

TECHNICAL NOTE

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TECHNICAL NOTE

1. Introduction

1.1. This Technical Note sets out the impact of proposed changes to bus movements in Oxford city centre.

1.2. The report is structured as follows:

- Section 2 relates to changes in hourly bus flows along the main streets in Oxford city centre;
- Section 3 outlines the changes in locations and use of city centre bus stops which will result;
- Section 4 considers the potential changes to walking distances between key city centre destinations and amended bus stops; and
- Section 5 contains an Equality Impact Assessment (EQIA) demonstrating the impact of the proposals on protected groups, and suggested mitigation where negative impacts occur.

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2. Hourly Bus Flows

2.1. Table 1 below shows the alterations to hourly bus flows that would result from the closure of Queen Street to buses. A typical weekday off-peak hour has been selected.

Table 1: Changes to hourly bus flows

Street	Direction	Current hourly flow	New hourly flow	Change
Hythe Bridge Street	Eastbound	0	0	0
	Westbound	0	15	+15
Park End Street	Eastbound	53	73	+20
	Westbound	53	58	+5
New Road	Eastbound	52	84	+32
	Westbound	49	84	+35
Queen Street	Eastbound	46	0	-46
Castle Street & Norfolk Street	Northbound	80	84	+4
	Southbound	34	84	+50
Speedwell Street	Eastbound	56	88	+32
	Westbound	102	108	+6
Butterwyke Place	Northbound	22	16	-6
Thames Street (East)	Eastbound	0	20	+20
	Westbound	0	0	0
St Aldate's	Northbound	66	97	+31
	Southbound	107	95	-12
High Street	Eastbound	92	97	+5
	Westbound	87	95	+8

2.2. Summary of the table above are as follows:

- The greatest increases are seen the routes to be taken by eastbound buses which are diverted away from Queen Street i.e. Castle Street, Norfolk Street, Abbey Place, Speedwell Street and St Aldate's;
- Bus movements on St Aldate's northbound will increase by a third, but there will be a slight reduction in southbound services as a result of changes brought about by the closure of Queen Street;
- New Road sees a significant increase in both directions, primarily as a result of services turning in the station area;
- There is a small increase in use of Speedwell Street (westbound), because they would now additionally be used by terminating buses from the west;
- The changes have the effect of equalising bus movements on city centre routes where there is currently an imbalance between westbound and eastbound movements; and

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- Hythe Bridge Street and Thames Street east of Butterwyke Place will now be utilised by buses where they currently are not, generally to facilitate turning movements.
- 2.3. In calculating the hourly bus flows, the bus stop allocation plan received from Oxfordshire County Council on 16 June 2017 has been used to identify the routes to be taken. As the bus routeing situation in Oxford city centre has been in a constant state of flux in the last two years, it has been assumed that services 3/3A, 8/9, 13, 31/34, 35, 280/X8, 300, U1, X2, X3, X30 and X32/X34 'currently' utilise Queen Street, with service 3/3A utilising stops there.

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3. Bus Stop Locations & Use

- 3.1. Table 2 below outlines the changes to the number of bus stops and the intensity of their use in Oxford city centre following the closure of Queen Street to buses and completion of the Westgate centre, compared to the situation before the Westgate works started.

Table 2: Changes to bus stop locations and use

Street	Direction	Current No. of bus stops	New No. of bus stops	Change	Current No. of buses stopping per hour	New No. of buses stopping per hour	Change
Hythe Bridge Street	West	0	1	+1	0	15	+15
Park End Street	East	1	1	0	18	54	+36
	West	1	2	+1	27	55	+28
New Road	East	3	3	0	42	23	-19
	West	3	3	0	33	19	-14
Queen Street/Bonn Square	East	1	0	-1	10	0	-10
Castle Street & Norfolk Street	South	2	6	+4	17	57	+40
	North	3	5	+2	45	52	+7
Speedwell Street	East	1	3	+2	54	72	+18
	West	1	1	0	70	70	0
Oxpens Road	East	0	1	+1	0	0	0
	West	0	1	+1	0	0	0
St Aldate's (north of Speedwell Street)	North	5	7	+2	51	68	+17
	South	5	5	0	38	58	+20
High Street	East	2	4	+2	9	43	+34
	West	3	3	0	77	71	-6

- 3.2. A summary of the table above is as follows:

- There is a net increase of 15 on number of bus stops across the area concerned;
- As a result, stopping patterns are more evenly distributed over the city centre. This leads to increases in key streets such as Park End Street, Castle Street, Norfolk Street and St Aldate's, but a significant reduction in New Road;
- Utilisation of the southbound stops in St Aldate's will increase as a result of fewer physical stops but an increase in the number of buses using them;

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- The largest increase in buses stopping per hour is in Castle Street and Norfolk Street (south), commensurate with the largest increase in bus stops. Bus services on the north side of these streets will be better distributed across a higher number of stops; and
- Oxpens Road and Hythe Bridge Street have new bus stops installed where they previously had none. In Oxpens Road, these are reserved for future expansion and no current bus services are identified to stop at this location.

