Transport and Works Act 1992

The Transport and Works
(Applications and Objections Procedure)
(England and Wales) Rules 2006

Midland Metro
(Birmingham City Centre Extension Land Acquisition and Variation) Order

Environmental Statement
Volume 2E: Transport Assessment
Midland Metro
Paradise Circus Variation

Transport Assessment
MMD-300207-CS26-DOC-0000-0002
November 2013

Centro
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1 Introduction

1.1 Background

Midland Metro Line One currently runs for approximately 20km from Wolverhampton St George’s to Snow Hill Railway Station in Birmingham, predominantly along a former railway alignment with 2km of street running tramway in Wolverhampton. A further 1.3km extension to the tramway is currently being constructed from Snow Hill to New Street Station which diverges from the existing route close to St Paul’s tram stop running parallel to the existing route into Snow Hill station. This scheme is a shortened version of the 2005 Scheme from St Paul’s through to Five Ways (Edgbaston) which has been granted a Transport & Works Act Order (TWAO).

Mott MacDonald is preparing reference design and contract documentation for a further extension to the shortened 2005 Scheme through to Centenary Square under the 2005 Order, which will be funded through the Birmingham City Centre Enterprise Zone. The proposed Centenary Square Extension (CSQ) extends the network by approximately 800m from the New Street Station tram stop on Stephenson Street via Pinfold Street to Victoria Square where a tram stop will be located adjacent to the Town Hall. The route continues via Paradise Street and Paradise Circus Queensway to a terminus on Broad Street adjacent to the International Convention Centre (ICC), Symphony Hall, REP Theatre and the new Central Library within Centenary Square.

The Paradise Circus gyratory and the immediate surrounding area encompassing the Copthorne Hotel, Central Library and Paradise Forum is due to be redeveloped by a joint venture company (Birmingham City Council, Argent and Altitude); this is known as the Paradise Circus Redevelopment (PCR). This has provided the opportunity for Centro to review the 2005 Scheme alignment and investigate the option of routing the Metro closer to the development by utilising the revised highway layout to provide a shorter, lower cost Metro alignment. Over a short section, this alternate alignment falls slightly outside the current 2005 Order and Centro are making a new TWAO application to gain powers to construct the alternative alignment through Paradise Circus ("The Variation"). It would also revive the powers of compulsory land acquisition gained under the 2005 Order and which expired in 2010, and would authorise the acquisition of the small additional amount of land required to facilitate the change to the route.

1.2 Document Purpose

A Transport Assessment was prepared in 2004 which considered the transport-related impacts of the 2005 Scheme and proposed, where necessary, due mitigation measures. Such measures became part of the package of scheme proposals.

The purpose of this Transport Assessment is to identify the net transport-related impacts of The Variation relative to the 2005 Scheme and, where net impacts arise, to consider how these might affect the level and type of mitigation proposed for the 2005 Scheme.
1.3 Document Scope

The scope for this Transport Assessment is based on the scope agreed with Centro and Birmingham City Council in July 2013. Relevant extracts are attached for reference in Appendix A.

1.4 Document Structure

The document is structured as follows:

- A scheme description is provided in Section 2
- The assessment methodology is described in Section 3
- The impact assessments are presented in Sections 4 to 11
- The report is summarised, with conclusions, in Section 12

Supporting information is also attached in appendices.
2 Scheme Description

2.1 Introduction

The purpose of this section is to provide a description of The Variation scheme and its evolution.

2.2 Scheme Overview

Figure 2.1 shows the CSQ section of the 2005 Scheme, between New Street station and Centenary Square.

This diagram shows that the CSQ section of the 2005 Scheme:

- Begins at the proposed stop at Stephenson Street (to serve New Street rail station)
- Runs on-street on Pinfold Street and Victoria Square to the next stop outside the Town Hall
- Runs along Paradise Street and passes around the south and west sides of the Paradise Circus gyratory via new bridge structures across Suffolk Street Queensway and over the Easy Row subway (a segregated alignment is required at this junction as a two-way Metro route would not be able to share space with a one-way traffic gyratory)
- Rejoins the highway on Broad Street and runs to a stop at Centenary Square

The CSQ scheme is proposed to be operational by 2017.

2.3 Proposed Scheme Variation

Since the 2005 Scheme was granted consent and powers, Argent has been granted outline planning permission for the Paradise Circus Redevelopment (PCR). This will involve a remodelling of the Paradise Circus...
Circus gyratory to accommodate the new development, including the proposed stopping up of the eastern side of the gyratory, such that the north, west and south sides of the gyratory become a two-way signalised junction as shown in Figure 2.2.

Figure 2.2: Proposed remodelled Paradise Circus junction to accommodate PCR proposals
Figure 2.3 below shows how this remodelled junction layout would accommodate the 2005 Scheme alignment.

It is noted that this highway layout differs from the one shown in Figure 2.2 above by the inclusion of a right-turning lane into the PCR basement car park. This would be required to compensate for the fact that the 2005 Scheme will prevent Broad Street from being used as a general traffic approach route to the development car park. The PCR consent is therefore conditioned to provide this right-turning lane in the event that the 2005 Scheme is implemented.

Figure 2.3: Remodelled Paradise Circus junction with 2005 Scheme

The remodelling of this junction as part of the PCR from a one-way gyratory to a two-way signalised arrangement opens up the option of Metro running through on-street, as opposed to having to circumnavigate the gyratory on a segregated alignment. The Variation alignment through the remodelled junction is therefore shown in Figure 2.4 below (which is an extract of the full drawing attached in Appendix B) and represents the arrangement which would have been originally included in the 2005 Order had the
junction already been remodelled by that time. It is noted that this highway layout also incorporates the right turn facility for traffic accessing the PCR basement car park (as per the requirements raised in the EIA Scoping Response).

Figure 2.4: The Variation scheme alignment through remodelled Paradise Circus junction

Source: Mott MacDonald drawing MMD-300207-CS11-DRA-0000-0004, 2013 – See Appendix B

This shared running alignment cannot be delivered within the 2005 Limits of Deviation (2005 LoD). Figure 2.5 shows the additional area (marked red) lying outside the current powers required to build The Variation.
In order to support the application for extended powers, it is therefore The Variation which is the subject of this Transport Assessment.
3  Assessment Methodology

3.1  Introduction

The purpose of this section is to summarise the methodology employed to conduct the impact assessments. This methodology has been developed to be consistent with Department for Transport guidelines and the 2004 Transport Assessment methodology and is as set out in the Transport Assessment Scoping Report agreed with Centro and Birmingham City Council (see Appendix A).

