (DTO) to undertake an assessment of the potential for bus based Park and Ride (P & R) sites within the Greater Dublin Area.

1.1.2 The principal objectives of the research were to:

- Provide guidance on the appropriateness of including bus based P & R measures as an element of an overall P & R strategy for the Greater Dublin area.
- Prepare the transport planning and economic case for a pilot bus-based P & R facility serving the Greater Dublin area, and
- Advise on the appropriate monitoring that should be carried out, should the pilot project be implemented, to assess its success or otherwise.

1.1.3 In particular, we were asked to:

- Advise on the effectiveness in transport planning terms of the provision of a bus-based Park and Ride system in the Greater Dublin area.
- Select from a list of available sites the ones that have the best chance of success in terms of:
  - ◆ Attracting the highest total number of daily users (new to public transport), particularly former car users
  - ◆ Having the best economic return.
  - ◆ Recommend an appropriate operator of a pilot Park & Ride Service.

1.1.4 A copy of the study brief is included in Appendix A of this report.

### 1.2 STRUCTURE OF THIS REPORT

1.2.1 This report is structured as follows:

- This chapter provides an overview of the study work programme.

- Chapter 2 – reviews the proposed satellite based P & R sites.
- Chapter 3 – summarises the potential demand, revenue and operating costs of the proposed inner sites and shortlists three sites for further analysis.
- Chapter 4 – develops the case for the three short-listed sites in further detail.
- Chapter 5 – outlines the management arrangements for the short-listed sites.
- Chapter 6 – details operating features of the site.
- Chapter 7 – provides a 5-year business plan and,
- Chapter 8 – provides a summary and conclusions of the study findings.
- Appendix A – contains the Study Brief.
- Appendix B – provides details of how demand was estimated for the inner P & R sites.
- Appendix C – provides details of the P & R revenue from the proposed sites.
- Appendix D – provides details of the operating costs of a dedicated bus service to P & R sites.
- Appendix E – outlines a low cost option for developing P&R at Liffey Valley Shopping centre

## **1.3 PARK & RIDE BEST PRACTICE GUIDANCE**

### **1.3.1 Park and Ride has the ability to:**

- reduce road traffic congestion.
- improve the city centre environment.
- improve mobility within the city and thereby the attractiveness of the city centre to visitors and shoppers.
- meet shortfalls in projected parking capacity in a conurbation.
- relieve pressure on city centre parking stock.
- obviate the need to provide additional city centre parking spaces to meet forecast increases in traffic growth, with benefits for land use planning.

### **1.3.2 The ability of P & R to achieve the above aims is largely determined by its competitive position relative to other travel choices available to people. The principal influences on this position are the:**

- relationship between the cost of using P & R and the cost of continuing in the private car and parking in the city centre,

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- the availability of parking in the city centre,
- quality and level of service provided at the P & R facility,
- perceived convenience and acceptability by potential customers.

1.3.3 Experience within the United Kingdom (UK) and other European countries indicates that there are consistent tolerances for the distance of the P & R site from the town or city centre. Although acceptable distances (and therefore journeys times by bus) vary according to the size of the urban area concerned, all successful P & R operations have the following characteristics:

- a) A maximum travel distance by bus of 5km.
- b) A maximum journey time by bus of 15-20 minutes.
- c) A maximum overall P & R travel time (journey time plus average wait time, weighted by 1.5) of 22.5 minutes, with overall journey, including parking and wait time equivalent to time taken to park in urban centre.

1.3.4 However, the UK has few examples of bus based P & R sites located in major conurbations similar to Dublin where traffic congestion tends to start much further out from the city centre. Other critical issues in major urban areas such as Dublin are that:

- Land is at a premium within the radius of the city centre that is usually associated with the optimal P & R location.
- Commuting distances may be greater in Dublin than elsewhere and the tolerances for P & R travel time may therefore be correspondingly greater.

1.3.5 Only three P & R operations in the UK are operated on a completely commercial basis - Cambridge, York and Oxford. 83% of UK sites are subsidised with the majority of operations secured under contracts that require the sponsoring authority to accept commercial risk.

## **1.4 IRISH PARK AND RIDE EXPERIENCE**

1.4.1 Cork is the only Irish city which has successfully implemented Park & Ride services, where a daily service was introduced to cater for the Christmas shopping period in December 1997. The service was very successful with 36,000 passengers using it over the Christmas period and it was continued on every Saturday throughout the year.

1.4.2 The bus service is operated on a daily basis from the end of November to mid January each year to cater for Christmas shoppers. To date over 300,000 passenger journeys have been made on the P & R service, with over 50,000 using the daily service during the Christmas 2001 period. The service operates from the Victoria Cross at the western side of the city (approximately 3km from the City Centre) and operates on a 10 minutes frequency during the Christmas period and 15 minutes on Saturdays throughout the year.

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- 1.4.3 In addition to the site at Victoria Cross, P & R has operated from the Tivoli and Blackpool areas at Christmas and has also been successfully used for special events e.g. Tall Ships Race, Tour De France 1998, Ford Cork Week etc.
- 1.4.4 An independent evaluation of the service concluded that the Christmas 1999 Park & Ride Service contributed some £2 million (€2.54 million) to the Cork city centre economy. Almost £700,000 (€90,000) was felt to be as a result of the P & R services i.e. this amount of money was spent in the city centre in Cork by people who would not otherwise have come to Cork if the Park & Ride service had not been available.
- 1.4.5 The P & R service in Cork operates on the basis of free car parking and users pay on the bus as follows:
- Adults: €2.50,
  - Children (under 16): €1.25,
  - Families (2 adults + 3 children): €5.00
- There is no limit on the amount of time that can be spent at the Park & Ride car park.
- 1.4.6 While shoppers have been the main target market for P & R in Cork, there is a small commuter element in the Christmas Period because the service starts at 08:30 and continues until 18:30. On Saturdays the service commences at 09:30 and finishes at 18:30.
- 1.4.7 The P & R service in Cork is a joint venture involving Cork City Council, Cork County Council and Bus Eireann in association with An Garda Siochana.
- 1.4.8 Although the above site has been a success, two other P & R sites in Cork proved unsuccessful. One site at Tivoli failed because, in the opinion of the bus operator, it was not visible from the road. The second at Blackpool failed due to difficulty in accessing the site, which eroded the attractiveness of using the facility.
- 1.4.9 The CASP report (Cork Area Strategic Plan 2001-2020) has recommended three permanent (bus based) P & R sites in Cork. These are proposed for Kinsale Road Roundabout, Bandon Road Roundabout and Carrigaline. The first of these at the Kinsale Road Roundabout, approximately 4km from the centre is expected to be in operation by mid 2003. This site will have an initial capacity of 600 spaces with the option to extend to 1,000 spaces if demand increases.

## **1.5 APPROACH**

- 1.5.1 A total of 40 sites in the Greater Dublin Area were proposed as potential locations for bus based P & R. However, subsequently one of the potential sites was withdrawn from the study because of the abandonment of the development proposal at the site. An additional four sites were withdrawn because of their proximity to existing or proposed rail stations.



- 1.5.2 Of the remaining 35 sites, it was considered necessary to distinguish between two distinct groups. These were categorised as:
- Outer or ‘Satellite’ Sites (greater than 20km from Dublin City Centre).
  - Inner sites (less than 20km from Dublin City Centre and within the built up area surrounding Dublin).
- 1.5.3 Illustrations of the locations of proposed sites are provided in Figures A (Chapter 2) and B (Chapter 3).
- 1.5.4 It was necessary to use two distinct methodologies to reflect the two categories of site location. The two categories of sites are:
- Outer or ‘Satellite’ P & R sites, which have been assessed by comparison of experience of similar operations elsewhere and their potential contribution towards the objectives mentioned in 1.1.3 in transport planning terms.
  - The inner sites have been assessed on the basis of available traffic flow data and the application of traffic interception rates based on our experience of bus based P & R in the UK.

# 2

## Outer or ‘Satellite’ P & R Sites

### 2.1 LIST OF PROPOSED OUTER SITES

- 2.1.1 13 locations have been proposed that fall within the category of outer sites. An illustration of their location is provided in Figure A. Table 1 details the sites, the corridor on which each is located and the distance of each from Dublin city centre.

**Table 1 : Proposed Outer P & R Sites**

Site Number	Location	Local Authority	Corridor	Distance of proposed site from Dublin City Centre (km)
1	Railway Stn, Port Access Rd, Wicklow	Wicklow	N11	46
2	Rathnew, Ballybeg	Wicklow	N11	45
3	Coynes Cross, Ashford	Wicklow	N11	39
4	Drummin, Kilpedder	Wicklow	N11	30
5	Greystones, Mill Road	Wicklow	N11	29
6	Blessington	Wicklow	N81	32
7	Dublin Rd, Naas	Kildare	N7	33
8	Trim Road, Enfield, Co. Meath	Meath	N4	43
9	Iffernock, Trim, Co. Meath	Meath	N3	46
10	Kilcarn, Navan	Meath	N3	46
11	Kells Rd, Navan, Co. Meath	Meath	N3	50
12	Julianstown Rd, Laytown	Meath	N1	41
13	Bray South	-	M11	22

- 2.1.2 Proposed sites 1, 5 and 12 were subsequently withdrawn from the study because of their proximity to existing rail stations.

### 2.2 SATELLITE PARK & RIDE

- 2.2.1 Conventional bus-based Park & Ride can be distinguished from rail-based P & R by the approach taken to the location of parking facilities and the use of dedicated, or ‘bespoke’ services. Unlike rail-based provision, which is generally spread over multiple stations, there are virtually no bus-based P & R operations with multiple

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collection points. Similarly, with a few notable exceptions, rail-based P & R attempts to feed passengers into existing (or sometimes enhanced) service patterns whereas over 97% of bus P & R customers in the UK travel on bespoke services, that would not exist but for the presence of the car park.

- 2.2.2 'Satellite' P & R replicates the rail-based approach for buses by providing one or more (generally smaller) sites, linked to existing or enhanced mainstream bus services. Car users then park at these key nodal points and transfer to scheduled bus services, which are also being used by other passengers.
- 2.2.3 This alternative form of bus P & R is regarded as more appropriate when:
- a) Projected demand is low and trip patterns diffuse in nature.
  - b) Bus travel distances are long, rendering it uneconomic to provide an attractive level of frequency with a bespoke service.
  - c) Land for parking is either expensive or unavailable.
  - d) There are environmental concerns about the local traffic impacts of the construction of large P & R car parks.
- 2.2.4 Satellite P & R is a significantly different service than the more conventional operation, based on bespoke services. Standard models cannot be used to evaluate potential demand and cost, these demand and bus service frequency issues can only be considered as part of a review of the bus or coach services that would form the service links.
- 2.2.5 Potential P & R sites more than 20kms from Dublin City Centre would, in our view, only be appropriate as satellite sites. The locations categorised as 'outer' sites have therefore been examined on this basis.

## **2.3 UK EXPERIENCE**

- 2.3.1 The principal experience in the United Kingdom of satellite bus based P & R services is that of Ellon, 26km north of Aberdeen. A 250 space car park has been provided by Aberdeenshire County Council and a mixture of existing commercial services and an enhanced P & R operation combine to provide a 15 minute frequency to/from Aberdeen during the morning and evening peaks. Inter peak frequency drops to around 30 minutes.
- 2.3.2 The car park commenced operation in October 2000. The maximum daytime occupancy currently is around 50 cars per day, 20% of site capacity. This equates to around 15,000 car journeys per annum diverted from entering Aberdeen city centre. Journey time by bus of 40 minutes is comparable with car for the dedicated P & R service, but is slower on the 'stopping' services that also serve the site as part of the overall seervice provision. The competitive bus journey time results from bus priority measures implemented to the north of Aberdeen.
- 2.3.3 Car parking is free but the commercial bus operator charges standard bus fares, per person. These arrangements mirror those governing local authority involvement in

rail-based P & R in Aberdeen. This has traditionally involved an agreement on enhanced parking provision, frequently linked to some measure of frequency enhancement of the established rail service.

- 2.3.4 There is also evidence in the UK of successful informal P & R arrangements for longer distance travel by bus and coach. This is often opportunistic where a service is provided to a major retail, leisure or business park, offering extensive free parking at a nodal point on the highway network. This type of facility typically occurs much further out from city centres than 'mainstream' P & R and may be relevant to the scale and travel distances involved in Dublin.
- 2.3.5 Nodal points used in this manner that we have examined include Reading Coachway (for London), Anderton Services (for Manchester) and Livingston (for Edinburgh). There is also evidence of this being an important element in demand for commuter coach services in to London.
- 2.3.6 Shorter distance satellite provision is being tried experimentally in North Leeds on the Scott Hall Road corridor, in conjunction with extensive bus priority and guided busways. The replicates smaller sites provided adjacent to Supertram stations in Sheffield. Take-up in Leeds has, to date, been poor.
- 2.3.7 Overall, experience in the UK suggests that successful satellite P & R is difficult to achieve, has limited potential, modest impact and fulfills a niche role.

## **2.4 EXISTING BUS LINKS**

- 2.4.1 Table 2, overleaf, provides an analysis of the existing bus services that either operate past the proposed sites or within close proximity, showing the frequency of the most frequent daytime service and the number of buses per hour.
- 2.4.2 Only four of the proposed sites have a bus service operating at 30 minutes or better either operating past or in close proximity to the site. Site 1 currently has no service that falls within the selection process and six sites have bus service frequencies of less than hourly.
- 2.4.3 Therefore it is extremely unlikely that any of the proposed outer sites could be served by existing bus services passing by the sites.