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4. Bus Passenger Walking Distances

- 4.1. The reconfiguration of bus routes in Oxford city centre results in changes to the physical location of bus stops as well as the routes that serve them. Consequently, the walk distances incurred by passengers intending to travel on these routes may also change.
- 4.2. This section of the note assesses the changes to the length of bus stop walking routes using a matrix of bus services and selected destinations around the city centre. This assessment shows the walking distances to the selected destinations from both inbound and outbound stops before the Westgate works started, and this is compared to the future arrangements following on from the proposed closure of Queen Street to buses and the completion of the Westgate development.
- 4.3. All bus services operating in the affected streets are included in the assessment, however it is recognised that some bus services are more popular than others. These services have been prioritised as part of the allocation of bus stops around the city centre in order to minimise walking distances for the most popular routes.
- 4.4. Nine selected destinations have been chosen to represent popular locations in the city centre. These are as follows:
 - Magdalen Street bus stops;
 - Cornmarket Street (centre);
 - Bonn Square;
 - Gloucester Green bus/coach station;
 - Broad Street (centre);
 - New Road, near Nuffield College;
 - High Street, by Covered Market entrance;
 - St Aldates, by Christ Church Cathedral; and
 - Old Greyfriars Street, south of Norfolk Street.
- 4.5. Some of the above destinations also serve as locations for clusters of bus stops, for example Magdalen Street from where services to north Oxford depart. This allows an assessment of the impact on cross-city journeys which require interchange in the central area.
- 4.6. The focus on selecting destinations has been to include those to the centre and north of the affected routes. This is because the general shift in bus service provision will be to the south, and therefore destinations such as the ice rink, police station, City of Oxford College and the courts are likely to be better served than with the current arrangement.
- 4.7. Walking distances were measured in a Geographic Information Systems (GIS) program based on electronic mapping. Whilst it is accepted that in reality the routes taken by pedestrians will vary on each occasion, depending on the availability of selected routes, the location of obstacles or the speed of pedestrian flow, the GIS program plots a route based on a theoretical possibility and it is acknowledged that some pedestrian journeys may be shorter or longer than the distance stated.

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- 4.8. Nonetheless, it is considered that utilisation of a GIS program to plot the available routes offers a robust basis for assessing the impacts of the scheme on walking distances to bus stops, because both the current and future scenarios are assessed using the same methodology.
- 4.9. The distances have been calculated based on the nearest bus stops to the nine identified destinations for each bus route. This may alter based on the new routes to be taken and stops to be served under the new arrangements. In cases where buses are extended from Magdalen Street/George Street to the Westgate area, significant improvement in walk distances are seen.
- 4.10. Clusters of bus stops have been used as the nodes for bus access, rather than individual stops. These clusters are as follows:
- Park End Street, by Worcester Street;
 - New Road;
 - Castle Street;
 - Norfolk Street;
 - Speedwell Street;
 - St Aldate's (south, by Christ Church Cathedral);
 - St Aldate's (north, by the Town Hall); and
 - High Street (by Turl Street).
- 4.11. In addition, existing bus distances were calculated from stops at Gloucester Green, George Street, Magdalen Street and Queen Street to provide comparisons for services currently serving these areas.
- 4.12. As stated above, both inbound and outbound bus stops have been included in the analysis – 'inbound' bus stops refer to stops where passengers would alight from the bus, and 'outbound' refers to boarding points. Where a bus route crosses the city centre, some stops may perform both functions.
- 4.13. Table 3 overleaf indicates the results of this assessment.

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Table 3: Average walking distances to/from city centre destinations

Service	Inbound			Outbound		
	Before	After	Change	Before	After	Change
1	320	185	-135	320	220	-100
3/3A	245	320	+75	305	320	+15
Eastbound 4	270	215	-55	270	215	-55
Westbound 4	245	215	-30	245	215	-30
5	240	185	-55	220	220	0
8/9	245	225	-20	305	350	+45
10	320	320	0	320	320	0
11	275	340	+65	275	365	+90
12	320	320	0	320	320	0
Northbound X3/X13	320	300	-20	320	300	-20
Southbound X3/X13	320	320	0	320	320	0
16	320	320	0	320	320	0
31	350	410	+60	410	320	-90
35	350	340	-10	410	345	-65
66	410	340	-70	410	345	-65
275	320	320	0	410	410	0
280/X8	240	210	-30	255	255	0
Northbound 300	185	215	+30	185	215	+30
Southbound 300	150	190	+40	150	190	+40
Eastbound 400	240	205	-35	240	205	-35
Westbound 400	240	185	-55	240	185	-55
S1	275	370	+95	340	370	+30
S5	370	215	-155	370	235	-135
T1	320	320	0	320	320	0
Eastbound U1	260	225	-35	260	225	-35
Westbound U1	240	185	-55	240	190	-50
U5/U5X	320	320	0	320	320	0
X2	350	410	+60	410	320	-90
X30	275	290	+15	270	205	-65
X32/X39/X40	350	370	+20	410	345	-65
Coaches	260	260	0	345	345	0
Sightseeing	255	290	+35	255	290	+35



