



View east along Western Gateway



Crossings over Western Gateway and side road on northern side



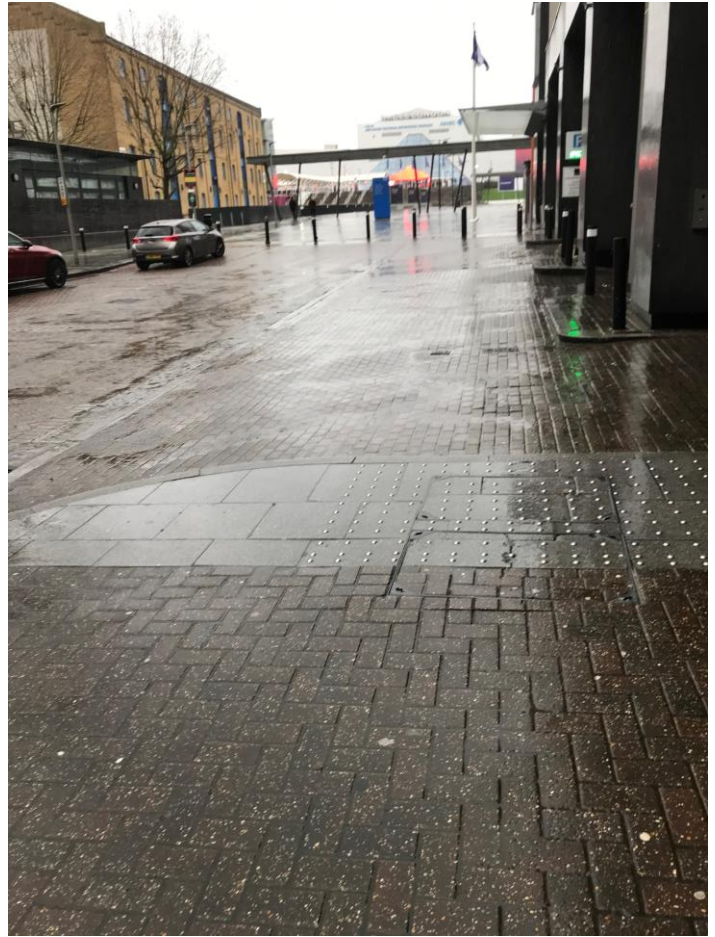
Very wide bellmouth/crossover for car park access



Fork at eastern end of Western Gateway



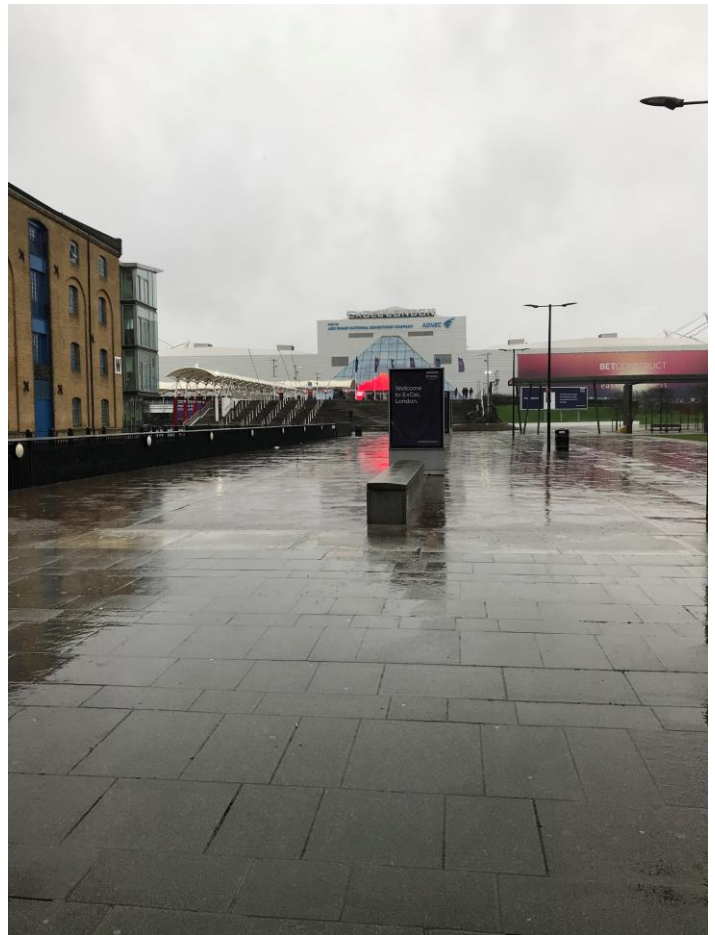
Northern side of street, looking towards Royal Victoria Square



