Figges Marsh

Technical Note: Bus Cost Benefits (including diversion route impact)

EVERY JOURNEY MATTERS

Prepared for:	Project and Programme Sponsorship - Network Sponsorship
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Executive Summary

The technical note that follows covers the cost-benefit analysis for the feasibility design stage of the Figges Marsh scheme which is situated in the London Borough of Merton.

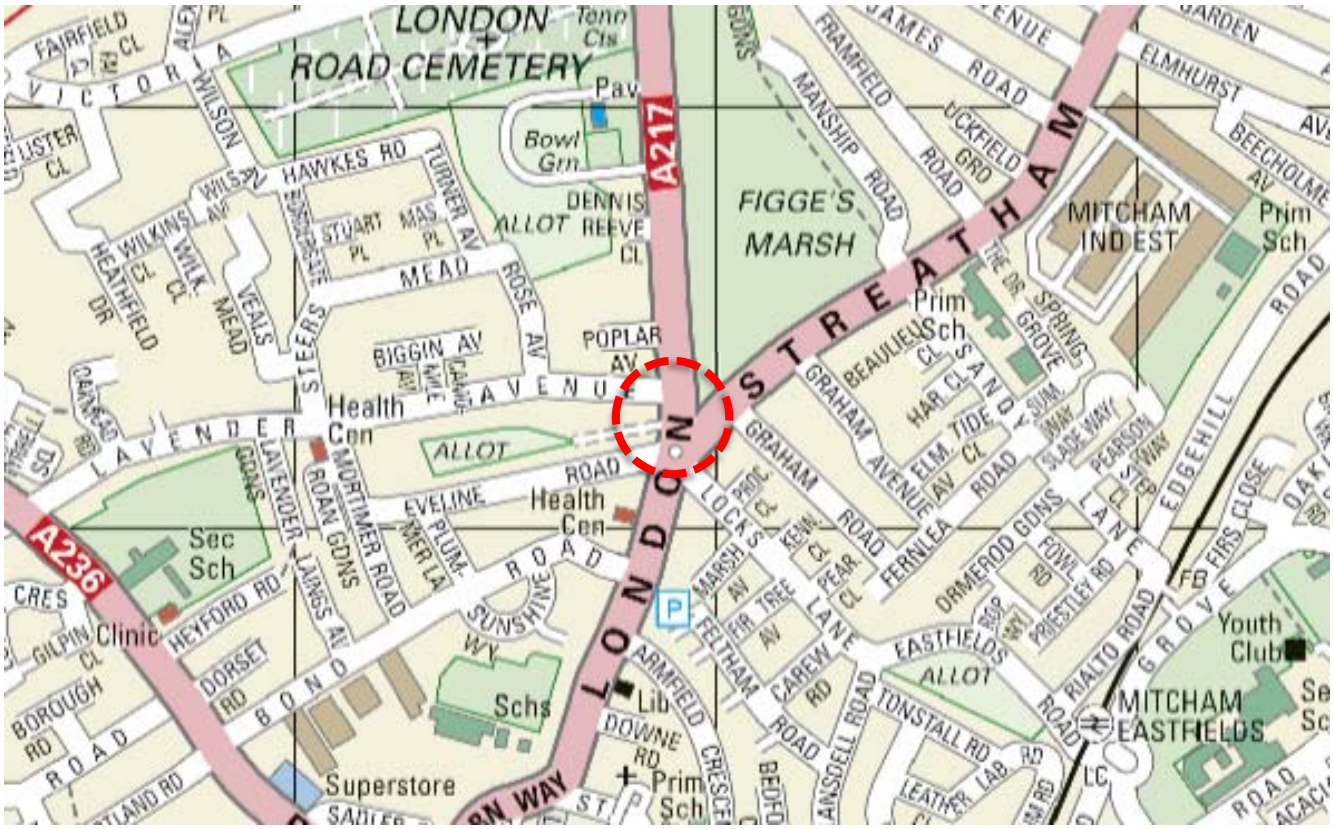
This note aims to provide a cost-benefit analysis for buses comparing the financial benefits of the scheme proposals compared with the impact (and potential financial losses) of diverting buses via Mitcham Town Centre during times of route curtailment or diversion for buses travelling southbound. The requirement of the diversion is a result of buses now being unable to turn left from London Road (southbound) into Streatham Road (north-eastbound) following the proposals to convert the existing roundabout to a traffic signalled junction.

