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MALAHIDE QBC & ENVIRONS LEVEL OF SERVICE ANALYSIS

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Abstract

This study undertakes a Public Transport Service Level Survey and Analysis at designated stops on bus routes within or serving the Northside Partnership (NSP) "Healthy Community" study area [1].

The survey collected data relating to bus frequency, boarding / alighting figures, distance travelled to the stop, travel mode to the stop and onward travel mode. Survey locations were identified to assess varying levels of service on offer within the study area, including arterial, orbital and local feeder services. For each stop location, a catchment distribution map was prepared identifying the street of trip origin for each surveyed trip.

The results suggest that *High Level of Service* bus stops have walking catchment thresholds of 1000m plus. This equates to a catchment area traditionally associated in the literature with quality rail services.

Orbital stops, over a smaller sample and with a lower level of service, appear to have a similarly high (1,000m+) catchment. Local feeder services appear to have a catchment consistent with conventional thinking (i.e. up to 500m).

Approximately 1 in 3 of all passengers surveyed transferred either from or to another public transport service. This appears very significant in an urban transport market traditionally associated with low or negligible levels of transferability.

The study indicates that bus corridors with sufficiently high levels of service can have comparable catchment areas as with light and metropolitan rail corridors and that level of service is a key concern in determining the attractiveness of a particular service.

The survey was taken over a restricted study area in a distinct part of Dublin city. While corroborated by results from other parts of the city [5], it is hoped that a larger sample in further studies can add robustness to the findings.

Introduction

This study undertakes a Public Transport Service Level Survey and Analysis at designated stops on bus routes within or serving the Northside Partnership (NSP) "Healthy Community" study area. This study forms part of a wider, action-based research programme, the "Northside Partnership Healthy Communities" Project, being steered by Northside Partnership, jointly with DIT Environment & Planning and the HSE Health Promotion Unit.

In 2013 an assessment of mobility was undertaken among key disadvantaged communities in the Northside Partnership "Healthy Community" area [1]. The study revealed that while mobility levels are high, perceptions of the quality of mobility services are very low, particularly in relation to service reliability. Furthermore, significant barriers to mobility are presented by poor environmental conditions as well as safety issues. The study recommended further research into the quality of mobility services in the area. One area that was highlighted for particular focus was the quality of public transport services accessing the area.

This study investigates the quality of public transport services in the study area, and user's perceptions thereof. It also investigates the distances people are willing to travel to services, as well as their propensity to transfer, at relative levels of service.

The "Healthy Communities" study area, described more fully in the 2013 AESOP Paper [1], comprises of 6 Electoral Districts (ED's) in a particularly disadvantaged part of the Northside Partnership district. It runs adjacent to the Malahide Quality Bus Corridor (QBC) which accesses the city centre. It is served by a number of branch (or local) feeder services. It is

also served by an orbital service, the 17A, which connects a number of key centres in the north east part of Dublin.

Methodology

In order to understand responses to public transport service levels in the area, surveys were undertaken at 5 designated stops on bus routes within or serving the Northside Partnership (NSP) Healthy Communities study area (see Figure 1). Three stops were on the Malahide QBC (Clare Hall, Coolock Village and Artane Roundabout). One stop was on a branch route (Priorswood Road) and one stop was on an orbital route (Kilmore Road).