3.2  Relevant Guidance

The 2004 Transport Assessment for the 2005 Scheme adopted a combination of the NATA approach and the then Scottish Government Transport Assessment Guidance. This resulted in the following receptors/impacts being considered:

- Pedestrians
- Cyclists
- Heavy rail
- Buses
- Coaches
- Hackney cabs
- Traffic
  - Access and servicing
  - Emergency services
  - Car parking
  - Park & Ride
  - Changes in patterns and flow
- Road safety

Since the Transport Assessment for the 2005 Scheme was published, the DfT issued ‘Guidance on Transport Assessment’ in 2007, which remains the most up-to-date Transport Assessment guidance presently available in the UK. Though mostly applicable to land use development schemes, the guidance confirms that the receptors and impacts considered in the 2005 Scheme Transport Assessment are still relevant for The Variation.

3.3  Assessment Objective

The purpose of this Transport Assessment is to identify the net transport-related impacts of The Variation relative to the 2005 Scheme and, where net impacts arise, to consider how these might affect the level and type of mitigation proposed for the 2005 Scheme.

3.4  Assessment Year

The assessment year is the proposed opening (operational) year of The Variation, which is 2017.
3.5 Committed Schemes and Developments

3.5.1 Committed Transport Schemes

As agreed with Birmingham City Council and to provide a realistic worst-case scenario for assessing transport impacts, the following committed transport schemes are assumed to have been implemented by 2017:

- Metro Line 1 extension to Stephenson Street;
- Remodelling of Paradise Circus junction (part of Paradise Circus redevelopment proposals);
- Arena Central pedestrian bridge over Suffolk Street Queensway (subject to ongoing negotiation);
- Birmingham City Centre Interchange;
- Albert Street closure;
- New access to Grosvenor Street / Jennens Road;
- Residents Controlled Parking Zones (Calthorpe Rd, Gilbey Rd & Tennant St areas);
- Bath Row / Cregoe Street junction signalisation (part of the Attwood Green and Park Central works);
- Holliday Street / Bridge Street junction improvement (part of the Arena Central development);
- Improved left-turn from Holloway Head into Suffolk Street (part of Pinch Points bid);
- Other Pinch Point schemes at: Ashted Circus, Curzon Circus, Bordesley Circus and Haden Circus; and
- Birmingham Cycle City Revolution proposals.

3.5.2 Metro-Related Transport Schemes

In addition to the above schemes, the following schemes form part of the package of measures agreed between Birmingham City Council and Centro to facilitate the 2005 Scheme:

- Additional pedestrian direction signage to stops;
- Navigation Street Link Road;
- Broad Street traffic management to accommodate Metro; and
- Five Ways roundabout signalisation.

These are therefore assumed to be operational by 2017.

3.5.3 Committed Developments

As agreed with Birmingham City Council and to provide a realistic worst-case scenario for assessing transport impacts, the following committed developments are assumed to be operational by 2017:

- Paradise Circus redevelopment (PCR);
- Arena Central and the V-Building; and
- Beneficial Buildings conversion.
3.6 Assessment Scenarios

3.6.1 Do Nothing Scenario

The Do Nothing Scenario for the purpose of this assessment is defined as being the realistic worst-case scenario (in traffic terms) which would potentially exist in 2017 without the Metro CSQ scheme. This is therefore defined as follows:

*PCR (with highway alterations in place), committed developments and committed transport schemes.*

The committed developments and committed transport schemes are as detailed above in Sections 3.5.3 and 3.5.1 respectively.

The committed developments will result in an increase in city centre traffic flows from 2013 to 2017. It is not proposed to add further background traffic growth. Reference to city centre traffic count data between 2006 and 2012 shows negligible growth over this period. Given the ongoing current economic conditions, it is therefore considered sufficiently robust to assume that any growth between the present and 2017 will be represented in the Do Nothing scenario by the addition of new committed development trips alone.

A pre-2017 Do Nothing scenario has not been considered as the 2017 Do Nothing scenario represents the realistic worst-case scenario in traffic and transport terms.

3.6.2 Metro Net Impact Scenarios

In order to identify the net transport impacts of The Variation relative to the 2005 Scheme, it is necessary to compare the following assessment scenarios:

Do Minimum: *The 2005 Scheme, PCR (with highway alterations in place), committed developments, committed transport schemes and Metro related schemes.*

Do Something: *The Variation, PCR (with highway alterations in place), committed developments, committed transport schemes and Metro related schemes.*

In traffic terms, these represent realistic worst-case scenarios for the predicted opening year of the CSQ scheme.

The committed developments and transport schemes are as detailed above in Sections 3.5.3 and 3.5.1 respectively. The Metro related schemes are detailed above in Section 3.5.2.
3.7 Assessment Impacts

The receptors/impacts considered by the 2004 Transport Assessment for the 2005 Scheme are listed in Section 3.2 above. However, it is noted that The Variation will not generate any changes for some of these receptors/impacts. These are detailed in the following table.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Net Impact?</th>
<th>Reason</th>
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<tbody>
<tr>
<td>Heavy rail</td>
<td>No</td>
<td>Revised route has no net impact on rail operations or on access to rail.</td>
</tr>
<tr>
<td>Coaches</td>
<td>No</td>
<td>Revised route has no net impact on coach operations, other than the impact common to all general traffic.</td>
</tr>
<tr>
<td>Emergency services</td>
<td>No</td>
<td>Revised route has no net impact on emergency service routes or access, other than the impact common to all general traffic.</td>
</tr>
<tr>
<td>Car parking</td>
<td>No</td>
<td>Revised route has no net impact on parking or on access to parking.</td>
</tr>
<tr>
<td>Park &amp; Ride</td>
<td>No</td>
<td>Revised route has no net impact on Park &amp; Ride or on access to Park &amp; Ride.</td>
</tr>
</tbody>
</table>

This Transport Assessment therefore only considers net changes of impacts to the following receptors:

- Pedestrians
- Cyclists
- Buses
- Hackney cabs
- Traffic
  - Access and servicing
  - Changes in patterns and flow
- Road safety

3.8 Assessment Criteria

Traffic and transport impacts (beneficial / adverse / neutral) on a receptor can be considered against the following categories:

- Capacity;
- Routing (i.e. distance travelled);
- Journey time; and
- Amenity.