**Table 2 : Existing Bus Services (Satellite sites)**

Site Number	Highest frequency service, mins	Journeys per day to C.C. (if less than hourly), no.	Buses Per Hour (all services), no.	Bus Services	Bus Journey Time into Dublin City Centre, mins <sup>1</sup>
1	-	-	-	-	-
2	-	14	-	133	84
3	-	14	-	133	80
4	30	-	2	184	50
5	30	21	3	84, 184	80
6	-	10	-	65	70
7	60	34	1	126, 130/131	50
8	60	11	2	115	45
9	-	12	-	111-113	70
10	15 (peak period)	72	2	108-109	47
11	15 (peak period)	72	2	108-109	62
12	-	4	-	190	105
13	60	-	1	84X	50

## **2.5 WEAKNESSES OF SATELLITE P & R SERVICES**

2.5.1 The problem with outer or ‘satellite’ based P & R sites designed to abstract car traffic from entering congested urban centres is that because of the remote location of the P & R site from the centre:

- Traffic congestion is not necessarily severe enough at the point of the site location to encourage change from car to bus.
- Traffic passing by the highway links close to the site are less likely to have the urban centre as their ultimate destination with increasing amounts of local and other traffic movements.
- Interception rates required to justify bespoke P & R provision need to be higher.
- The bus journey time element becomes more significant as a proportion of the total journey and less attractive to the car user.
- Bespoke service operation becomes uneconomic because of the resources required to operate a frequent enough service to attract car users.

2.5.2 Satellite P & R sites therefore rely on the modification of existing services to achieve a reasonable frequency. The relative attractiveness of this option to the car user is

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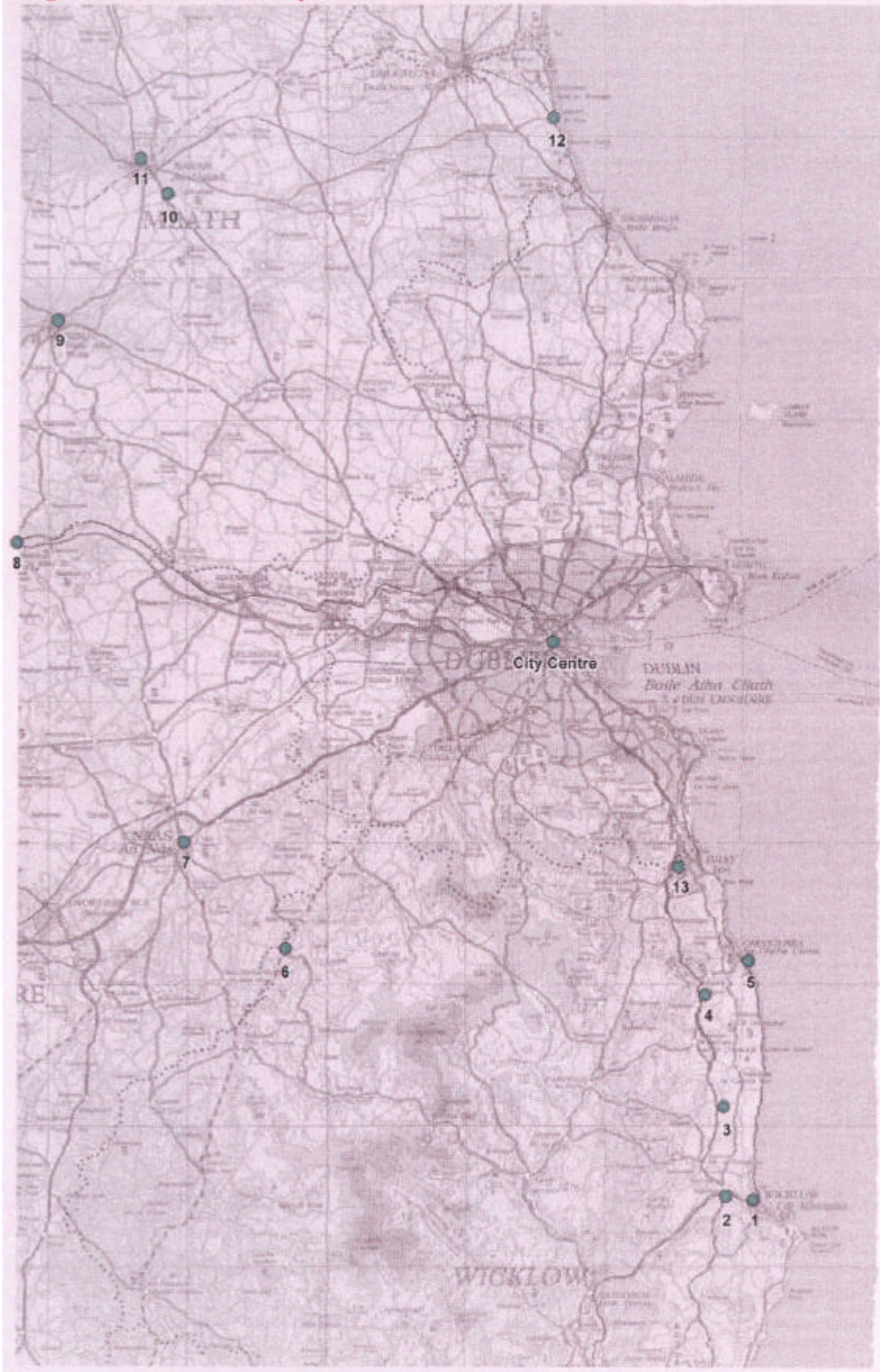
<sup>1</sup> Based on existing timetabled services. Some corridors have enhanced services at peak periods.

heavily dependent on the complex relationship between journey time (especially if travelling by ‘stopping’ service), effective frequency and pricing.

## **2.6 CONCLUSION**

- 2.6.1 Experience of bus based satellite P & R elsewhere is limited though it is unlikely that any single site will satisfy the selection criteria agreed for this study. Based on the Aberdeen experience of 50 cars per day, this would only result in annual demand of around 15,000 car trips per annum, a figure considerably exceeded by all the proposed inner sites detailed in Chapter 3.
- 2.6.2 Analysis of existing bus services shows that only proposed sites 4, 5, 10 and 11 in Table 1 have services providing a 30-minute frequency service into Dublin. These would present the lowest cost option for development of satellite based P&R. Sites 4 and 5 are more likely to face competition with the rail service to Wicklow and it is suggested that the two sites in Navan could be examined to assess their potential for satellite bus based P&R. The likely information requirements to develop a case for a satellite bus based P&R are:
- Examination of existing traffic flows and origin/destination of motorists within capture of site to determine extent of flows into Dublin.
  - Market research of sample of motorists within catchment.
  - Review of capacity on existing bus network.
  - Assessment of relative journey time and costs, including fares and parking charges.
- 2.6.3 The promotion of a ‘satellite’ P & R strategy for Dublin would require a re - evaluation of the availability, quality and marketing of longer-distance bus and coach services as mentioned above. This is beyond the brief of this study and would require research on specific market opportunities for this approach. Potential ‘satellite’ P & R sites are therefore not considered further in this report, which is mainly concerned with identifying a location for a trial P & R service.

**Figure A: Location of Proposed Satellite Sites**





# 3

## Inner P & R Sites

### 3.1 LIST OF PROPOSED INNER SITES

3.1.1 Details of the 26 proposed locations categorised as inner sites are provided below in Table 3. Sites are numbered according to the corridor with the lowest number in each sequence corresponding to the site that is closest to Dublin city centre on that corridor. The location of the sites is indicated in Figure B.

3.1.2 Proposed site N7/1 was subsequently withdrawn from the study because it has now been selected as the location for the Luas tram based P & R site. An additional site (Eircom Park) was withdrawn at a very early stage in the study due to abandonment of the development proposal and therefore is not included in Table 3.

**Table 3 : Proposed Inner P & R Sites**

Site No.	Location	Corridor	Proposed by	Existing Bus services		
				Highest Frequency Service, mins	Buses Per Hour (all services), no	Bus Services
N1/1	Kennel Club, Cloghran - N1	N1	PK Holdings	20	6	33/33B,41/41B /41C,230
N1/2	Lissenhall, Swords	N1	Fingal	15 (peak)	2	100/101
N2/1	N2/M50 junction - Finglas North	N2	PK Holdings	10	12	40/40A,134
N2/2	Kilshane, Finglas	N2	Fingal	20	3	103
N3/1	N3/M50 junction – Castleknock	N3	PK Holdings	10	11	38,39,70/70X, 76A,237
N3/2	N3 - Tolka Valley Park	N3	PK Holdings	60	1	70
N3/3	Damastown, Blanchardstown	N3	Fingal	30	3	70/70X,107-109
N3/4	Pace, Dunboyne, Co.Meath	N3	Meath	30	3	70X, 107-109
N4/1	Liffey Valley Shopping Centre	N4	South Dublin	5 <sup>2</sup>	22	25,25A,66/66 A/66B,67/67A, 78A/210

<sup>2</sup> Only services 78A and 210 serve the site, other services accessed by footbridge to N4 corridor



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Site No.	Location	Corridor	Proposed by	Existing Bus services		
				Highest Frequency Service, mins	Buses Per Hour (all services), no	Bus Services
N4/2	N4 – Fonthill Road	N4	PK Holdings	15	9	25/25A,66/66A/66B,66X,67/67A
N4/3	Land at Edmonsbury	N4	South Dublin	15	8	25/25A,66/66A/66B,67/67A
N4/4	Leixlip - R148 (Close to M4/N4)	N4	PK Holdings	60	2	66/66A/66B
N4/5	Leixlip – Tara Coop site	N4	S. Murray	60	2	66/66A/66B
N7/1	Red Cow Interchange	N7	South Dublin	12	7	51/51B, 68, 69
N7/2	Kingswood / Corkagh Park	N7	South Dublin	60	1	69
N7/3	N7 - Citywest Golf Course, Rathcoole	N7	PK Holdings	60	1	69
N7/4	Sewage Treatment / Rathcoole	N7	South Dublin	60	1	69
N11/1	Cornelscourt - N11	N11	PK Holdings	60	2	45,46,63,84,86,117
N11/2	Kilbogget Park	N11	DLRCC <sup>3</sup>	60	2	45, 84, 84X
N11/3	M11 – Loughlinstown	N11	PK Holdings	20	4	45,84
N11/4	Bray North	M11	DLRCC	20	4	45/45A, 84/84X
N81/1	Land at Balrothery	N81	South Dublin	30	4	54A,65/65B
N81/2	M50/N81 intersection - close to site N81/1	N81	PK Holdings	30	4	54A,65/65B
N81/3	Land near The Square, Tallaght	N81	South Dublin	10	24	49/49A,50,54A,56A,65/65B, 77,77A
N81/4	Land near N81/N82 junction	N81	South Dublin	30	5	50, 65/65B
R107/1	Malahide Road R107 - jnc.32	R107	PK Holdings	20	3	42, 43

<sup>3</sup> Dun Laoghaire Rathdown County Council

## **3.2 METHODOLOGY FOR DEMAND ESTIMATION**

3.2.1 In the absence of a generalised cost model to predict the demand for P & R at the proposed sites it was necessary to analyse demand for Park & Ride at each site on the basis of the following factors, which are considered to influence demand:

- Distance from city centre: This will have an impact on the proportion of traffic passing the site, intending to travel to the city centre and the consequent interception rate.
- Absolute value of total traffic flow past site: The potential demand will be proportionate to this value.
- Comparable journey times by bus and car: The investment in Quality Bus Corridors that has taken place along most of the radial routes into Dublin has resulted in journey time savings by bus over car. This has resulted in increases in bus patronage. Surveys from Dublin Bus on the Stillorgan QBC have shown that following completion of the Stillorgan QBC, up to 60% of new bus users were former car users. The journey time saving by bus from all the proposed sites has therefore been taken into account when estimating the potential patronage. This will vary from site to site depending on both the corridor and its location along it. The comparable bus and car journey times are based on journey time surveys undertaken for Dublin City Council.

## **3.3 POTENTIAL DEMAND**

3.3.1 The result of the assessment of the potential demand at the proposed sites is shown in Table 4. Appendix B details the assumptions and calculations underlying the estimation of demand at the P & R sites.

3.3.2 Table 4 shows that the site with the highest potential car transfers to bus-based P & R is N4/2 located on the N4 corridor. Next best performers are sites N11/1 on the N11 corridor and site N4/3, also on the N4 corridor.

3.3.3 The three sites located on the N7 corridor (shaded in grey) have potential demand amounting to 376 cars per day. However, if we subtract the number of spaces at the proposed tram based P & R site on the N7 corridor as part of Luas, amounting to 550 spaces, then this undermines the case for a bus based P & R site on this corridor. The potential demand for sites on the N7 do not exceed the capacity of the tram based site. We have therefore excluded sites on the N7 from further analysis.

3.3.4 The N4/2 site potential is greater than that for the N11/1 and in terms of attracting the highest total number of daily users, is the most likely to be successful as a pilot P & R scheme.