The results of the cost-benefit analysis reveal that as long as the diversion is in place **for no more than 2.6 days out of every 7 (averaged across the year)**, then the scheme proposals will result in an overall positive financial benefit. This equates to running **62.7%** of the buses on the southbound route **without** a diversion to ensure a positive benefit.

Location

The proposed scheme is located at the five-arm junction of the A217 London Road, A216 Streatham Road, Eveline Road and Lock's Lane. The junction is often colloquially known as Figges Marsh, named after the Common land located to the north to the junction.

A map of the study area is below:



Bus Cost-Benefit Analysis

Data Required

To obtain the bus cost benefit analysis, there are three things that are required for the calculation. As such for each bus route through the scheme we need to find the:

- Existing Bus Journey Times
- Proposed Bus Journey Times (VISSIM modelling results)
- Passenger Numbers (Passenger Volume Data).

VISSIM Modelling Results (Bus Journey Times)

The journey times are possible to obtain from the VISSIM model produced as part of this scheme during the feasibility design stage.

Below is the extracted bus journey time results from both the **Base** model (existing bus journey times) and **Proposed** model (the bus journey times expected in the new layout), along with the difference between the two.

Buses	Base		Proposed		Difference	
Travel section	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
355, 280, 264 & 270 Northbound	2-3	2-3	2-3	2-3	No change	No change
201 & 127 Northbound	1-2	1-2	1-2	1-2	No change	No change
355, 280, 264 & 270 Southbound	2-3	3-4	2-3	2-3	No change	**-(1-2)**
201 & 127 Southbound	6-7	14-15	4-5	6-7	**-(1-2)**	**-(4-5)**
152 South-Westbound	5-6	3-4	2-3	3-4	**-(2-3)**	**-(0-1)**
152 South-Eastbound	1-2	1-2	0-1	1-2	No change	No change

Figures highlighted in green in the 'difference' column show where a journey time saving has been achieved, likely leading to a positive financial return.

For the purposes of the calculation we have assumed the higher of the two values when a range of journey times are displayed.

Passengers Volume Data

The number of passengers can be obtained from the ODX data, which is based upon Oyster / Contactless card usage on the buses. NB: This data was taken in 2016 (latest available at time of study).

The figures below show the average weekday daily "on the bus" passenger figures of all the stop-to-stop links along the route. This is broken down per peak, route and direction of the service.

Route	Direction	Peak (3 hour time period)	Average Daily Bus Count	Average Daily[1] Bus Passengers
127	Northbound	AM	14	209
127	Northbound	PM	14	286
127	Southbound	AM	14	298
127	Southbound	PM	13	208
152	South-Westbound	AM	15	310
152	South-Westbound	PM	15	163
152	South-Eastbound	AM	13	149
152	South-Eastbound	PM	15	299
201	Northbound	AM	11	192
201	Northbound	PM	11	248
201	Southbound	AM	11	279
201	Southbound	PM	11	173
264	Northbound	AM	15	576
264	Northbound	PM	15	451
264	Southbound	AM	16	403
264	Southbound	PM	16	611
270	Southbound	AM	16	160
270	Southbound	PM	17	364
270	Northbound	AM	18	467
270	Northbound	PM	16	196
280	Southbound	AM	18	495
280	Southbound	PM	17	667
280	Northbound	AM	17	616
280	Northbound	PM	18	463
355	Northbound	AM	15	274
355	Northbound	PM	14	162
355	Southbound	AM	14	117
355	Southbound	PM	15	208

[1] This is the total number of all bus passengers travelling for that particular bus services across the 3 hour peak time period.