Depending on the impact category, the magnitude of impact is defined in
Table 3.1 has been developed based on professional knowledge and experience of similar transport schemes elsewhere in the country.
Table 3.1: Definition of impact magnitude

<table>
<thead>
<tr>
<th>Impact Magnitude</th>
<th>Capacity</th>
<th>Routing</th>
<th>Journey Time</th>
<th>Amenity</th>
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<tbody>
<tr>
<td>Negligible</td>
<td>No material impact</td>
<td>No material impact</td>
<td>No material impact</td>
<td>No material impact</td>
</tr>
<tr>
<td>Low</td>
<td>Minor change within 5% either</td>
<td>Minor change no variation to travel time or</td>
<td>Minor change within 5% either</td>
<td>No loss of amenity/full re-provision</td>
</tr>
<tr>
<td></td>
<td>adverse or beneficial</td>
<td>directness of route</td>
<td>adverse or beneficial</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Moderate change between 5% to</td>
<td>Moderate change minor variation to travel</td>
<td>Moderate change between 5% to</td>
<td>Moderate loss of provision with minimal</td>
</tr>
<tr>
<td></td>
<td>10% either adverse or beneficial</td>
<td>time or minor detour from route</td>
<td>10% either adverse or beneficial</td>
<td>impact upon receptors travel behaviour</td>
</tr>
<tr>
<td>High</td>
<td>Major change over 10% either</td>
<td>Significant change – major variation to</td>
<td>Major change over 10% either</td>
<td>Major loss of provision, impact upon</td>
</tr>
<tr>
<td></td>
<td>adverse or beneficial</td>
<td>travel time or major detour from route</td>
<td>adverse or beneficial</td>
<td>receptors travel behaviour</td>
</tr>
</tbody>
</table>

3.9 Assessment Approach

As noted above, the purpose of this assessment is to identify the net transport impacts of the Do Something (The Variation) scenario relative to the Do Minimum (2005 Scheme) scenario, on the basis that the latter impacts are already consented. In order to isolate these net impacts for assessment, the following methodology has been employed:

1. The Do Nothing scenario is reviewed in terms of the changes it introduces relative to the existing situation (2013).
2. The Do Minimum scenario is reviewed in terms of the changes it introduces against the Do Nothing scenario and, where applicable, against the conditions recorded in the 2004 Transport Assessment.
3. The Do Minimum scenario impacts are then identified and assessed by comparing this scenario with the Do Nothing scenario.
4. It is then considered to what degree the Do Minimum impacts are also present in the Do Something scenario, so it can be understood if this latter scenario results in an improvement or deterioration in the impacts already consented.
5. It is further considered whether the Do Something scenario introduces new impacts (either beneficial or adverse) which are not present in the Do Minimum scenario.
6. Mitigation is then considered for any Do Something scenario net impacts identified.

This approach has been adopted to demonstrate continuity and allow comparison with the 2004 Transport Assessment. It is in line with the methodology agreed with Centro and Birmingham City Council in the scoping report (see Appendix A) and is reflected in the structure of each of the assessment sections below. It is noted that this structure is different to the structure required for the accompanying Environmental Statement transport chapter, but the assessment outcomes are the same in each case.
The assessment chapters are focused on operational impacts, as the operational phase represents the realistic worst-case scenario in transport terms, but construction phase impacts are considered for all receptors in Section 11.
4 Pedestrian Impact Assessment

4.1 Introduction

The purpose of this section is to review the net impact on pedestrians of the Do Something (The Variation) scenario relative to the Do Minimum (2005 Scheme) scenario. The impacts of the Do Nothing scenario relative to existing are also qualitatively noted.

This section considers operational phase impacts only, as this represents the realistic worst-case scenario in transport terms. However, construction impacts are considered in Section 11.

4.2 Do Nothing Scenario

As part of the Arena Central planning consent, it is proposed to construct a pedestrian/cycle bridge on the south side of the Paradise Circus gyratory across Suffolk Street Queensway.

The greatest pedestrian impact of the Do Nothing scenario, relative to the existing (2013) situation, will be through the PCR and associated Paradise Circus junction remodelling scheme which will result in the following positive pedestrian impacts:

1. The closure of the east arm of the Paradise Circus gyratory will remove the need for the existing signalised pedestrian crossing from Paradise Street. It will also allow this section of highway to be converted to pedestrian-only public realm.
2. The PCR will allow for more open, direct and pleasant pedestrian routes to be created between Victoria Square and the north side of Broad Street.

4.3 Do Minimum Scenario

4.3.1 Description

Figure 4.1 below is an extract from the 2004 Transport Assessment and shows pedestrian routes and signage through and around Paradise Circus at that time, together with the 2005 Scheme alignment.
The pedestrian routes and signage shown on this figure are still applicable today, in 2013, except for the subway route under Paradise Circus Queensway to Fletcher’s Walk which has since been filled in. The main east-west routes are:

- Through Paradise Forum and over Paradise Circus, between Victoria Square and the north side of Broad Street.
- Through Fletcher’s Walk shopping arcade and under Paradise Circus, via the Easy Row subway, between Paradise Street and the south side of Broad Street.

The Do Minimum scenario does not affect the first of these routes.

The second route presently requires a highway crossing of Paradise Street and Paradise Circus. Since the subway has been filled in, this is facilitated by signalised crossings on Paradise Street and Paradise Circus. With the Do Minimum scenario, this crossing would be replaced by a crossing on Paradise Street.

The Do Minimum also affects the second route in that the 2005 Scheme alignment results in a narrowing of the footway on the south side of Paradise Street. This therefore reduces the space available to pedestrians along this section.
It is also noted that the alignment on the west side of Paradise Circus runs along the existing pedestrian route from the south side of Broad Street to the Easy Row subway and southwards to Suffolk Street Queensway. This is shown in Figure 4.2, which is an extract from the 2004 Transport Assessment and shows the tram alignment in pink (eastbound) and green (westbound), combined with the existing Paradise Circus gyratory layout. This arrangement would require the existing pedestrian route to be displaced laterally to accommodate the 2005 Scheme, as shown in the Figure 4.2.

4.3.2 Do Minimum Scenario Pedestrian-Related Impacts

The pedestrian-related impacts of the Do Minimum scenario, relative to the Do Nothing scenario, are as follows:
### 4.4 Do Something Scenario

#### 4.4.1 Description

As described in Section 2.3 above, The Variation (see Figure 2.4) differs from the 2005 Scheme (see Figure 2.3) by running on-street through the Paradise Circus junction as opposed to on a segregated alignment.