Southern side of street – footpath ends at hotel service area



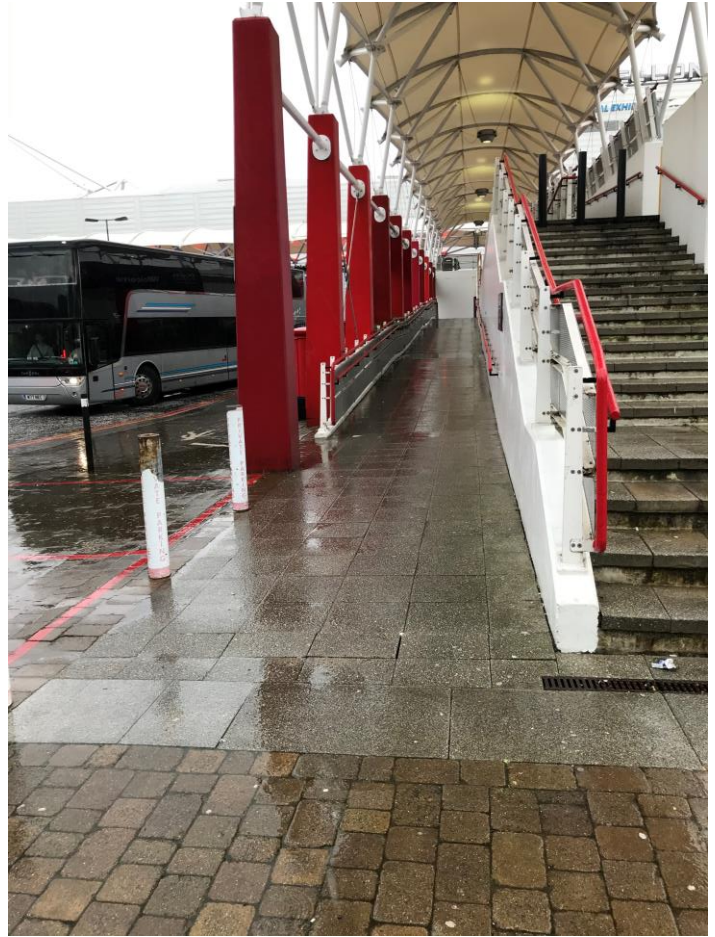
Entrance to Royal Victoria Square



Royal Victoria Square, looking towards ExCeL



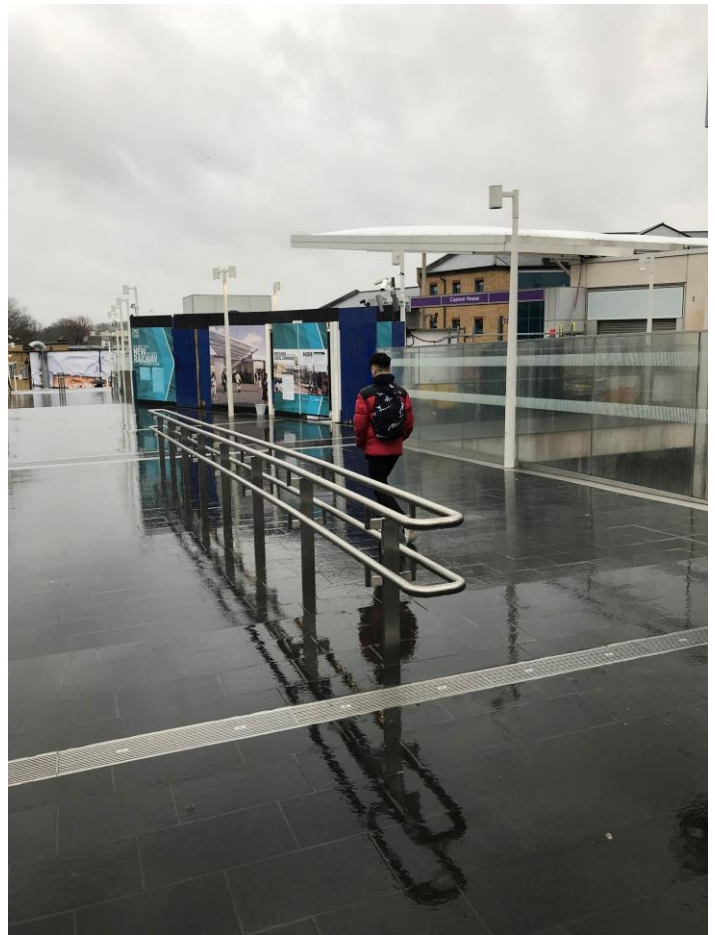
Steps up to Western Terrace



Ramp route to Western Terrace



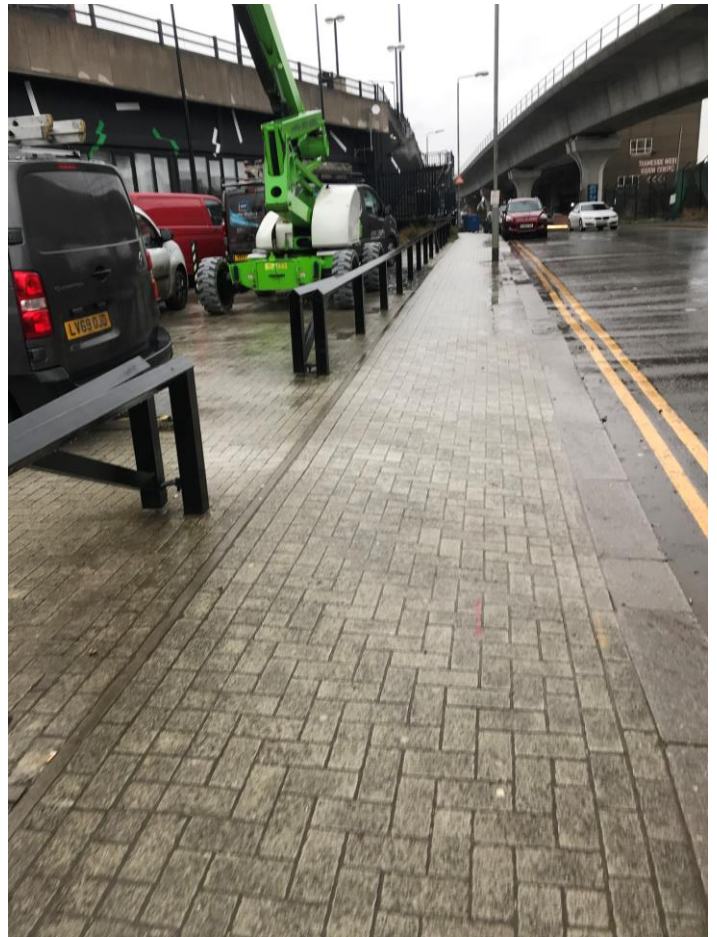
Covered walkway link to station entrances



Station entrance for Elizabeth Line (adjacent to DLR entrance)



View south-east on Dock Road – large mailbox obstruction



Northern side of street



Northern side of street



Southern side of street



Northern side of street, looking south-east



Southern side of street, footpath ends in middle-distance



Northern side of street, looking south-east