Economic Benefit Calculation

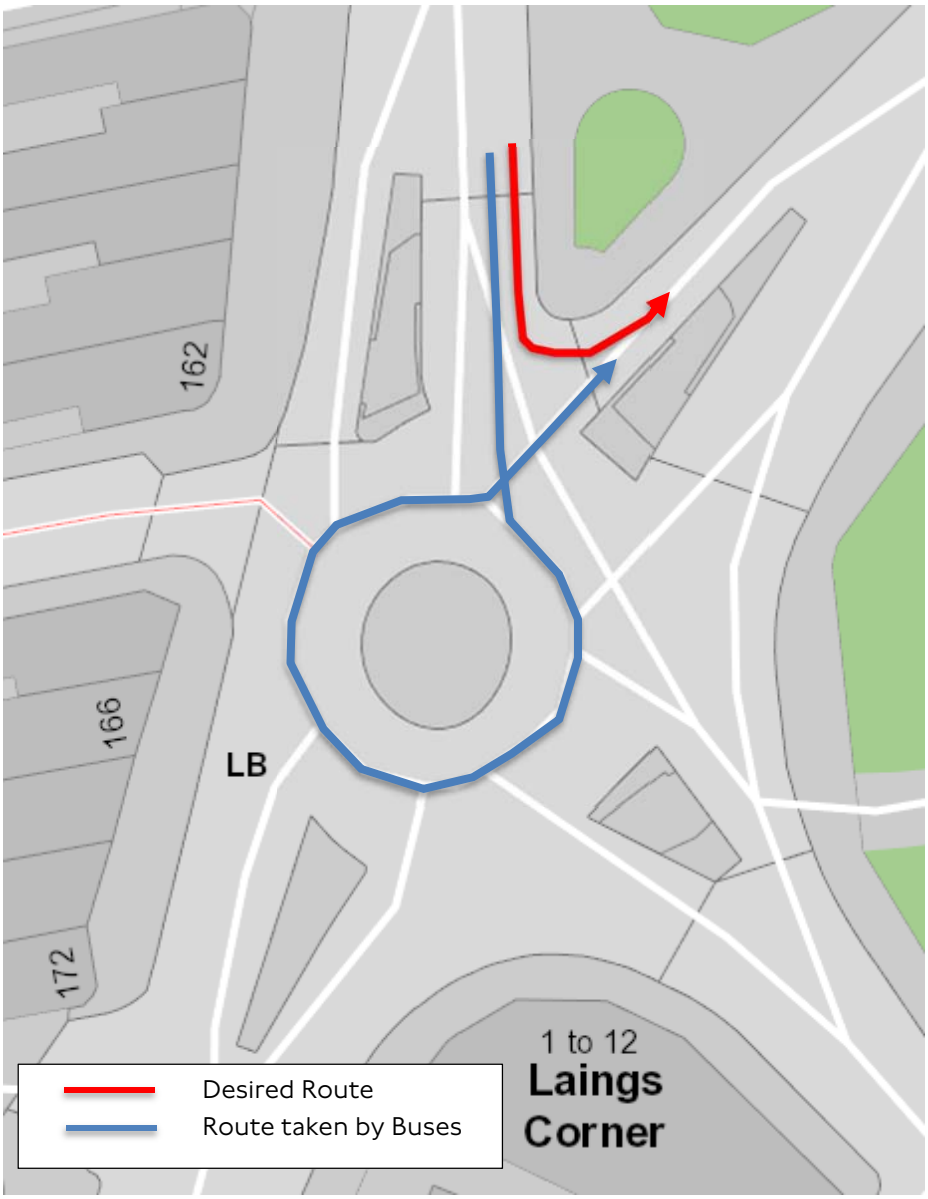
Time Period	Route	Direction	Passengers (per day, per Period)	Journey Time Before (secs)	Journey Time After (secs)	Journey Time Difference (secs)	Economic Benefit (£ p.a.)
AM Peak (07:00-09:59)	355, 280, 264 & 270	Northbound	1932	180	180	0	0
	201 & 127	Northbound	401	120	120	0	0
	355, 280, 264 & 270	Southbound	1174	180	180	0	0
	201 & 127	Southbound	576	420	300	-120	£35,904
	152	South-westbound	310	360	180	-180	£28,985
	152	South-eastbound	149	120	60	-60	£4,644
PM Peak (16:00-18:59)	355, 280, 264 & 270	Northbound	1272	180	180	0	0
	201 & 127	Northbound	533	120	120	0	0
	355, 280, 264 & 270	Southbound	1849	240	180	-60	£57,627
	201 & 127	Southbound	381	900	420	-480	£94,996
	152	South-westbound	163	240	240	0	0
	152	South-eastbound	299	120	120	0	0
						Total	£222,156