Of the two main pedestrian routes described in Section 4.3.1 above, the only one impacted by The Variation alignment is the route across Paradise Street to Fletcher’s Walk. As with the 2005 Scheme, this will be addressed through the provision of a signalised pedestrian crossing across the alignment on Paradise Street, as highlighted in Figure 4.3.

![Figure 4.3: Proposed pedestrian crossing across The Variation scheme on Paradise Street](source)

Source: Mott MacDonald drawing MMD-300207-CS11-DRA-0000-0004

---

<table>
<thead>
<tr>
<th>Ref</th>
<th>Impact</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The scheme will narrow the footway along the south side of Paradise Circus Queensway</td>
<td>Negligible, as new footway width adequate for low pedestrian demand along this section</td>
</tr>
<tr>
<td>2</td>
<td>The alignment will run along the current pedestrian route from Broad Street to the Easy Row subway and Suffolk Street Queensway, causing it to be displaced laterally by about 10m</td>
<td>Negligible, as displaced route will be as convenient</td>
</tr>
</tbody>
</table>
Unlike with the 2005 Scheme, however, The Variation does not affect the existing pedestrian route between Fletcher’s Walk and the south side of Broad Street.

### 4.4.2 Do Something Scenario Pedestrian-Related Net Impacts

Table 4.2 lists the above identified Do Minimum pedestrian-related impacts and notes how the Do Something scheme will modify them.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Do Minimum Impact</th>
<th>Do Minimum Magnitude</th>
<th>Do Something Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The scheme will narrow the footway along the south side of Paradise Circus Queensway</td>
<td>Negligible</td>
<td>None – footway will be narrowed to same degree</td>
</tr>
<tr>
<td>2</td>
<td>The alignment will run along the current pedestrian route from Broad Street to the Easy Row subway and Suffolk Street Queensway, causing it to be displaced laterally by about 10m</td>
<td>Negligible</td>
<td>Improved – revised-alignment will not affect this pedestrian route at all</td>
</tr>
</tbody>
</table>

### 4.4.3 Do Something Scenario Pedestrian-Related New Impacts

The Do Something scenario will not generate any new pedestrian-related impacts relative to the Do Minimum scenario.

### 4.5 Pedestrian-Related Impact Assessment Summary

The redevelopment of Paradise Circus and the remodelling of the gyratory in the Do Nothing scenario will generate positive impacts for pedestrians relative to the existing situation through the removal of some existing movement barriers and the creation of new routes and better public realm.

The Do Minimum scenario will generate the following pedestrian-related impacts, relative to the Do Nothing scenario:

1. The scheme will narrow the footway along the south side of Paradise Circus Queensway.
2. The alignment will run along the current pedestrian route from the Easy Row subway to Broad Street causing it to be re-routed.

These impacts are assessed to be of negligible magnitude.

The Do Something scenario will result in no change to the first of these impacts and a removal of the second impact. It will also not introduce any new pedestrian-related impacts.

The net impact on pedestrians of the Do Something scenario, relative to the Do Minimum scenario, will therefore be slightly beneficial.
5 Cycling Impact Assessment

5.1 Introduction

The purpose of this section is to review the net impact on cyclists of the Do Something (The Variation) scenario relative to the Do Minimum (2005 Scheme) scenario. The impacts of the Do Nothing scenario are also noted.

This section considers operational phase impacts only, as this represents the realistic worst-case scenario in transport terms. However, construction impacts are considered in Section 11.

5.2 Do Nothing Scenario

The Birmingham Cycle Revolution proposals for the city centre are proposed to be implemented by the Metro CSQ scheme opening year of 2017. Figure 5.1 shows a city centre extract of the routes proposed to be implemented or consolidated as part of the proposals (full drawing attached in Appendix C.1).

Figure 5.1: Birmingham Cycle Revolution city centre cycle route proposals

Source: Extract from Birmingham Cycle Revolution City Centre Quadrant proposals
Currently, there is no designated on-highway cycle route through the Paradise Circus gyratory and cyclists are recommended to walk their cycles through Paradise Forum. With the redevelopment of Paradise Forum, however, cyclists will be able to cycle along this route, which represents an improvement.

5.3 Do Minimum Scenario

5.3.1 Description

The 2005 Scheme CSQ route will affect cycle use along its length between Stephenson Street to Centenary Square, as follows:

- Cycling will not be permitted on Pinfold Street due to inadequate space. However, a contraflow cycle lane will be installed on Hill Street to provide a comparably convenient alternative route.
- The proposed stop on Paradise Street will restrict cycling to the footpath on the south side of the street. Cyclists will need to dismount for this section. However, the designated cycle through-route via Hill Street will be to pass over the tram route to go through the PCR site. This section of Paradise Street will therefore only be used by cyclists wishing to access frontages on Paradise Street itself, so this restriction will affect very few users.
- The section of Broad Street between Paradise Circus and Centenary Square will be too narrow to allow trams to safely pass cyclists. Cyclists will therefore be recommended to use the alternative and more appropriate parallel routes through the PCR site, via Cambridge Street or via Holliday Street.

The alignment does not effect on-highway cycling on the north-south axis through Paradise Circus, though more suitable alternative routes are also available for this movement.

5.3.2 Do Minimum Scenario Cycle-Related Impacts

The cycle-related impacts of the Do Minimum scenario, relative to the Do Nothing scenario, are as listed in the Table 5.1:

<table>
<thead>
<tr>
<th>Ref</th>
<th>Impact</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scheme will prevent cycling on Pinfold Street, requiring contraflow lane on Hill Street to provide alternative route</td>
<td>Negligible, with alternative route provision via Hill Street</td>
</tr>
<tr>
<td>2</td>
<td>Cyclists will be required to dismount on Paradise Street to use shared footway on south side</td>
<td>Negligible, with alternative route provision through PCR site</td>
</tr>
<tr>
<td>3</td>
<td>Cycling not recommended on Broad Street between Paradise Circus and Centenary Square</td>
<td>Negligible, with route provision through PCR site</td>
</tr>
</tbody>
</table>
5.4  Do Something Scenario

5.4.1  Description

The Variation, between Stephenson Street and Centenary Square, will affect designated cycle routes in the same ways as described above for the 2005 Scheme.

Figure 5.2 shows how the Do Something scenario will interface with existing and proposed cycle routes around Paradise Circus.