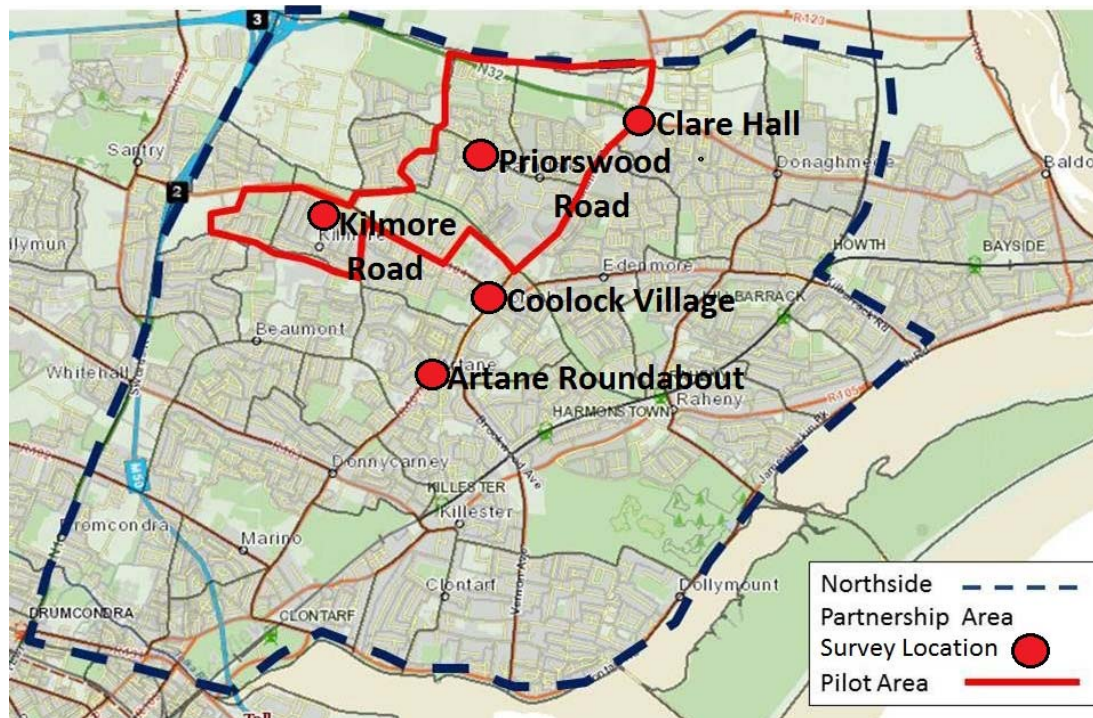


Figure 1: Healthy Communities Study Area and location of surveys

The surveys were undertaken by DIT BSc Spatial Planning students on Thursday 10th April from 8am – 10am at 5 bus stops on the Malahide QBC & environs. The surveys were undertaken in pairs and the following data was captured: -

- Trip origin;
- Principle mode travelled to the stop;
- Principle mode of onward travel;
- User perceptions of service quality at the stop;
- Bus frequency;
- Boarding / alighting figures.

Quotas were easily met at the QBC stops. Quotas were too high on the orbital and local stops, relative to the number of passengers actually using these stops, but an adequate quantum was sampled.

A total of 194 boarding passengers were surveyed out of a total of 616 who boarded during the survey, yielding a sample of 32%.

For each stop location, a catchment distribution map was prepared showing the origin of each surveyed trip. Charts were also prepared illustrating user perception of service quality, propensity to transfer and bus operations at the stop.

Levels of Service

The number of buses per hour serving each stop location was recorded (see Table 1). Overall a marked difference in Level of Service was noted between the QBC inbound and other routes.

- QBC service frequencies increased as the corridor approached the city, with 30 buses per hour serving the Artane Roundabout stop (inbound) during the peak hour.
- On the orbital route, at Kilmore, 4-5 buses per hour were recorded (in both directions).
- At the Priorswood stop, a local branch route, 5-8 (inbound) buses per hour were recorded.

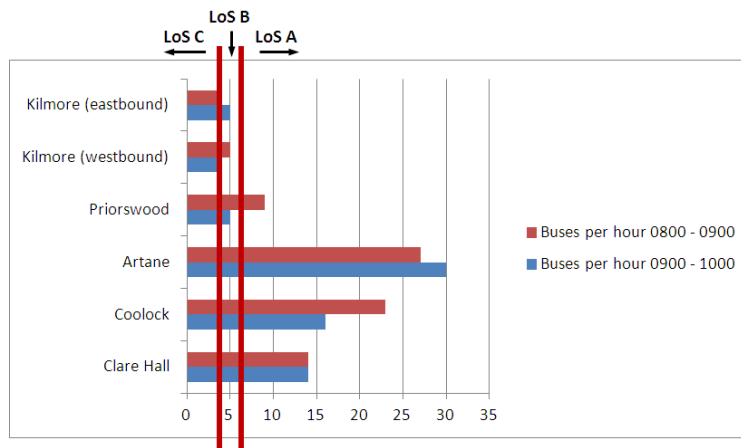


Table 1 (left): Service Frequency by location

The Level of Service (LoS) on the Malahide Corridor has been assessed previously in the context of the Transportation Research Board's Transit Capacity and Quality of Service Manual (TCQSM) [2]. The TCQSM provides a multi-criteria toolkit for measuring the quality of a

