



Toronto Union Pearson Express

Ridership Forecast Update May 2013

<date>

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The views expressed within this Report are based upon:

- Information collected by us up to May 2013
- Information provided to us up to May 2013;
- Review of written information supplied by Metrolinx

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Glossary

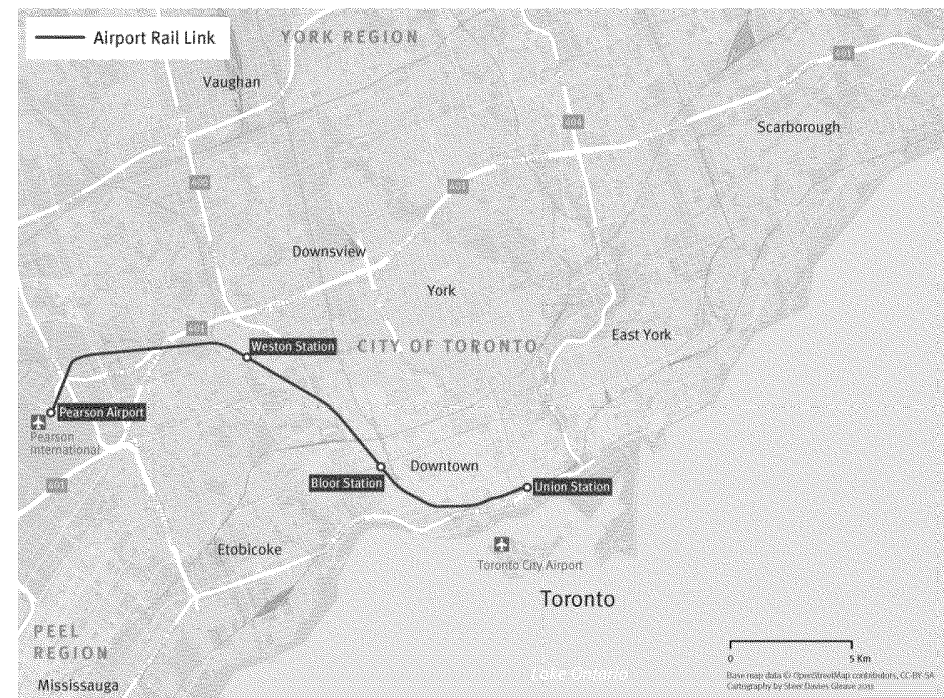
ARL	Airport Rail Link
Avg	Average
CAD	Canadian Dollar
CAGR	Compound Annual Growth Rate
GDP	Gross Domestic Product
GTAA	Greater Toronto Airport Authority
GTHA	Greater Toronto and Hamilton Area
km	Kilometre
LBPIA	Lester B. Pearson International Airport
LRT	Light Rail Transit
One-way	Passengers travelling either to or from LBPIA
Pax	Passengers
SNC	SNC Lavalin
SP	Stated Preference
TTC	Toronto Transit Commission
UPAG	Union Pearson Air-Link Group
UPE	Union Pearson Express

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Context Background

- Lester B. Pearson International Airport (LBPIA) is located in the City of Mississauga and serves the population of Toronto and the Greater Toronto and Hamilton Area (GTHA). In 2012 34.9 million passengers travelled through LBPIA. By 2031 this is forecast to reach 49.5 million.
- These high volumes of passengers puts pressure on the existing modes of surface access serving the airport where passengers currently have the choice between taxis, driving and parking or being dropped off, the privately-operated airport express bus (Pacific Western) or a number of local bus services operated by Toronto Transit Commission (TTC).
- Since 2001, there have been plans to develop a new airport rail link - the Union Pearson Express (UPE) - which would provide a new direct and rapid passenger rail service between Union Station in downtown Toronto and LBPIA some 22.5km away. The service is planned to open in the spring of 2015, in time for the Pan American Games which will be held in Toronto in the summer of 2015.
- The UPE will use the existing Georgetown alignment from Union Station passing through Bloor and Weston before travelling along a new dedicated spur to LBPIA.



Context

Scope

- I In 2009 Steer Davies Gleave undertook an Investment Grade Ridership and Revenue study for SNC Lavalin for the UPE service. Having taken over as sponsors of the scheme, Metrolinx commissioned a new study in 2011 to update these forecasts under a number of new operating assumptions both for the UPE and for a number of the competing modes, as well as taking into account the latest passenger growth at LBPIA.
- I In July 2010, the Ontario Government asked Metrolinx to build, own and operate the UPE from Union Station to LBPIA. From this date Metrolinx assumed responsibility for the project including design, construction and operations, building on the work that had been undertaken in the past. The project had previously been led by Union Pearson Air-Link Group (UPAG), a subsidiary of SNC Lavalin.
- I This report in 2013 is an update on the ridership forecast for Metrolinx. The scope has been to:
 1. Review actual air passenger data and the forecast made in 2011
 2. Update the air traffic forecasts to account for actual 2011 and 2012 data and updated assumptions
 3. Review the population and employment forecasts underpinning the spatial distribution of potential demand
 4. Review Deloitte discrete choice work of 2012
 5. Update travel time assumptions for principal highways
 6. Update other assumptions for competitive modes
 7. **Exclusion per Committee Direction**
 8. Consider the impact of the Pan/Parapan Am Games in 2015.



Context

Assumptions Update

I Air traffic

- GTHA forecast air traffic has increased for domestic and trans-border flights, largely due to higher actual passenger numbers in 2011 and 2012 than previously forecast (forecast for 2012 was 35.8 million, actual 37.1 million). This, combined with more optimistic long-term GDP forecasts for Canada and the US, contribute to the higher domestic and trans-border forecasts than the ones made in 2011.
- LBPIA forecast air traffic will increase at an average rate of 1.9% per annum between 2012 and 2031. Our new forecasts for trans-border passengers are higher than the 2011 forecasts due to more optimistic GDP forecasts than previously employed. International flights have not seen a significant change. The domestic forecast is now lower than that of 2011 due to the rapid increase in forecast demand at Billy Bishop Airport, where the number of passengers increased by 27% from 1.5 million in 2011 to 1.9 million in 2012. We have made assumptions that Billy Bishop will reach a capacity of 3.5 million in 2021 and then continue operating at full capacity.

I Highway journey times

- Updated drive times were considered using Google Maps and MTO travel survey data but none of the estimates found were thought to reflect the true situation. Highway journey times from the surveys carried out in 2009 were kept in the model.

I Population and employment forecasts

- We confirmed that the most recent population and employment forecasts (“Updated Municipal”) have been used in the model.