Source: Extract from Mott MacDonald drawing MMD-300207-CS99-DRA-1200-0021 P1
Figure 5.2 shows:

- Three east-west alternative routes to Broad Street, via:
  - Bridge Street, Holliday Street and Navigation Street (shown blue and yellow – existing routes);
  - Centenary Square and Paradise Forum (shown green – existing route); and
  - Cambridge Street and Paradise Forum (shown red – new route to come forward with PCR scheme).

- Proposed contraflow cycle lane on Hill Street to provide alternative route to Pinfold Street

As in the case for the Do Minimum scenario, the Do Something scenario does not prevent on-highway cycle routes through Paradise Circus on a north-south axis. However, whereas the Do Minimum scenario allows on-highway cycling between Paradise Street and Parade without conflicting with trams, the Do Something scheme does not because The Variation alignment runs through the junction on-street. For the Do Something scenario, therefore, cycle trips between Paradise Street and Parade will need to use the off-street alternatives shown in Figure 5.2, though these alternative routes are also considered more suitable than the equivalent on-highway route.

### 5.4.2 Do Something Scenario Cycle-Related Net Impacts

Table 5.2 lists the above identified Do Minimum cycle-related impacts and notes how the Do Something scheme will modify them.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Impact</th>
<th>Do Minimum Impact</th>
<th>Do Minimum Magnitude</th>
<th>Do Something Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scheme will prevent cycling on Pinfold Street, requiring contraflow lane on Hill Street to provide alternative route</td>
<td>Scheme will prevent cycling on Pinfold Street, requiring contraflow lane on Hill Street to provide alternative route</td>
<td>Negligible</td>
<td>None – same measures proposed</td>
</tr>
<tr>
<td>2</td>
<td>Cyclists will be required to dismount on Paradise Street to use shared footway on south side</td>
<td>Cyclists will be required to dismount on Paradise Street to use shared footway on south side</td>
<td>Negligible</td>
<td>None – same measures proposed</td>
</tr>
<tr>
<td>3</td>
<td>Cycling not recommended on Broad Street between Paradise Circus and Centenary Square</td>
<td>Cycling not recommended on Broad Street between Paradise Circus and Centenary Square</td>
<td>Negligible</td>
<td>None – same measures proposed</td>
</tr>
</tbody>
</table>

### 5.4.3 Do Something Scenario Cycle-Related New Impacts

As noted in Section 5.4.1 above, the Do Something scenario will generate one new cycle-related impact relative to the Do Minimum scenario:

<table>
<thead>
<tr>
<th>Ref</th>
<th>Impact</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On-street route between Paradise Street and Parade not recommended for cyclists because of conflict with on-street tram alignment</td>
<td>Negligible, as alternative routes are more convenient</td>
</tr>
</tbody>
</table>
5.5 Cycle-Related Impact Assessment Summary

The introduction of Birmingham Cycle Revolution proposals and the redevelopment of Paradise Circus public realm in the Do Nothing scenario will generate positive impacts for cyclists, relative to the baseline situation.

The Do Minimum scenario will only generate negligible cycle-related impacts, relative to the Do Nothing scenario. The Do Something scenario will result in no change to these impacts. It will introduce a new cycle-related impact, but the effect of this impact will also be negligible.

The net impact on cycling of the Do Something scenario, relative to the Do Minimum scenario, will therefore be neutral.
6 Bus Impact Assessment

6.1 Introduction

The purpose of this section is to review the net impact on bus services of the Do Something (The Variation) scenario relative to the Do Minimum (2005 Scheme) scenario. The impacts of the Do Nothing scenario are also noted.

This section considers operational phase impacts only, as this represents the realistic worst-case scenario in transport terms. However, construction impacts are considered in Section 11.

6.2 Do Nothing Scenario

The two main impacts of the Do Nothing scenario on buses are as follows:

- The Birmingham City Centre Interchange has a positive impact on bus service provision for the city centre; and
- The remodelling of the Paradise Circus gyratory will mean that the existing bus stops on the eastern arm of the junction will be displaced elsewhere as this arm is proposed for conversion to public space.

6.3 Do Minimum Scenario

6.3.1 Description

The 2005 Scheme will result in Paradise Street being restricted to through-movements by tram only, whereas it is currently used by bus services. The alternative route to Paradise Circus from the south side of the city centre is via Smallbrook Queensway and Holloway Circus. This is a congested route at peak times, so it is proposed to introduce a new link between Navigation Street and Holliday Street (the ‘Navigation Street Link’ – see Section 3.5.2) which would provide an alternative route for buses.

As part of the Do Minimum scenario, it is also proposed to restrict Broad Street to trams, buses and hackney cabs only between Paradise Circus and Centenary Square. The left-turn and right-turn into and out of Broad Street would therefore be for bus and hackney cab only.

6.3.2 Do Minimum Scenario Bus-Related Impacts

The bus-related impacts of the Do Minimum scenario at Paradise Circus, relative to the Do Nothing scenario in the same area, are as listed in Table 6.1.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Impact</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Closure of Paradise Street to buses requiring re-routeing</td>
<td>Negligible, with Navigation Street Link</td>
</tr>
<tr>
<td>2</td>
<td>Broad Street restricted to tram, bus and hackney cabs only</td>
<td>Moderate beneficial, as will reduce congestion impacts for buses on this link</td>
</tr>
</tbody>
</table>
6.4 **Do Something Scenario**

6.4.1 **Description**

As with the Do Minimum scenario, the Do Something scenario also requires the closure of Paradise Street to all through-movements except trams and restricts Broad Street to trams, buses and hackney cabs only between Paradise Circus and Centenary Square.

6.4.2 **Do Something Scenario Bus-Related Net Impacts**

Table 6.2 lists the above identified Do Minimum bus-related impacts and notes how the Do Something scheme will modify them.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Do Minimum Impact</th>
<th>Do Minimum Magnitude</th>
<th>Do Something Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Closure of Paradise Street to buses requiring re-routeing</td>
<td>Negligible, with Navigation Street Link</td>
<td>None – same impact applies</td>
</tr>
<tr>
<td>2</td>
<td>Broad Street restricted to tram, bus and hackney cabs only</td>
<td>Moderate beneficial</td>
<td>None – same impact applies</td>
</tr>
</tbody>
</table>

6.4.3 **Do Something Scenario Bus-Related New Impacts**

The Do Something scenario will not generate any new bus-related impacts relative to the Do Minimum scenario.

