

Woodbrook public transport demand (v5)

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For Carvill Group

1. Introduction

This paper first examines the likely passenger demand generated by the LD1 development in Lisburn. It then considers issues relating to phasing of the service, and pump priming required in the early years. It should be emphasised that the figures in this paper should not be regarded as firm estimates, but are to provide a basis for discussion and negotiation.

The estimates of bus demand produced in the Transport Assessments include only peak hours. This is useful for determining the maximum capacity required, but total daily demand is of more use in determining the commercial viability of service frequencies and hours of operation that can be supported.

2. Passenger demand calculation

RPS method and assumptions (1)

The method used by RPS for the Transport Assessment for the uplift in Carvill dwelling numbers uses TRICS database comparable developments (although these are not specified) in order to determine trip rates inbound and outbound at am and pm peak times only.

RPS in their revised Transport Assessment (February 2008) assumed mode share of 11% for the journey to work, and an assumption that the am peak passengers consist solely of journey to work passengers. (The 11% was given as the 2001 mode split for the Ballymacross adjoining Ward in Lisburn) This estimate is incorrect. The bus and train mode share for adjacent Wards was as follows:

Journey to work 2001	Ballymacross	Ballymacash	Ballinderry
Train	52 (2%)	60 (3%)	34 (2%)
Bus	131 (5%)	39 (2%)	17 (1%)
Note: some of those going by train will also make a bus trip to and from the station. These are not included in the bus figure.			

The calculation was based on the revised number of dwellings proposed for Phase 2 of the Carvill portion of LD1, namely 728 flats and 362 houses (1,090 total).

The Transport Assessment estimated that the outbound am peak hour demand as 109 bus trips. If the same trip rate for the am peak hour was applied to the whole of the LD1 development (i.e. 2,900, including reported uplift of dwelling numbers in the non-Carvill parts of the scheme), this would give an outbound am peak bus **demand of 290**. There is no figure provided for average non-peak demand. Since these figures are based on an 11% mode share, which is regarded by Translink as unrealistically high, the demand figure is also regarded by Translink as unrealistic.

The bus mode share for work in the Eastern region (excluding Belfast) was 5% in 2006-2006. If this is applied to the TA, the am **peak outbound demand from LD1 would be 131** rather than the 290 given by RPS. The figure for Carvill Woodbrook Phase 2 would be 50 rather than the 108 shown in the TA.

Alternative method of calculation (2)

As a check against the RPS-based output, an alternative method has been applied, again to calculate the am peak hour outbound bus passenger demand.

The same mode share is assumed. The trips are calculated as follows:

Dwellings	2,900
Average h/h size	2.6 (Ballymacoss Ward is 2.6)
Derived population	7,540
Trips per person/day (assumed)	2.5 (NI average))
Total trips/day	18,850
Assumed 10% am peak	1,885
Bus mode share 5%	94

The output from this method is close to that using the RPS method

Alternative method (3)

A further alternative method is to translate (likely) passenger figures per capita into peak hour trips. To make this calculation data are needed on the present per-capita bus ridership. To calculate the peak demand, a benchmark figure is also needed for the distribution of bus trips as between peak and off peak times.

In the absence of Lisburn data, the following assumptions have been used:

Per capita bus ridership in Northern Ireland (average) is around 42 trips per year (Population 1.71m population and 73.32m bus trips). This translates to a mode share of all trips of around 4%. Lisburn falls (in terms of population size) between the largest and smallest settlements in Northern Ireland, and it therefore seems reasonable to assume that the bus trip rate is around the NI

average. The population assumed is the same as for method 2 above (2,900 dwellings with average 2.6 h/h size)

Bus trips per annum per capita for LD1	42 (4% of all trips)
Per annum bus trips by LD1 population	316,680
Weekly bus trips	6,090
Average weekday bus trips	1,000 (weekday=16.5% of week)
Average weekday outbound bus trips	500
Average inbound bus trips	500
Am peak hour trips (outbound)	50 (10% of daily outbound trips)

Note: The 10% of trips in am peak is assumed but may be too high, given that the town services in west Lisburn do not start until after the morning peak.

Table 1 Summary of am peak hour bus demand calculations

Method	AM peak hour outbound bus trips
1. RPS – TRICS comparables and local census mode share	131 (using revised mode share)
2. Average trip rate and local census mode share	94
3. NI average per-capita bus use (benchmarking) and assumed peak hour share	50

This table illustrates a range of possible peak hour bus demand from 50 to 131, depending on the method used to calculate the demand. The lower figure equates with what Translink would consider to be realistic under current conditions.