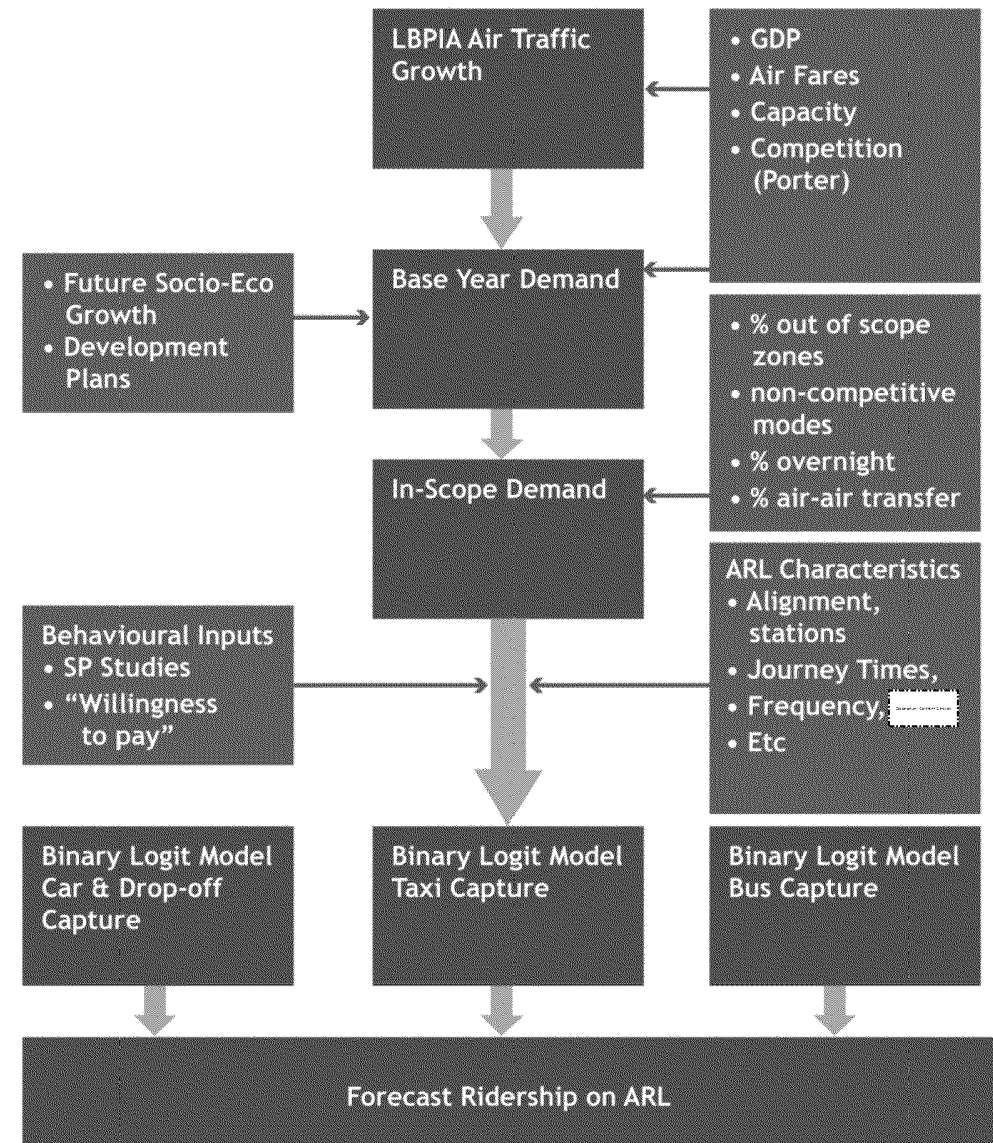
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Methodology

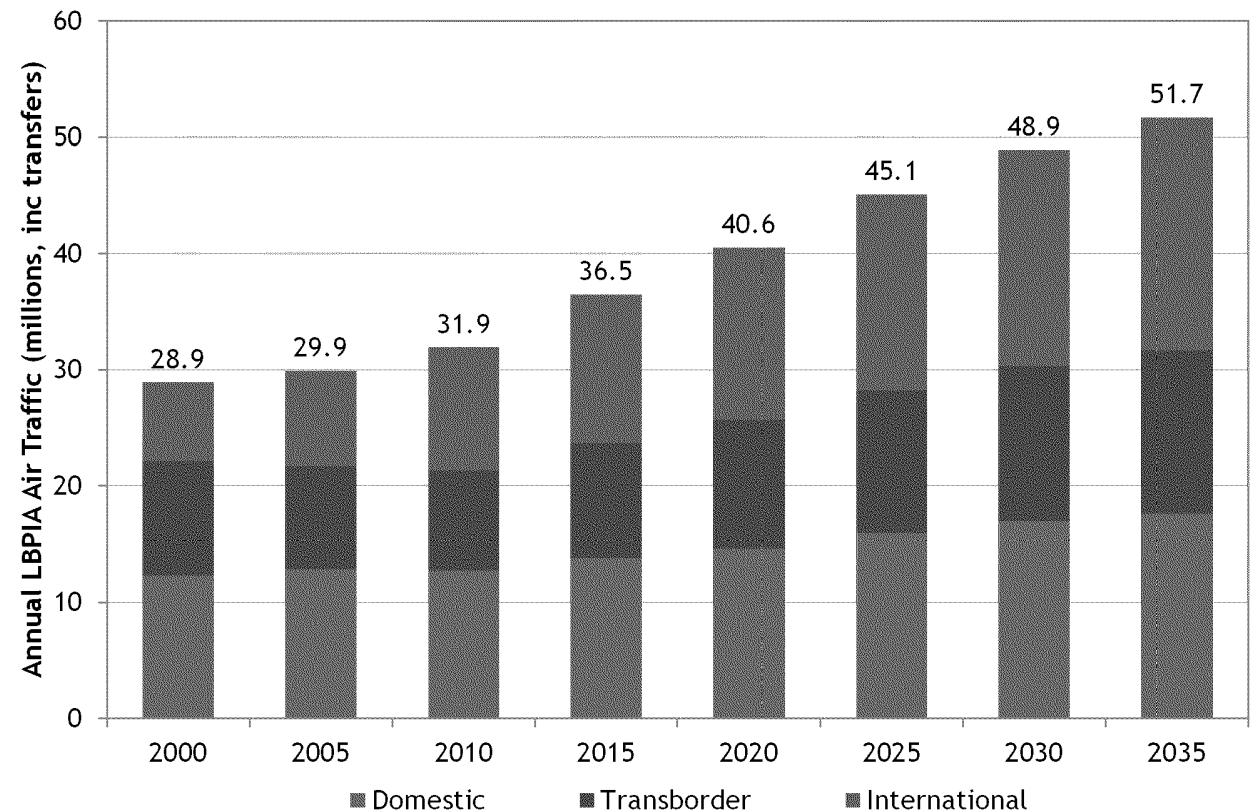
Overall Approach

- I Our forecasting approach is based on a framework widely accepted throughout the transportation industry and commonly used to estimate potential demand for toll roads, urban transit systems and rail networks.
- I It relies on answering two significant questions:
 - In-scope market: how much of the total travel between LBPIA and GTHA could reasonably be attracted to the UPE?
 - Traffic capture: how much of this in-scope travel can actually be captured?
- I In the following slides we focus on each of the key building blocks of the forecasting process, as illustrated in the figure to the right:
 - The LBPIA air traffic: volumes and trends
 - Determining the size of the in-scope demand
 - Assessing the level of capture, both for different market segments and taking into account decision drivers
 - The key characteristics and assumptions that affect the UPE service and its operations