**Table 4 : Potential Demand**

Site No.	Location	Corridor	Average Weekday inbound traffic flow (07:00 – 15:00)	Overall Interception Rate (%)	Average Weekday Demand at Applied Overall Interception Rate <sup>4</sup> (Cars)	Annual Demand at Applied Int. Rate (Cars)
N1/1	Kennel Club, Cloghran - N1	N1	9,993	4.48%	287	87,830
N1/2	Lissenhall, Swords	N1	8,744	4.83%	263	80,672
N2/1	N2/M50 junction – Finglas North	N2	7,197	4.33%	141	43,250
N2/2	Kilshane, Finglas	N2	5,125	4.44%	103	31,692
N3/1	N3/M50 junction – Castleknock	N3	8,016	4.63%	371	113,670
N3/2	N3 - Tolka Valley Park	N3	16,371	4.40%	437	133,828
N3/3	Damastown, Blanchardstown	N3	16,371	4.40%	437	133,828
N3/4	Pace, Dunboyne, Co.Meath	N3	16,371	4.40%	437	133,828
N4/1	Liffey Valley Shopping Centre	N4	16,508	5.39%	399	122,245
N4/2	N4 – Fonthill Road slip road	N4	16,508	6.34%	469	143,771
N4/3	Land at Edmonsbury	N4	14,032	6.82%	429	131,353
N4/4	Leixlip - R148 (Close to M4/N4)	N4	7,790	8.95%	314	96,339
N4/5	Leixlip	N4	7,790	8.95%	314	96,339
N7/2	Kingswood / Corkagh Park	N7	12,691	4.78%	376	115,094
N7/3	City West Golf Course - N7	N7	12,691	4.78%	376	115,094
N7/4	Saggart / Rathcoole	N7	12,691	4.78%	376	115,094
N11/1	Cornelscourt - N11	N11	9,023	5.87%	462	141,580
N11/2	Killbogget Park	N11	9,023	5.42%	295	90,510
N11/3	M11 – Loughlinstown	N11	9,023	5.11%	278	85,304
N11/4	Bray North	N11	11,794	4.14%	295	90,469
N81/1 <sup>5</sup>	Land at Balrothery	N81	5,261	3.58%	62	18,882

<sup>4</sup> Including allowance for journey time differential between car and bus resulting from QBC.

<sup>5</sup> Overall interception rate falls below 4% for sites on the N81 corridor because of higher traffic flows in the inter peak period when P&R demand falls.

### *Bus Based Park and Ride*

Site No.	Location	Corridor	Average Weekday inbound traffic flow (07:00 – 15:00)	Overall Interception Rate (%)	Average Weekday Demand at Applied Overall Interception Rate <sup>4</sup> (Cars)	Annual Demand at Applied Int. Rate (Cars)
N81/2	M50/N81 intersection - close to site N81/1	N81	5,261	3.58%	62	18,882
N81/3	Land near The Square, Tallaght	N81	4,735	3.58%	55	16,994
N81/4	Land near N81/N82 junction	N81	4,209	3.58%	49	15,106
R107/1	Malahide Road R107 - jnc.32	R107	11,136	4.16%	278	85,213

## **3.4 OPERATING REVENUE**

- 3.4.1 Pricing is a critical element in the competitive advantages required for P & R to be perceived as an attractive alternative to city centre parking. The relationship with city centre parking charges is a complex issue because whilst it is reasonable to expect the distance travelled to influence the price charged, the relationship with city centre parking charges overrides this.
- 3.4.2 This results in an optimum P & R price that has no direct relationship with the distance travelled and the resulting operating costs. The dynamics of this price and cost relationship must be considered carefully in any proposal.
- 3.4.3 We have modelled the pricing structure based on parking charges in Dublin city centre allowing a price advantage for P & R. The financial assessment of the proposed P & R sites is based upon the relationship between the estimated P & R demand, operating costs and the parking revenue received.
- 3.4.4 Based on the existing pricing structure of Dublin city centre parking charges (see Appendix C for details), we have modelled the potential revenue from P & R operations on the assumption of pricing per car at the following rates:
- €8 – Monday to Friday peak (07:00 to 09:30hrs)
  - €4.50 – all other times.
- 3.4.5 This pricing assumption would allow P & R to undercut pricing for the journey-to-work market and be comparable for the cost of a three hour inter peak trip into Dublin city centre. Based on these assumptions, the modelled P & R annual revenue from each site is detailed in Table 5.
- 3.4.6 The estimated revenue excludes fares from kiss & ride passengers, cyclists, walk in passengers, and those fed to the P & R service by other bus services.

**Table 5 : Projected Demand and Revenue**

Site No.	Location	Distance from City Centre (km)	Annual Demand (Cars)	Annual P & R Revenue (€)
N1/1	Kennel Club, Cloghran – N1	11	87,830	545,499
N1/2	Lissenhall, Swords	17	80,672	514,140
N2/1	N2/M50 junction – Finglas North	8	43,250	262,711
N2/2	Kilshane, Finglas	12	31,692	195,187
N3/1	N3/M50 junction – Castleknock	9	113,670	720,242
N3/2	N3 – Tolka Valley Park	13	133,828	833,272
N3/3	Damastown, Blanchardstown	13.5	133,828	833,272
N3/4	Pace, Dunboyne, Co.Meath	19	133,828	833,272
N4/1	Liffey Valley Shopping Centre	10	122,245	800,089
N4/2	N4 – Fonthill Road slip road	11	143,771	952,143
N4/3	Land at Edmonsbury	12	131,353	873,944
N4/4	Leixlip – R148 (Close to M4/N4)	16	96,339	643,159
N4/5	Leixlip	17	96,339	643,159
N11/1	Cornelscourt - N11	12	141,580	886,232
N11/2	Kilbogget Park	12.5	90,510	559,747
N11/3	M11 – Loughlinstown	16	85,304	523,694
N11/4	Bray North	19	90,469	545,271
N81/1	Land at Balrothery	9	18,882	106,519
N81/2	M50/N81 intersection - close to site N81/1	9	18,882	106,519
N81/3	Land near The Square, Tallaght	11	16,994	95,867
N81/4	Land near N81/N82 junction	14	15,106	85,215
R107/1	Malahide Road R107 - jnc.32	10	85,213	514,582

### 3.5 DEDICATED SERVICE OPERATING COSTS

- 3.5.1 Experience of bus based P & R sites in the UK, shows that in order to be sufficiently attractive to persuade car drivers to use the service, a frequency of at least every 10 to 15 minutes needs to be provided.
- 3.5.2 Table 3 shows that the potential for modifying one single service to call at a new P & R site is restricted to sites N2/1, N3/1, N4/1, N7/1 and N81/3.
- 3.5.3 Modification of existing services to serve P & R sites has not been a particularly common approach to P & R provision in the UK. Operation of bespoke P & R services has generally been adopted because of:

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- **Capacity issues** – services commencing both before or at the P & R site can result in either existing bus users or P & R users unable to gain a seat on the service, especially at peak times. This diminishes the attractiveness of the service to either group of users that are disadvantaged.
- **Journey time issues** – P & R services having to observe normal stops en route increases the perceived journey time and reduces the attractiveness of the P & R site to car users since the journey time differential between the two modes diminishes.
- **Pricing issues** – P & R services have traditionally been priced on the basis of cost of town / city centre parking. This has led to the divorcing of P & R charges from bus fares in the corridor served. This position is not tenable under a combined service bus and P & R service option, particularly if P & R fares are lower than fares on conventional bus services.

3.5.4 We have developed our approach to assessing operating costs for the P & R services on the basis of operating a high frequency (every 10 minutes) bespoke service limited stop between the P & R site and points in the city centre. Operating cost assumptions are provided in Appendix D.

3.5.5 Table 6 summarises the estimated operating costs for a dedicated P & R service from each of the locations considered, based on the standard cost model.

**Table 6 : Operating Costs**

Site No.	Location	Distance from City Centre (km)	Vehicle Requirement (No.)	Annualised Operating Cost (€)
N1/1	Kennel Club, Cloghran – N1	11	8	1,211,714
N1/2	Lissenhall, Swords	17	11	1,683,750
N2/1	N2/M50 junction – Finglas North	8	6	921,846
N2/2	Kilshane, Finglas	12	8	1,236,537
N3/1	N3/M50 junction – Castleknock	9	6	946,668
N3/2	N3 - Tolka Valley Park	13	9	1,369,059
N3/3	Damastown, Blanchardstown	13.5	9	1,381,471
N3/4	Pace, Dunboyne, Co.Meath	19	12	1,841,096
N4/1	Liffey Valley Shopping Centre	12	8	1,236,537
N4/2	N4 – Lucan (Fonthill Road slip road)	11	7	1,104,014
N4/3	Land at Edmonsbury	12	8	1,248,948
N4/4	Leixlip - R148 (Close to M4/N4)	16	11	1,658,928
N4/5	Leixlip	17	11	1,683,750
N11/1	Cornelscourt – N11	12	8	1,236,537
N11/2	Kilbogget Park	12.5	8	1,248,948
N11/3	M11 – Loughlinstown	16	10	1,551,228

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Site No.	Location	Distance from City Centre (km)	Vehicle Requirement (No.)	Annualised Operating Cost (€)
N11/4	Bray North	19	12	1,841,096
N81/1	Land at Balrothery	9	6	946,668
N81/2	M50/N81 intersection - close to site N81/1	9	6	946,668
N81/3	Land near The Square, Tallaght	11	8	1,211,714
N81/4	Land near N81/N82 junction	14	9	1,393,882
R107/1	Malahide Road R107 - jnc.32	10	7	1,079,191

## **3.6 CONCLUSIONS**

3.6.1 Table 7, overleaf, lists the sites in ascending order of revenue support.

3.6.2 Based on the likely operating costs and modelled P & R revenue, it is envisaged that the operating costs of all proposed sites would exceed revenue, implying the need for revenue support.

3.6.3 The three sites with the lowest revenue shortfall are:

- N4/2 – Lucan (Fonthill Road)
- N3/1 – Castleknock / M50 junction
- N11/1 - Cornelscourt

3.6.4 These are considered to have the best financial return in terms of the projected revenue shortfall and number of potential car transfers to bus based P & R. Of the three sites, the Fonthill Road site has the lowest projected requirement for financial support and the highest number of potential car transfers to bus based P&R.

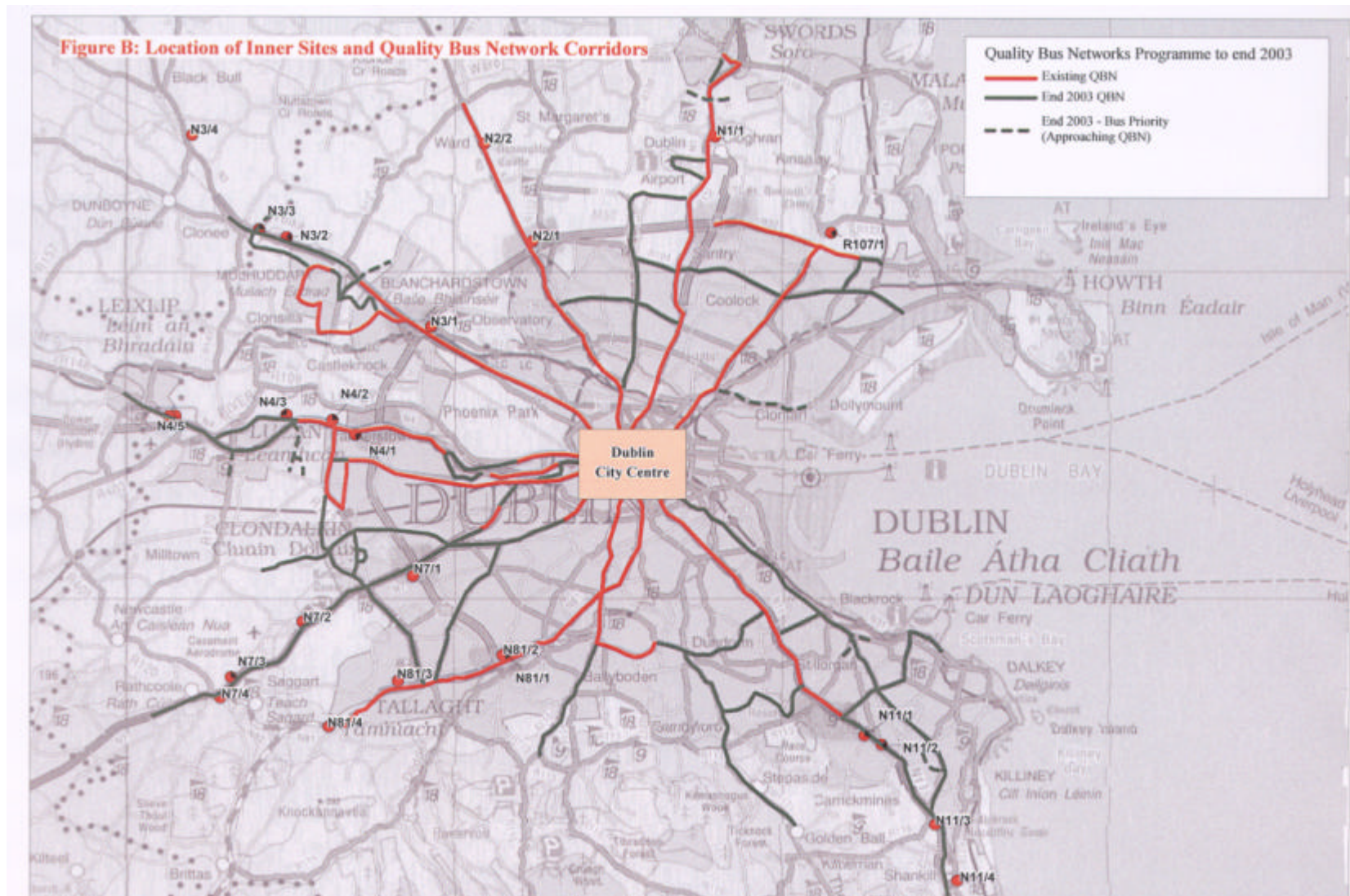
3.6.5 Whilst the P & R revenue, operating costs and projected revenue support will vary if it is considered necessary to apply other assumptions of pricing and cost parameters, it is not considered likely that the hierarchy of site performance would change significantly, particularly that of the top three sites.