public transport service. Principle criteria include: Hours of Service; Relative Travel Time / Service Frequency. Overall, in the 2003 assessment, the corridor scored highly in terms of all measures applied, yielding TCQSM scores of LOS A-C, and in most cases A-B.

This current assessment similarly finds the services under study scoring highly in terms of respective TCQSM LoS criteria. In terms of Hours of Service, all routes are within LoS A. In terms of Service Frequency (see Table 1) each service scores as follows: -

- QBC services were running on a 2-4 minute frequency (LoS A);
- Local services were running on a 8-12 minute frequency (LoS B);
- Orbital services were running on a 12-15 minute frequency (LoS A-B).

Patronage Data and Sample Sizes

The number of passengers boarding and alighting at each stop during the survey period was recorded (see Table 2).

- A total of 616 passengers boarded and 236 passengers alighted at the survey stops.
- Patronage was significantly higher at the QBC stops. 90% of all surveyed movements were at the three QBC stops.
- The numbers of passengers alighting increased inbound on the Malahide QBC.
- No passengers alighted at the Priorswood stop.
- A balanced, if low patronage profile was evident at the Kilmore orbital stop, where similar numbers boarded (24) as alighted (19).

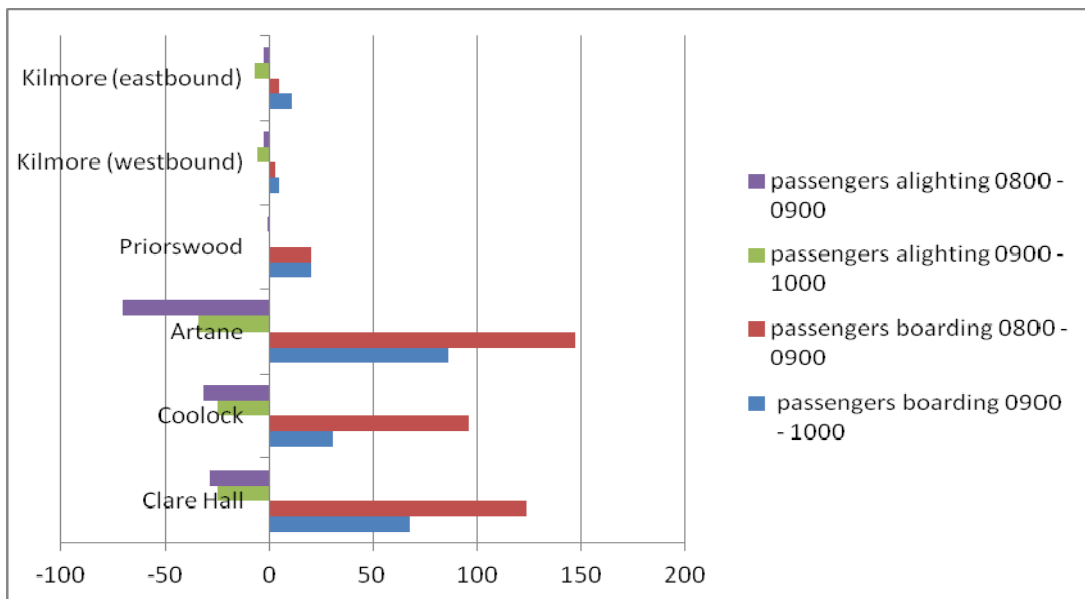


Table 2: Passengers boarding & alighting by survey location

Propensity for Transfer

At each stop waiting passengers were queried as to which mode they arrived on and, also, how they planned to complete their onward journey at the other end of the service. The results were as follows: -

- 80% of passengers walked to their bus stop;
- 11% of passengers drove to their bus stop (mostly kiss & ride);
- 8% of passengers arrived at their stop by bus;
- 29% transfer onto another public transport service while 2% transfer onto a bike.