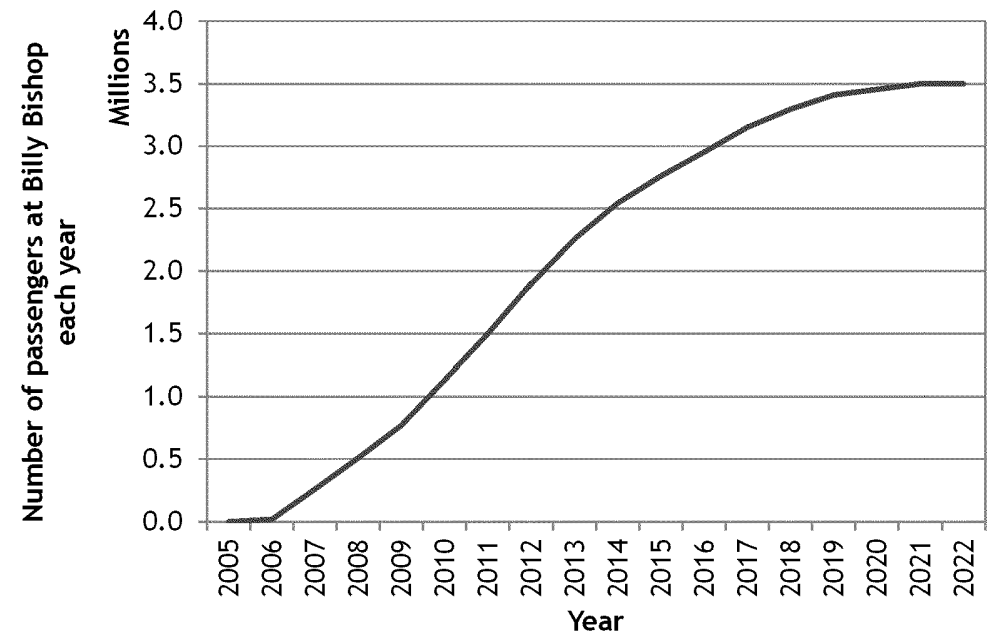
Approach: Air Traffic Forecast Update

- I Independent air traffic forecasts for LBPIA have been developed by Steer Davies Gleave by first forecasting the air traffic growth for the GTHA, and then separating out the LBPIA passengers from Billy Bishop City Airport and Hamilton Airport.
- I The forecasts have been developed using a series of drivers including:
 - Information at a flight sector level (the type of flight): trans-border, domestic and international;
 - Historical trends in air traffic;
 - GDP forecasts;
 - Cost of air travel;
 - Likely changes in airline strategy, particularly reflecting the activities of Porter Airlines at Billy Bishop; and
 - Capacity constraints at each airport.
- I **LBPIA air traffic** is forecast to increase at an average rate of 1.9% per annum between 2012 and 2031. Forecast growth in trans-border passengers is higher because of a more optimistic GDP forecast for Canada and the US. The domestic forecast would have also increased for the same reason but is now lower than in the forecast made in 2011, due to the forecast rapid increase in flights at Billy Bishop Airport. Assumptions on Billy Bishop Airport are set out on the next slide.



Approach: Toronto City Billy Bishop Airport Assumptions

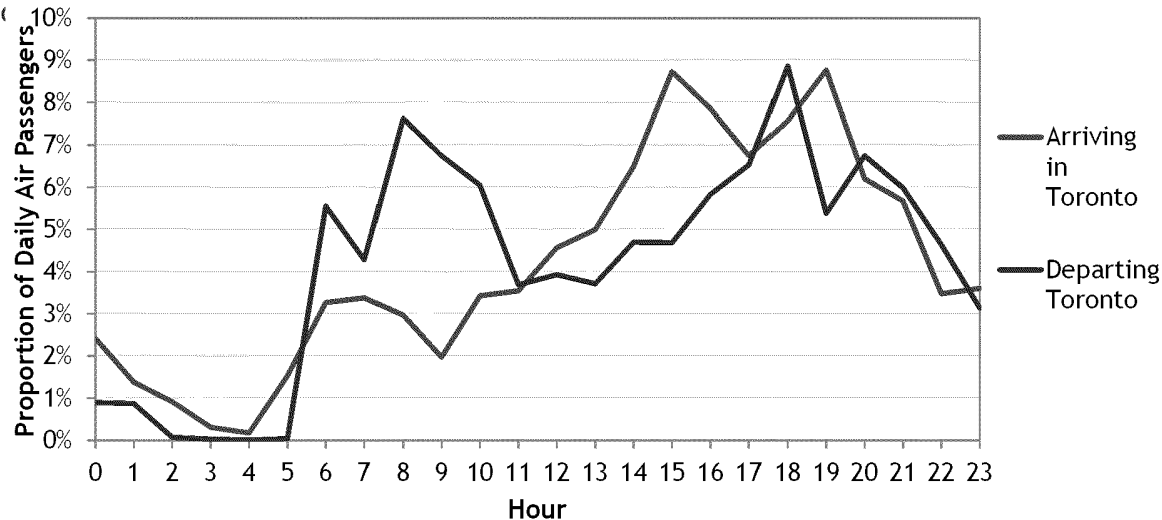
- There has been rapid growth at Billy Bishop Airport in the past few years, with 1.5 million passengers in 2011 and a 27% increase to 1.9 million passengers in 2012.
- This has mainly been due to the rapid expansion of Porter Airlines, a regional passenger carrier in operation since late 2006. In April 2013, the airline proposed to extend the runway at Billy Bishop, in order to operate 12 new Bombardier jets, worth US\$2.29 billion.
- Based on the trend in the past few years, we have made the following assumptions on the future growth of Billy Bishop. These represent an aggressive growth profile (shown in the diagram) and hence result in a conservative forecast for LBPIA demand.
 - In 2012, 58,660 out of a maximum of 73,730 slots were used. This corresponds to 79.6% usage. We have increased this to 100% to make full use of the airport slots by 2021.
 - Load factors of aircraft - in 2011, this averaged at 41.4%; in 2012, the figure had risen to 44.4%. This is quite low and there is potential for airlines to increase the number of passengers on each flight. We have increased the load factor to 65% by 2021.
 - Although Porter Airlines wishes to extend the runways and operate larger jets, we have assumed that average jet sizes remain constant and do not grow in the next 20 years.
 - The combination of these assumptions allows the airport to carry 2.8 million passengers in 2015 and 3.5 million passengers in 2021. From then onwards, there is no more capacity to increase the number of passengers.
 - We have conservatively assumed that all of this growth at Billy Bishop is demand taken from LBPIA, rather than Billy Bishop generating new demand.



Approach: Daily Trends in Air Traffic

- The figure below illustrates the daily variation in air traffic, separately for arriving and departing passengers (excluding those transferring) for an average day (includes weekends and weekdays).
- The busiest times of day:
 - On average, arriving passengers peak in the afternoon between 15:00 and 19:00, with a small dip at 17:00. The period between 15:00 and 19:00 accounts for just under 40% of the arriving daily passengers.
 - The profile for departing passengers shows two peaks: one in the morning between 08:00 and 10:00, accounting for 20.4% of the daily departing passengers, and a second in the afternoon between 17:00 and 18:00 accounting for a further 15.4%.
- The quietest times across the day for both arriving and departing passengers occur in the early morning:
 - Between 03:00 and 04:00 for those arriving;
 - Between 02:00 and 05:00 for departures.