**Table 7 : Ranked Assessment of Sites**

Rank	Site No.	Location	Annualised P & R Demand (Cars)	Annualised Revenue (€)	Annualised Bus Operating Cost (€)	P & R Revenue less Bus Operating Cost (€)
1	N4/2	N4 - Lucan (Fonthill Road)	143,771	952,143	1,104,014	-151,871
2	N3/1	N3/M50 junction - Castleknock	113,670	720,242	946,668	-226,427
3	N11/1	Cornelscourt - N11	141,580	886,232	1,236,537	-350,305
4	N4/3	Land at Edmonsbury	131,353	873,944	1,248,948	-375,004
5	N4/1	Liffey Valley Shopping Centre	122,245	800,089	1,236,537	-436,447
6	N3/2	N3 - Tolka Valley Park	133,828	833,272	1,369,059	-535,787
7	N3/3	Damastown, Blanchardstown	133,828	833,272	1,381,471	-548,198
8	R107/1	Malahide Road R107 - jnc.32	85,213	514,582	1,079,191	-564,609
9	N2/1	N2/M50 junction - Finglas North	43,250	262,711	921,846	-659,134
10	N1/1	Kennel Club, Cloghran - N1	87,830	545,499	1,211,714	-666,215
11	N11/2	Killbogget Park	90,510	559,747	1,248,948	-689,201
12	N81/2	M50/N81 intersection - close to site N81/1	18,882	106,519	946,668	-840,150
13	N81/1	Land at Balrothery	18,882	106,519	946,668	-840,150
14	N3/4	Pace, Dunboyne, Co.Meath	133,828	833,272	1,841,096	-1,007,823
15	N11/3	M11 - Loughlinstown	85,304	523,694	1,551,228	-1,027,534
16	N2/2	Kilshane, Finglas	31,692	195,187	1,236,537	-1,041,349
17	N4/4	Leixlip - R148 (Close to M4/N4)	96,339	643,159	1,658,928	-1,015,769
18	N4/5	Leixlip	96,339	643,159	1,683,750	-1,040,591
19	N81/3	Land near The Square, Tallaght	16,994	95,867	1,211,714	-1,115,847
20	N1/2	Lissenhall, Swords	80,672	514,140	1,683,750	-1,169,610
21	N11/4	Bray North	90,469	545,271	1,841,096	-1,295,824
22	N81/4	Land near N81/N82 junction	15,106	85,215	1,393,882	-1,308,667



### *Bus Based Park and Ride*



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# 4

## Short Listed Sites

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### 4.1 INTRODUCTION

4.1.1 This chapter takes forward the N4 Fonthill Road site that is considered to have the best chance of success in terms of:

- Attracting the highest total number of daily users (new to public transport), from passing car users.
- Having the best financial return.

4.1.2 Whilst both the N4/1 (Liffey Valley) and N4/2 (Fonthill Road) sites are based upon identical traffic flows past the sites, the circuitous nature of the route required to access the Liffey Valley site erodes the journey time saving by bus.

4.1.3 Our experience of other P&R operations indicate that this would be seen as ‘dead’ mileage from the motorists’ perspective as opposed to the convenience of the Fonthill Road site. Such a diversion would undermine the journey time savings perceived by the motorist that are critical to the success of P&R.

4.1.4 However, it is recognised that Liffey Valley would represent a low capital cost solution involving the use of existing car parking provision. The use of existing car parking at the Liffey Valley site would introduce a number of complex issues relating to how the P&R operation would be managed within the existing parking arrangements. This is developed as Appendix E to this report.

4.1.5 On this basis we recommend the Fonthill Road site as the preferred location of the pilot P&R site and develop this in more detail below.

### 4.2 INTERCEPTION RATE SENSITIVITY

4.2.1 We have modelled the effect of increases in the traffic interception rates achieved by the sites N4/2 to illustrate the sensitivity. This is provided in Table 8.

**Table 8 : Interception Rate Sensitivity (Site N4/2)**

Overall Interception Rate, i (%)	Annualised Demand at Applied Int. Rate	Annualised Revenue (€)	Annualised Bus Operating Cost (€)	P & R Revenue less Bus Operating Cost (€)
i - 1.0%	121,101	740,143	1,104,014	-363,871
i - 0.5%	132,436	846,143	1,104,014	-257,871
i	143,771	952,143	1,104,014	-151,871
i + 0.5%	155,105	1,058,143	1,104,014	-45,871
i + 1.0%	166,440	1,164,143	1,104,014	60,129

4.2.2 The data in Table 8 shows that if the overall P&R demand of site N4/2 improved beyond the modelled demand then this reduces the revenue support dramatically. A modest 1% increase in the overall interception rate would result in a revenue surplus of €60k. These costs exclude fixed operating costs, which are included in the Business Plan (Chapter 7).

4.2.3 As explained in earlier sections P & R performance is critically linked to its competitive performance against the alternative of city centre parking. It is also strongly influenced by growth in the economy and in traffic volumes, which further increase pressure on congestion delays, parking availability and cost.

### 4.3 SITE OCCUPANCY

4.3.1 Our estimation of site occupancy is based upon a model developed by us from observed entry and exit rates at a number of UK bus-based P & R sites. We have applied these rates to the projected demand for the three short-listed sites on the N4 corridor.

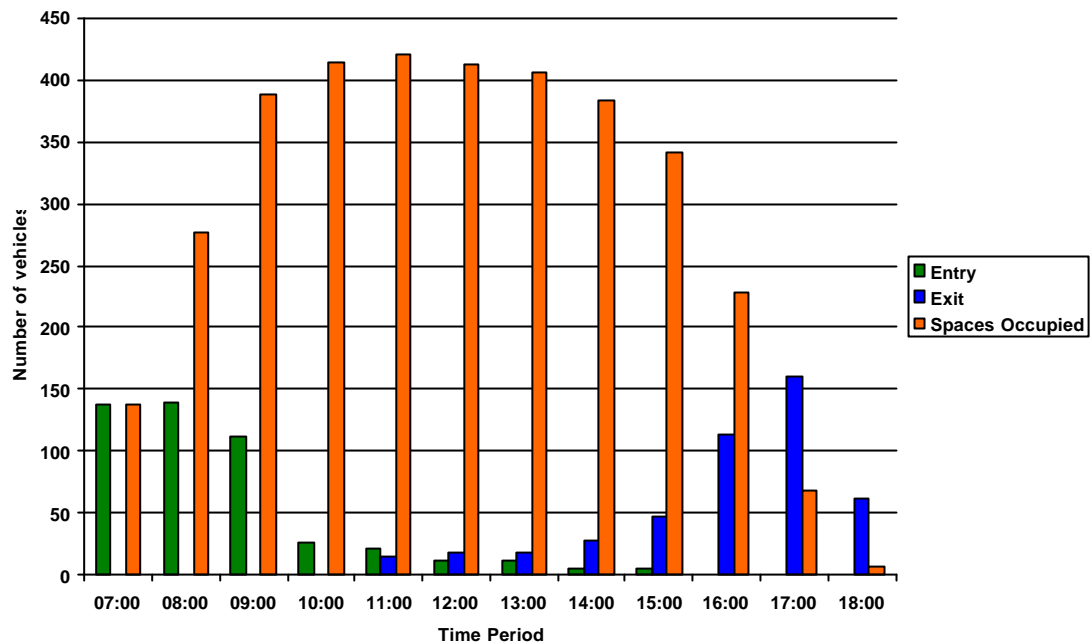
4.3.2 Based upon this approach, the maximum site occupancy for each site is provided below in Table 9.

**Table 9 : Maximum Site Occupancy**

Site	Location	Maximum site occupancy
N4/2	Fonthill Road slip road	413

4.3.3 Figure C illustrates the projected entry, exit and occupancy of the three sites that are based on the same traffic data. It shows that peak occupancy is achieved between 11:00 and 12:00 of just over 400 cars. Between 07:00 and 09:30, 350 cars would be attracted to the site.

**Figure C: Estimated Occupancy at N4 sites**



## 4.4 EXPANSION NEED AND POTENTIAL

4.4.1 Based upon the projected occupancy of the short listed sites on the N4 corridor, we would envisage construction of a 500 space car park, with space available for overflow parking for 250 additional cars, allowing for future expansion. Information supplied to us for the short-listed sites does not indicate any limit on the number of car parking spaces that can be accommodated, based on standard allowances for car spaces per hectare. It will be necessary to confirm that the tested sites can accommodate this number of cars allowing for physical obstacles such as overhead electricity lines, drainage and unsuitable ground conditions.

4.4.2 We have modelled the sensitivity of site occupancy based on the range of interception rates detailed in 4.2.1 and provided in Table 10. This shows that maximum site occupancy increases to 543 cars upon achievement of an overall interception rate,  $i(6.34\%) + 2.0\%$ . We do not believe that a level of interception significantly above this would be viable at any of the sites investigated without a fundamental change in transportation policy within the Dublin area. In this context we would define fundamental as including a radical increase in parking charges, a significant reduction (10%+) in existing parking stock and/or some measure of road user charging.

4.4.3 We therefore believe that a 500-space facility represents an optimum size of P & R unit under existing conditions and policies. This would cater for parking demand at an overall intercept rate of around 7.5%.

**Table 10 : Sensitivity of Site Occupancy(Site N4/2)**

	Overall Interception Rate, i				
	i %	i + 0.5%	i + 1.0%	i + 1.5%	i + 2.0%
Site Occupancy	413	446	478	511	543

## 4.5 BUS SERVICE OCCUPANCY

4.5.1 Based upon the modelled entry and exit rates, we can apply the car occupancy rates supplied by the DTO to estimate the occupancy on the bus service provided. The current car occupancy rates supplied by DTO are:

- 1.47 – morning and afternoon peak
- 1.42 – inter peak

4.5.2 Assuming a 10-minute service, providing six departures per hour, the peak bus service occupancy is detailed in Table 11 for the short listed N4 sites for a range of overall interception rates between i (6.34%) and i + 2%. The peak bus journey occupancy<sup>7</sup> occurs between 08:00 and 09:00 for all interception rates.

**Table 11 : Peak Bus Journey Occupancy Per Departure (Site N4/2)**

	Overall Interception Rate, i				
	i %	i + 0.5%	i + 1.0%	i + 1.5%	i + 2.0%
Occupancy per departure in peak hour	34	37	40	42	45

4.5.3 Table 11 shows the increase in peak bus journey occupancy as interception rates increase and beyond i + 1% the seated capacity of a low floor, single deck, bus is exceeded. It is therefore recommended that either low floor articulated or double deck vehicles are secured for the P & R service because:

- Variations in the ‘smoothness’ of peak demand may result in overcrowding on certain journeys and result in cramped single deck vehicles.
- Low floor articulated or double deck vehicles can accommodate potential P & R growth without changes to vehicle type or service specification.

4.5.4 We have assumed provision of double deck buses for the operation of the bus service. The capacity of these vehicles, when applied to the projected demand profile, would allow a slackening of the inter-peak frequency to 15-minutes. Such a reduction would have a modest effect on demand and would deliver an operating economy, with a reduction in the operating subsidy requirement.

<sup>6</sup> Where i is the overall interception rate for site N4/2 of 6.34%

<sup>7</sup> Assuming demand per hour is spread evenly throughout the number of departures in the hour.



## **4.6 BUS SERVICE OPTIONS**

- 4.6.1 We have tested alternative options for the provision of bus services to serve the proposed pilot site.

### **Use of Existing Services**

- 4.6.2 Observation of existing services passing the site show that at peak hours journeys are already between 70-80% loaded and would be unable to accommodate the peak loadings generated from the P & R site. Only services 66X and 67X offer a limited stop journey into the city that is considered to be sufficiently attractive to motorists. This option has therefore been discounted.

### **Operation of Peak Only Service**

- 4.6.3 We have calculated the results of operating a high frequency service between 07:00 and 10:00 and 15:30 to 18:30 only to cater for peak period demand only. It is assumed that during the inter peak period no access to the site would be allowed since this would imply the need for existing services to call at the site, creating complications with the pricing structure.
- 4.6.4 The peak only option reduces the revenue support because of the 'peaked' nature of the demand as shown in Table 12. However, some costs such as on-site parking supervision will not be avoided.

**Table 12 : Peak Only Operation (Site N4/2)**

<b>Annualised Demand</b>	<b>Annualised Revenue (€)</b>	<b>Annualised Bus Operating Cost (€)</b>	<b>P &amp; R Revenue less Bus Operating Cost (€)</b>
87,193	697,543	769,497	-71,954

### **Reduced Inter-Peak Operation**

- 4.6.5 Operation at peak only raises issues of poor vehicle utilisation and attractiveness of the P&R travel option, particularly if new vehicles were purchased for the P&R service. This would effectively prevent catchment of the inter peak shoppers market. Nevertheless, in recognition of the peaked nature of the modelled P & R demand, we have tested the option of reducing inter-peak frequency to 15-minutes. The results are provided in Table 13 and show that this would achieve a saving of almost €80k from operation of a 10-minute service throughout the day. It is proposed that the reduction of inter peak frequency is adopted.

**Table 13 : Reduced Inter Peak Operation (Site N4/2)**

<b>Annualised Demand</b>	<b>Annualised Revenue (€)</b>	<b>Annualised Bus Operating Cost (€)</b>	<b>P &amp; R Revenue less Bus Operating Cost (€)</b>
143,771	952,143	1,024,909	-72,767

## **4.7 RECOMMENDED SITE**

- 4.7.1 The proposed Fonthill Road site (N4/2) is projected to deliver the greatest level of use at the lowest net cost. However, this ignores capital cost considerations that may outweigh any revenue or operating cost considerations.

