

Taxi Research Partners DCTC Neighborhood Van Service Assessment

1.0 Executive Summary

This paper identifies the potential market for Neighborhood Van services to operate in the District of Columbia. The analysis is based on a large scale survey of DC residents, undertaken in the fall of 2014, and the development of a cost model, as set out in this document. The paper concludes that demand exists for Neighborhood Vans, in two areas in South East Washington DC. The paper concludes that current demand could be satisfied by the licensing of four (4) neighborhood vans in a zone within Ward 7, and three (3) vans in a zone within Ward 8, where each van operated two shifts per day. Or eight (8) vans in zone 7, and six (6) vans in zone 8 where operated on single shifts. Demand for overnight transportation within the zones would be insufficient to justify overnight provision.

What is a Neighborhood Van?

A neighborhood van would be a new service type that provides 'Jitney' type services to defined areas within the District of Columbia. Passengers would be able to hail or call the vehicle, and would be asked a single fare of around \$6 per trip. The van would remain in active service for the majority of its operating hours, and would stop only briefly as dictated by loading, and collection of passengers. The van would be available to all and used in multiple occupancy. Each would be provided using flexible wheelchair accessible vans, such as the Ford Transit Midroof in flex alignment.

How does the Neighborhood Van fit within Taxi Licensing?

A Neighborhood Van would be a licensed vehicle plying for hire, regulated by the District of Columbia Taxicab Commission. It is not intended to provide a taxi service, but rather operate from multiple passengers within a defined area or zone. Van services would not seek to replace taxis, nor divert trips that would otherwise be taken using taxis, but rather to provide a new method to access goods and services in areas with low taxi penetration.

What would a Neighborhood Van driver earn?

After costs, a Neighborhood Van driver would receive take home earnings of approximately \$30,000, described below. No single driver will earn exactly the same amount. The amount is likely to vary depending on the local circumstances, and can be higher for drivers able to attract more passengers, for example where phone bookings are taken using a cellphone.

1.1 Survey Data

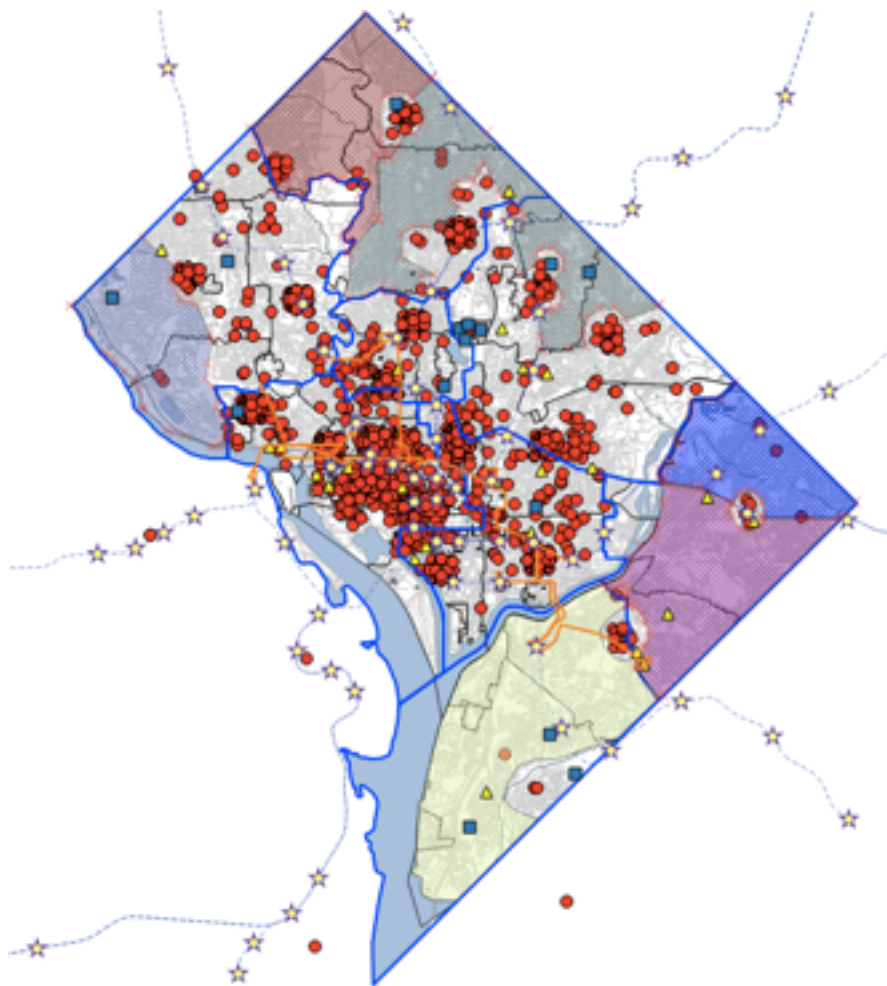
We have based our analysis upon measured data, including that held by the DCTC Taxicab Information System (TCIS) and survey responses. A large-scale survey was undertaken in fall 2014, with 4,000 Survey questionnaires distributed to recipients identified at random from the electoral register. Surveys were distributed across wards with low taxi use, and in neighborhoods with a limited number of taxi pick-ups. Survey data has been used to calculate the number of trips likely in each neighborhood, likely trip purpose, and trip length, as well as informing location and zone definition. Survey data was applied to the calculation of the numbers of vehicles required to provide services