Approximately 1 in 3 of all passengers surveyed transferred either from or to another public transport service. Overall this appears a very high level of passenger transfer within a transport market where traditionally transferability is thought of as being low or even negligible.

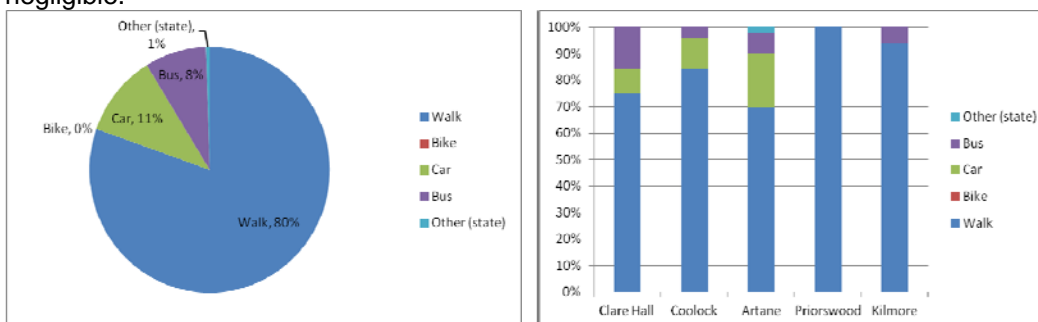


Table 3a&b: Arrival mode (left) and (right) Arrival mode by survey location

The highest level of transfers (54.9%) was recorded at the Coolock Village stop, which is served by both radial and orbital services. Coolock Village is served by strong arterial and orbital services. These are reasonably well connected, if not directly so. A walking distance of 140m separates the 17A orbital service and the Malahide QBC services at Tonleegge Road / Malahide Road. However, since most of the transfers are for the onward journey other factors would appear to be influencing the travel patterns. It is not clear from the survey data what these may be. A deeper investigation at this location, such as a focus group or more detailed survey, may be required to validate and understand this data better.

Significant levels of public transport transfer (35.7%, 20%, 30% & 29.4%) were also recorded at the Clare Hall, Artane, Priorswood and Kilmore stops.

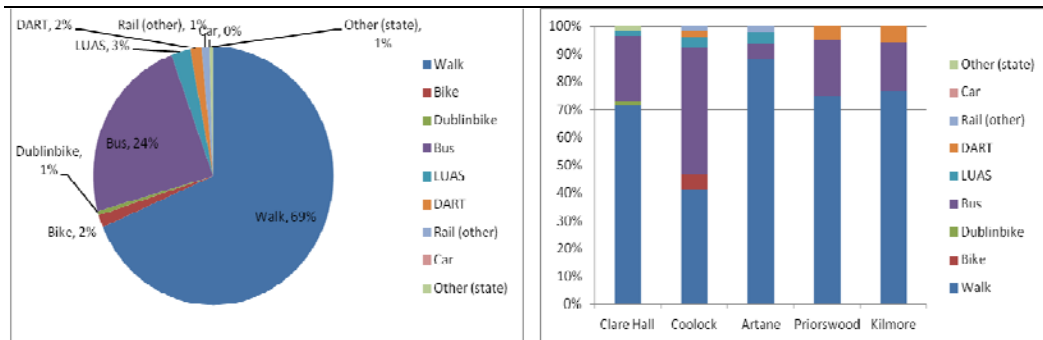


Table 4a&b: Onward travel mode (left) and (right) Onward travel mode by location

In total, 35.5% of all travellers surveyed transferred either from or to another public transport mode as part of their journey. Excluding the Coolock outlier, this figure reduces to 28.7%.