6.5 **Bus-Related Impact Assessment Summary**

The opening of the Birmingham City Centre Interchange in the Do Nothing scenario has a positive impact on bus service provision for the city centre, while the remodelling of the Paradise Circus gyratory will result in the bus stops on the eastern side of the gyratory being relocated.

The main bus-related impacts of the Do Minimum scenario will be as follows:

1. Closure of Paradise Street to buses requiring re-routeing, but the impact of this will be negligible with the provision of the Navigation Street Link; and
2. Broad Street restricted to tram, bus and hackney cabs only, which will have beneficial impacts for buses along this section.

The Do Something scenario will result in no change to either of these impacts and will also not introduce any new bus-related impacts.

The net impact on buses of the Do Something scenario, relative to the Do Minimum scenario, will therefore be **neutral** overall.
7 Hackney Cab Impact Assessment

7.1 Introduction

The purpose of this section is to review the net impact on hackney cab services of the Do Something (The Variation) scenario relative to the Do Minimum (2005 Scheme) scenario. The impacts of the Do Nothing scenario are also noted.

This section considers operational phase impacts only, as this represents the realistic worst-case scenario in transport terms. However, construction impacts are considered in Section 11.

7.2 Do Nothing Scenario

The main development included in the Do Nothing scenario which will affect hackney cab routeing, rank locations and capacity is Birmingham Gateway. This will result in some changes to hackney cab operations around the station, but these will not affect the area being considered by this assessment.

7.3 Do Minimum Scenario

7.3.1 Description

The 2005 Scheme will result in Paradise Street being restricted to through-movements by tram only, whereas it is currently used by hackney cabs. The alternative route to Paradise Circus from the south side of the city centre is via Smallbrook Queensway and Holloway Circus. This is a congested route at peak times, so it is proposed to introduce a new link between Navigation Street and Holliday Street (the ‘Navigation Street Link’ – see Section 3.5.2) which would provide an alternative route for hackney cabs.

As part of the Do Minimum scenario, it is also proposed to restrict Broad Street to trams, buses and hackney cabs only between Paradise Circus and Centenary Square. The left-turn and right-turn into and out of Broad Street would therefore be for buses and hackney cabs only.

7.3.2 Do Minimum Scenario Hackney Cab-Related Impacts

The hackney cab-related impacts of the Do Minimum scenario at Paradise Circus, relative to the Do Nothing scenario in the same area, are as listed in the following table:

<table>
<thead>
<tr>
<th>Ref</th>
<th>Impact</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Closure of Paradise Street to hackney cabs requiring re-routeing</td>
<td>Negligible, with Navigation Street Link</td>
</tr>
<tr>
<td>2</td>
<td>Broad Street restricted to tram, bus and hackney cabs only</td>
<td>Moderate beneficial, as will reduce congestion impacts for hackney cabs on this link</td>
</tr>
</tbody>
</table>
7.4 Do Something Scenario

7.4.1 Description

As with the Do Minimum scenario, the Do Something scenario also requires the closure of Paradise Street to all through-movements except trams and restricts Broad Street to trams, buses and hackney cabs only between Paradise Circus and Centenary Square.

7.4.2 Do Something Scenario Hackney Cab-Related Net Impacts

Table 7.2 lists the above identified Do Minimum hackney cab-related impacts and notes how the Do Something scheme will modify them.

Table 7.2: Modification of Do Minimum scenario hackney cab-related impacts by Do Something scenario

<table>
<thead>
<tr>
<th>Ref</th>
<th>Do Minimum Impact</th>
<th>Do Minimum Magnitude</th>
<th>Do Something Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Closure of Paradise Street to hackney cabs requiring re-routeing</td>
<td>Neutral, with Navigation Street Link</td>
<td>None – same impact applies</td>
</tr>
<tr>
<td>2</td>
<td>Broad Street restricted to tram, bus and hackney cabs only</td>
<td>Moderate beneficial</td>
<td>None – same impact applies</td>
</tr>
</tbody>
</table>

7.4.3 Do Something Scenario Hackney Cab-Related New Impacts

The Do Something scenario will not generate any new hackney cab-related impacts relative to the Do Minimum scenario.

7.5 Hackney Cab-Related Impact Assessment Summary

The main Do Nothing scenario development which will affect hackney cab operations is the development of Birmingham New Street station, but this will not affect the area being considered by this assessment.

The main hackney cab-related impacts of the Do Minimum scenario will be as follows:

1. Closure of Paradise Street to hackney cabs requiring re-routeing, but the impact of this will be negligible with the provision of the Navigation Street Link; and
2. Broad Street restricted to tram, bus and hackney cabs only, which will have beneficial impacts for hackney cabs along this section.

The Do Something scenario will result in no change to either of these impacts and will also not introduce any new hackney cab-related impacts.

The net impact on hackney cabs of the Do Something scenario, relative to the Do Minimum scenario, will therefore be neutral.
8 Access & Servicing Impact Assessment

8.1 Introduction

The purpose of this section is to review the net impact on access and servicing of the Do Something (The Variation) scenario relative to the Do Minimum (2005 Scheme) scenario. The impacts of the Do Nothing scenario are also noted.

This section considers operational phase impacts only, as this represents the realistic worst-case scenario in transport terms. However, construction impacts are considered in Section 11.

8.2 Do Nothing Scenario

The two developments which will impact on servicing arrangements in the area of interest are:

- Paradise Circus redevelopment
- Arena Central development

The servicing and access arrangements for these committed developments are considered further in the following sections.

8.2.1 Paradise Circus

Vehicular access to the Paradise Circus development will primarily be via the basement car park which will be accessed and egressed as follows (see Figure 2.2 above):

- Via new all movements access/egress off west side of Paradise Circus Queensway, opposite Broad Street; and
- Via new left-in/left-out access/egress off north side of Paradise Circus Queensway.

Most servicing will take place from the basement area, with service vehicles entering via the west access and leaving via the north egress. The two buildings proposed on the south side of the development will be serviced from the highway at street level via the Paradise Street service loop.

8.2.2 Arena Central

The Arena Central development will be accessed and serviced from Bridge Street and Holliday Street.

8.3 Do Minimum Scenario

8.3.1 Description

The 2005 Scheme results in the closure of Paradise Street to all through-traffic except trams. Servicing for Paradise Street properties will continue as follows:
A service loop will be provided to allow access to the Town Hall. This will be accessed from Paradise Street Queensway, with service vehicles sharing the eastbound tramway on Paradise Street in order to return to Paradise Street Queensway; and

Frontages on the south side of Paradise Street will be serviced from the rear (Swallow Street), as per the existing provision. The direction of Swallow Street will also be reversed to allow an anti-clockwise one-way loop to be formed with Hill Street and Brunel Street.