and potential for commercial return to be made by an operator or groups of operators, discussed in subsequent sections of this document. Current operational data was derived from TCIS to provide an overview of locations with limited taxi service, and to calibrate the number of trips stated within the survey and likely to be demanded of Neighborhood Vans, described in more detail below.

1.2 Geographical zones for analysis

The initial analysis identified locations where taxi services (pick ups) were limited. Areas with higher numbers of taxi pick ups are illustrated on map 1 by red dots, with a number of shaded zones added to show areas with lower numbers of taxi trips.

Map 1: Locations of principal taxi pick ups



Three areas are distinctly less well served by taxis than other locations, being the area to the South and East of the Anacostia river, roughly equating the lower right hand area of the map including

present day wards 7 and 8; the area at the northern apex of the District, being part of wards 4 and 5; and the area to the west of the map running along and parallel to the Potomac river. A sample of addresses was obtained from the Electoral Register for each of Wards 4,5,6,7 and 8, and a total of 4,000 surveys were distributed. A response rate of slightly above 10% was received, and this formed the base for the calculations discussed below.

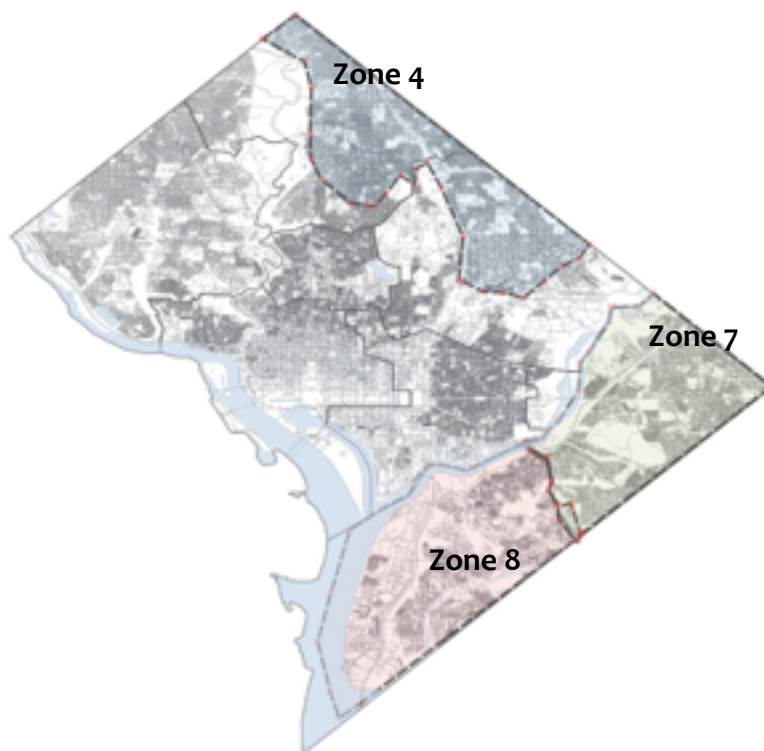
1.3 Calculation of base demand

Base demand was calculated on the reported propensity, or likelihood, that a respondent would use a Neighborhood van. The number was calibrated using observed traffic flows and taxi use by area, to provide a total number of trips per neighborhood.

Three zones were identified and named after the ward in which their largest area fell. These are:

- Zone 4: Covers the Northern apex and north East border with Maryland, including sections of wards 4 and 5
- Zone 7: Covers the physical area of ward 7, including an area around Good Hope Safeway grocery store, shared with Zone 8
- Zone 8: Covers the physical area of ward 8, including an area around Good Hope Safeway grocery store, shared with Zone 7

Map 2: Initial operating zones for analysis



Base demand was calculated using responses to usage identified within the survey, and calibrated as discussed below. Trip production rates were derived from stated frequency of use, illustrated in relation to car use in table 1.