Level of Service Analysis

At each stop waiting passengers were queried how they would rate the service they were taking in terms of the following service factors: Frequency; Comfort; Convenience; Safety, and Reliability.

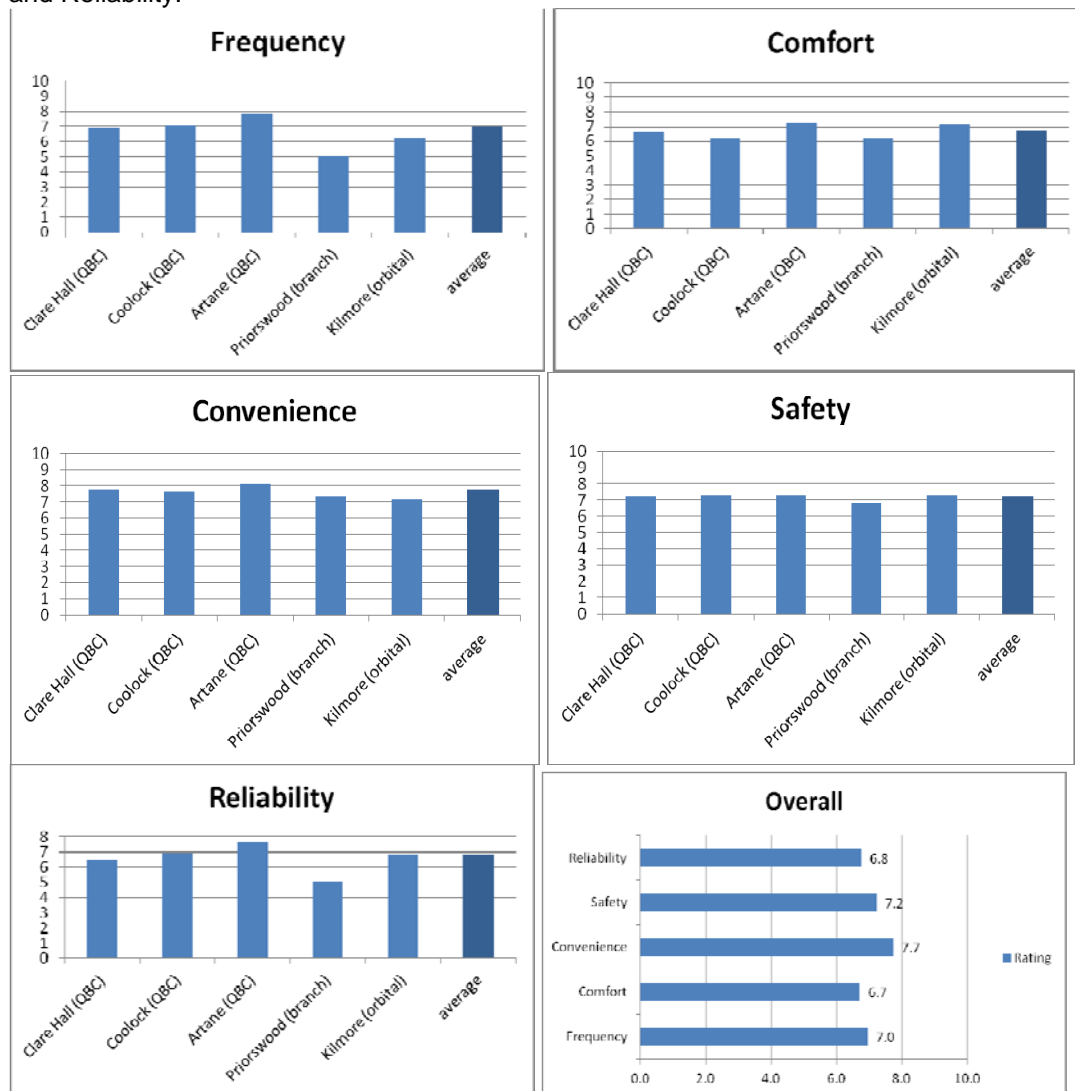


Table 5: Traveller's Perceptions of Service Quality at Each Stop Location

Overall perception of service quality was high, scoring approximately 7 out of 10 (or higher) for reliability, safety, convenience, comfort and frequency. Only the Priorswood stop scored less than 6 out of 10 for any criteria (scoring 5.1 for both frequency and reliability).