3. Bus service in relation to demand

The higher peak hour figure of 130 would require 3 single deck buses (capacity around 50) which could be met with a regular 20 minute frequency, or 2 double deck buses (capacity 80) and a half hourly frequency. The higher frequency service has greater capability to attract more passengers (mode shift away from car or other modes), but this higher level of custom would have to fund the extra operating costs involved.

If demand is closer to the lower demand figure of 50 given by method 3 above, even greater efforts will be required to attract car users by raising the quality of service (“loss leader” subsidy) and by providing incentives and encouragements through the design of LD1 and the marketing and

management of travel at LD1. In terms of the raw peak demand numbers, two single deck 30-seat midi-buses per hour could provide sufficient capacity. However, a half-hourly service in practice will not encourage bus use, and certainly not mode shift away from the car, for which a minimum frequency of 20 minutes is required, and for which 15 minutes is considerably better. Moreover, the peak demand is rarely divided between the two halves of the hour, so there will be lack of flexibility with a half hourly service with the potential for overcrowding. It would therefore be preferable to operate three midi-buses running at 20 minute intervals. This also provides some spare capacity to allow for passenger growth.

In addition, account must be taken of the passenger demand from other areas between Woodbrook and the Lisburn bus station. Buses should be leaving LD1 with spare capacity to allow these extra passengers to board. A half hour service with a total hourly capacity of 80 (two buses with a capacity of 40 each) would mean about one third free capacity for this purpose.

Financial viability will be affected by a number of factors, for example:

- Frequency and hours of operation
- Bus size and quality
- The potential for other passengers boarding/alighting outside LD1
- The potential for “reverse” flow by non-residents
- Double deck buses may be preferable if demand is “peaky”, but not at the expense of providing an attractive frequency
- Whether the higher frequency can generate additional off-peak demand
- The proportion of concessionary fares
- The extent of integration with other (rail and bus) services in Lisburn, including the use of “plusbus” tickets
- The proportion of residents’ destinations served by the route(s) offered
- The effectiveness of marketing and travel planning

4. Other points relating to the bus service

- Bus service viability requires balanced passenger demand both in terms of peak and off-peak times of day, between weekdays and weekends, and also between outbound and inbound directions. The calculations above take no account of this.
- The existing assumed bus mode share of 5% in parts of west Lisburn for the journey to work could be higher in LD1 by virtue of the initiatives taken in the design and management of the scheme to promote the bus in preference to the car.
- The bus mode share is normally higher for the journey to work than for other trip purposes. However, this appears not to be the case with existing town services in west Lisburn, which do not begin operation until after the morning peak hour is over, and which finish operating before the evening peak hour is finished. This suggests that the town services are used mostly by shoppers rather than commuters.

- The inclusion at Woodbrook of some employment and a range of shopping and other facilities, and the proximity to the village centre of a primary school and recreation facilities will generate some inbound demand at off-peak as well as peak times. Such trips will assist the viability of the bus service, although they unlikely to be numerous.
- No account is taken here of passenger demand from other areas along the route. In practice this could form a significant part of the demand for the route(s) serving LD1, and thus add to their viability.
- Higher frequencies and qualities are capable of generating extra bus use. The aspiration for Woodbrook is to work hard to achieve this growth in bus use, especially for off-peak and non-work journeys. However, experience with town services in various NI towns has not shown a growth in demand commensurate with the increased town service frequencies. It may be noted that experience in other countries suggests that bus services cannot attract car users with frequencies of less than 20 minutes. The NI town services are mostly hourly or half hourly at best, and so the inability to attract substantial extra custom fits with the continental and other UK experience.
- The routing of services to Woodbrook needs careful consideration to maximise the utility to residents and visitors, to minimise “dead” mileage, and to provide a fast link to Lisburn centre. The 325 J currently provides the most direct route.
- It is assumed that the commercial viability should be judged on the basis of whole route costs and whole route revenues. Lightly used services (e.g. late evening and Sundays) will be internally cross-subsidised by the more heavily used services. There is no current prospect of evening or Sunday services, however.

5. Phasing

Taking an overall completion rate for LD1 of 300 per year, the project will take about a further 9 years to complete (2017).

Dwellings will be phased in so that those along or close to the bus route (spine route through LD1) are developed first. This will both minimise up-front infrastructure costs, and maximise bus use potential amongst the early residents.