Table 1: Car Use / Trip Production by ward

ALL WARDS		ALL	Zone 4	Zone 7	Zone 8
Stated my own car use	Percentage from survey	1/way trips per week (1)	(b * c)		
Every Day	48.55%	14	6.797	7	6.1824
Every Week	18.84%	4	0.7536	1.1852	0.4676
Every Month	0.72%	0.5	0.0036	0.00925	0
Less than once per month	2.17%	0.25	0.005425	0.004625	0.0065
Hardly ever	5.07%	0.1	0.00507	0.00185	0.00779
Do not use	24.64%	0	0	0	0
Effective trips / week, all population			7.565	8.201	6.664
Effective trips / day, all population			1.081	1.172	0.952

The survey data suggests a difference in car use across the District, with zones 7 and 8 demonstrating lower than average use of cars, zone 4 a higher rate of car use. Using the same concept applied to Neighborhood vans, calibrated against observed and recorded use of transit and taxis¹, an initial calculation suggests that zone 4 would produce an average of 27 trips per day and would be unlikely to sustain operations on a commercial basis. Zone 7 and Zone 8 would be more likely to be commercially viable, producing 145 trips, and 124 respectively, see table 1a.

Table 1a: Trip Production and Van requirement by zone

	Zone 4	Zone 7	Zone 8
Predicted van trips / day	27.9	144.93	124.34
Minimum Van Requirement	0	4	3
Mean hours in service		14	14
Mean passengers carried per hour / van		2.59	2.96
Mean trip distance / person (miles)		4.31	4.28
Mean driven distance/hr @ 1.5 occupancy (miles)		7.44	8.45

¹ Calibration provides a method of extrapolating likely demand for a new service on the basis of observed demand and stated desire to use. This is described in subsequent sections of the document.

On the basis of vans operating a two shift system (2 x 1 shift of up to 8 hours), Zone 7 would require 4 vans to cover the predicted demand, and zone 8, 3 vans.

1.4 Operating Economics

In order to provide a reasonable service, the van operator needs to balance income received from fares against costs of operation. In the following tables we illustrate the annual costs and potential income. Table 2 sets out the typical ownership and shift patterns on which this calculation is based.

Table 2 Van ownership, shift patterns and fare charged

Ownership / operations	
Vehicle ownership, costs split evenly between	2
Numbers of shifts operated per day	2
Length of shift in hours per day	7
Fare charged per passenger carried	\$6

Annual costs are based on the Ford Midroof, illustrated here with a service life of 8 years, purchased new and depreciated over 8 years to a zero resale value, and split between fixed costs - the cost of the vehicle itself, and variable costs such as fuel. Vehicle purchase costs have been obtained from Ford, and the conversion company mobility works. Trip purpose and trip distance have been identified from survey responses. Fuel efficiencies have been obtained from the 2015 Department of Energy Fuel Economy Guide.

1.4.1 Calculating take home pay, zone 7

As the numbers of passengers differs by zone, we have set out separate calculations for zones 7 and 8. Zone 4 is unlikely to attract sufficient users to make commercial sense. Vehicle costs, shown in table 3, remain consistent between zones.

Take home pay is calculated as the total income derived from fares minus the amount paid out in operating costs. Table 3 illustrates the fixed costs of purchasing a vehicle, including its finance, insurance and maintenance. Table 4 illustrates fuel costs that would be encountered in zone 7 for an average driver. The fuel cost is based on current rates (November 2014), which may change; and a calculation of mean trip distance based on survey responses to use and distance to activity. Trips that would fall outside the zone are excluded as these would not be available using a Neighborhood Van. Table 5 illustrates a calculation of monies taken through fares and are totaled in Table 6 to show potential take home pay for a driver operating in zone 7. A similar calculation is made for zone 8 and illustrated in tables 7 - 9.

Table 3 Annual vehicle fixed costs, Zones 7 and 8

Item	Description	Total Cost	Annual Cost
Vehicle	Ford Chassis Cost, qualified government purchase cost	\$31473.00	
	Upfit Cost accessibility	\$17493.00	
	Dealer Fee	\$118.00	
	Mobility and retail discount	-\$1500.00	\$5948.00
Finance Cost	Vehicle Finance APR from: Wells Fargo (APR: 5.24%)		\$311.68
Vehicle Annual Insurance Cost			\$3,500.00
Vehicle Annual Maintenance Cost			\$1,000.00
Vehicle Annual License Costs	1 yr taxi plus application cost		\$175.00
Vehicle Annual Test Costs			\$200.00
	TOTAL Annual Fixed Costs		\$11134.68
	Number owners sharing cost	2	
	TOTAL Annual Fixed Costs per owner		\$5567.34

Table 4 Annual vehicle costs - variable costs Zone 7 only

Item	Description	Base	Unit	Costs
Distance driven per hour	Miles driven per hour. Both loaded and empty	7.44	Miles	
Vehicle Fuel Efficiency	Estimated gasoline efficiencies	16	MPG	
Fuel Cost	Gallon Regular Gasoline (sourced Nov 26, 2014)	\$2.80	Gallon	
Fuel cost per hour				\$1.30
	Hours worked / day / driver	7	Hours	
	Days worked / week / driver	6	Days	
	Weeks worked / year / driver	50	Weeks	
Fuel costs per year				\$2,732.84