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# 5

## Management Arrangements

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### 5.1 OBJECTIVES

- 5.1.1 Park & Ride operations require close management at a detailed level. Perhaps even more than other transport services P & R is designed to attract car users to an attractive alternative. Quality management, pricing, marketing and operational control are all dynamic factors influencing the demand for the service and therefore the achievement of the P & R strategy.
- 5.1.2 At the same time P & R cannot be considered as an independent business enterprise. It must function as an integral part of a transport strategy. The management, development and pricing strategy must therefore relate to the objectives of that strategy.
- 5.1.3 We have therefore defined the principal objectives of the management arrangements for P & R in Dublin as a requirement to:
- Reduce administrative burden to the managing agency.
  - Provide a framework for risk sharing and thereby reduce financial exposure and incentivise the operating partner.
  - Transfer responsibility for all day-to-day operational issues, including car park management, to the operating partner.
  - Secure the provision of a bus service at the appropriate levels of quality and performance.
  - Ensure cost effective service provision through competition between potential bus operators.
- 5.1.4 These objectives need to be considered in the context of the form and structure of an operating contract and the appropriate agency for management of this function.

### 5.2 P & R MANAGING AGENCY

- 5.2.1 There are three principal influences on the selection of an appropriate organisation to be responsible for the strategic content of a P & R contract and for the management of the consequent contract:



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- a) The area in which the maximum expenditure is required (terminal location) is rarely the same as the area that enjoys the largest part of the benefits (congestion relief, improved environment, reduced parking pressure etc.).
- b) The users of the service are, by the nature of the service, widely spread and can rarely be associated directly with one particular area.
- c) P & R strategy must be related to parking, traffic and transportation strategies for the whole of the urban area in question to avoid 'unintended consequences', such as increased traffic on other corridors generated by displaced parking capacity in the city centre.

5.2.2 The proposed locations of the short-listed sites on the N4 are located within South Dublin County Council (SDCC). However, most of the benefits of traffic abstraction are concentrated within the Dublin City Council (DCC) area. It would not be reasonable to expect SDCC to fund the benefits to be derived by DCC.

5.2.3 While some parallels exist in the UK, this type of situation can be accommodated by the relationship between city and shire county councils. The equivalent relationship in the Dublin context is the application of Section 59 agreements between Dublin City Council (DCC) and the other Dublin local authorities. Under this agreement, the Director of Traffic DCC can carry out traffic management works in another local authority area once the approval of that Local Authority is obtained.

5.2.4 Reflecting the multi-tasking nature (e.g. car park management, bus operation, strategic planning, enforcement, security, etc) of the day-to-day management of a Park and Ride service, it is necessary that this role should be overseen by a P&R Managing Agency. Since it is planned to establish a Greater Dublin Authority in the future to take responsibility for strategic transport planning in the Greater Dublin Area this development must influence allocation of this role. It would be logical that this Authority should manage the capital and revenue funding, securing of site and letting of any P&R contract, if bus-based P&R is to form a long-term element of transport strategy in the region.

5.2.5 It is therefore recommended that in the long term the Greater Dublin Authority would adopt the role of managing agent.

5.2.6 In the shorter term we believe that allocation of this responsibility could logically fall to either

- a) The Dublin Transportation Office, which has a strategic planning role, or
- b) The Director of Traffic, Dublin City Council, given the existing statutory powers available to implement traffic management measures across Local Authority boundaries.

5.2.7 In procurement of P & R services the managing agent would report to the DTO Steering Committee on transport planning and policy issues. On the basis of our understanding of the relative roles and functions of the above two organisations we believe that the balance of advantage lies with the allocation of this responsibility

with the Director of Traffic. Figure D shows the proposed management structure of the P & R service in diagrammatic form.

### **5.3 OPERATING PARTNER**

- 5.3.1 The presentation of a ‘seamless’ product for potential users is an essential feature of successful P & R operations. The operational strategy must therefore bring control of the P & R terminal and the bus service under a common management. This is a relatively unusual combination of parking, site management and bus operation disciplines. All aspects of the product including site maintenance, security, passenger facilities, operating frequency and reliability, ticketing & pricing, marketing and customer interface must be managed closely and effectively.
- 5.3.2 Great care must therefore be exercised in the appointment of an appropriate partner and in the structuring of the contract for this relationship. A defective structure can easily result in the limited resources of a managing agency becoming swamped by the pressing and immediate demands of operational issues.
- 5.3.3 It is not proposed that the managing agent should be involved in the day-to-day management of the P & R operation. Rather it is proposed that responsibility for all day-to-day operation, including car park management, is awarded to an operating partner.
- 5.3.4 The operating partner should, as far as possible, be incentivised by a direct involvement in the commercial performance of the service.
- 5.3.5 A logical division of responsibility for terminal maintenance and management is proposed as part of an operating agreement. The following aspects will be the responsibility of the operating partner:
- site supervision
  - security
  - service operation and regulation
  - ticket and revenue control
  - day-to-day management
  - grounds & equipment maintenance.
- 5.3.6 It is envisaged that some of these elements may be sub-contracted by the operating partner but this will limit the extent of contract management by the DTO. However, the operating contract should provide for minimum performance standards on:
- Terminal points and minimum service frequencies.
  - Essential vehicle features, age and capacity.
  - Car park management and maintenance specification.

- Maximum standard fares and key discount fares.
- Customer charter, performance requirements and ‘penalty’ payments for sub standard operation.

5.3.7 In view of the sensitivity of revenue shortfall / surplus to the traffic interception rate achieved by the short-listed P & R sites, it is proposed that a Revenue Guarantee / Bonus Approach style contract with the operating partner is adopted. This means that:

- An operating partner bids for a specification.
- Upper and lower revenue parameters form part of the agreement.
- A revenue guarantee to the operator for the lower limit is agreed, and
- A revenue bonus (a percentage of additional income) is offered for income above the upper figure.

## 5.4 OPERATING CONTRACT

5.4.1 We have developed model conditions for this type of agreement that have been adapted for P & R contracts in the cities of York and Ipswich. We will make these available to DTO. Some customisation is required for each agreement to encompass both local circumstances and an extensive ‘menu’ of options for dealing with individual features. It is therefore inappropriate to propose a proscriptive basis for agreement within this report. The key features that can be addressed under ‘good practice’ considerations are set out in Table 14.

**Table 14 : Contract Coverage**

Subject	Details
Management	Operating Partner to appoint designated P & R Services Manager
Bus Service Specification	Quality standards of vehicles, low floor access, age, seating capacity, dedicated livery  Intermediate stopping places proposed by contractor but city centre stops to be determined by DTO in consultation with Dublin City Council and the bus operator  Days of Operation, timetable
Service supervision	At least one supervisor on site during opening hours.  Contractor responsible for service regulation and ticket inspections.
Fare Collection	Detailed by DTO
Customer contract	Produced jointly by DTO and contractor to cover:  Key information  Expectation of service standards, quality and delivery  Complaints procedures and response times  Compensation

***Bus Based Park and Ride***

<b>Subject</b>	<b>Details</b>
Marketing	Contractor to produce and implement a marketing plan for life of contract, updated annually.
Repair and maintenance	Contractor responsible for internal site and vehicle maintenance.
Security	Contractor will have four major security objectives, protection of – Persons (users) Property (location and equipment) Employees Vehicles left unattended by service users
Monitoring	Quarterly reports produced by contractor
Financial Records	Maintained by contractor
Health and Safety	Contractor to provide and maintain safe working places.
Retail and Merchandising	Limited to sale of products and goods which do not interfere with main purpose of location.

### *Bus Based Park and Ride*

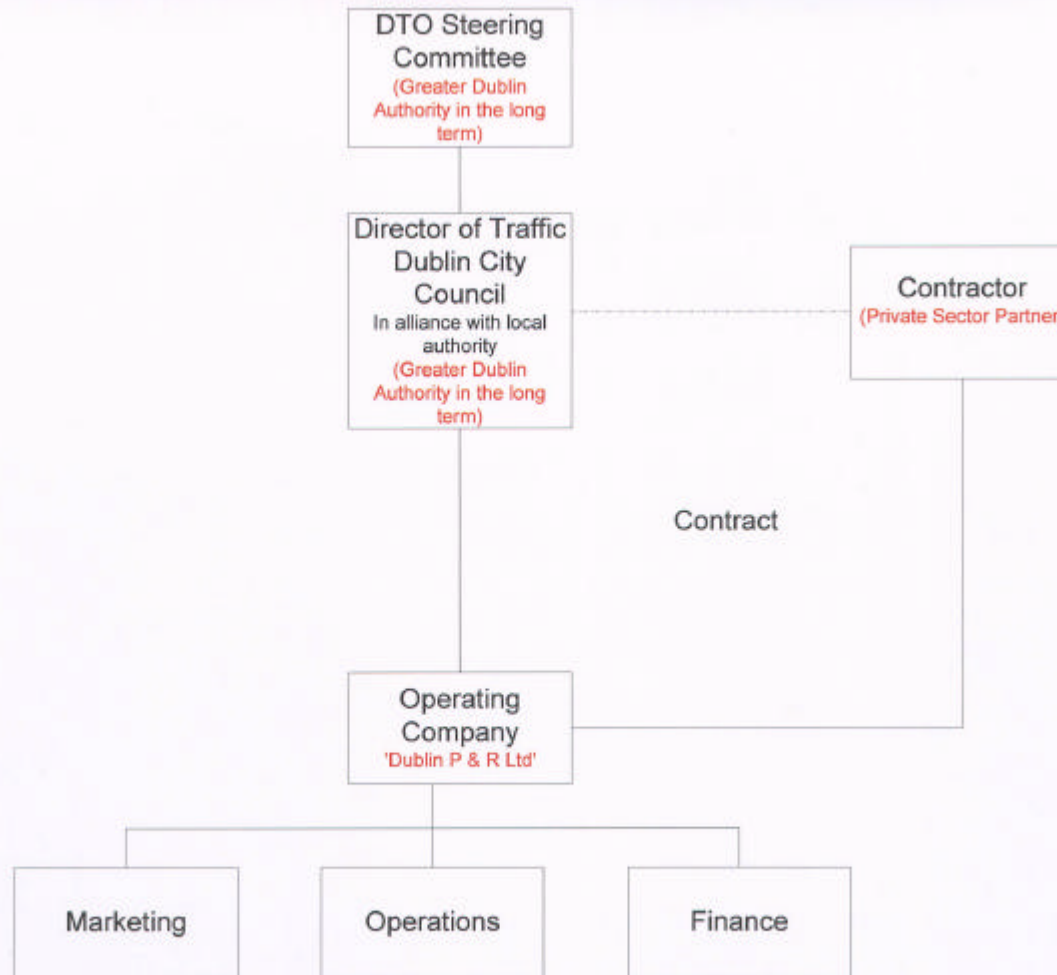


Figure D: Proposed P & R Management Arrangements Short and Long Term

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# 6

## Operating Features

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### **6.1 INTRODUCTION**

- 6.1.1 Our approach to determining the operating features of a P & R operation is based upon acknowledged good practice of bus based P & R operation in the UK. Whilst some elements of UK practice may not be relevant to Dublin we believe that the greater part of UK experience is directly transferable.

### **6.2 CHARGING POLICY AND TICKETING**

- 6.2.1 Five options are available for charging on P & R services and these may be summarised as follows:

- a) On-bus payment for bus service only, car parking free
- b) On-site payment for bus service only, car parking free
- c) On-site payment for both car park and bus service
- d) On-site payment for car park only, bus service free
- e) Pre-paid P&R ticket.

- 6.2.2 The principal elements considered in the evaluation of these options are:

- Ability of user to relate P & R charges to cost of parking in city centre.
- Government taxation policy (Value Added Tax) – under current EU rules VAT is chargeable on parking fees but not on bus fares.
- Operational efficiency.
- Cost and availability of ticketing equipment.
- Scope for, and revenue implications of fraud, theft and misuse.
- The need to avoid abstraction of revenue from mainstream public transport .
- Customer perceptions of service.

- 6.2.3 The major decisions in consideration of the approach to charging are therefore:

### ***Bus Based Park and Ride***

- Whether payment is made on site or on the bus (this is largely an operational, security, ticketing and pricing consideration).
- Whether payment is made on a 'per person' or a 'per car' basis (this is a more strategic consideration).

6.2.4 Table 15 provides a summary of the advantages and disadvantages of per-person and per-car charging systems.

**Table 15 : Comparison of Charging Systems**

	Vehicle based scheme	Person based scheme
Advantages	Minimises ticket issue Easy to 'sell' to motorists Pricing comparable with parking charge system in city centre Avoids multiple person penalty Known single charge for P & R use	Relates charge to number of passengers Simplifies ticket issue
Disadvantages	Perceived as a penalty charge for parking Secondary ticketing scheme required for non-parkers (such as 'walk in' users and cyclists)	Penalty for multiple car occupancy unless discounts offered – which would be difficult to police Pricing more difficult to relate to parking charge system in city centre Increases number of tickets to be issued Fare level may need to take account of mainstream bus services or result in perceived discriminatory charging

6.2.5 Charging methods have a direct implication for the ticketing system. It is suggested that the overall objectives for any ticketing system should include:

- Minimising the delay associated with ticket purchase.
- Providing a simple and easily understood system.
- Providing the maximum degree of flexibility to allow response to changing market conditions and allow promotional pricing.
- Minimising the risk of theft or fraudulent travel.

6.2.6 It is clear that no one single system provides an ideal solution. A car based pricing structure appears to be the best option in attempting to market P & R against the alternative of continuing to drive to city centre parking. It is easy to market this to motorists and allows pricing to be easily linked to parking charges in the city centre.

6.2.7 This approach is however less appropriate when:

- a) The P & R service is intended to form part of the overall 'mainstream' bus network.

### ***Bus Based Park and Ride***

- b) There are likely to be a significant number of pedestrian and cycle users of the terminal.
- c) It is envisaged that 'Kiss and Ride' (users being dropped off and collected by a friend or family member) will form an element of use.
- d) There are concerns about fraudulent use associated with multiple individual drivers travelling together on the same ticket.
- e) The site is located in an area where mainstream bus users have easy access and may have a financial advantage in using P & R instead.