■ Variations in air traffic at

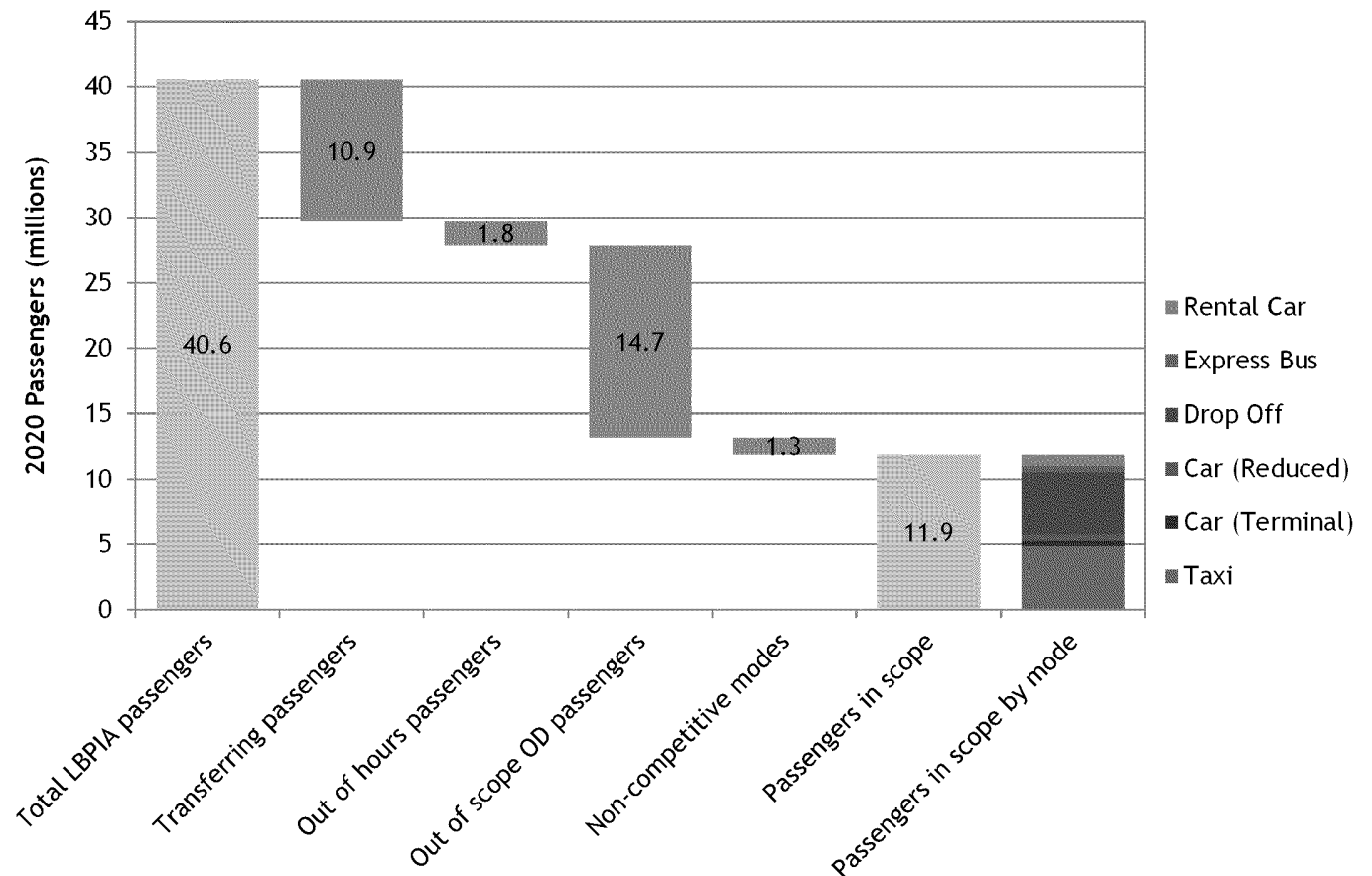


r the UPE service.

Methodology

Approach: In-Scope Demand in 2020

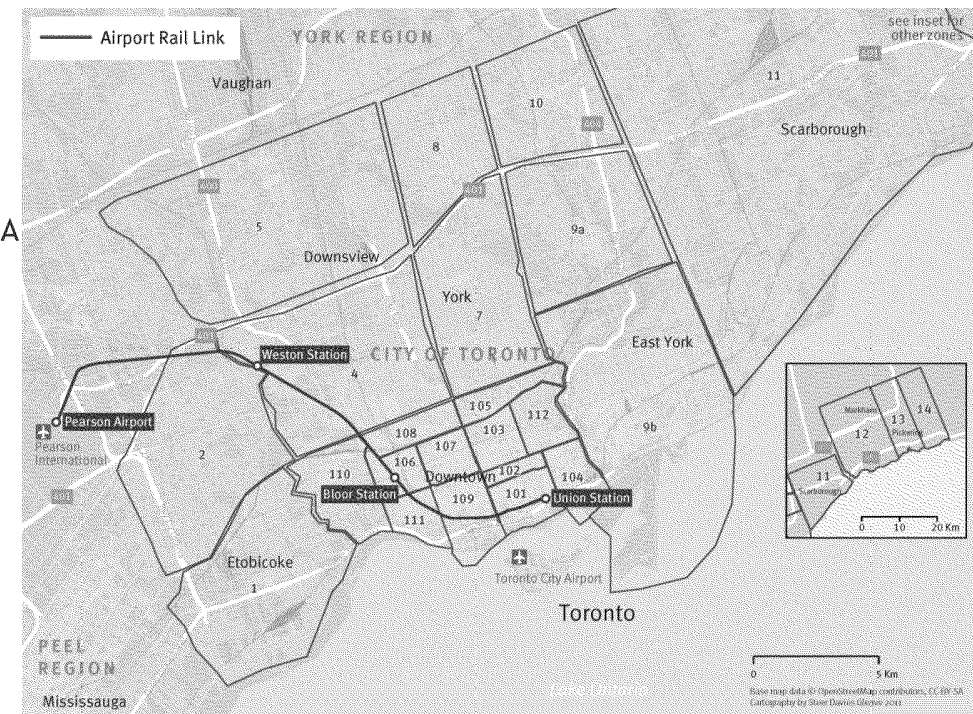
- The size of the in-scope market has been established through examination of the air traffic at LBPIA, both in the UPE opening year and into the future.
- Some groups of passengers are removed from the total air traffic; those remaining are termed the “in-scope demand”. Those discounted for the purposes of assessing in-scope demand are:
 - Transferring passengers who are changing planes and therefore do not leave the airport;
 - Those travelling at times outside of the proposed hours of operation for the UPE;
 - Passengers travelling currently using modes of transport from which it would not be logical to switch such as dedicated hotel shuttles or hire cars; and
 - Those travelling from areas outside of the UPE corridor such as from Mississauga or Brampton where the current mode of travel would remain advantageous.



- The figure to the left illustrates this process for a single forecast year, 2020.
- 40.55 million passengers are forecast to use LBPIA, including those transferring to other aircraft who do not have an origin or destination in the GTHA.
- After removing those passengers who could not or logically would not use the UPE, 11.86 million passengers remain in-scope.

Approach: Traffic Capture

- I To address traffic capture, we have considered the following issues:
 - **Exclusion per Committee Direction**
 - How will each traveller choose between options?
- I Capture is estimated for different mini-segments of the in-scope market. Mini-segments are defined to reflect different times and costs, and underlying behaviours and preferences across the total in-scope market. We use the following segments:
 - Current mode of travel: airport express bus, taxi, drive and park (terminal parking or remote lots), drop off
 - Residency: resident of the GTHA or not
 - Purpose of journey: travel for business or not
 - Type of flight: domestic, trans-border, international
 - Time of day when travel to/from the airport would occur:
 - * morning peak, afternoon peak, other off peak times
 - Travelling party: travelling alone or in a group
 - Area in GTHA travelled to/from 25 areas (termed zones) in GTHA
- I A zoning system covering 25 different areas in the GTHA has been chosen to reflect different propensities to use the UPE which will be driven by:
 - Demographics of those travelling to or from the airport, for example downtown areas logically have a higher number of business non residents
 - Times and costs on the current modes of travel
 - Access to the proposed UPE stations, in terms of times, costs and ease of interchange