Table 5: Income calculation zone 7

Item	Description	Base	Unit	Costs
Fare charged	Flat rate per trip	\$6.00		
	Passengers per hour in service / vehicle	2.59	Passengers	
	Income per hour	\$15.53		
	Hours worked / day / driver	7	Hours	
	Days worked / week / driver	6	Days	
	Weeks worked / year / driver	50	Weeks	
Income per year	Amount received before costs / driver			\$32,609.25

Table 6 Annual costs, vehicles + fuel, Annual take home income - zone 7

Item	Description	Base	Unit	Totals
Fixed costs	From table 3	\$5567.34	/ Year	
Fuel costs	From table 4	\$2,732.84	/ Year	
TOTAL COSTS PA				\$8,300.17
Income	From table 5	\$32,609.25	/ Year	
TOTAL INCOME PA				\$32,609.25
Effective Pay	Income before costs MINUS costs		/ Year	\$24,309.08

1.4.2 Calculating take home pay, zone 8

As for zone 7, above, the following calculations set out the potential take home pay for a driver in zone 8. Vehicle costs, shown in table 3, remain consistent between zones.

Table 7 Annual vehicle costs - variable costs Zone 8 only

Item	Description	Base	Unit	Costs
Distance driven per hour	Miles driven per hour. Both loaded and empty	8.45	Miles	
Vehicle Fuel Efficiency	Estimated gasoline efficiencies	16	MPG	
Fuel Cost	Gallon Regular Gasoline (sourced Nov 26, 2014)	\$2.80	/ Gallon	
Fuel cost per hour				\$1.48
	Hours worked / day / driver	7	Hours	
	Days worked / week / driver	6	Days	
	Weeks worked / year / driver	50	Weeks	
Fuel costs per year				\$3,104.36

Table 8: Income calculation zone 8

Item	Description	Base	Unit	Costs
Fare charged	Flat rate per trip	\$6		
	Passengers per hour in service / vehicle	2.96		
	Income per hour		\$17.76	
	Hours worked / day / driver	7	Hours	
	Days worked / week / driver	6	Days	
	Weeks worked / year / driver	50	Weeks	
Income per year	Amount received before costs / driver			\$37,302.00

Table 9 Annual costs, vehicles + fuel, Annual Take home pay - zone 8

Item	Description	Base	Unit	Totals
Fixed costs	From table 3	\$5567.34	/Year	
Fuel costs	From table 7	\$3,104.36	/Year	
TOTAL COSTS PA				\$8,671.69
Income	From table 8	\$37,302.00	/Year	
TOTAL INCOME PA				\$37,302.00
Effective Pay	Income before costs MINUS costs			\$28,630.31

2.0 Zone Definitions

Neighborhood Van zones are defined on the basis of a defined geographical area within which sufficient demand is identified to justify commercial provision. Two zones are likely to be commercially viable, and are broadly contiguous with Ward 7 and Ward 8 according to the 2012 ward boundaries for the District of Columbia. We have named these zone7 and zone 8 respectively. A similar area centered in the northern apex of the District, including areas of Wards 4 and 5 (and a small part of Ward 6), was considered but did not demonstrate sufficient demand to justify commercial provision on the basis of survey responses.

The definition of zones are illustrated in Maps 2 and 3, below, and are based on the ward boundaries and exceptions:

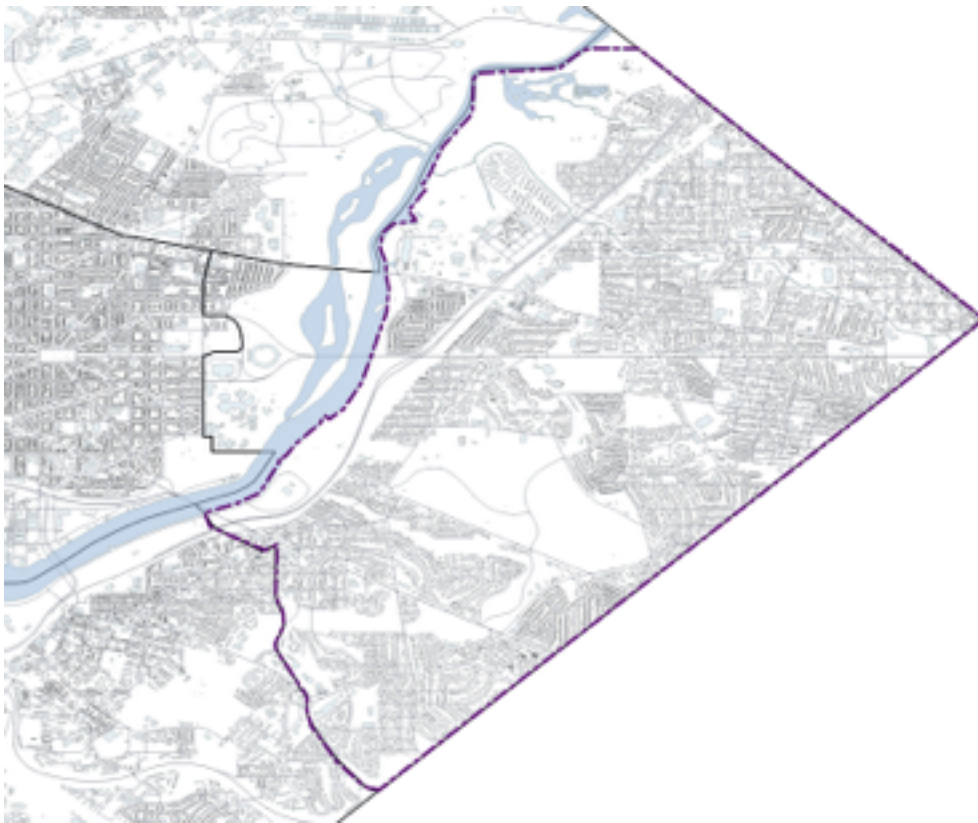
Zone 7 is confined to the 2012 geographical boundary of Ward 7, to include all of ward 7, with the following exclusions:

- The zone shall not extend to the West of the Anacostia River
- The zone shall not include Kingman Island

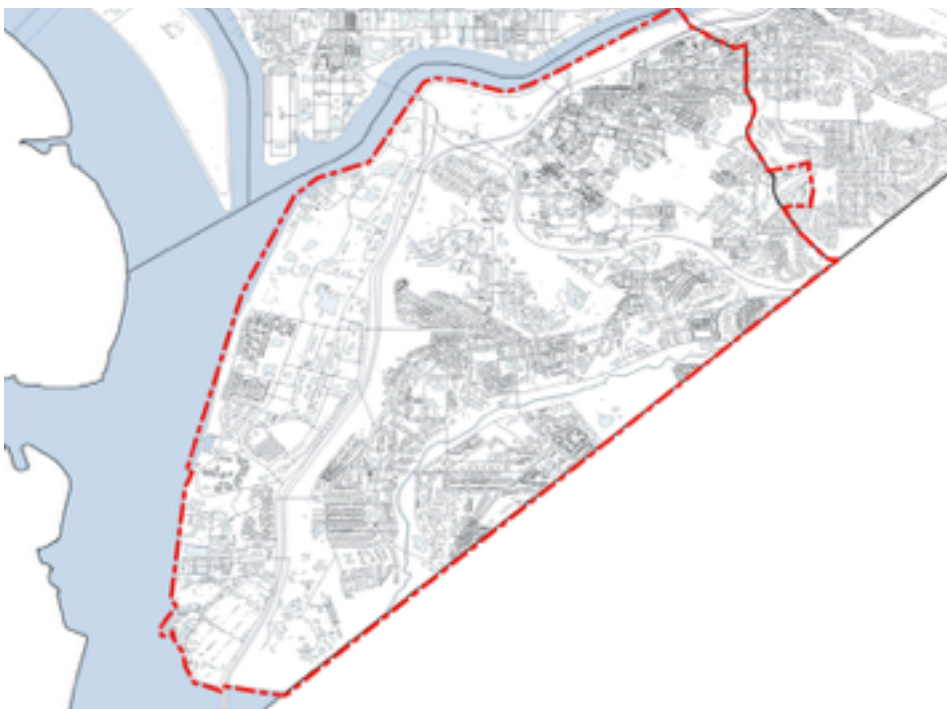
Zone 8 is confined to the 2012 geographical boundary of Ward 8, to include all of ward 8, with the following additions:

- The zone shall also include the retail area to the South and East of the intersection of Good Hope Rd SE and Alabama Ave SE, to include but not extending beyond: Erie Street SE to the south, 30th St SE to the east, and the intersection of Akron Place SE and 30th St SE to the north.