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4.14. The distances are rounded off to the nearest 5 metres.

4.15. The main findings of this assessment are as follows:

- 55% of bus services in this area of the city centre will experience a small change (± 50 metres) in walking distances from **inbound** stops to key destinations;
- 59% of bus services in this area of the city centre will experience a small change (± 50 metres) in walking distances between key destinations and **outbound** stops;
- There is an **improvement** in walking distance for 41% of inbound bus services and 44% of outbound bus services;
- There is a **detriment** to walking distance for 33% of inbound bus services and 22% of outbound bus services;
- Walking distances range from 185 metres to 410 metres, with the largest increase being 95m for services S1 and X30 (inbound) and 90 metres for service 11 (outbound), and the greatest reductions being 155 metres for service S5 (inbound) and 135 metres for the same service (outbound);
- The overall impact on bus walking distances is negligible; and
- The overall mean average walking distance from inbound bus stops will **decrease** from 290 to 280 metres, and for outbound bus stops will **decrease** from 305 metres to 285 metres.

4.16. It is considered that this is due to many services now making a greater number of stops in the city centre than at present, including some routes which are diverted to serve more of the city centre.

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5. Equality Impact Assessment (EQIA)

- 5.1. This section of the note contains an Equality Impact Assessment (EQIA) which identifies the potential effects of the closure of Queen Street to buses on certain groups of people.
- 5.2. The Equality Act 2010 brings together, harmonises and extends current equality law. It replaces the existing antidiscrimination laws with a single Act. It simplifies the law, removing inconsistencies and making it easier for people to understand and comply with it. The Act makes it unlawful to discriminate (treat less favourably) either directly or indirectly because of a protected characteristic in relation to employment; supply of goods and services including education etc.
- 5.3. Public Authorities have a legal responsibility to assess their activities, and to set out how they will protect people from discrimination on the basis of the following 'protected characteristics':
- Age;
 - Disability;
 - Gender reassignment;
 - Marriage and civil partnership;
 - Pregnancy and maternity;
 - Race;
 - Religion or belief;
 - Sex; and
 - Sexual orientation.
- 5.4. The tables overleaf satisfy this legal requirement in terms of the proposed scheme.



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Age

Many conditions relating to older age, such as disabilities and health problems, are dealt with under the 'Disability' section below.

Table 6.1: Impact on persons below driving age

Positive aspects of scheme	Negative impacts of scheme	Proposed mitigation for negative impacts
Improved public realm in Queen Street Reduction in walk distance for some passengers Improved passenger infrastructure at the majority of bus stops Perception of increased security by higher footfall in vicinity of Westgate Centre		
	Walking distances between some key destinations and bus stops may increase	Busiest services allocated to stops closest to existing arrangements Extra public seating provided as part of Westgate development will help mitigate additional walking distances Improvement to public realm reduces perception of greater distance
	Reduction in environment quality in streets experiencing higher bus frequency and stopping	Additional pedestrian facilities provided, with alterations made to bus stops on St Aldates to reduce pavement congestion





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Disability

Table 6.2: Impact on persons with mobility impairments

Positive aspects of scheme	Negative impacts of scheme	Proposed mitigation for negative impacts
<p>Improved public realm in Queen Street</p> <p>Reduction in walk distance for some passengers</p> <p>Improved passenger infrastructure at the majority of bus stops, including perch seating and level entry boarding</p> <p>Perception of increased security by higher footfall in vicinity of Westgate Centre</p>		
	<p>Walking distances between some key destinations and bus stops may increase</p>	<p>Busiest services allocated to stops closest to existing arrangements</p> <p>Extra public seating provided as part of Westgate development will help mitigate additional walking distances</p> <p>Improvement to public realm reduces perception of greater distance</p>
	<p>Reduction in environment quality in streets experiencing higher bus frequency and stopping</p> <p>Difficulties for wheelchair users passing areas of higher footfall and bus shelters</p>	<p>Additional pedestrian facilities provided, with alterations made to bus stops on St Aldates to reduce pavement congestion</p> <p>Bus stops have been located in areas of maximum pavement space to reduce issues</p>