Bus Route Resilience

Left Turn from London Road (northern arm) into Streatham Road (north-eastern arm)

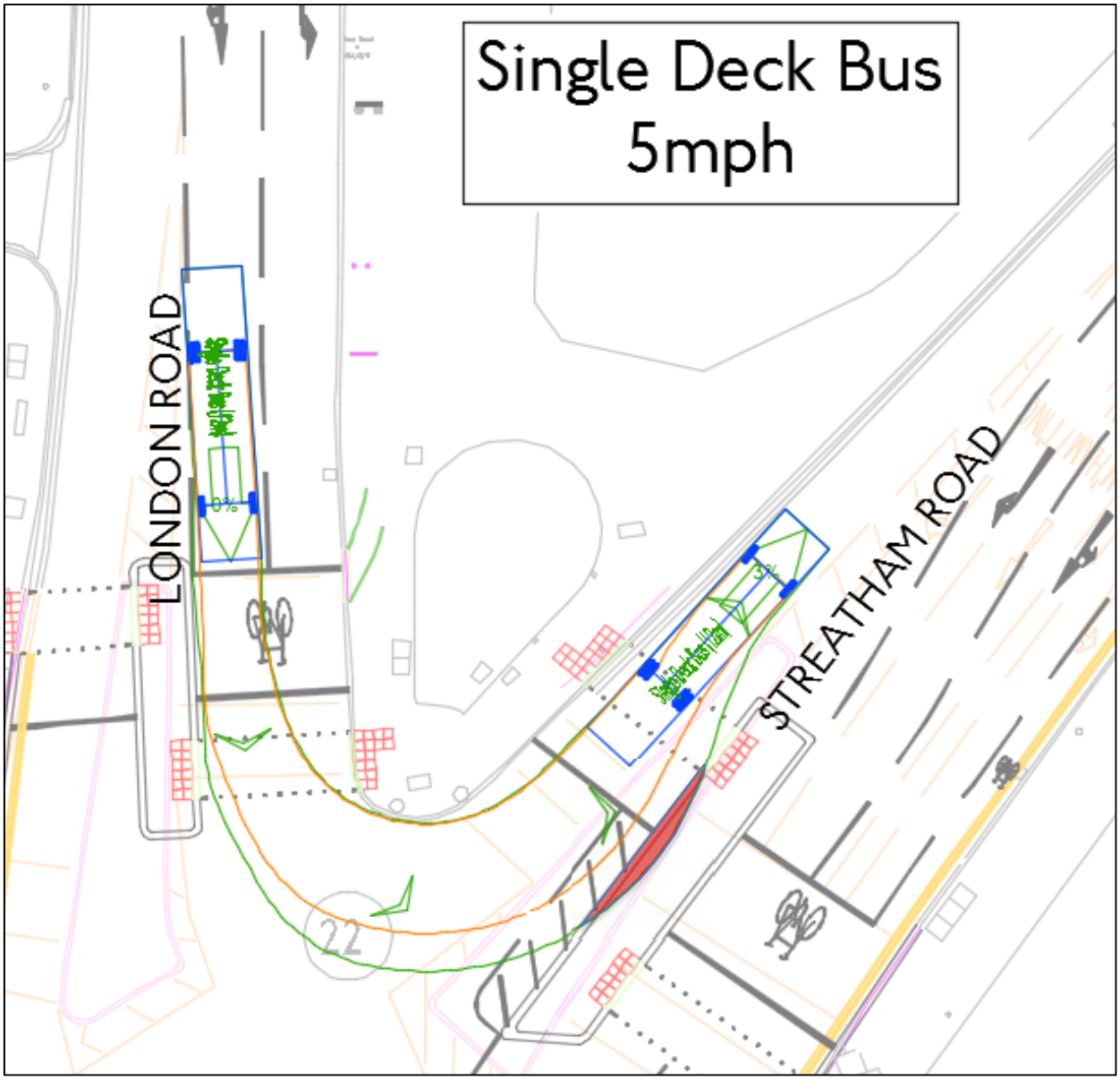
During stakeholder liaison, TfL Engineering were informed by the local bus operators that the left turn from London Road (southbound) into Streatham Road (north-eastbound) is often used by buses on diversion or for routes that have been curtailed.