Map 2: Zone 7 boundaries



Map 3: Zone 8 boundaries



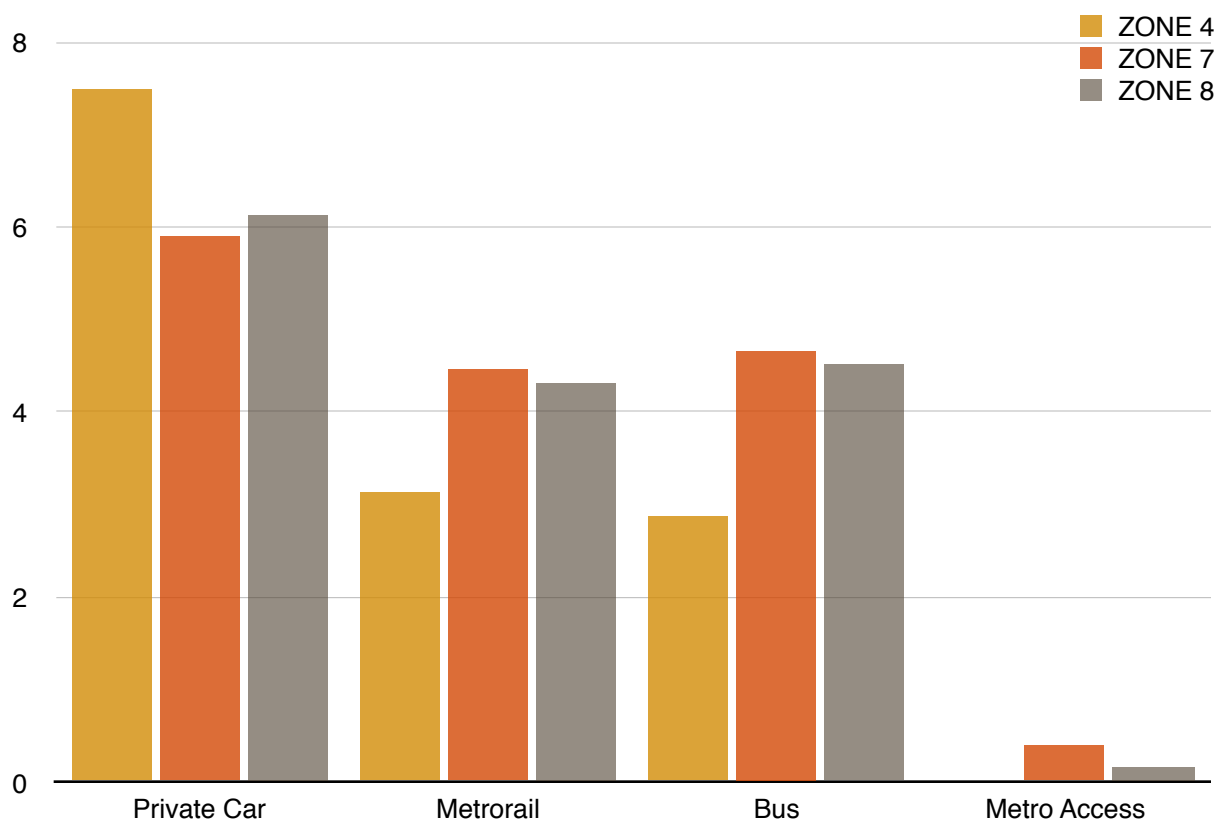
3.0 Review

Responses received from the public survey suggest that interest and likely uptake of a Neighborhood Van service is limited to a restricted area of the District. Initial zones for consideration were identified where taxi services were observed to be limited including wards 7 and 8, and parts of wards 4, 5 and 6. Public surveys were undertaken within these areas and suggested that only two areas were likely to be commercially viable, roughly equivalent to wards 7 and 8. The following sections illustrate responses to the public survey.

Demand for car use, as well as traditional transit, is compared in chart 1, and suggests a lower car use in zone 7 and 8, compared to zone 4. Zone 4 responses suggest a trip production for cars of around 7.5 trips / week, compared to just under 6 in zone 7, and only a small proportion more in zone 8.

Zone 7 and 8 also demonstrated a higher reliance on public transit, with a roughly even use of bus and metro. Metro access trips also featured in zones 7 and 8, while their use in zone 4 was too low to be identified on the same scale.

Chart 1: Trip productions per respondent (by zone) Trips per week - car / transit



Taxi use was significantly lower, with a mean engagement rate of less than 0.5 trips per week in all zones, and differences in the methods of engagement between zone 4, with a higher rate of hailed

taxi, while zones 7 and 8 also reported dispatched and stand based engagement, thou each zone reported relatively low numbers of taxi engagements compared to either car or transit, see chart 2.