Assuming the lower demand level discussed above, the prospects for commercial viability appear to be poor. Even with a final demand of 100 in the peak and 1,000 daily subsidy would need to be ongoing, unless the indicated 20 minute frequency can generate sufficient extra demand to bridge the gap. If demand were to be half of this amount, the subsidy requirement would be greater still. The amount of subsidy required as a result of extending services into Woodbrook will depend on the demand arising from other parts of the route. For example, if a subsidy was paid to provide a 20 minute service frequency, this would have to cover the cost of the extra operation for the entire distance between Woodbrook and Lisburn centre. If intervening demand did not increase, then Woodbrook would have to meet the entire subsidy.

Table 3 Assumed lower (average) demand level

End of year	Dwellings completed	Passengers AM peak outbound	Total bus trips/day (assumed)	Bus frequency (per hour)	Subsidy level (to be determined)
2009	600	20	200	3	6
2011	1,200	41	400	3	5
2013	1,800	62	600	3	4
2015	2,400	82	800	3	3
2017	2,900	99	965	3	2

Note: highlighted level is the LD1 dwellings with existing permission.

It is clear from the above tables that without the higher number of dwellings currently proposed, and without a fairly large mode share across the day, the provision of good bus services will require ongoing subsidy. This is considered to be unsustainable in the long term. The demand on current conditions could easily be half that shown in Table 3. This would inevitably mean only a half hour service, and still a prospect of ongoing subsidy requirement.

The proposed strategy is therefore:

1. Early promotional efforts to boost bus use
2. Provision of a quality service from the start, with appropriate level of subsidy – the affordability of this is not yet clear
3. Monitor bus usage and mode share, and costs and revenues
4. Continue and upgrade efforts as required over the short to medium term to bring passenger demand up to a level that will achieve commercial viability
5. Aim to reduce the level of subsidy by Carvill and other developers to zero by 2015
6. Continue to plan for higher residential density in the vicinity of the bus stops.

6. Demand with non-residents and higher mode share

The percentage mode share for bus trips is critical to the bus passenger demand. With the higher population proposed, together with the mixed uses attracting reverse-flow trips, it is estimated that an overall mode share of 12% will be required to achieve a commercially viable 15 minute service throughout the day and evening. This is 3 times the overall bus mode share for Northern Ireland, but could be achieved if the LD1 travel planning initiatives are fully implemented, and circumstances beyond Woodbrook support the objective. (There are, however, potential threats to the objective, such as the continued expansion of Sprucefield shopping centre at the expense of Lisburn centre. Carvill Group have no control over such factors.)

7. Assumed level of service requirement

The following is assumed to be the baseline level of service to achieve up to a 12-15% mode share average for all trips. This is three times higher than the

current NI average. Therefore, in order to achieve a high bus mode share at LD1, it would be necessary not only to promote and give incentives to choose the bus, but to provide a level of service that will provide a credible and acceptable alternative to the car for a range of journey purposes.

Bus service criteria that could meet these requirements are set out below:

1. Serves Lisburn rail station and bus station, Lisburn centre
2. Serves the whole of LD1 – stops max 300m from 90% of homes
3. 364 days a year service
4. 17 hour service daily (Sundays could be less) (e.g. 6.00 – 23.00)
5. Clockface timetable, regular intervals, the same every day
6. Initial frequency minimum 20 mins daytime, 30 mins late evening and Sundays
7. Target end frequency 10 mins daytime and 20 mins evenings/Sundays
8. Direct and legible route(s) (no combination routes, no long one-way loops, no long diversions into housing or industrial estates)
9. Congestion-free routes for reliability
10. Quality, accessible vehicles
11. All services operate same end-to-end route
12. High quality information at all stops
13. High quality off-route information (preferably real-time available individually by mobile phone and at multiple publicly accessible locations)

Under current conditions, Translink have advised that items 1, 3, 4, 6, 7, 13 are not achievable.

8. Conclusion

In order to secure a high quality, sustainable and commercially viable bus service for LD1 development area, it is necessary to build at sufficient density and mix to provide a good level of bus passenger demand throughout the day. Subsidy will be required in the early years before the development is fully built out and occupied, and the details of this will need to be determined (e.g. level, type, source of funding, timescale). The 1,800 initial dwelling numbers at LD1 (for which outline consent has been granted) is judged to be insufficient to support a quality bus service without a long-term subsidy being necessary.

The proposed uplift in dwelling numbers to 2,900 will help towards a viable bus service. The aim will be a minimum of three buses per hour during the day, increasing to four buses per hour from the main square by completion of the scheme.

In addition to sufficient population density, it will be necessary to take other measures to ensure that demand is at a level much higher than average. These measures are likely to require action by the developers in partnership with Translink. Some of these measures have already been outlined (e.g. the provision of a travel pass to new residents, and lower levels of parking provision) and further measures may also need to be determined. These should be determined for the whole of LD1.