Lamp column placement restricts effective width significantly



Northern side of street, looking south-east



Southern side of street – no footpath



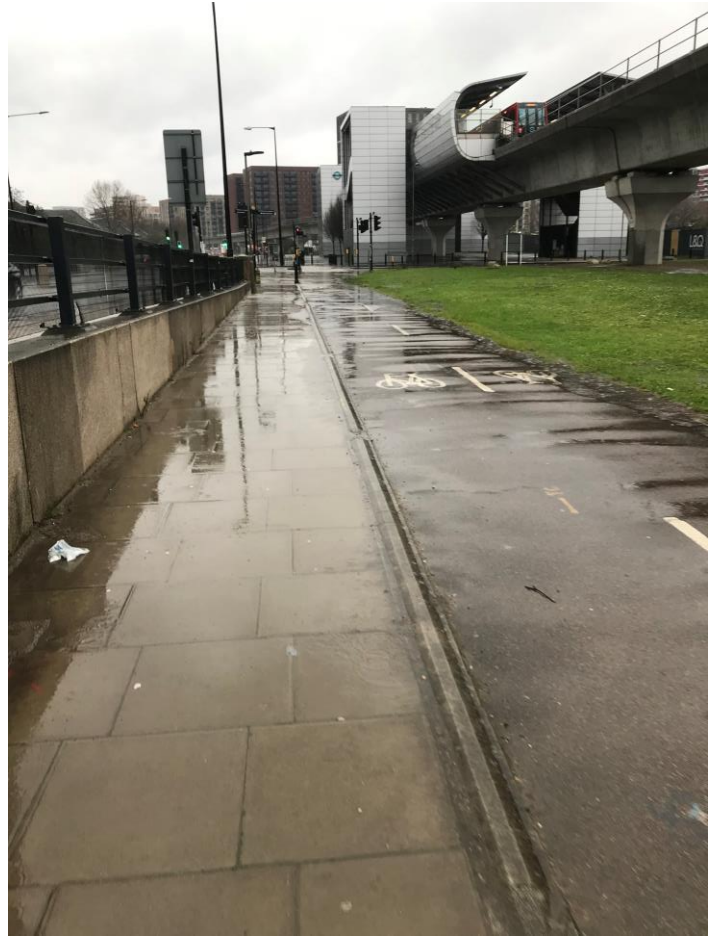
Footpath obstructions (wheelie bins etc)



Footpath obstruction – outwards opening gates



View towards station



Footpath and cycle path towards station



Signal controlled junction for North Woolwich Road



Signal controlled junction with refuge island and (some) guardrails

## Appendix C DLR Capacity Assessment

To Chris Mullett

## Technical Note

Cc

From Dhiren Bakarania

Date 28 April 2020

Project Thameside West Station Assessment

Project No. 23318402

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# Capacity Analysis Results Summary