Chart 2: Trip productions / respondent (by zone) Trips per week - Taxi

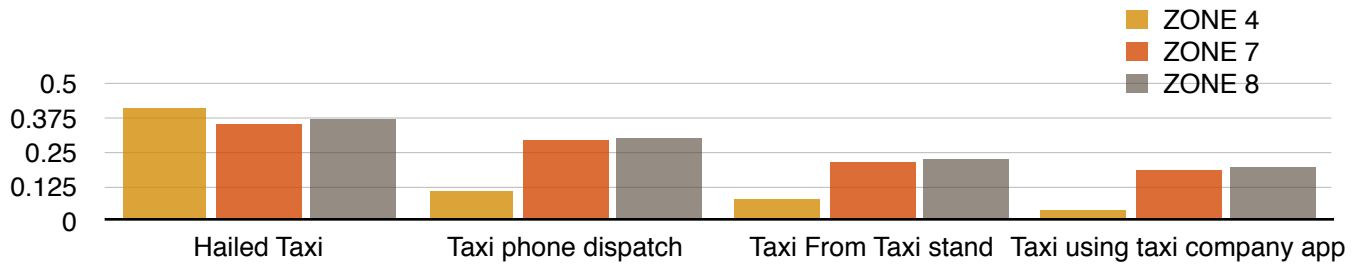
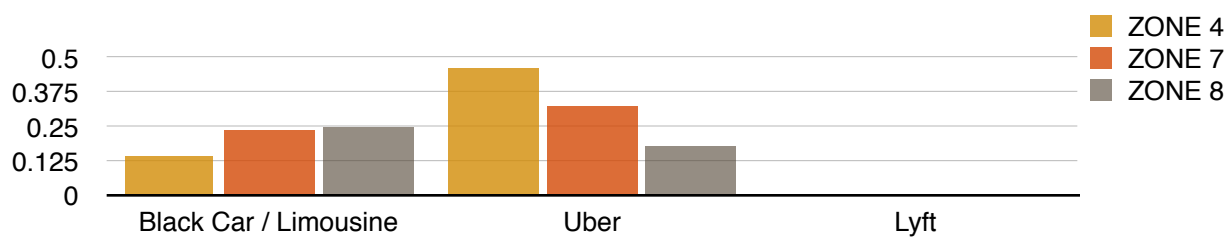
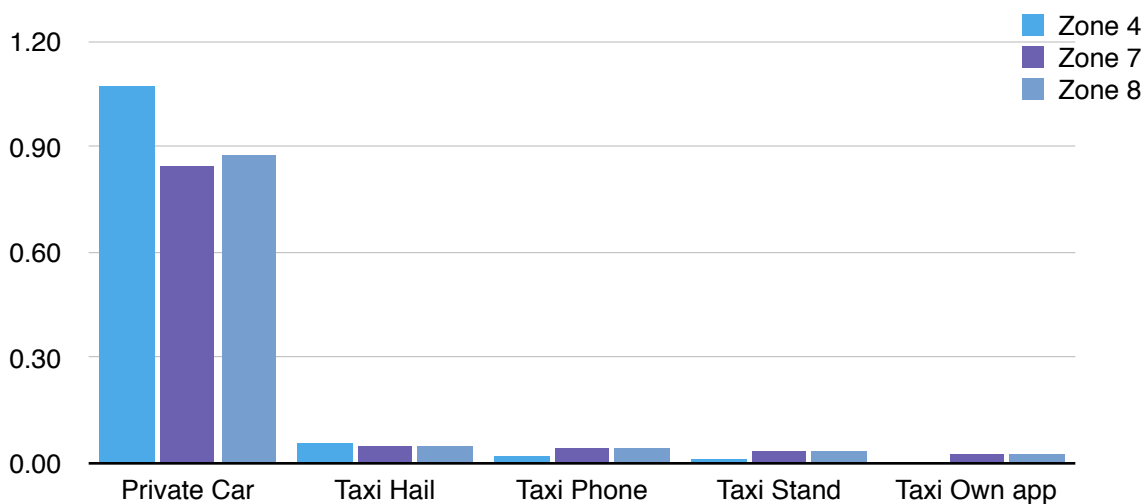


Chart 3: Trip productions / respondent (by zone) Trips per week - TNC dispatch / Black Car