6.2.8 The process of taking cash, giving change and issuing tickets on a One Person Operated (OPO) bus typically absorbs between 12% and 15% of total vehicle time, with implications on operational efficiency. Since payment will be concentrated at the P & R site, we recommend the installation of ticketing machines to enable users to pre-purchase tickets before boarding, but with the facility to also purchase tickets on the bus if required. In addition, pre-paid weekly and season tickets should be made available and strongly promoted.

6.2.9 The above analysis implies the adoption of payment options b) and e) in 6.2.1 above, but with the facility to allow a).

6.2.10 Effective policing of the ticketing arrangement to prevent multiple users parking without charge and grouping together to enjoy multiple occupancy at a reduced rate on the bus service can be avoided by installing a ticketing system that would:

- Issue a ticket for display within car, and
- multiple tickets according to the number of persons in the car.

## **6.3 SERVICE PROVISION**

6.3.1 We have reviewed three basic options for service provision for this site:

- Bespoke P&R service.
- Peak hour only bespoke service.
- Use of existing Dublin Bus services.

6.3.2 A high service quality is essential, to provide a comparable level of comfort for car users whose alternative mode (car) has a higher level of comfort than a typical public service vehicle. It is proposed that:

- Low floor accessible vehicles are used.
- Vehicles operate in a special livery and are dedicated to the service.
- Drivers are trained in customer care skills.



## ***Bus Based Park and Ride***

- A 10-minute headway service is operated during peak hours reducing to a 15-minute headway at off-peak times.

6.3.3 We have considered the merits or otherwise of securing the service operation either as a contracted service or through a route licence. Since it is intended to incentivise the operator to improve patronage and revenue for the P & R operation, with a revenue bonus for eliminating subsidy requirement, it is recommended that a route licence application be pursued.

6.3.4 Our modelling of bus operating costs has been developed on the basis of the dedicated service operating along sections of the Lucan QBC and Chapelizod By-Pass that also has long sections of currently under-utilised bus lanes. We have assumed that the service will terminate around Bachelors Walk / Aston Quay area.

### **Operating Hours**

6.3.5 Hours of operation of P & R sites tend to reflect local attitudes and requirements, but usually the shortest weekday operations are 08:00 to 18:00hrs. In view of the longer commuting distances and variations in working hours common in major conurbations, we propose that opening hours between 07:00 and 19:00hrs are adopted and the operating costs have been modelled on this basis.

## **6.4 FACILITY SPECIFICATION**

6.4.1 It is envisaged that the basic facilities at the proposed parking site would include:

- An enclosed waiting area with 'tip-up' seating units and litter bins.
- Two electronic ticket machines, capable of giving change.
- A supervisors office / public information point.
- A fully surfaced car park
- A security fence around the site
- A public telephone
- Closed circuit television coverage throughout the site
- Good standards of illumination and unobstructed views from the supervisors office.
- Display / leaflet facilities for visitor information.
- Male & female toilets.

## **6.5 SIGNAGE**

6.5.1 It is recommended that P&R sign posting is erected at 1km intervals from a distance of 5km west of the proposed site along the N4 and M4 corridors the create awareness of the site and also to the north and south along the M50. As a minimum the signage should detail:

- The site name & a distinctive Park and Ride logo
- 10 minute bus service
- 500 spaces
- Opening Times
- Prices

## **6.6 MARKETING STRATEGY**

6.6.1 The principles of marketing embrace the whole process of relating the ‘product’ to the potential market. This must necessarily be an interactive process with regular research of the views of customers and potential customers, regular assessment of performance and relative price and the ability to identify and segment the market served.

6.6.2 P & R operates in a highly competitive environment and it can only achieve its optimum potential if a dynamic approach is adopted to relating the product to the potential market. The marketing plan should take account of the following:

- Pricing policy and discount sensitivity
- Fare marketing and special offer deals, including joint promotions with city retailers and employers
- ‘Added value’ journey enhancements
- Annual promotional campaigns
- Product refinement and quality monitoring
- Promotional media and new market development
- Image and branding considerations
- Refining future market research and customer feedback.

## **6.7 PERFORMANCE MONITORING**

6.7.1 Service quality is achieved in two stages:

- a) The specification of quality requirements and the putting into place of mechanisms and agreements designed to deliver the required quality parameters.
- b) Monitoring and enforcement of quality standards as part of the strategic management of the business.

6.7.2 A range of indicators are proposed in Table 16 that will allow the performance of the pilot P & R site to be monitored.

**Table 16 : Performance Monitoring**

<b>Indicator</b>	<b>Details</b>
Ticket Sales and Revenue	Comparison with estimated performance, number of car journeys removed from Dublin city centre
Traffic flows	Collected by time period to calculate actual interception rates and traffic impact assessment of P & R site
Punctuality	Survey of journey time reliability and punctuality of departures.
Satisfaction surveys	Passenger survey to determine satisfaction with a range of quality indicators such as reliability, driver, cleanliness and possibly 'mystery passenger' checks.
Complaints	Formal customer charter and details of complaints to be submitted to DTO including details of what action taken and reply to complainant.

6.7.3 Checking and monitoring procedures should be administered by the DTO to ensure that all operational and quality requirements are being met.

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# 7

## Business Plan

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### 7.1 INTRODUCTION

- 7.1.1 This chapter of the report provides a projection of anticipated costs and revenues for all P & R expenditure for a five-year period for site N4/2.

### 7.2 CAPITAL COSTS

- 7.2.1 The capital cost elements of this business plan are, as agreed, based on a 'unit cost' basis using cost data from recently developed P & R schemes within the UK. This data has been calibrated against information provided by Park Rite Ltd.
- 7.2.2 Our assessment of projected capital costs for a 500-space surface P & R site is based on two recent UK schemes for similar size car park construction costs and data supplied by Park Rite Ltd in Ireland. Based on an average of €3,100 per parking space, total site construction costs of €1.8m are envisaged including site preparation, landscaping, paving and parking spaces. However, this cost is exclusive of site acquisition and any junction remodelling that will be dependent on a full traffic impact assessment.
- 7.2.3 A further €0.5m is expected for P & R terminal building including waiting facilities, supervisors office, information point and toilets.
- 7.2.4 Exclusive of land acquisition and highway junction remodelling costs, capital costs of **€2.3m** are assumed.

### 7.3 FIVE YEAR PLAN

- 7.3.1 Table 17 below provides a summary of the five-year plan. We have modelled this on the basis of 2002 prices and have assumed that with effective marketing, the overall interception rate will increase by 0.25% per annum over the five-year period. Other P & R costs are based on assumptions using data sets held for UK based sites. They will need to be updated if equivalent data becomes available for Ireland.
- 7.3.2 The target growth of 0.25% per annum will allow the 500 space car park to meet the demand at the P & R site without the requirement to use the 250 space overflow car park.

### *Bus Based Park and Ride*

7.3.3 Operating costs are based on the operation of a dedicated bus service at 10 minute frequency during peak periods and 15 minute frequency at all other times.

**Table 17 : Five Year Business Plan (2002 prices)**

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Total Annual Operating Costs (Bus Service)<sup>8</sup></b>					
Driver Costs (€)	300,300	300,300	300,300	300,300	300,300
Mileage Related Costs (€)	248,545	248,545	248,545	248,545	248,545
Vehicle Costs (€)	399,000	399,000	399,000	399,000	399,000
Supervisory Costs (€)	77,064	77,064	77,064	77,064	77,064
<b>Total Bus Operating Costs (€)</b>	<b>1,024,909</b>	<b>1,024,909</b>	<b>1,024,909</b>	<b>1,024,909</b>	<b>1,024,909</b>
<b>Other P &amp; R Costs</b>					
P & R Manager	38,000	38,000	38,000	38,000	38,000
Ticketing Equipment (€)	7,750	7,750	7,750	7,750	7,750
Quality Monitoring (€)	15,000	15,000	15,000	15,000	15,000
Marketing and Promotion (€)	35,000	15,000	15,000	15,000	15,000
Car Park Maintenance and Cleaning (€)	75,000	75,000	75,000	75,000	75,000
<b>Total Other Costs (€)</b>	<b>170,750</b>	<b>150,750</b>	<b>150,750</b>	<b>150,750</b>	<b>150,750</b>
<b>Park &amp; Ride Demand Revenue</b>					
Annualised Demand	143,771	149,438	155,105	160,773	166,440
<b>Annualised Revenue (€)</b>	<b>952,143</b>	<b>1,005,143</b>	<b>1,058,143</b>	<b>1,111,143</b>	<b>1,164,143</b>
P & R Revenue less Bus Operating Cost (€)	-72,767	-19,767	33,233	86,233	139,233
<b>Modelled Peak Occupancy of Site</b>	<b>413</b>	<b>429</b>	<b>446</b>	<b>462</b>	<b>478</b>
<b>Cash-Flow</b>					
Total Costs (€)	1,195,659	1,175,659	1,175,659	1,175,659	1,175,659
Total Revenue (€)	952,143	1,005,143	1,058,143	1,111,143	1,164,143
Cash Flow Projection (€)	-243,517	-170,517	-117,517	-64,517	-11,517
Operating Subsidy Requirement (€)	243,517	170,517	117,517	64,517	11,517
<b>Subsidy per car (€)</b>	<b>1.69</b>	<b>1.14</b>	<b>0.76</b>	<b>0.40</b>	<b>0.07</b>

Illustration based on 2002 prices – no adjustment for inflation.

7.3.4 The business plan projection indicates a need for revenue subsidy to cover the shortfall between estimated revenue and all costs. Assumed increases in the attractiveness of bus based P & R with effective marketing results in a significant reduction in the need for subsidy, reducing the subsidy per car from €1.69 to €0.07 per car over the life of the five year plan.

<sup>8</sup> Based on reducing inter peak P&R service to 15 minute frequency.

## **7.4 FUNDING STRATEGY**

- 7.4.1 The funding position for major P & R projects in the UK, and the small number of bus-based schemes that have been progressed in other European countries has generally been:
- a) Construction of the terminal and provision of associated highway and bus priority measures from a single capital fund (normally central government but with some developer contributions in a minority of cases).
  - b) Provision of the services with initial revenue support with one of four longer-term outcomes:
    - ◆ A permanent need for financial support.
    - ◆ A ring-fenced funding support stream such as a city centre parking levy.
    - ◆ The elimination and recovery of subsidy from operating surpluses in later years.
    - ◆ An operating contract that provides for anticipated future profits to accrue to the operator in return for accepting short term losses.
- 7.4.2 As noted earlier in the report, the majority of UK schemes still require ongoing financial support although an increasing number of these are anticipated to ‘break even’ at a later date. This is mainly due to a commitment to very low charge levels, to maintain a differential with city centre parking charges. In many of these instances users of park and ride buses are therefore being subsidised, whilst users of mainstream buses are not. We believe that there are equity and value for money concerns with such an approach.
- 7.4.3 Ring-fenced funding has obvious benefits for relating funding sources and applications but this principle of hypothecation is not generally supported. It can be highly effective in ‘balancing’ parking charging and demand and is generally favoured over general taxation by users. Although a levy on city centre parking charges would be the obvious and logical approach to P & R funding this can be problematic where a local authority relies on parking income to support other expenditure heads.
- 7.4.4 We believe that any sound proposal for P & R should provide for the opportunity to recover initial operating losses within the first five years of operation. This could be achieved in both the third and fourth revenue funding options indicated above. Recovery of initial losses can be built in to the business plan for the operation, with the promoting agency accepting the commercial risk. Alternatively this risk can be transferred to the private sector operating partner through a five year franchise agreement.
- 7.4.5 If the operating contractor is to become a genuine business partner and effectively promote and develop the business then it will be appropriate that this company should be fully involved in the business risk. We therefore believe that a franchise

approach offers the optimum structure for finance with the maximum level of risk transfer to the private sector operator. This should ideally be addressed through a 'time out' bidding process under which bidders indicate the length of time beyond the five year base franchise that they would need to retain the contract.

## **7.5 EXIT STRATEGY**

- 7.5.1 In Chapter 4 we identified our recommended site for a pilot P & R operation based on construction of a purpose-built car park and terminal (site N4/2) at Fonthill Road Slip). We have outlined in Appendix E the issues relating to the provision of a short term facility at Liffey Valley Shopping Centre.
- 7.5.2 Although it is possible to close any P & R facility the substantial investment in the car park and terminal facilities render this an unattractive prospect. The only purpose-built facility that we have identified in Europe as having been abandoned was at Paisley in Scotland. In this case minimal terminal facilities were provided and the parking facility was simply abandoned.
- 7.5.3 Short term facilities can obviously be abandoned with relative ease although some capital costs will inevitably be occurred, even for the most basic of facilities. In addition, care must be exercised in the agreement reached with a facilitating landowner, to minimise risk exposure.
- 7.5.4 The demand estimates used in our model evaluation are conservative and we have no reason to believe that the forecast use will not be achieved. Should there be any serious doubt that this level of demand will be sustained then experimental provision of a short-term facility at Liffey Valley Shopping Centre should be considered.
- 7.5.5 The short term facility could be brought into operation within three months and would help to establish the case for the permanent facility. The lower quality of facility and service provided would, however, result in a lower take-up.