## Introduction

1. With the opening of Phase 1 of the Thameside West development, DLR services are expected to see an increase in demand due to additional trips linked to the development. Whilst in the long term, once the development is fully built out, the planned Thames Wharf DLR station is expected to be able to cater for these additional trips by providing sufficient station capacity to enable them to access DLR services, it is anticipated that in the interim period these trips will make use of nearby stations.
2. Two stations in particular, West Silvertown and Royal Victoria DLR stations, are expected to receive a large proportion of the development's public transport trips since, as a result of being in close proximity to the development site, they provide the most convenient access to DLR services and the wider rail network.
3. In order to address concerns about the impacts on these stations and determine their ability to cope with the additional trips, a station capacity assessment was requested by Transport for London (TfL) for both West Silvertown and Royal Victoria stations. The scope and methodology of the assessment were discussed and agreed with both TfL and DLR. The purpose of this note is to summarise the work undertaken and present the findings of this assessment.
4. The assessment was conducted on the basis of London Underground's (LU's) station capacity guidance<sup>1</sup> and focused on the following station elements:
  - West Silvertown (see Figure 1)
    - Stair and lift capacity to/from the inbound (towards Central London/Stratford) platform;
    - Stair and lift capacity to/from the outbound (towards Woolwich Arsenal) platform;
  - Royal Victoria (see Figure 2)
    - Entry/Exit capacity on inbound platform (towards Central London/Stratford) platform;
    - Entry/exit capacity on outbound platform (towards Beckton) platform; and
    - Stair and lift capacity of station footbridge.
5. A forecast year of 2021 was assessed and both the morning (07:00 to 10:00) and evening (16:00 to 19:00) peaks were considered.
6. The assessment compares baseline demand (station demand without development trips) against with development demand (baseline demand plus development trips). Based on advice received from DLR, baseline demand was based on 2019 observed station entry and exit counts which were then factored to account for the expected impacts of the Elizabeth line. Development trips were obtained through a comparison of 2021 Railplan Base Minus and Development station demand matrices (taken from the results of strategic public transport modelling work previously conducted by Steer).

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<sup>1</sup> Transport for London (2019), S1371 Station capacity planning (issue A7)

Figure 1: West Silvertown DLR station schematic

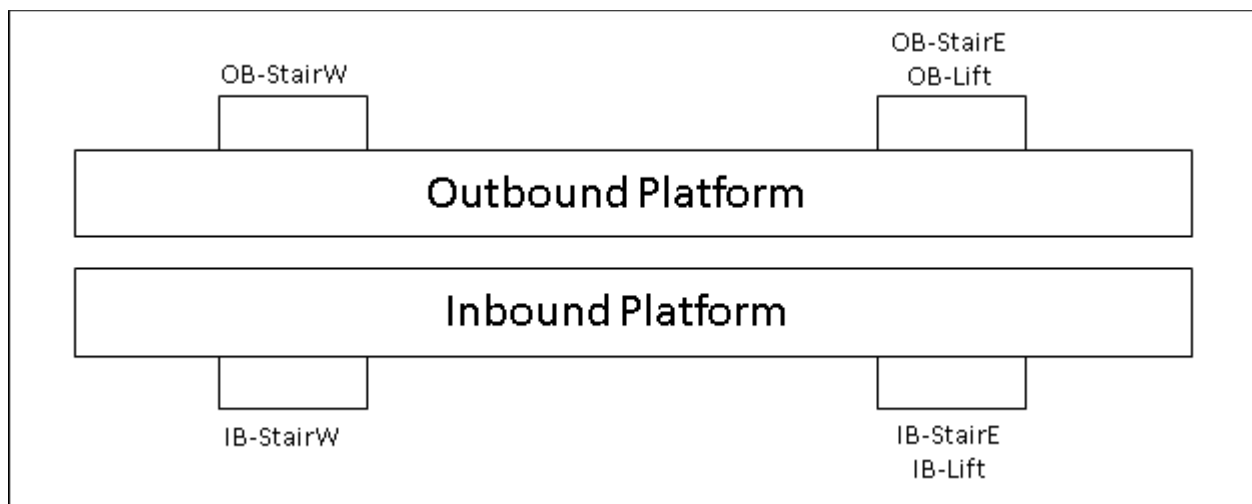
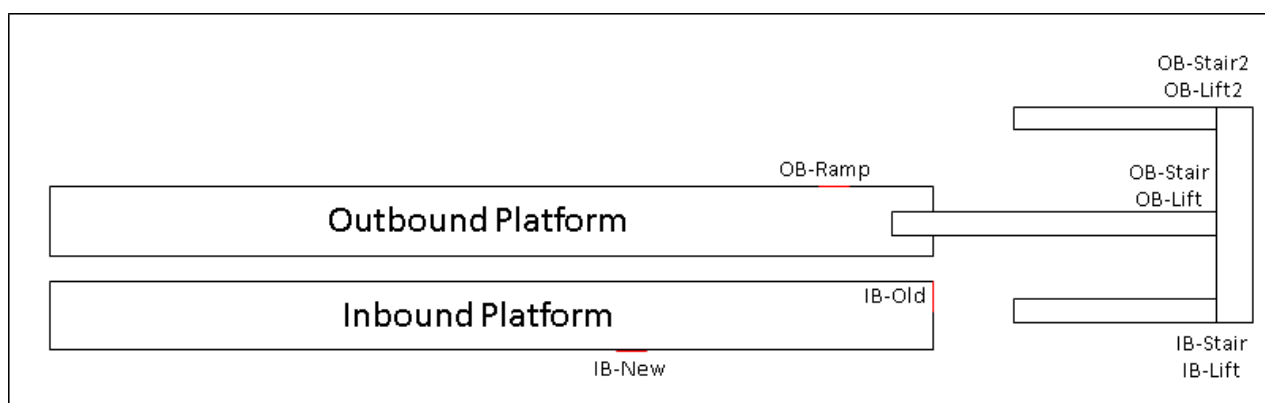


Figure 2: Royal Victoria DLR station schematic



7. To account for developments that are expected to be in place by 2021 but which were not included in the strategic public transport models, several scenarios (involving applying an uplift to the baseline demand) were assessed. These scenarios include:
  1. Baseline demand (no uplift);
  2. Baseline +5% uplift;
  3. Baseline +20% uplift; and
  4. Baseline +35% uplift.