Within the sampled population there is a consistently favourable perception towards both the overall Quality of Service and individual components. This survey was conducted during the peak and shoulder-peak service periods. An off-peak or diurnal study may possibly yield more complex results. Generally, analysing and interpreting perceptions of service quality and ordered choices can itself be complex [3]. It is hoped that this data, combined with that from other, similar studies in other parts of the city, will be analysed in further, more detailed studies.

Catchment Analysis

For each stop location, a catchment distribution map was prepared showing the absolute origin of each surveyed trip (see Figures 3a-e). Frequently, during the surveys, travellers provided the names of estates, rather than street names, as the point of their trip origin. In either case the trip was geo-referenced to a street or estate centroid and plotted accordingly. Note: for some stops, several trips originate from faraway points so additional small scale maps were created.

Figure 3a: Malahide QBC - Clare Hall (stop i/d: 4563)

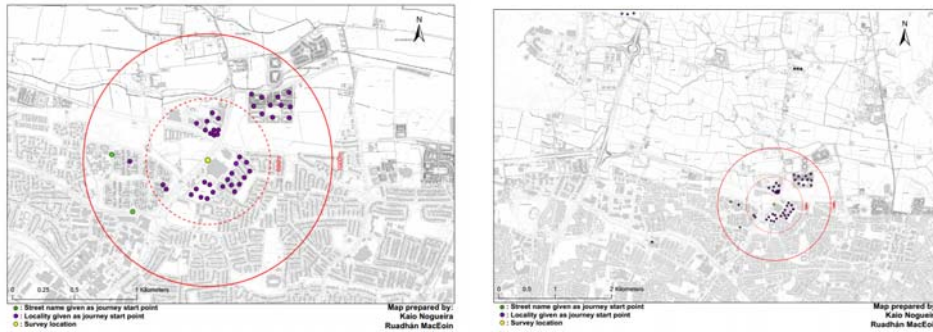


Figure 3b: Malahide QBC - Coolock Village (stop i/d: 1274)

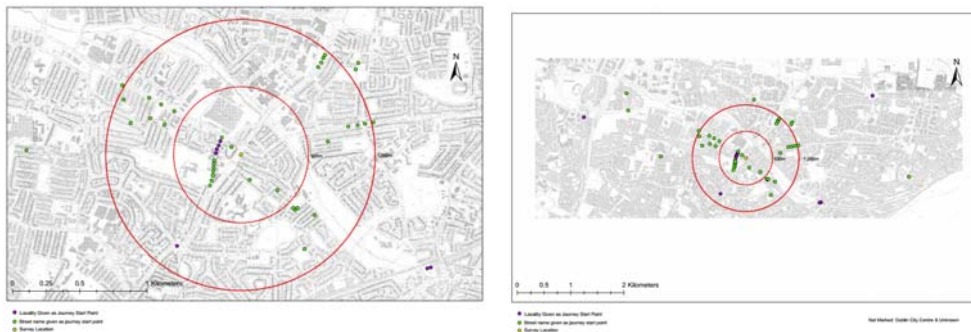


Figure 3c: Malahide QBC - Artane Roundabout (stop i/d: 1277)

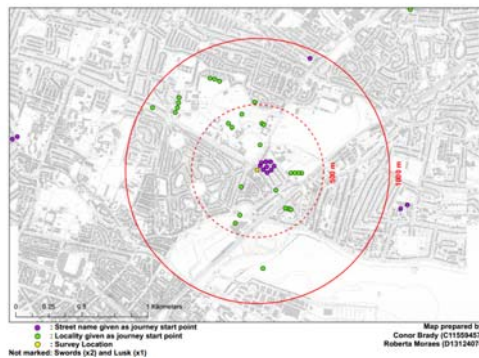


Figure 3d: 17A Orbital - Kilmore Road (stop i/d: 1252)