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# 8

## Conclusions

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### **8.1 STRATEGIC ROLE**

- 8.1.1 Conventional bus-based Park & Ride has a limited role in Dublin due to the size of the city. Bus-based P & R is ideally suited to urban areas of less than 200,000 inhabitants and the size (and therefore travel distances) militate against its effectiveness.
- 8.1.2 The size and planned development of the Greater Dublin Area may provide opportunities for Park & Ride in an alternative format, identified as 'satellite P & R'. This format involves the provision of a series of smaller P & R nodes on a corridor and is more appropriate where travel distances are great and demand is disparate.
- 8.1.3 The potential role that 'satellite' Park and Ride can play in meeting both the requirements for parking in development centres themselves, in addition to linking those development centres to strategic transport networks should be investigated. This assessment is, however, outside the scope of this report.
- 8.1.4 There are limited opportunities for development of schemes that meet parameters for likely success that are implied by experience in other cities. Given traffic speeds and distances involved rail-based Park and Ride is likely to dominate any provision in Dublin.
- 8.1.5 This study has identified a site that offers the optimum performance in terms of developing a pilot bus based P&R site.

### **8.2 OPTIMUM SITE PERFORMANCE**

- 8.2.1 There are no empirical objective criteria for 'value for money' from Park & Ride investment. The best-performing site in our analysis is predicted to displace a minimum of 143,000 car trips per annum in to Dublin City Centre, accounting for three million vehicle kilometres per annum, largely on congested roads.
- 8.2.2 There is some evidence of higher interception rates being achieved in the cities with existing P & R, and with traffic and parking conditions closest to those prevailing in Dublin. The appropriateness of applying a base interception rates for Dublin higher than the tested 4% could only be validated through field research.
- 8.2.3 This projection takes no account of possible 'generated' traffic or the possibility that city centre parking stock released due to P & R might attract other car users. The



extent to which these two effects result from P & R provision is a matter of some controversy and debate, and is beyond the remit of this project.

## **8.3 SELECTION OF SITES**

8.3.1 Two categories of proposed sites were identified for the purposes of this study:

- Satellite based Park & Ride (small, distant sites to be served by existing bus links).
- ‘Traditional’ high volume bespoke operations.

8.3.2 The satellite sites were excluded from further analysis since in our opinion they are unlikely to result in any significant switch of car journeys to bus based P & R.

8.3.3 The remaining sites have been evaluated on the basis of traffic flow and journey time data to short-list sites with the best financial return. Access to Quality Bus Corridor (QBC) infrastructure is critical to the achievement of the operating speeds and resource utilisation that are essential to commercial success.

8.3.4 The three sites with the best financial performance are:

- N4/2 – Lucan (Fonthill Road)
- N3/1 – Castleknock / M50 junction
- N11/1 - Cornelscourt

8.3.5 Of these sites, N4/2 at Fonthill Road slip road on the N4 is considered to be the most attractive site in terms of accessibility for motorists, demand potential and net costs and is the recommended pilot P&R site.

8.3.6 The site at Liffey Valley offers potential for significant capital cost savings (through use of an existing car park) but the route required to access the site would reduce the attractiveness of the P & R to the target market. It also raises issues of pricing strategy that are explored in Appendix E.

## **8.4 PARK AND RIDE COSTS**

8.4.1 The capital costs of a P & R terminal on one of the N4 sites would be approximately €2.3m, excluding costs of land acquisition and any highway remodelling necessary to accommodate site entry and egress.

8.4.2 We do not believe that there would be any realistic prospect of achieving any significant repayment of investment capital or servicing the debt incurred from capital acquisition from trading income.

8.4.3 Our business plan forecasts suggest a subsidy requirement of €243k for the first year of operation, reducing to €170k and €17k in year 2 and year 3 respectively. Beyond

year four our forecasts indicate that the operation should require a much reduced subsidy of €11k.

- 8.4.4 No account is taken of additional revenue sources (advertising, sponsorship, other use of vehicles, non-P & R passengers etc.) or potential to reduce operating costs below those currently prevailing in Dublin.

## **8.5 PARK & RIDE CONTRACT AND MANAGEMENT**

- 8.5.1 Because of the strategic role of P & R and the disparity in distribution of costs and benefits we believe that the procurement and management of P & R should be undertaken through the Director of Traffic, Dublin City Council. A shadow board shown in Figure D should ideally oversee this function.

- 8.5.2 A single ‘all functions’ contract should be pursued with an operating partner providing a ‘seamless’ service to users. This will be a complex and detailed agreement that should specify minimum standards for:

- site supervision and security
- provision and maintenance of passenger facilities
- service operation and regulation
- ticket and revenue control
- information, marketing & promotion
- equipment and site maintenance.

- 8.5.3 The operating partner should be incentivised to improve performance through a ‘revenue bonus’ contract but with an appropriate level of ‘revenue guarantee’ to reduce the priced cost of the risk taken. The optimum agreement format would be based on a ‘time out’ bid for a variable length operating franchise.

## **8.6 CHARGING AND TICKETING STRATEGY**

- 8.6.1 We have analysed the merits of vehicle and person based charging systems and recommended that vehicle based charging be adopted because it:

- Is much easier to market to motorists.
- More readily comparable with city centre parking charges.
- Does not penalise multiple car occupancy.

- 8.6.2 Ticket vending machines are proposed to reduce the need for on-bus payment and speed boarding times. Payment is proposed for the bus service element only to avoid the need for Value Added Tax to be charged on fares.

**Dublin Bus Based Park and Ride**

**Appendix A:  
Study Brief**



**THE TAS PARTNERSHIP LIMITED**

**SPECIALIST CONSULTANTS IN PUBLIC TRANSPORT**

## **A1.1 BUS BASED PARK AND RIDE PILOT SITE – CONSULTANTS BRIEF**

### **Objective**

- A1.1.1 The DTO invites consultants to tender for the following:
- to provide guidance on the appropriateness of including bus-based Park and Ride measures as an element of an overall Park and Ride strategy for the Greater Dublin Area,
  - to prepare the transport planning and economic case for a pilot bus-based Park and Ride facility serving the Greater Dublin Area, and
  - to advise on the appropriate monitoring that should be carried out, should the pilot project be implemented, to assess its success or otherwise.

### **Planning and Transport Background**

- A1.1.2 The DTO Strategy 2000-2016 *A Platform for Change* was published in September, 2000 and proposes a transport strategy designed to contribute to the achievement of Strategic Planning Guidelines (SPGs) goals for the Greater Dublin Area.
- A1.1.3 The SPGs (1999) describe the desired size and form of the Greater Dublin Area. The SPGs are framed on the twin principles of:
- *Consolidating* development in a designated Metropolitan Area to accommodate greater population than at present, together with
  - Designating a series of *sustainable development* centres within an area known as the Hinterland Area, with high quality public transport links to the Metropolitan Area.
- A1.1.4 A Platform for Change recommends a greatly expanded public transport network to serve the consolidated Metropolitan Area, and proposes to link sustainable development centres in the Hinterland Area to the Metropolitan Area by high quality rail and bus networks.
- A1.1.5 The policy on Park and Ride within *A Platform for Change* states that facilities should be provided at locations where the national road network meets the public transport networks. These locations should be where cars accessing Park and Ride services do not add to congestion on the road network.

### **Consultant's Tasks**

A1.1.6 Specifically, the consultant will be asked to:

- Advise on the effectiveness in transport planning terms of the provision of a bus-based Park and Ride system in the Greater Dublin Area
- Select from a list of available sites (to be supplied by DTO Executive) the ones that have in the opinion of the consultant the best chance of success in terms of the highest total number of daily users (new to public transport), particularly former car commuters, and the best economic return. Indicate which of these is the preferred option to develop as a pilot Park and Ride facility.
- Estimate the size and composition of the target market of users of the selected Park and Ride site.
- Make recommendations on the following operational / service issues with a view to maximising the probability of success of the Park and Ride service :
  - ◆ Number of car parking spaces and the layout and form (surface car parking, multi-storey or skypark) of the site
  - ◆ Lighting, fencing and landscaping
  - ◆ Security for cars and persons
  - ◆ Facilities for buses, including turning circles, site access and egress arrangements, bus stops, etc.
  - ◆ Facilities for cycles, taxis and pedestrians
  - ◆ Waiting facilities for passengers
  - ◆ Hours of operation / day and days of operation / week
  - ◆ Marketing and promotion
  - ◆ Signage on the approach road network,
  - ◆ Charging regime and ticketing arrangements (including the public transport charges and ticketing)
- Estimate the additional bus capacity required to serve the predicted profile of use of the pilot Park and Ride site, all day and by day of week. Estimate desired journey time savings by bus necessary to make the service an attractive option. Recommend route designs, e.g. destinations, stopping patterns, dedicated or regular services, bus size, frequency, branding, bus priorities, etc.

### ***Bus Based Park and Ride***

- Recommend the appropriate agency to take responsibility for the operation of the pilot bus-based Park and Ride service and, where appropriate, associated bus services.
- Prepare a business plan over the period to maturity of the service, (including, where appropriate, associated bus services) showing estimated annual operating costs and revenues, estimated capital costs of any construction / maintenance required, etc. Estimate the amount of funding required, if any, for the responsible agency. Identify appropriate sources of such funding.
- Prepare an exit strategy for use if a decision to shut down the pilot site is taken.
- Produce a report detailing all assumptions, analyses, conclusions and recommendations.
- Attend progress meetings at the DTO offices, as required.
- Produce short written progress reports and other documentation as required.
- Make oral presentations at interim and final stages to the DTO Steering and Advisory Committees as required.

#### **Information to be provided to Consultant**

- Final Report of A Platform for Change
- The Short Term Action Plan
- The Strategic Planning Guidelines (1999) and the Reviews (2000, 2001)
- Existing bus corridor capacities
- List of available sites, compiled by DTO Executive
- Access to DTO model

#### **Consultant's tender**

- Interested Consultants are invited to submit to the DTO for consideration:
  - ◆ summary interpretation of the brief (3 pages)
  - ◆ proposed project methodology
  - ◆ proposed project team, including details of relevant experience of key team members, their status within the organisation and the charge-out rate for each,
  - ◆ cost of the project, and schedule of expected payments
  - ◆ Consultant's insurance details.

**Study Period**

- A1.1.7 It is anticipated that the study will take 6 weeks to complete, starting in mid-March 2002.

**Dublin Bus Based Park and Ride**

# **Appendix B:**

## **Demand Estimation**

### **Inner P&R Sites**



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## **B1.1 TRAFFIC FLOW DATA**

B1.1.1 Our approach to the modelling of potential demand for each site is based upon the provision of traffic flow data relevant to each site. The principal requirements of such data sets are that they are available by:

- vehicle type
- direction
- hourly time period.

B1.1.2 Whilst data was supplied by the client from the Dublin Transportation Model (DTM) and from counts undertaken by the National Roads Authority (NRA), neither data set was complete. DTM data was supplied for six sites based on an average weekday<sup>1</sup> morning peak flow into Dublin and an average weekday inter-peak flow.

B1.1.3 To apply the observed variations in interception rates by time period, it was necessary to produce flows by time period from the data supplied from the DTM. This was accomplished by a spreadsheet analysis producing similar averages from the sites using NRA data and then calculating the relationship between the average and hourly time periods. The DTM data was then distributed according to these factors to produce hourly flows.

B1.1.4 The traffic count data was available by direction and time period. Using data supplied by the NRA for Irish Roads, the proportion of car flows was modelled by time period and applied to the traffic count data.

B1.1.5 For many of the corridors, only one count data site was available. In the absence of more robust data this was used to calculate potential demand. Even with the limitations of the data this has still allowed a reasonable methodology to be employed to differentiate the relative performance of the proposed sites. Should work on building a business case for one of the short-listed sites be undertaken it is recommended that more accurate data is obtained.

B1.1.6 The target market for the P & R site was examined in terms of the percentage of traffic on the radial route having destinations inside the M50 on the same radial route. Where actual traffic count data was unavailable, this was done by a Select Link Analysis of the M50 junctions for the peak and off peak hour.

## **B1.2 P & R INTERCEPTION RATE**

B1.2.1 The interception rate for each site was determined by separating it into two parts; the base interception rate (estimated from experience of P & R sites elsewhere) and the incremental interception rate (estimated from an examination of relative journey time savings by bus over car).

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<sup>1</sup> Monday to Friday

## **B1.3 BASE INTERCEPTION RATE**

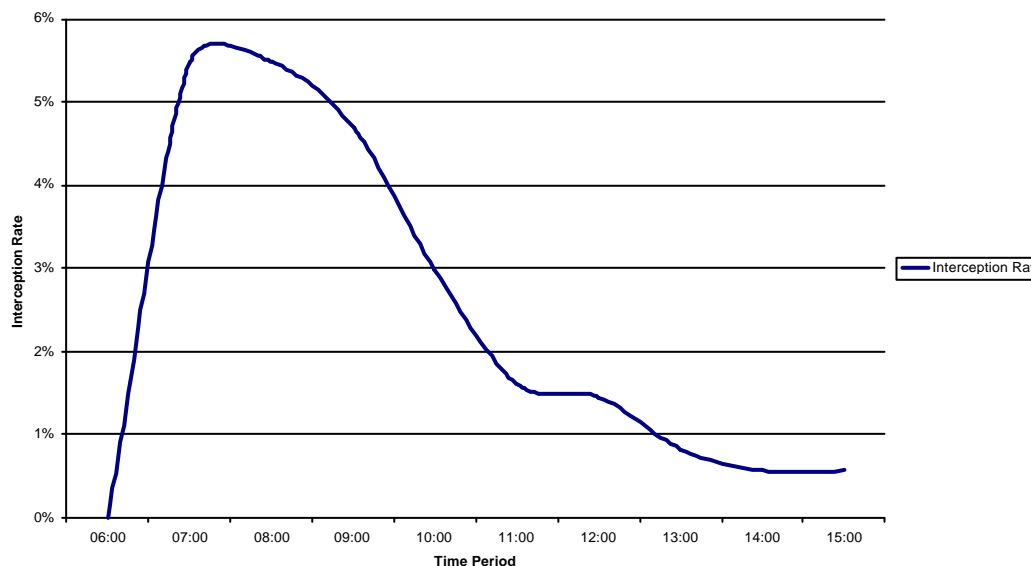
B1.3.1 The base interception rate has been estimated on the basis of experience of P & R sites in the UK, which indicate an active P & R time period of between 07:00 and 15:00hrs. Our research and analysis<sup>2</sup> of existing P & R operations show that overall interception rates are typically between 5% and 10% of traffic flows on the adjacent highway link. Rates towards or in excess of the top end of this scale are more commonly associated with urban centres where:

- P & R provision is linked to parking restraint in the town/city centre (sites in Oxford have achieved interception rates of between 11% and 15% since the introduction of such measures as part of the Oxford Transport Strategy).
- The differential pricing between parking charges in the town/city centre and the P & R site provides an incentive to use P & R.