## Methodology

8. The assessment was conducted on the basis of LU’s station planning guidance. The aspects of the guidance that are most relevant to this assessment include:
  - Conversion of peak 3-hour demand to the average flow per minute;
  - Calculation of two-way passageway widths;
  - Calculation of two-way stair widths;
  - Calculation of lift capacities; and
  - Calculation of two-way platform entry/exit widths.

## Demand

9. Steer was advised by DLR that whilst 2019 station counts can be assumed to be very similar to 2021 pre-Elizabeth line demand, it was recommended that the assessment be conducted on the basis of post-Elizabeth line demand. To convert 2019 entry/exit counts (provided by DLR) to 2021 post-Elizabeth line demand, factors were derived using Railplan model results (provided by TfL’s strategic modelling team)

for two identical 2021 scenarios, one with the Elizabeth line and one without. Since only AM peak with and without Elizabeth line scenarios exist, PM peak factors were derived by simply reversing the AM peak factors (i.e. PM peak entry = AM peak exit and PM peak exit = AM peak entry). These factors were then applied to the 2019 entry/exit station counts.

10. It's worth noting that, based on the AM peak pre and post-Elizabeth line Railplan model results, the overall effect of the introduction of Elizabeth line services is to reduce demand at both West Silvertown and Royal Victoria stations. At West Silvertown, the reduction is circa. 16% for both entries and exits and at Royal Victoria the reductions are 46% and 41% for entries and exits respectively.
11. Station entry/exit demand was then converted to boarders and alighters by platform by applying platform distributions calculated from 2021 Base Minus Railplan model results.
12. Development trips were extracted through a comparison of 2021 Base Minus and Development Railplan model results.
13. Using peak conversion factors from LU's station planning guidance, the 3-hour peak demand was converted into average minute passenger flows. The demand for each scenario was then calculated by applying the appropriate uplift to the baseline flows and, for the with development demand, adding on the development trips (see Table 1, Table 2, Table 3, and Table 4).

**Table 1: West Silvertown AM average minute passenger flows by scenario**

Scenario	Demand	DLR Woolwich Arsenal NB		DLR Woolwich Arsenal SB	
		Boarders	Alighters	Boarders	Alighters
1	Baseline	6.48	0.47	0.36	4.00
1	Baseline + Development	9.17	0.57	0.53	4.53
2	Baseline (+5%)	6.80	0.50	0.38	4.20
2	Baseline (+5%) + Development	9.50	0.60	0.55	4.73
3	Baseline (+20%)	7.77	0.57	0.43	4.80
3	Baseline (+20%) + Development	10.47	0.67	0.60	5.33
4	Baseline (+35%)	8.74	0.64	0.48	5.40
4	Baseline (+35%) + Development	11.44	0.74	0.65	5.93

**Table 2: West Silvertown PM average minute passenger flows by scenario**

Scenario	Demand	DLR Woolwich Arsenal NB		DLR Woolwich Arsenal SB	
		Boarders	Alighters	Boarders	Alighters
1	Baseline	4.20	0.23	0.37	5.04
1	Baseline + Development	5.24	0.43	0.50	6.75
2	Baseline (+5%)	4.41	0.24	0.39	5.30
2	Baseline (+5%) + Development	5.45	0.44	0.52	7.00
3	Baseline (+20%)	5.04	0.27	0.44	6.05
3	Baseline (+20%) + Development	6.08	0.47	0.58	7.76
4	Baseline (+35%)	5.67	0.31	0.50	6.81
4	Baseline (+35%) + Development	6.71	0.51	0.63	8.52

**Table 3: Royal Victoria AM average minute passengers flows by scenario**

Scenario	Demand	DLR Beckton WB		DLR Beckton EB	
		Boarders	Alighters	Boarders	Alighters
1	Baseline	9.22	0.57	0.41	3.19
1	Baseline + Development	9.31	0.61	0.49	3.31
2	Baseline (+5%)	9.68	0.60	0.43	3.35
2	Baseline (+5%) + Development	9.77	0.64	0.51	3.47
3	Baseline (+20%)	11.06	0.69	0.49	3.83
3	Baseline (+20%) + Development	11.16	0.73	0.57	3.95
4	Baseline (+35%)	12.44	0.77	0.55	4.31
4	Baseline (+35%) + Development	12.54	0.81	0.63	4.43

**Table 4: Royal Victoria PM average minute passenger flows by scenario**

Scenario	Demand	DLR Beckton WB		DLR Beckton EB	
		Boarders	Alighters	Boarders	Alighters
1	Baseline	3.85	0.39	0.40	6.53
1	Baseline + Development	3.85	0.47	0.44	7.33
2	Baseline (+5%)	4.04	0.40	0.42	6.86
2	Baseline (+5%) + Development	4.05	0.49	0.46	7.66
3	Baseline (+20%)	4.62	0.46	0.48	7.83
3	Baseline (+20%) + Development	4.62	0.55	0.52	8.64
4	Baseline (+35%)	5.19	0.52	0.54	8.81
4	Baseline (+35%) + Development	5.20	0.61	0.58	9.62