The existing geometry of the junction is very tight, making the left turn hard for a larger vehicle, such as a bus, to physically make the left turn directly. To overcome this issue, buses would travel around the roundabout to align themselves with the exit. The diagram below indicates the left turn (in red) and the route taken by buses to reach Streatham Road (in blue).



Whilst vehicles can make the turn by utilising the roundabout in the current layout, the new layout will involve the removal of the roundabout to accommodate full signalisation.

The vehicle tracking drawing below shows a double decker bus attempting to make the left turn under the proposed new layout.

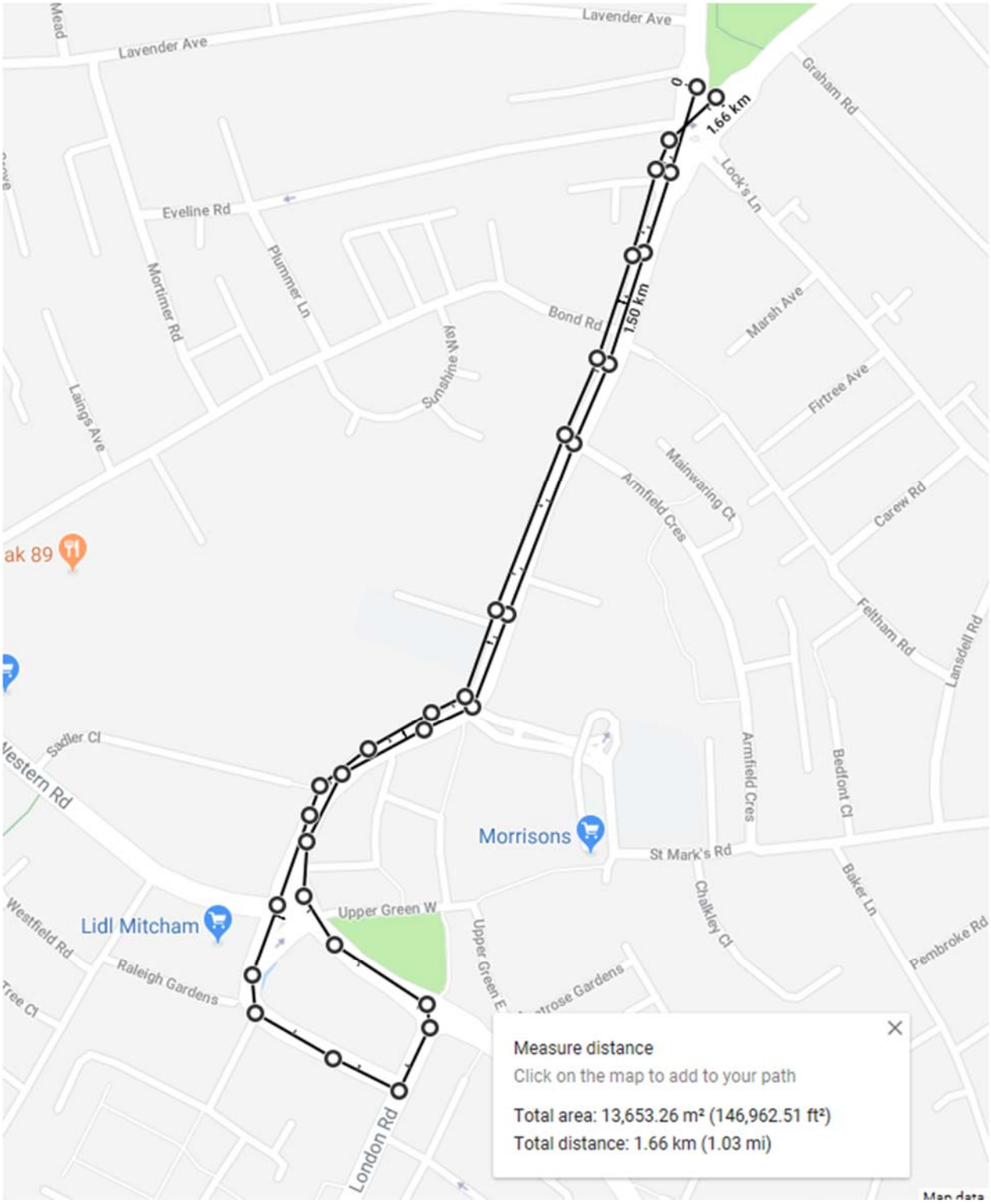


As can be seen above, the tracking shows that the overhang of the bus encroaches on the central pedestrian island on Streatham Road. As a further and potentially more serious issue, the bus has to make the turn from the offside lane (the turn is not physically possible from the nearside lane). Turning from the offside lane would be a safety critical issue, due to the high chance that a turning bus would be involved in a 'left turn hook' collision with a vehicle on the nearside lane travelling straight ahead.

Even under the assumption that the curtailment of the bus routes or need for diversion would be a relatively rare occurrence, the left turn manoeuvre cannot be safely accommodated and should therefore not be promoted by the design team to Bus Operations. As such buses would have to access Streatham Road by another means.

Diversion Route

The most likely alterative diversion route (when a bus needs to reach Streatham Road from London road) would be to continue travelling south towards Mitcham Town Centre and utilise the one-way system to return to Figges Marsh. The potential alternative route (totalling a distance of 1.66km) is shown in the map below.



Economic Impact of diversion