B1.3.2 The greater distance of the proposed Dublin sites from the city centre, compared to other existing P & R sites in the UK, will reduce the attractiveness of using the P & R service. We have therefore added caution to our usual forecasting and tested a base average interception rate of 4.0% to the traffic flow within the active travel period.

B1.3.3 The P & R model applies a base interception rate to the traffic flows in the active P & R travel period, and distributes the average rate of 4% by hourly time period from observations of other P & R sites in the UK. However, we have calibrated the distribution according to the trip rates into Dublin in recognition of the earlier peak in traffic flows. An illustration of this variation is provided in Figure E.

**Figure E : Variations in Base Interception Rate by Time Period**



<sup>2</sup> Including TAS publication Park and Ride Survey and Report 2000

## **B1.4 INCREMENTAL INTERCEPTION RATE**

- B1.4.1 Journey times by bus and car from sites located on different corridors to the city centre will vary depending on the location of the site in relation to a radial route into the C.C. This is particularly evident along radial routes where Quality Bus Corridors are in place, with significant journey time savings by bus achieved along these routes. This has resulted in significant increases in patronage on bus routes operating along these corridors. This response of users was reflected in the estimation of the interception rate. It will increase the attractiveness of using the P & R service and the associated traffic interception rate.
- B1.4.2 Specifically, the development of Quality Bus Corridors (QBC) in Dublin has resulted in:
- reduction in observed bus journey times with bus journey times quicker than car for many journeys to/from the city centre at peak periods
  - reduction in the variability of journey times
  - substantial increases in bus use, and
  - up to 60% of new bus users being attracted from car on certain corridors.
- B1.4.3 Figure B (Chapter 3) illustrates the relationship between the proposed sites and the existing and proposed QBCs. The QBCs will give buses priority over other traffic and bring about related benefits to P & R operation. This should:
- Ensure that P & R resources will be used efficiently.
  - Makes the service more attractive to users by offering faster and more dependable journey times.
- B1.4.4 Data supplied by DTO indicated a 0.86% reduction in cars for every 1 minute saving in relative bus and car journey times, following completion of QBC schemes (0.86% transfer to bus/ 1 minute change in relative bus and car journey times). These former car users have transferred onto bus. DTO data on the observed differential between peak hour car and bus journey times for each proposed P & R site has been used in this assessment.
- B1.4.5 Where a site is located along the proposed QBN Network, it is assumed that the QBN Network will be completed before the opening of any P & R Site. A Design Speed of 22kph is assumed for the proposed network.
- B1.4.6 For sites where the journey time information does not extend from the city centre to the site, the same average speed is assumed to the site as currently exists from the city centre to the end of the existing QBC infrastructure.
- B1.4.7 A factor reflecting the rate of increase in demand for every 1 minute saving in journey time by bus over car (0.86%/ min) has been multiplied by the journey time saving, assuming the first 5 minutes of time saving to be of no influence. This gave the incremental intercept rate for the site, and allowed for the attractiveness of bus

based P & R resulting from the potential journey time saving offered by bus from each site to be taken into consideration in the demand estimation.

## **B1.5 POTENTIAL DEMAND**

B1.5.1 The formula for calculating potential demand is therefore:

<b>Potential Demand (Cars) =</b>	$(\text{Traffic Flow} * \% \text{ Straight Through Traffic}) * (\text{Base Interception Rate} + 0.86\% / \text{min} * (\text{Journey Time Saving, in mins} - 5 \text{ mins}))$
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A journey time penalty of 5 minutes was applied based on past research which shows that journey time savings of less than 5 minutes are perceived as being negligible and are not significant enough to encourage modal switch.

B1.5.2 This was done for each hour of the active P & R time period (07:00 – 15:00hrs). The traffic flow, the percentage straight through traffic and the base interception rate will vary for each hour during the active period. The impact of journey time savings are applied to traffic flows within the morning peak period (07:00 – 10:00hrs).

B1.5.3 The patronage figures were calculated for each hour based on the average vehicle occupancy figures from the Dublin Transportation Model. The peak hour figure of 1.47 is assumed to be representative of the entire peak period (07:00 – 10:00hrs) and the off peak figure of 1.42 is assumed to be representative of all other times (10:00 – 15:00hrs).

B1.5.4 Table B1, below for a sample site, N4/ 2 indicates the step by step procedure for estimating the demand for a P & R sites. The same procedure was followed for all other sites.

B1.5.5 The P & R model then calculates average weekday demand and applies a factor to estimate the demand on Saturdays. Our experience of P & R operations in the UK suggests that demand increases on Saturdays by around 13%. This has been applied to the average weekday demand, used to estimate weekly demand and then annualised.

*Bus Based Park and Ride*

**Table B1: Sample Demand Estimation for Inner Sites, (N4/ 2)**

Site No.	Time Period	Average Weekday Inbound Traffic Flow, cars	Percentage Straight Through Traffic by Time Period (% STT), %	Straight Through Traffic, cars	Base Intercept Rate by Time Period (Average = 4%), %	Journey Time Saving (JTS) by bus over car from site entrance to C.C., mins	Incremental Intercept Rate = JTF * (JTS – JTP)	Overall Interception Rate = Base Interception Rate + Overall Interception Rate, %	Weekday P & R demand = Straight Through Traffic * Overall Interception Rate, cars	Annualised Demand (Assumes a Monday – Saturday operation) with cars
N4/ 2	07.00 – 07.59	2,514	58	1,458	6.82	8	2.58	9.4	137	
	08.00 – 08.59	2,474	58	1,434	7.15	8	2.58	9.73	140	
	09.00 – 09.59	2,053	58	1,190	6.75	8	2.58	9.33	111	
	10.00 – 10.59	1,628	35	570	4.52	-	-	4.52	26	
	11.00 – 11.59	1,492	35	522	3.96	-	-	3.96	21	
	12.00 – 12.59	1,496	35	524	2.29	-	-	2.29	12	
	13.00 – 13.59	1,688	35	591	2.06	-	-	2.06	12	
	14.00 – 14.59	1,577	35	552	1.01	-	-	1.01	6	
	15.00 – 15.59	1,602	35	561	0.98	-	-	0.98	5	
	07.00 – 15.59	18,577	-	7,402				6.34	470	143,771

**Dublin Bus Based Park and Ride**

**Appendix C:**

**Dublin Parking Charges**



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## **C1.1 ASSESSMENT OF PARKING CHARGES**

- C1.1.1 We have estimated typical costs of parking within Dublin Centre based on both public car parks and, as far as we can ascertain, through privately arranged lettings.
- C1.1.2 Data collected from Dublin City Council shows that parking charges in multi-storey car parks varies between €1.27 to €2.35 per hour. Pressure on parking and the relative demand for short and long term parking appears to result in a relatively ‘flat’ scale of charging. Our assessment of parking charges is provided in Table C1 and shows that charges of between €10.40 and €21.30 are made for an eight hour working day.
- C1.1.3 Our assessment of P & R operations in the UK suggest that inter-peak demand for P & R sites typically involves a stay of around four hour duration. Table C1 shows that a four hour parking duration would cost between €5.20 and €10.60.
- C1.1.4 On-street parking in Dublin city centre varies between €1.50 and €1.90 per hour with a maximum stay of three hours. This implies parking charges of between €4.50 and €5.70 for shorter visits. Given current demand patterns we would expect that some part of current ‘all day’ demand is actually being met by on-street parking with ‘meter feeding’ and mid day relocation.
- C1.1.5 Although non-public parking is frequently provided at no cost to the car user we believe that the pressures on parking availability in Dublin give this sector a unique dimension in P & R assessment. By utilising the ‘dublinparking.com’ brokerage facility we have attempted to ascertain the ‘market value’ of all-day parking spaces within and on the fringe of the city centre.
- C1.1.6 Although this is necessarily an imprecise exercise and some of the results appear inconsistent and contradictory, it does give an indication of the extent to which both individuals and organisations are seeking additional parking provision and the prices that are being paid for these facilities.
- C1.1.7 From this analysis we concluded that:
- A market price of €8 per day is readily sustainable for a secure all-day parking place.
  - Inter-peak, shorter stay (half day or less) parking commands a much lower price and our best estimate of a sustainable price is €4.5.
- C1.1.8 The above prices have been used as a base case for our model. This could be refined with the addition of detailed data on non-residential parking stock, a better understanding of abuses of short term provision and a greater depth of understanding of the private letting market.

**Table C1 : Dublin City Parking Charges**

Parking Area	Price of 4 Hour Stay (€)	Price of 8 Hour Stay (€)	Notes
<b>Dublin City Operated Sites</b>			
Yellow Zone	7.60	15.20	
Red Zone	6.00	12.00	
Green Zone	5.20	10.40	
<b>ParkRite Operated Sites</b>			
ILAC Centre Car Park	8.10	21.30	
Parnell Centre Car Park	8.80	11.00	Over 4 hours a daily rate of 11.00 charged regardless of stay
Arnott's Car Park	9.20	14.30	
Irish Life Car Park	9.60	19.20	2.40 per hour for each hour stayed
Drury Street Car Park	8.60	20.30	
Dawson Car Park	9.10	21.30	
IFSC Car Park	9.20	18.40	2.30 per hour for each hour stayed
Christchurch Car Park	10.40	20.80	
Temple Bar	10.60	21.30	



**Dublin Bus Based Park and Ride**

**Appendix D:**

**Bus Operating Costs**



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## **D1.1 OPERATIONAL COST PARAMETERS**

D1.1.1 To provide a full comparison of each proposed site, it is also necessary to consider the operating costs for the provision of a bespoke service. We have modelled the likely operating costs using a number of input assumptions based on urban bus costs in the UK. These have been verified by Dublin Bus as being indicative of operating costs in the Dublin area. The input assumptions are provided in Table D1.

**Table D1 : Operational Cost Parameters**

Parameter	
Service Frequency	10 minutes
Journey time	= Distance / 22 kph for limited stop operation along QBC route
Vehicle Requirement	= Round trip time (including at least 5 minutes recovery time at each end) / frequency
Hours of Operation (07:00 to 19:00)	12 hours
Period of Operation	6 days (Monday to Saturday)
Driver Cost	€12.5 per hour
Supervisors on site	1
Supervisors Hourly Rate	€19 per hour
Mileage Related Costs	
Engineering Costs (tyres, fuel, maintenance)	€0.51 per km
Vehicle Costs	
Annual lease charge (per vehicle, per annum based on new low floor double deck / articulated vehicle price of EUR 285,000)	€57,000
Annualisation	52 weeks

**Dublin Bus Based Park and Ride**

**Appendix E:**

**Low Cost P&R Liffey  
Valley SWOT Analysis**



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## **E1.1 INTRODUCTION**

- E1.1.1 Our assessment of the proposed sites for the bus based Park and Ride (P&R) study has highlighted three sites along the N4 corridor as candidates for a pilot site. The recommended site is located adjacent to the Fonthill Road slip road.
- E1.1.2 Whilst the proposed Liffey Valley site has similar modelled demand characteristics, there is a journey time penalty because of the access from the N4 corridor that would reduce the attractiveness of this site to car users and increase operating costs.
- E1.1.3 However, it is recognised that the site could made operational with substantially less capital outlay. We have been asked by our client to review the merits of the Liffey Valley site being developed as a quick 'low-cost' bus based option, possibly in time for Christmas shopping 2002. This has been developed using Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis.

## **E1.2 SWOT ANALYSIS**

<b>Strengths</b>	<b>Weaknesses</b>	<b>Opportunities</b>	<b>Threats</b>
Low start up costs	<p>Difficult to segregate P&amp;R parking from other parking at the site.</p> <p>No parking restrictions on site currently. Introduction of restrictions may be viewed as a restriction on availability of shopping time, particularly in pre-Christmas period. May be viewed as abstracting shoppers from Liffey Valley.</p> <p>Lack of parking restrictions implies charging per bus journey. (Current price €1.30 single into Dublin)</p> <p>Low pricing could result in abstraction from other public transport or local car trips to P&amp;R site. Not in line with DoT objectives of local journeys being undertaken solely by public transport.</p> <p>Charging per car would be open to abuse in view of availability of 'free' parking.</p> <p>Short lead time to implement before end of November.</p>	<p>Ability to 'test the water' of bus based P&amp;R in Dublin.</p> <p>Possibility of enhancing existing 66X and 67X services to provide express services into Dublin and increase capacity of existing services.</p>	<p>Pricing strategy could undermine future charging of pilot bus based P&amp;R.</p> <p>Short preparation time could result in insufficient promotion that could undermine future P&amp;R development if unsuccessful.</p>

- E1.2.1 Our analysis highlights a number of weaknesses with the development of a quick low-cost option that could undermine the strategic development of bus based P&R in Dublin.

***Bus Based Park and Ride***

- E1.2.2 In view of the negotiations and arrangements necessary prior to implementation we feel that implementation before the end of November 2002 would be very optimistic.