**Routeing**

14. At West Silvertown station, baseline demand was assigned to each of the station elements being assessed using platform access distribution data provided by DLR (see Table 5 for the calculated distributions). At Royal Victoria station, since the platform access distribution data were incomplete and because the assessment included station elements in addition to those providing platform access, a combination of platform access distribution data and routeing assumptions were used to assign demand to each of the assessed station elements.
15. Using platform access distribution data for the outbound platform, the boarding and alighting demand on each platform at Royal Victoria was first disaggregated by direction (passengers travelling between the platforms and either the north or the south of the station) based on the distribution of passengers between the ramp versus the stair and lift in the provided data. This was then further subdivided into lift or stair demand using the lift versus stair distribution. Finally, using assumptions about station layout, direction of travel, and passenger routeing, the demand in each of these categories was assigned to all corresponding station elements.
16. In the case of movements between the inbound platform and origins/destinations south of the station, no data were available to split demand between the old and new platform accesses. Additionally, it was not the case (unlike many of the other station elements) that demand necessarily had to be assigned to a particular platform access due to routeing requirements. As a result, the assumption was made to distribute this category of demand evenly between the two platform accesses (see Table 7 for the calculated distributions).
17. Development trips at both stations were assigned to the station element(s) that provided the most direct route from the origin to the destination of each movement, taking into account the relative positions of the stations and the development site (see Table 6 and Table 8 for the calculated distributions for West Silvertown and Royal Victoria respectively).

**Table 5: West Silvertown – assignment of baseline boarding/alighting demand by platform to station elements**

Platform	Movement	IB-StairE	IB-StairW	IB-Lift	OB-StairE	OB-StairW	OB-Lift
DLR Woolwich Arsenal NB	Boarding [%]	23.00%	45.70%	31.30%	-	-	-
DLR Woolwich Arsenal NB	Alighting [%]	31.53%	43.33%	25.14%	-	-	-
DLR Woolwich Arsenal SB	Boarding [%]	-	-	-	21.60%	32.50%	45.90%
DLR Woolwich Arsenal SB	Alighting [%]	-	-	-	24.90%	64.60%	10.50%

**Table 6: West Silvertown – assignment of development boarding/alighting demand by platform to station elements**

Platform	Movement	IB-StairE	IB-StairW	IB-Lift	OB-StairE	OB-StairW	OB-Lift
DLR Woolwich Arsenal NB	Boarding [%]	-	68.70%	31.30%	-	-	-
DLR Woolwich Arsenal NB	Alighting [%]	-	74.86%	25.14%	-	-	-
DLR Woolwich Arsenal SB	Boarding [%]	-	-	-	-	54.10%	45.90%
DLR Woolwich Arsenal SB	Alighting [%]	-	-	-	-	89.50%	10.50%

**Table 7: Royal Victoria – assignment of baseline boarding/alighting demand by platform to station elements**

Platform	Movement	IB-New	IB-Old	OB-Stair	OB-Ramp	OB-Lift	IB-Stair	IB-Lift	OB-Stair2	OB-Lift2
DLR Beckton WB	Boarding [%]	32.67%	67.33%	-	-	-	33.02%	1.64%	33.02%	1.64%
DLR Beckton WB	Alighting [%]	37.05%	62.95%	-	-	-	24.15%	1.75%	24.15%	1.75%
DLR Beckton EB	Boarding [%]	-	-	62.24%	34.67%	3.10%	62.24%	3.10%	-	-
DLR Beckton EB	Alighting [%]	-	-	69.10%	25.90%	5.00%	69.10%	5.00%	-	-

**Table 8: Royal Victoria – assignment of development boarding/alighting demand by platform to station elements**

Platform	Movement	IB-New	IB-Old	OB-Stair	OB-Ramp	OB-Lift	IB-Stair	IB-Lift	OB-Stair2	OB-Lift2
DLR Beckton WB	Boarding [%]	100.00%	-	-	-	-	-	-	-	-
DLR Beckton WB	Alighting [%]	100.00%	-	-	-	-	-	-	-	-
DLR Beckton EB	Boarding [%]	-	-	95.26%	-	4.74%	95.26%	4.74%	-	-
DLR Beckton EB	Alighting [%]	-	-	93.25%	-	6.75%	93.25%	6.75%	-	-

## Station Elements

18. Due to the current circumstances surrounding COVID-19, it was not possible to conduct any site visits in order to take width measurements and make observations. Therefore, in order to be able to conduct the assessment, information about station elements was provided to Steer by DLR. The information includes:
- Widths of stairs and platform accesses;
  - Lift capacities;
  - Lift frequencies; and
  - The distribution of boarding and alighting passengers between platform accesses.
19. At Royal Victoria, two additional stairs and lifts were included in the assessment that are not platform accesses and so were not part of the information provided. The purpose of including the additional station elements was to provide as robust and comprehensive an assessment as was possible and, even though the extra station elements do not themselves provide passengers with direct access to the platforms, they are used by passengers of Royal Victoria station and so are relevant when considering station capacity (see Table 9 and Table 10 for information on the station elements included in the assessment).