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		Bus services at Castle Street/Norfolk Street also serve stops in Speedwell Street and/or St Aldates, for alternative access
	Proposed bus stops in some locations (Castle Street, Norfolk Street, rear of Westgate Centre) suffer from lack of visibility, increasing fear of crime	Higher pedestrian and bus flows at most times of day due to greater attractiveness of city centre. High levels of lighting at bus stops

Table 6.3: Impact on persons with sensory impairments

Positive aspects of scheme	Negative impacts of scheme	Proposed mitigation for negative impacts
Improved public realm in Queen Street Reduction in walk distance for some passengers		
	Walking distances between some key destinations and bus stops may increase	Busiest services allocated to stops closest to existing arrangements Extra public seating as part of Westgate centre will help to mitigate additional walking distances Improvement to public realm reduces perception of greater distance
	Difficulties for sight impaired persons passing areas of higher footfall and bus shelters, particularly in St Aldates and Castle Street/Norfolk Street	Additional pedestrian facilities provided, with alterations made to bus stops on St Aldates to reduce pavement congestion Bus stops have been located in areas of maximum pavement space to reduce issues





TECHNICAL NOTE

	Information about relocation of bus stops may be difficult to access or interpret	Information provided by a variety of media and well in advance so that passengers are informed prior to journey Bus drivers informed of changes so can advise passengers of new stop arrangements
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Table 6.4: Impact on persons with respiratory health impairments

Positive aspects of scheme	Negative impacts of scheme	Proposed mitigation for negative impacts
Levels of exposure to nitrogen dioxide and particulates will decrease in Queen Street and immediate surrounding areas		
	Walking distances between some key destinations and bus stops may increase	Busiest services allocated to stops closest to existing arrangements Extra public seating as part of Westgate centre will help to mitigate additional walking distances Improvement to public realm reduces perception of greater distance
	Air quality is expected to worsen in streets with higher bus flow and greater levels of stopping buses	Increased use of low emission buses, such as hybrid/stop-start technology Low Emission Zone has been in force since 2014 Studies are being commissioned to explore development of Zero Emission Zone





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Table 6.5: Impact on persons with learning difficulties

Positive aspects of scheme	Negative impacts of scheme	Proposed mitigation for negative impacts
Improved public realm in Queen Street, including reduction in street furniture Reduction in walk distance for some passengers		
	Walking distances between some key destinations and bus stops may increase	Busiest services allocated to stops closest to existing arrangements Information provided by a variety of media and well in advance so that passengers are informed prior to journey Improvement to public realm reduces perception of greater distance
	Information about relocation of bus stops may be difficult to access or interpret	Information provided by a variety of media and well in advance so that passengers are informed prior to journey Bus drivers informed of changes so can advise passengers of new stop arrangements



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Pregnancy and maternity

Table 6.6: Impact on pregnant women and those with infant children

Positive aspects of scheme	Negative impacts of scheme	Proposed mitigation for negative impacts
<p>Improved public realm in Queen Street, including reduction in street furniture</p> <p>Reduction in walk distance for some passengers</p> <p>Levels of exposure to nitrogen dioxide and particulates will decrease in Queen Street and immediate surrounding areas</p> <p>Perception of increased security by higher footfall in vicinity of Westgate Centre</p> <p>Increase in public seating</p> <p>Improvement in street surfacing</p>		
	<p>Walking distances between some key destinations and bus stops may increase</p>	<p>Busiest services allocated to stops closest to existing arrangements</p> <p>Improvement to public realm reduces perception of greater distance</p>
	<p>Difficulties for pregnant women or buggy users passing areas of higher footfall and bus shelters, particularly in St Aldates and Castle Street/Norfolk Street</p>	<p>Additional pedestrian facilities provided, with alterations made to bus stops on St Aldates to reduce pavement congestion</p> <p>Bus stops have been located in areas of maximum pavement space to reduce issues</p>
	<p>Air quality is expected to worsen in streets with higher bus flow and greater levels of</p>	<p>Increased use of low emission buses, such</p>



TECHNICAL NOTE

	stopping buses	as hybrid/stop-start technology Low Emission Zone has been in force since 2014 Studies are being commissioned to explore development of Zero Emission Zone
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Gender reassignment

It is not considered that there are any impacts relating to this protected characteristic.

Marriage and civil partnership

It is not considered that there are any impacts relating to this protected characteristic.

Race

It is not considered that there are any impacts relating to this protected characteristic.

Religion or belief

It is not considered that there are any impacts relating to this protected characteristic.





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Sex

It is not considered that there are any impacts relating to this protected characteristic.

Sexual orientation

It is not considered that there are any impacts relating to this protected characteristic.