8.3.2 Do-Minimum Scenario Access and Servicing Related Impacts

As noted above, the Do Minimum scenario will not directly impact on access or servicing arrangements for adjacent properties.

The only impact of the Do Minimum scenario at Paradise Circus, relative to the Do Nothing scenario in the same area, is listed in Table 8.1.

Table 8.1: Do Minimum scenario access and servicing related-related impacts

<table>
<thead>
<tr>
<th>Ref</th>
<th>Impact</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The closure of Broad Street to general traffic will remove one of the access/egress routes to/from the PCR access</td>
<td>Negligible, as direct alternative routes available via Paradise Circus Queensway north and south</td>
</tr>
</tbody>
</table>

8.4 Do Something Scenario

8.4.1 Description

As with the Do Minimum scenario, the Do Something scenario does not directly impact on access or servicing arrangements for adjacent properties but does result in Broad Street being removed as a potential access route to the PCR.

8.4.2 Do Something Scenario Access and Servicing Related Net Impacts

Table 8.2 lists the above identified Do Minimum access and servicing related impacts and notes how the Do Something scheme will modify them.

Table 8.2: Modification of Do Minimum scenario access and servicing related impacts by Do Something scenario

<table>
<thead>
<tr>
<th>Ref</th>
<th>Do Minimum Impact</th>
<th>Do Minimum Magnitude</th>
<th>Do Something Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The closure of Broad Street to general traffic will remove one of the access/egress routes to/from the PCR access</td>
<td>Negligible, as direct alternative routes available via Paradise Circus Queensway north and south</td>
<td>None – same impact applies</td>
</tr>
</tbody>
</table>
8.4.3 Do Something Scenario Access and Servicing Related New Impacts

The Do Something scenario will not generate any new access and servicing related impacts relative to the Do Minimum scenario.

8.5 Access and Servicing Related Impact Assessment Summary

The redevelopment of Paradise Circus and Arena Central in the Do Nothing scenario will result in these developments being accessed and serviced from the northern and western sides of Paradise Circus for the former and from Bridge Street and Holliday Street for the latter.

The main access and servicing related impact of the Do Minimum scenario will be as follows:

1. The closure of Broad Street to general traffic will remove one of the access/egress routes to/from the PCR access, but this will have a negligible impact as direct alternative routes will be available

The Do Something scenario will result in no change to this impact and will also not introduce any new access and servicing related impacts.

The net impact on access and servicing of the Do Something scenario, relative to the Do Minimum scenario, will therefore be neutral.
9 Traffic Impact Assessment

9.1 Introduction

The purpose of this section is to review the net traffic impact of the Do Something (The Variation) scenario relative to the Do Minimum (2005 Scheme) scenario. The impacts of the Do Nothing scenario are also noted.

This section considers operational phase impacts only, as this represents the realistic worst-case scenario in transport terms. However, construction impacts are considered in Section 11.

9.2 Assessment Methodology

The Birmingham City Council City Centre SATURN model was used to identify and assess the net impact of the Do Something scenario on local traffic flows, relative to the impact of the Do Minimum scenario. The SATURN model is able to simulate the reassignment impacts likely to occur with such measures as closing Broad Street to general traffic.

The traffic flows for the Paradise Circus junction were then extracted to allow this junction to be modelled in detail using LinSig. The signal staging from the LinSig models were also input back into the SATURN model to derive final SATURN link flows and finally re-run back in the LinSig model to test the performance of the Paradise Circus junction. These flows and signal data were also input into a VISSIM model of the junction to ensure a robust assessment of the interaction of trams and traffic.

As described in Section 3.4 above, the assessment year is the opening year of 2017 and the assessment periods are:

- Weekday AM peak period (08:00-09:00)
- Weekday PM peak period (17:00-18:00)

These assumptions are considered to provide a realistic worst-case scenario for assessment for the following reasons:

- The committed developments will generate more traffic when fully operational than when under construction; and
- The weekday AM and PM peak hours represent the times of the week when the highway network is busiest.

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1 SATURN is a suite of flexible network analysis programs developed at the Institute for Transport Studies, University of Leeds, and is most suitable for the analysis of relatively minor network changes such as the introduction of one-way streets, changes to junction controls, bus-only streets, etc.

2 LinSig has been the UK industry standard software for the assessment and design of traffic signal junctions and is most suitable for rapid testing of new traffic signal schemes which involve large numbers of alternative options. LinSig allows different options to be quickly modelled and rejected or taken forward possibly to more detailed resource intensive modelling such as microsimulation.

3 VISSIM is a microscopic multi-modal traffic flow simulation software package developed by PTV which models networks and junctions at the level of individual user decisions.
It is noted that the main modelling scenarios tested have not included the potential Arena pedestrian footbridge over Suffolk Street Queensway as it is understood that the status of this scheme is currently under review. However, its inclusion is considered below as a sensitivity test.

9.3 Do Nothing Scenario

All the committed transport schemes and developments listed above in Sections 3.5.1 and 3.5.3 respectively, and which form part of the Do Nothing scenario, will have an impact on city centre traffic flows relative to the existing situation. The net impact is likely to be an increase in traffic flows overall.

9.4 Do Minimum Scenario

9.4.1 Description

The Do Minimum differs from the Do Nothing scenario by the inclusion of:

- The 2005 Scheme (see Figure 2.3 above); and
- Metro-related transport schemes (see Section 3.5.2 above).

The main impacts of the 2005 Scheme on the operation of the highway network, relative to the Do Nothing scenario, are:

- The closure of Paradise Street to all through-traffic except trams closes off a key traffic egress route from the west city centre area to Paradise Circus. To avoid all this traffic adding to congestion on Smallbrook Queensway and at Holloway Circus, it is proposed to open the Navigation Street Link to provide an alternative egress route (see Section 3.5.2 above).
- The closure of Broad Street to general traffic will require traffic to use alternative routes.

These changes will impact on traffic flows and patterns on the local surrounding network. However, it is noted that, as the tram runs primarily around the outside of the Paradise Circus junction on a segregated alignment, the 2005 Scheme has a limited interaction with traffic movements through the junction.