**Table 9: West Silvertown station element information**

Element	Type	Width [m]	Cycle Time [min]	Capacity [pax]
IB-StairE	Stairway	2		
IB-StairW	Stairway	2		
IB-Lift	Lift		0.75	8
OB-StairE	Stairway	2		
OB-StairW	Stairway	2		
OB-Lift	Lift		0.75	8

**Table 10: Royal Victoria station element information**

Element	Type	Width [m]	Cycle Time [min]	Capacity [pax]
IB-New	Walkway	1.5		
IB-Old	Walkway	1.5		
OB-Stair	Stairway	1.5		
OB-Ramp	Walkway	2		
OB-Lift	Lift		1.33	4
IB-Stair	Stairway	1.5		
IB-Lift	Lift		1.33	4
OB-Stair2	Stairway	1.5		
OB-Lift2	Lift		1.33	4

20. It should be noted that since no information was available for additional station elements IB-Stair, IB-Lift, OB-Stair2, and OB-Lift2, the properties of these elements have been assumed to be identical to OB-Stair and OB-Lift in the cases of stairs and lifts respectively.

## Results

21. The assessment consists of two types of demand versus capacity analysis, one for elements whose capacity is determined by their width, and another for lifts (whose capacity is based upon a combination of the cycle time and load capacity). Since LU's station planning guidance treats these two types of elements differently, the same approach has been adopted in this assessment.

22. The results presented in the tables below show what proportion of the element capacity is calculated to be used by the forecast demand. For example, a value of 50% would mean that the element is expected to have twice as much capacity compared to what would be needed, based on the forecast demand. A value of 200% would mean that the element is expected to have only half the capacity required based on forecast demand.
23. Table 11 and Table 12 show the AM width and lift calculations respectively for West Silvertown. Table 13 and Table 14 show the PM width and lift calculations respectively for West Silvertown.
24. Table 15 and Table 16 show the AM width and lift calculations respectively for Royal Victoria. Table 17 and Table 18 show the PM width and lift calculations respectively for Royal Victoria.
25. At West Silvertown, both stair and lift capacity are predicted to be able to comfortably meet the requirements of the forecast demand in all scenarios. Even in the worst case (Scenario 4 Baseline (+35%) + Development AM peak), the forecast demand for the inbound lift is predicted to only require approximately one third of the available capacity.
26. Royal Victoria has less capacity and is predicted to be generally busier than West Silvertown across a range of entry/exit points; however, this is predominantly due to baseline demand, rather than due to trips related to the Thameside West development. Similar to West Silvertown, even in the worst case (Scenario 4 Baseline (+35%) + Development AM peak), the forecast demand for the inbound old platform access is predicted to only require approximately one quarter of the available capacity.

## Conclusion

27. The station capacity assessment outlined in this note found no capacity issues at either West Silvertown or Royal Victoria station. Even when attempting to account for developments due between 2019 and 2021 (by uplifting baseline flows by up to 35%) and then adding Thameside West development trips on top, the assessment indicates that both stations should be able to accommodate the forecast demand and have a significant amount of capacity left over.

**Table 11: West Silvertown AM width calculation results**

Element ID	Capacity [pax/min]	Scen. 01 Baseline	Scen. 01 Baseline + Development	Scen. 02 Baseline (+5%)	Scen. 02 Baseline (+5%) + Development	Scen. 03 Baseline (+20%)	Scen. 03 Baseline (+20%) + Development	Scen. 04 Baseline (+35%)	Scen. 04 Baseline (+35%) + Development
IB-StairE	56	2.93%	2.93%	3.07%	3.07%	3.51%	3.51%	3.95%	3.95%
IB-StairW	56	5.65%	9.09%	5.93%	9.37%	6.78%	10.22%	7.63%	11.07%
OB-StairE	56	1.92%	1.92%	2.01%	2.01%	2.30%	2.30%	2.59%	2.59%
OB-StairW	56	4.82%	5.84%	5.06%	6.08%	5.78%	6.80%	6.50%	7.52%

**Table 12: West Silvertown AM lift calculation results**

Element ID	Capacity [peak min pax]	Scen. 01 Baseline	Scen. 01 Baseline + Development	Scen. 02 Baseline (+5%)	Scen. 02 Baseline (+5%) + Development	Scen. 03 Baseline (+20%)	Scen. 03 Baseline (+20%) + Development	Scen. 04 Baseline (+35%)	Scen. 04 Baseline (+35%) + Development
IB-Lift	10.64	19.05%	26.98%	20.00%	27.94%	22.86%	30.79%	25.72%	33.65%
OB-Lift	10.64	3.94%	4.47%	4.14%	4.67%	4.73%	5.26%	5.32%	5.85%