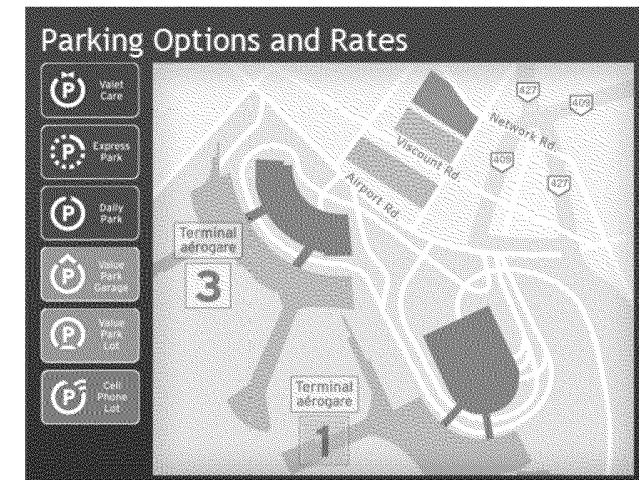


Methodology

Approach: Relative Costs of Travel

- I The relative cost of travel for each competing mode has been established using a combination of publically available data sources and new data collected specifically for the work carried out for SNC in 2009.
- I For each current mode of travel, and for each of the 25 areas in GTHA we established:
 - The one-way cost of travel to the airport per person, both in peak and off peak travel conditions
 - * For travel by private car this includes parking charges only, fuel and tolls are not taken into account
 - The time spent in the vehicle travelling to the airport, both in peak and off peak periods
 - The time to travel from an origin in the GTHA to the main mode of travel (access time)
 - * For travel by private car or taxi this is zero minutes
 - * For travel by transit this is the time to the transit station or stop
 - Any time spent waiting for the current mode of travel to arrive at the station or stop (transit and taxi only)
 - Time between the drop off point at the airport and the main terminal (egress time)
 - * For travel by private car this is the time between the car park and the terminal, separately for the terminal and reduced rate lots which tend to be in remote locations
 - * For travel by transit or taxi this is assumed to be zero minutes
- I We have developed a set of cost assumptions for travel by UPE in a similar fashion, using:
 - Assumptions about which station passengers will use from the different areas in GTHA and how they will travel to this station
 - Run times between UPE stations and the planned number of trains that will operate each hour

Exclusion per Committee Direction



Approach: UPE Characteristics and Key Assumptions

I In developing this set of forecasts for Metrolinx we have assumed the following UPE service characteristics:

- The UPE will open for service on 5th April 2015
- Trains will run every day, 365 days a year
- Hours of operation will be from 5am to 1am the following day
- There will be four trains an hour all day in each direction
- Each service will call at Union Station, Bloor, Weston and LBPIA
- Interchanges at each station will be clearly marked and easy to navigate
- Service will have a premium “look and feel” and be clearly branded as different from other rail services operating in Toronto
- The journey time between Union Station and LBPIA will be 25 minutes, in each direction
- **Exclusion per Committee Direction**
- Planned station improvements will be completed at Union Station and that the UPE will have its own dedicated platform both at Union and at the airport station.

I In addition we have assumed that:

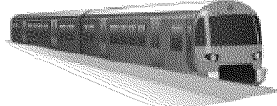
- During the first three years of operation, passenger numbers will “ramp-up”:
 - * Year One: 65%, Year Two: 80%, Year Three: 90%
 - * The ramp-up assumptions have been estimated based on other international rail services.
- There are no problems with crowding on the trains and the trains are not under any demand constraint.



Approach: Behaviours and Decision Drivers

- Passenger behaviours and their decision drivers are a key input to the forecasting framework. They are used to reflect how the different segments of the market will react to the UPE. In simple terms we believe that all passengers will respond logically to time savings and cost differences. If one mode of travel is cheaper and faster than another, it would be perceived as more attractive.
- However there are other factors not related to time and cost which can have a bearing. These are more difficult to measure and are typically reflecting in a mode constant which reflects all other underlying preferences for one mode of travel compared to another.
- In 2009 we undertook a program of behavioural research with airport users in the terminal in order to estimate these modal preferences as well as sensitivities to time and cost. The survey was carried out as part of the wider study for SNC, with 1,260 passengers who had travelled to the airport from the in-scope area by either car, airport express bus or taxi.
- The data from this research was used to estimate behavioural choice models which allow us to quantify the modal preferences and sensitivities using a well established mathematical framework
- Please refer to the previous report from 2011.

T_2

Option A Taxi or Limo, as today  \$50 one-way 45 minutes to Airport	Option B Express Train from Union Station  Exclusion per Committee Direction 20 minutes from Union Station to Airport Services every 15 minutes Access to Union Station as you described
Which would you choose?	
Option A	Neither
Option B	

Results

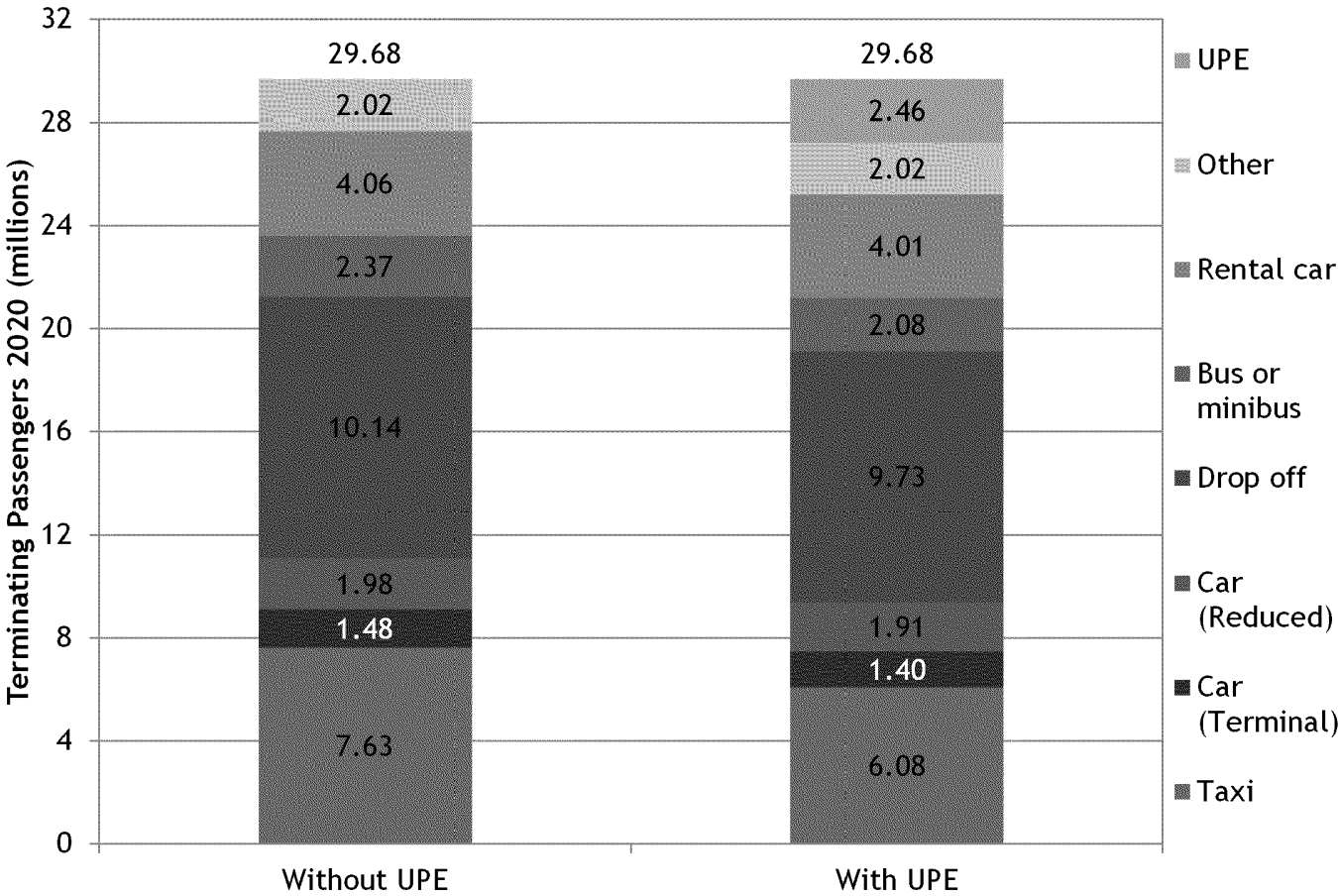
Summary in 2020

- We have developed a base case set of forecasts for the UPE between opening year in 2015 and 2031. The forecasts suggest that the UPE will be well used with 2.46 million passengers forecast by 2020.
- For the total market of those travelling to or from the airport by all modes, at all times and from all directions, this is equivalent to 8.3%. This corresponds well with published statistics for other air-rail links both in North America and across the world.