Figure 3e: 27A Branch Feeder - Priorswood Road (stop i/d: 1260)

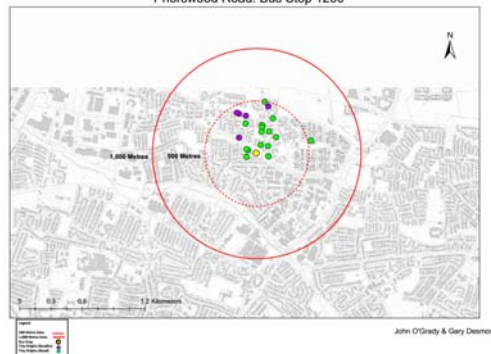


Table 6 provides a breakdown of the quantum of trips from each significant travel band.

At those stops where LoS A Service Frequency levels are provided (i.e. the QBC stops), 50.4% of trip origins are 500m or greater. An 85th percentile analysis indicates a natural catchment threshold range of 850m – 1,000m.

At the LoS A-B stop (i.e. the branch feeder stop) 95% of trip origins are within 500m.

At the LoS B stop (i.e. the orbital stop) 66% of trip origins are 500m or greater. An 85th percentile analysis suggests a natural catchment threshold of 1000m.

The study demonstrates that, within the study area, both High Level of Service and orbital service bus stops have catchment thresholds significantly greater than 500m. 85th percentile analysis suggests natural catchment thresholds of 850-1000m. This equates to a catchment area traditionally associated in the literature with quality rail services. These catchments are measured in Euclidian (as the crow flies) distances. Actual network distance would with certainty, yield significantly larger catchment thresholds.

		< 500m	500m - 1000m	> 1000m	85th Percentile
LoS A	Clare Hall	30	14	8	44
	Coolock	15	21	13	42
	Artane	26	11	5	36
		49.7%	32.2%	18.2%	
LoS A-B	Priorswood	19	1	0	17
		95%	5%	0%	
LoS B	Kilmore	5	8	2	13
		33%	53%	13%	

Table 6: Quantum of Trip Origins by Travel Band

Conclusions

Each of the *High Level of Service* stops (Clare Hall, Coolock Village and the Artane Roundabout) have catchments thresholds of 1000m or higher. This equates to a catchment area traditionally associated in the literature with quality rail services [4].

The orbital service stop (Kilmore Road) also has a walking catchment threshold of 1000m or higher, although it is directionally biased, indicating possible catchment overlap with another stop. Beaumont Hospital, a short distance to the southwest, is also a major trip attractor.

The local service stop at Priorswood has a very clearly defined walking catchment threshold of 500m. This is directionally biased, indicating possible overlap with an adjacent stop.

Approximately 1 in 3 (35.5%) of all passengers surveyed transferred either from or to another public transport service. The highest level of transfers was recorded at the Coolock Village stop, where 55% of all travellers surveyed transferred as part of their journey.

A similar study being carried out on the Stillorgan QBC, a corresponding QBC serving higher socio-economically stratified suburbs on the southside of the city, revealed lower but still significant levels of transfer. In the Stillorgan study, transfer rates were 14% of all trips. While much lower, this still demonstrates a significant latent demand for transfer within the overall network [5].

Overall perception of service quality was high, scoring approximately 7 out of 10 (or higher) for reliability, safety, convenience, comfort and frequency. Only the Priorswood stop scored less than 6 out of 10 (for both frequency and reliability).

These results point towards a number of potentially relevant and new understandings about public transport user behaviour within the Greater Dublin Area: -

- i) that users may be more influenced by Level of Service than by transport mode;
- ii) that there is a demand for transfer within the Dublin transport market, even where it may be poorly provided for;
- iii) that orbital services may have a relevance within a quality bus network

The available data and relevance of the findings suggest that further more detailed assessment is warranted. The "network analyst" function within ArcGIS should be applied to the trip-origin distributions to assess the relationship between catchment and urban form in more detail. The data associated with each survey point is nuanced and may be skewed by socio-economic and geographical factors such as urban density. A larger study sampling a wider study area may add robustness to the findings.

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