**Table 13: West Silvertown PM width calculation results**

Element ID	Capacity [pax/min]	Scen. 01 Baseline	Scen. 01 Baseline + Development	Scen. 02 Baseline (+5%)	Scen. 02 Baseline (+5%) + Development	Scen. 03 Baseline (+20%)	Scen. 03 Baseline (+20%) + Development	Scen. 04 Baseline (+35%)	Scen. 04 Baseline (+35%) + Development
IB-StairE	56	1.85%	1.85%	1.95%	1.95%	2.22%	2.22%	2.50%	2.50%
IB-StairW	56	3.60%	5.14%	3.79%	5.32%	4.33%	5.86%	4.87%	6.41%
OB-StairE	56	2.39%	2.39%	2.50%	2.50%	2.86%	2.86%	3.22%	3.22%
OB-StairW	56	6.03%	8.89%	6.33%	9.19%	7.24%	10.10%	8.14%	11.00%

**Table 14: West Silvertown PM lift calculation results**

Element ID	Capacity [peak min pax]	Scen. 01 Baseline	Scen. 01 Baseline + Development	Scen. 02 Baseline (+5%)	Scen. 02 Baseline (+5%) + Development	Scen. 03 Baseline (+20%)	Scen. 03 Baseline (+20%) + Development	Scen. 04 Baseline (+35%)	Scen. 04 Baseline (+35%) + Development
IB-Lift	10.64	12.36%	15.41%	12.98%	16.03%	14.83%	17.89%	16.69%	19.74%
OB-Lift	10.64	4.98%	6.66%	5.23%	6.91%	5.97%	7.66%	6.72%	8.40%

**Table 15: Royal Victoria AM width calculation results**

Element ID	Capacity [pax/min]	Scen. 01 Baseline	Scen. 01 Baseline + Development	Scen. 02 Baseline (+5%)	Scen. 02 Baseline (+5%) + Development	Scen. 03 Baseline (+20%)	Scen. 03 Baseline (+20%) + Development	Scen. 04 Baseline (+35%)	Scen. 04 Baseline (+35%) + Development
IB-New	36	8.95%	9.33%	9.40%	9.78%	10.74%	11.12%	12.09%	12.47%
IB-Old	36	18.24%	18.24%	19.15%	19.15%	21.89%	21.89%	24.62%	24.62%
OB-Stair	42	5.85%	6.30%	6.14%	6.59%	7.02%	7.47%	7.90%	8.35%
OB-Ramp	56	1.73%	1.73%	1.81%	1.81%	2.07%	2.07%	2.33%	2.33%
IB-Stair	42	13.42%	13.88%	14.09%	14.55%	16.11%	16.56%	18.12%	18.58%
OB-Stair2	42	7.58%	7.58%	7.95%	7.95%	9.09%	9.09%	10.23%	10.23%

**Table 16: Royal Victoria AM lift calculation results**

Element ID	Capacity [peak min pax]	Scen. 01 Baseline	Scen. 01 Baseline + Development	Scen. 02 Baseline (+5%)	Scen. 02 Baseline (+5%) + Development	Scen. 03 Baseline (+20%)	Scen. 03 Baseline (+20%) + Development	Scen. 04 Baseline (+35%)	Scen. 04 Baseline (+35%) + Development
OB-Lift	3	5.32%	5.59%	5.58%	5.86%	6.38%	6.65%	7.18%	7.45%
IB-Lift	3	10.36%	10.64%	10.88%	11.16%	12.44%	12.71%	13.99%	14.26%
OB-Lift2	3	5.05%	5.05%	5.30%	5.30%	6.06%	6.06%	6.81%	6.81%

**Table 17: Royal Victoria PM width calculation results**

Element ID	Capacity [pax/min]	Scen. 01 Baseline	Scen. 01 Baseline + Development	Scen. 02 Baseline (+5%)	Scen. 02 Baseline (+5%) + Development	Scen. 03 Baseline (+20%)	Scen. 03 Baseline (+20%) + Development	Scen. 04 Baseline (+35%)	Scen. 04 Baseline (+35%) + Development
IB-New	36	3.89%	4.14%	4.08%	4.34%	4.66%	4.92%	5.25%	5.50%
IB-Old	36	7.87%	7.87%	8.26%	8.26%	9.44%	9.44%	10.62%	10.62%
OB-Stair	42	11.34%	13.20%	11.91%	13.77%	13.61%	15.47%	15.31%	17.17%
OB-Ramp	56	3.27%	3.27%	3.43%	3.43%	3.92%	3.92%	4.41%	4.41%
IB-Stair	42	14.58%	16.45%	15.31%	17.18%	17.50%	19.37%	19.69%	21.55%
OB-Stair2	42	3.25%	3.25%	3.41%	3.41%	3.89%	3.89%	4.38%	4.38%

**Table 18: Royal Victoria PM lift calculation results**

Element ID	Capacity [peak min pax]	Scen. 01 Baseline	Scen. 01 Baseline + Development	Scen. 02 Baseline (+5%)	Scen. 02 Baseline (+5%) + Development	Scen. 03 Baseline (+20%)	Scen. 03 Baseline (+20%) + Development	Scen. 04 Baseline (+35%)	Scen. 04 Baseline (+35%) + Development
OB-Lift	3	10.88%	12.69%	11.43%	13.23%	13.06%	14.86%	14.69%	16.50%
IB-Lift	3	12.99%	14.79%	13.64%	15.44%	15.59%	17.39%	17.53%	19.34%
OB-Lift2	3	2.11%	2.11%	2.21%	2.21%	2.53%	2.53%	2.84%	2.84%

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