- The forecast market share of those travelling to or from the airport both with and without the UPE in 2020 is shown to the right.

- The forecasts suggest that by 2020 the market share of those passengers will change as follows:

- Using taxis will reduce from 25.7% to 20.5%
- Being dropped off at the airport falls from 34.1% to 32.8%
- Travelling by any bus mode decreases from 8.0% to 7.0%
- Parking at the airport will fall from 11.7% to 11.2%



Results

UPE Ridership Exclusion per Committee Direction For Selected Years

- The table below shows forecast UPE ridership and revenue for the model from the opening year of 2015 and at selected intermediate years through to 2031. Note that this is without ramp-up.
- Ridership is forecast to increase in line with the growth in passengers at LBPIA, from 2.36 million in 2018 to 2.94 million in 2031.

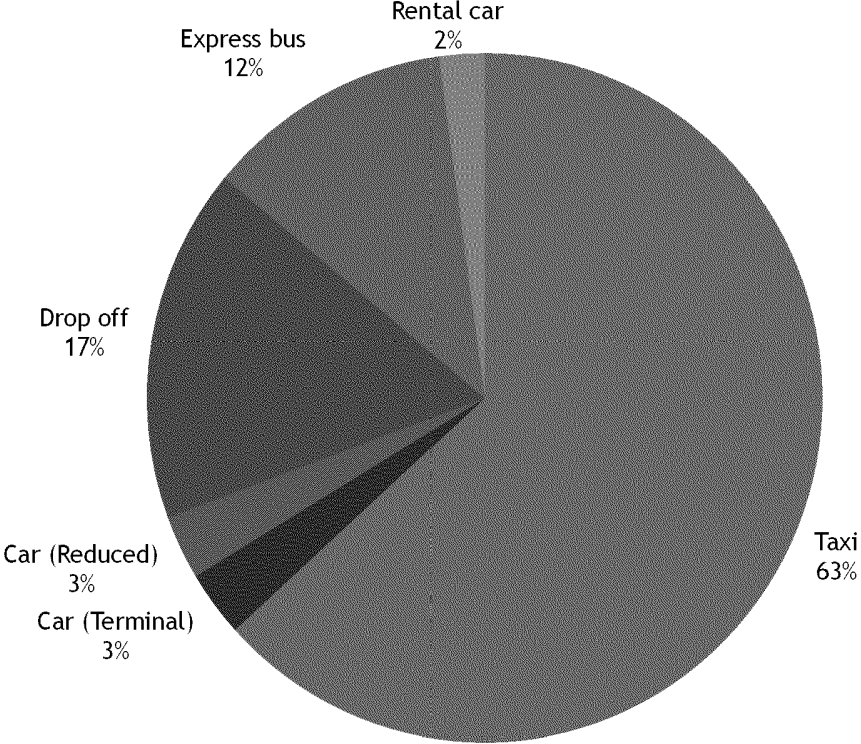
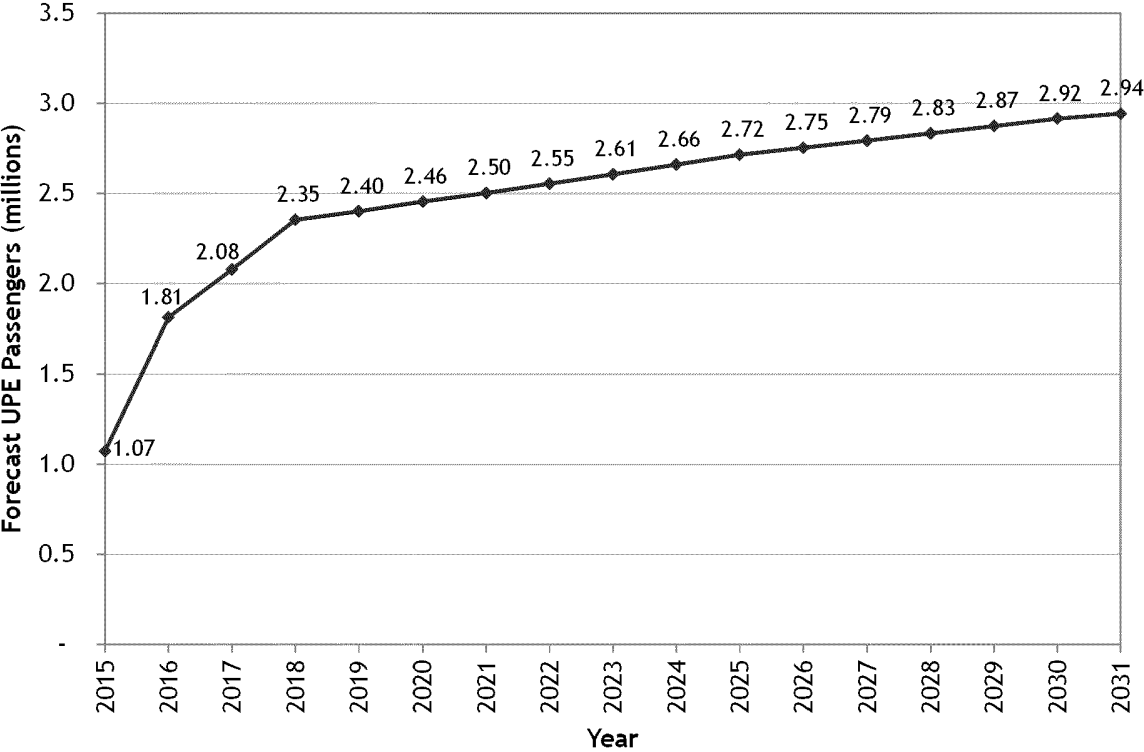
Full Year		2015	2018	2020	2025	2031
LBPIA passengers	Millions	36.5	38.8	40.6	45.1	49.5
In-scope passengers	Millions	10.7	11.0	11.9	13.1	14.2
Capture rate	%	20.7%	20.7%	20.7%	20.7%	20.7%
Forecast UPE ridership (one-way)	Millions	2.22	2.36	2.46	2.72	2.94
Exclusion per Committee Direction						

- Taking into account that the opening date of the UPE is April 5th 2015, and the ramp up period in the first few years:
 - Forecast UPE one-way ridership in 2015 is 1.07 million passengers; and
 - Exclusion per Committee Direction**

Results

Composition of UPE Passengers and Forecast Through Time

- **Exclusion per Committee Direction** annual UPE passengers are initially forecast at 1.07 million (one-way movements in either direction) in opening year (calendar year, accounting for an opening date of 5th April 2015), rising to 2.46 million in 2018 when the system reaches maturity.
- Passengers numbers are forecast to grow at an average annual rate of 1.7% per annum from 2018 until 2031 when volumes reach 2.94 million.
- In 2020, 2.46 million passengers are forecast to use the UPE. This is forecast to comprise:
 - 63% who had previously used taxis,
 - 12% who had previously used the express bus and
 - 25% who had travelled to the airport by car (either parking, rental car or being dropped off).



Results

Car Trips Taken Off the Road

- The UPE will compete with, and abstract, demand from existing modes of airport access and therefore remove car trips from congested roads. The table below shows the forecast number of car trips that will be removed due to air passengers choosing to travel by UPE.
- The two competitive modes that will be most significantly impacted by UPE are taxi and drop off.
- Based on assumptions around average vehicle occupancy from the 2009 SDG survey, we forecast that in 2020 10.0 million fewer car trips will be made to or from LBPIA as a result of UPE, made up of 4.6 million taxi trips and 5.4 million private car trips.