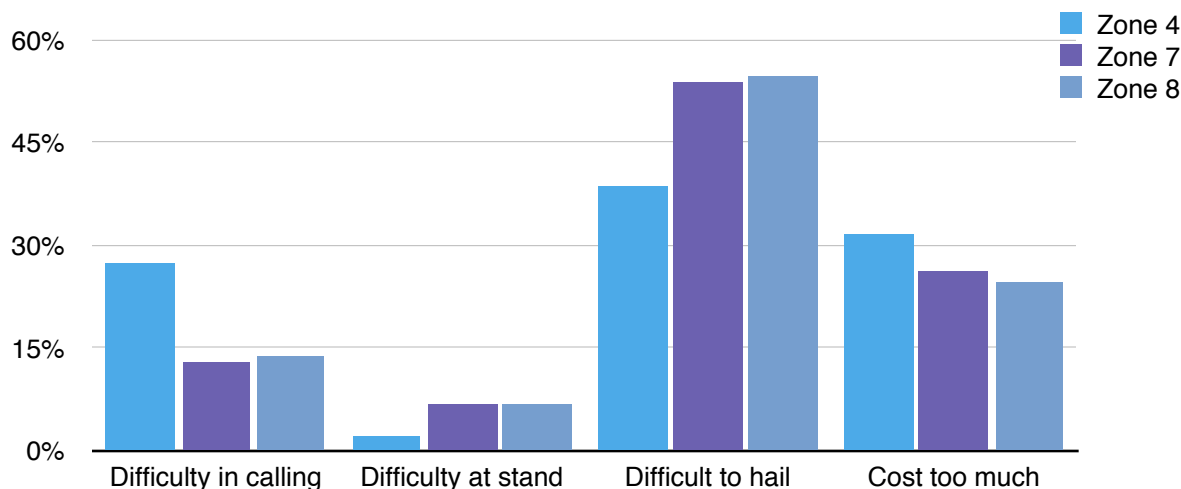
New technology use of app based TNC was also low, with an observable peak of Uber use in zone 4, compared to lower use in zone 7, and far lower use in zone 8, where its use mirrored that of Taxi companies own label apps. Lyft, a direct competitor to some Uber services, did not receive any significant use in any of the zones included in the survey. Chart 4 illustrates the relative trip production rates for car use per day against that of taxis.

Chart 4: Trip production rates car / taxi (by zone) per day



The survey also sought to identify primary reasons why taxis were not used, see chart 5. Two primary reasons were quoted, the inability to access vehicles and cost, with over half of all respondents in zones 7 and 8 reporting an inability to hail taxis as a primary reason against their use.

Chart 5: Reasons for not using taxis (by zone)



3.1 Use of Neighborhood Vans

The final element in the analysis is the identification of vehicle use, sometimes referred to as assignment. In this exercise the stated uses of the Neighborhood van are identified to suggest distribution of vans by time of day and location in a zone. Trip purpose distribution is illustrated in table 10.

Table 10: Stated trip purpose, using Neighborhood Vans

Trip Purpose percent	Zone 4	Zone 7	Zone 8
Church	5%	5.26%	4.4%
Medical	21.67%	23.16%	23.08%
Kids	0%	1.05%	1.1%
Library	0%	1.05%	1.1%
Metro	8.33%	2.11%	2.2%
NTE	15%	10.53%	10.99%
Shopping	30%	38.95%	38.46%
Sports	5%	2.11%	2.2%
VFR	8.33%	9.47%	9.89%
Work	6.67%	6.32%	6.59%

Four primary purposes are identified in zones 7 and 8, being travel to/from, in declining order:

- Shopping (Grocery Shopping)
- Medical appointments
- Night Time Entertainment (Bars, Restaurants)
- Visiting Friends and Relations (VFR)

The range of activities can be seen to spread across most daytime hours, and into the evening. Able activity is seen in the daytime demand for services in access to/from: shopping, medical appointments, and visiting friends relations - accounting for around 70% of all trips; while a more limited evening demand is also visible - of around 10%. Other activities reported all represent daytime demand. Few early-morning activities are reported for zone 7 or 8, with no more than 7% of all reported trips being for work purposes, and a low number of trips to Metro stations in the same zones, of around 2%. This suggests that a realistic and commercial service may operate in the period after the morning commuter rush hour with a extended service in to the evening provided by a smaller number of vans.

Shopping locations are also popular suggesting a commercial benefit in concentrating on services to and from popular grocery stores. This includes the Safeway store and retail park at the southern end of Good Hope Ave, which lies in zone 7, but very close to the boundary of zone 8. Service zone areas have been extended to allow Neighborhood Vans from both zone 7 and zone 8 to serve this location.

Medical facilities are also popular as stated trip destinations, with around 25% of trips stated as starting / ending at a medical center. These should provide a focus for service provision in addition to shopping locations.

4.0 Conclusions

In line with the analysis as set out above, it is a reasonable conclusion that Neighborhood Van services would be suitable and able to be provided commercially in two zones within the District of Columbia. These zones are identified above, and are labelled as zone 7 and zone 8, broadly falling within the District of Columbia wards of the same name.

A limited demand is identified in other areas of the city, but this is felt to be insufficient to be provided on a commercial basis.

Fully commercial services would require a fare in the region of six dollars per person per trip. It may also be necessary to assist in the purchase of specific vehicles through the provision of a surety by the DCTC, to auto manufacturers, supporting the purchase of new vehicles. Such security would not be required where older vehicles were allowed into service.

On the basis of joint ownership and operation, where a vehicle is provided for two shifts per day and Capital costs are shared evenly between two, or more, owner drivers, current demand suggests a need to issue four (4) licenses for use in zone 7, and three (3) for use in zone 8. Single shifted vehicles would require double this number to provide a comparable service.