To calculate the economic impact we would need to find the average cruise speed of a bus along the link. As no data is currently available, we have assumed a cruise speed of 9.8mph, taken from the TfL publication of the Buses Performance Data - Bus speeds reports for Merton. *(https://tfl.gov.uk/corporate/publications-and-reports/buses-performance-data#on-this-page-4)*

A diversion distance of **1.66km** at an assumed **9.8mph** average cruise speed would take an **extra** 6 minutes and 19 seconds (or **379 seconds**) to complete.

This diversion would impact routes **264**, **270**, **280** and **355** in the southbound direction only.

As such we will only look at the impact to that route in our data.

Impact of Diversion (via Mitcham Town Centre)					
Time Period	Route	Direction	Passengers per Period	Extra Journey Time to divert (secs)	Economic cost of diversion (£ p.a.)
AM Peak	355, 280, 264, 270	Southbound	1174	379	£231,124.73
PM Peak	355, 280, 264, 270	Southbound	1849	379	£364,011.60
				Total cost of diversion (£ per annum)	£595,136.33
				Total cost of diversion (£ per day)	£1,630.51

Note that overall the scheme proposals have the following financial benefit:

Economic benefit of scheme (£ per annum)	£222,156.00
Economic benefit of scheme (£ per day)	£608.65

As such, whilst the diversion of the buses will cost £1,630.51 per day, every day where normal bus operations are provided would yield an economic benefit of £608.65 per day.

Therefore by dividing the two figures against each other, it can be calculated the level of service required (averaged over a year) to avoid a negative economic benefit.

$$\left(1 - \frac{£608.65}{£1630.51}\right) \times 100 = 62.7\%$$

Therefore, TfL would need to run **62.7%** of the buses on the southbound route **without** a diversion to avoid a negative economic benefit.

In more simplistic terms, over the course of a week (7 days) TfL should ensure that the diversion route should run for **no more** than **2.6 days** out of every **7** when averaged over the course of a calendar year.

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