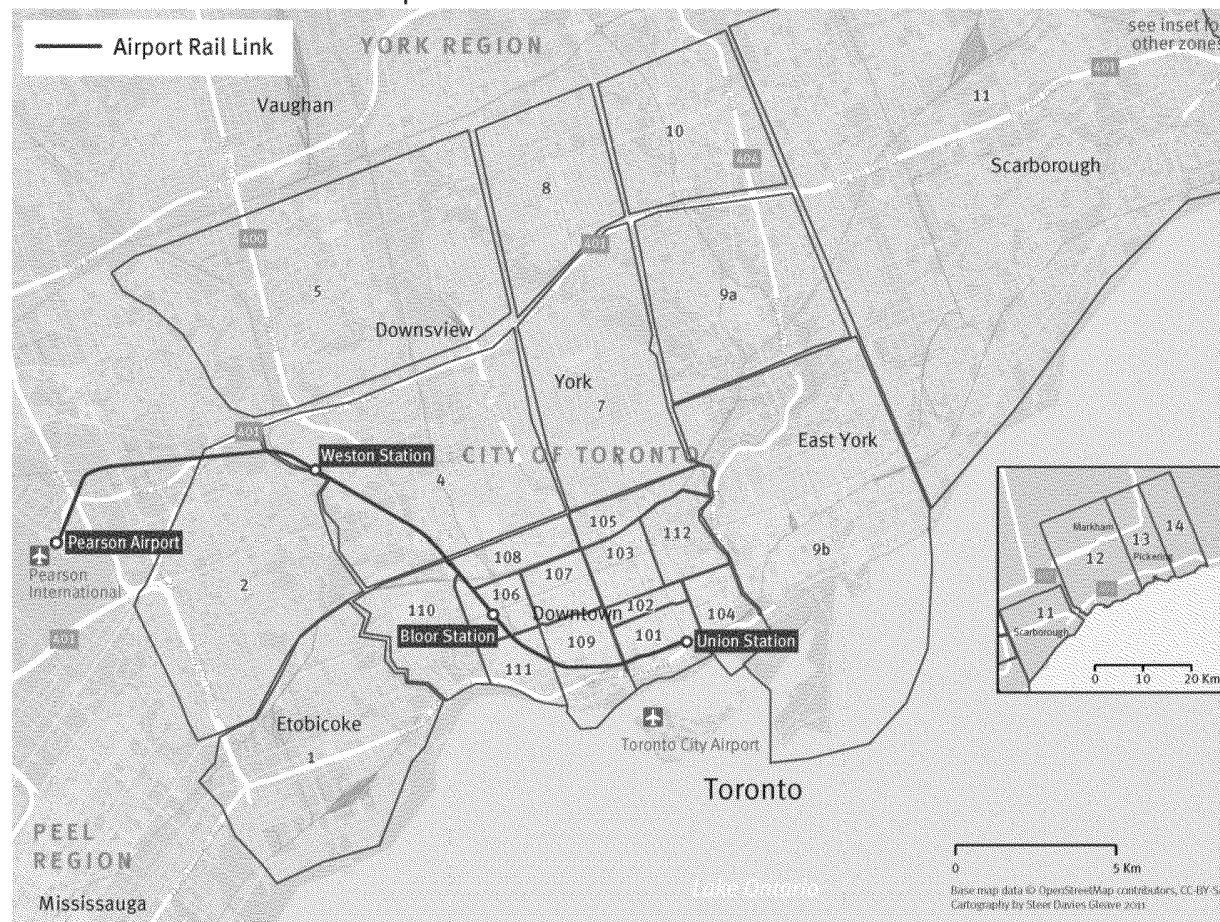
Car trips removed from road (millions)	2015	2018	2020	2025	2031
Taxi	4.20	4.45	4.61	5.08	5.49
Car (Terminal)	0.30	0.31	0.33	0.36	0.39
Car (Reduced)	0.38	0.40	0.42	0.47	0.51
Drop off	3.50	3.74	3.90	4.32	4.71
Rental Car	0.70	0.74	0.77	0.84	0.91
Total	9.07	9.64	10.02	11.07	12.01

Results

Capture Rates by Area of Toronto in 2020

- The number of passengers attracted to the UPE varies across different areas in Toronto. The highest numbers are attracted from the downtown areas, and in particular the area closest to Union where the station can be accessed by foot.
- For the area immediately around Union Station (zone 101), 60% of the overall in-scope market is captured by the UPE. The downtown area (zones 101-112) accounts for 73% of the forecast demand for the UP Express.

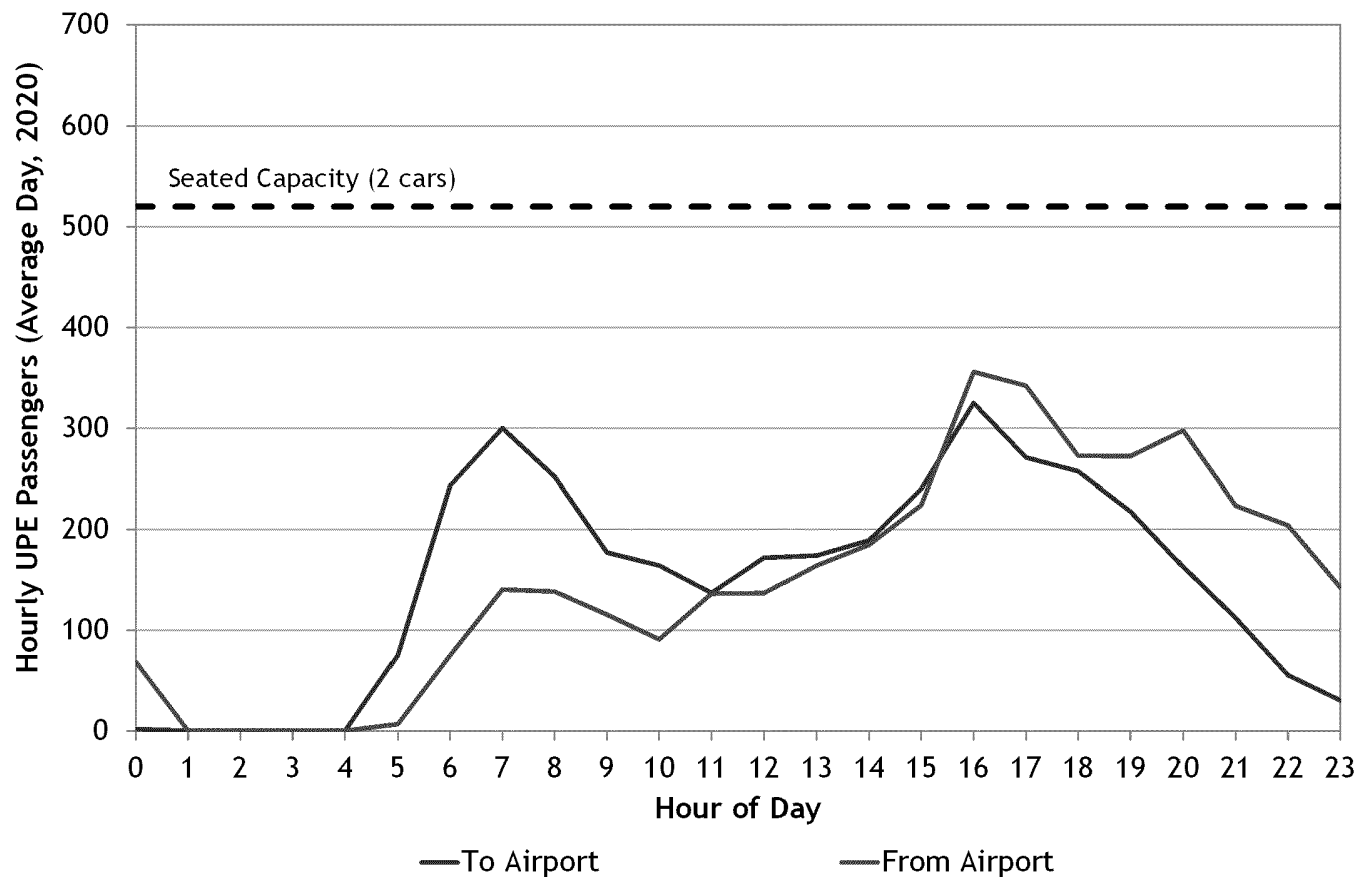
Thematic capture rate map
will be included here



Results

UPE Passengers by Time of Day on an Average Day in 2020

- By adopting the GTAA hour of day passenger profiles from 2012, we have developed forecasts for each hour of UPE service. The figure below shows the likely range of passenger volumes in 2020 in both directions of travel separately.
- An allowance has been made for the amount of time that passengers typically need to pass through the airport when:
 - arriving at LBPIA (45 minutes domestic/trans-border, 60 minutes international), and
 - check-in and security checks (60 /90/120 minutes for domestic, trans-border and international respectively).



- In general the afternoon period is likely to be busier on the UPE compared to the morning due to the high volume of international flights taking off and landing at that time.
- Forecast demand to the airport between 06:00-08:00 is also high.
- However, if we assume the UPE service is configured to the minimum capacity of a 2-car train (130 seats), the implied seated capacity is 520 passengers per hour, well above the forecast demand.
- On an average day across the year, including both weekends and weekdays, the forecast passengers can be comfortably accommodated, even in the peak period.

Results

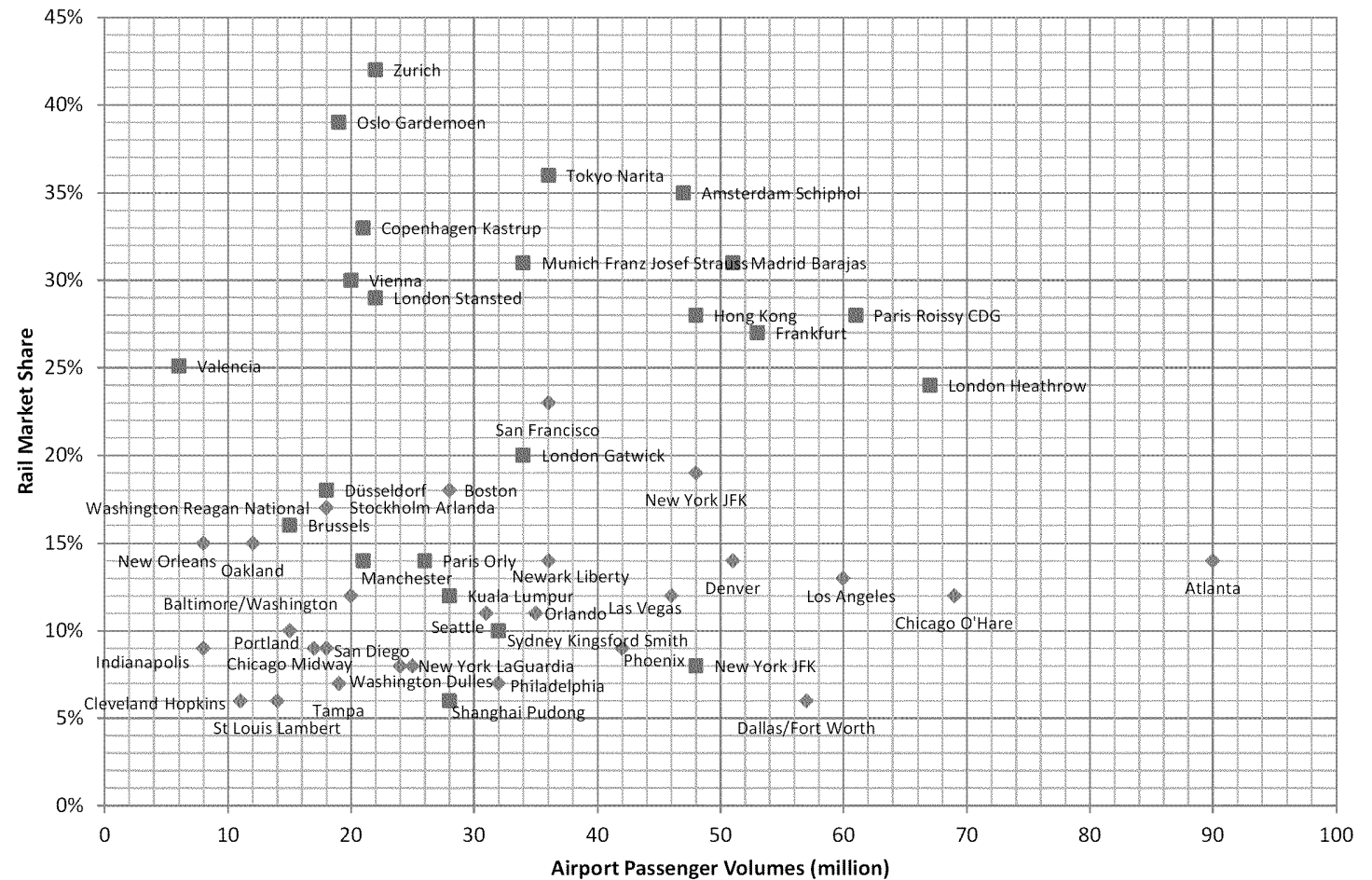
Comparison with Other International Airports

- The figure shows the rail market share for a number of world airports against the airport passenger volumes in millions.

- For North America we show total transit share (rail + bus)

- With a forecast market share of 8.3% and passenger volumes of 2.4 million in 2020, the UPE in Toronto is comparable with other North American cities such as:

- Vancouver served by the Canada Line rapid transit service: 10% rail market share
- Chicago Midway, served by Chicago Transit Authority “L” trains: 6% rail and 9% transit overall
- Seattle served by the Link light rail service: overall transit market share of 11%
- Baltimore Washington served by a large number of rail services (Amtrak, MARC and a light rail system): 12% transit market share



Exclusion per Committee Direction

Exclusion per Committee Direction

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Conclusion

- I 40.6 million passengers are forecast to use LBPIA in 2020. Removing those transferring between planes leaves close to 30 million surface access passengers.
 - The UPE is forecast to carry 8.3% of the surface access market. This is well within the range of other airports in the world, and in particular North American rail links such as Vancouver and Chicago.
- I In opening year we forecast that the UPE will carry 1.07 million passengers, with 2.35 million by 2018 when the system reaches maturity. This is assuming a 65% ramp-up in the first year, which may be conservative given the Pan-Am Games in July 2015, just three months after opening. By 2020 passenger numbers are forecast to reach 2.46 million with:
 - 63% who had previously used taxis,
 - 12% who had previously used the express bus and
 - 25% who had travelled to the airport by car (either parking, rental car or being dropped off).
- I Capture rates vary depending on the area of Toronto that passengers are travelling from.
 - For the area immediately around Union Station in the downtown area, 60% are captured from the overall in-scope market.
 - And the area around Bloor Station is 47%.
 - 73% of the forecast 2020 ARL ridership are travelling to or from the Downtown area.
- I Union Station is forecast to carry the most passengers with at least 75% expected to board or alight at this location. This has implications for operational plans given the time it will take for passengers to board and alight with luggage at the Union Station end of the trip where platform space is more restricted.

Exclusion per Committee Direction

Appendix - Forecasts for Pan Am / Parapan Am Games, 2015

■ To be completed

Appendix - Review of Deloitte Survey 2012

■ To be completed

Control Sheet

Project/Proposal Name:	Toronto UP Express Ridership Forecast Update May 2013
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ISSUE HISTORY

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