9.4.2 SATURN Link Flow Results

Bandwidth plots showing Do Minimum scenario link-flows (actual) in the AM and PM peak hours are attached in Appendix D. These show:

- Low flows on north end of Broad Street, reflecting the closure to general traffic;
- Sheepcote Street / St Vincent Street used as alternative route to Broad Street, especially southbound; and
- Bath Row / Holloway Head also used as alternative route to Broad Street, especially northbound.

As would be expected, the heaviest flows are on the A38 and the A4540 ring road.
A comparison of these link flows to the equivalent Do Something flows is carried out in the next section below in order to identify the net impacts of the latter scenario.

### 9.4.3 LinSig Results for Paradise Circus Junction

The traffic flows from the Do Minimum SATURN model formed the inputs to a LinSig model of the Paradise Circus junction to test the impacts of The Variation scheme on the performance of this junction. However, as the SATURN model does not model hackney cabs and service vehicles separately from general traffic, neither of these modes are represented on the restricted section of Broad Street and Paradise Street. Estimates for these flows have therefore been added to the SATURN flows on these two links to generate a robust assessment scenario.

The service vehicle and hackney cab flow estimates are based on:

- Flows used for 2004 Transport Assessment VISSIM model;
- Advice provided by Argent re flows to the PCR development; and
- Manual hackney cab flow count on Broad Street undertaken by Mott MacDonald on 10 September 2013.

AM and PM peak hour LinSig modelling results for the Paradise Circus junction in the Do Minimum scenario (see Figure 2.3 for junction layout) are available on request from Centro. A summary of the results, in comparison to the equivalent Do Minimum results, is as follows:

- AM peak hour: -18.6% PRC (Practical Reserve Capacity); and
- PM peak hour: -7.6% PRC.

PRC considers a 90% degree of saturation to be the maximum practical operating capacity, above which flow breakdown and cumulative queuing begin to take place. Negative PRC values therefore show the percentage reduction in traffic which would be required for the junction to operate at a 90% degree of saturation.

The links of the junction predicted to operate at over 90% saturation in the AM peak hour are detailed in the following table.

<table>
<thead>
<tr>
<th>Node</th>
<th>Arm</th>
<th>Lane</th>
<th>Deg Sat</th>
<th>Max Mean Queue (veh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Broad St</td>
<td>Left turn</td>
<td>106.7%</td>
<td>12.9</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus SB</td>
<td>Ahead / left turn</td>
<td>102.6%</td>
<td>65.0</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus SB</td>
<td>Right turn</td>
<td>91.6%</td>
<td>6.4</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus NB</td>
<td>Offside ahead lane / right turn</td>
<td>103.1%</td>
<td>16.0</td>
</tr>
<tr>
<td>Suffolk St Queensway NB /</td>
<td>Suffolk St Queensway NB</td>
<td>Nearside ahead lane</td>
<td>106.6%</td>
<td>96.3</td>
</tr>
</tbody>
</table>

These issues are arising for the following reasons:
Southbound on Paradise Circus, there is one ahead and left-into-development lane and one opposed right turning lane but insufficient green time to clear either;

Northbound on Paradise Circus, right turning development traffic blocks back into the offside ahead lane, thus reducing the ahead movement to a single lane. In order to prevent queues from this stopline blocking back over the tram lines, the queue is moved to the stopline on the Suffolk Street Queensway off-slip; and

In order to maximise green time on the Paradise Circus arms, there is also insufficient green time available to the Broad Street arm.

The links of the junction predicted to operate at over 90% saturation in the PM peak hour are detailed in the following table.

<table>
<thead>
<tr>
<th>Node</th>
<th>Arm</th>
<th>Lane</th>
<th>Deg Sat</th>
<th>Max Mean Queue (veh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus SB</td>
<td>Ahead / left turn</td>
<td>96.9%</td>
<td>42.3</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus SB</td>
<td>Right turn</td>
<td>96.1%</td>
<td>7.6</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Development</td>
<td>Right turn</td>
<td>96.7%</td>
<td>16.7</td>
</tr>
</tbody>
</table>

These issues are arising for the following reasons:

- Paradise Circus southbound experiences the same capacity issues as in the AM peak, though less so as the flow is lower in the PM peak; and
- The remaining green time available is insufficient to fully clear the right-turning development traffic.

It is noted that Paradise Circus northbound operates within capacity in the PM peak as flows are lower and the lighter right turn movement into the development does not block back during this period.

A comparison of these modelling results with the equivalent Do Something results is carried out in the next section below in order to identify the net impacts of the latter scenario.

### 9.5 Do Something Scenario

#### 9.5.1 Description

The Do Something scenario includes The Variation that runs on-street through Paradise Circus, instead of round the southern and western sides of it as in the Do Minimum.

In light of the above LinSig assessment results for the Do Minimum scenario, the Do Something junction layout for Paradise Circus has been improved as follows (see Figure 2.4):

- A right turn lane has been added to Paradise Circus southbound for accessing Broad Street so that both the main carriageway lanes can be used for straight ahead movements.
These two ahead lanes are then continued southwards throughout the junction, as opposed to the one lane arrangement in the Do Minimum layout.

It is noted that these same changes could equally be applied to the 2005 Scheme junction layout if it were to be further developed.

Outside of The Variation Site area, however, the Do Something scenario requires the same changes to the operation of the surrounding highway network as listed above for the Do Minimum scenario (see Section 9.4.1), ie closure of Paradise Street and Broad Street to general traffic.

It is noted that, though the tram runs with traffic through Paradise Circus in this scenario, the signal staging can be arranged such that the tram is able to run during traffic stages.

However, it is also noted that, once a westbound tram enters the junction from Paradise Street, it must clear the junction in one movement due to there being insufficient space within the junction for it to stop without blocking other traffic movements. In order to facilitate this, signals must be timed so that minimal traffic queuing is permitted at the Paradise Circus Queensway northbound stopline. This is reflected in the modelling results presented below.

### 9.5.2 SATURN Link Flow Results

Bandwidth plots showing Do Something scenario link-flows (actual) in the AM and PM peak hours are attached in Appendix E. These show the same characteristics as the equivalent Do Minimum scenario results.

Appendix F shows difference plots which highlight the difference in link-flows between the Do Something and Do Minimum scenarios. Negative values (in green) show where flows have dropped in the Do Something scenario, and positive values (in red) where they have increased.

The results for the AM peak hour show very minimal flow changes, with a minor increase on the A38 southbound.

The results for the PM show greater changes, with less traffic passing under Paradise Circus on the A38 northbound and more appearing to pass through the junction and through the Colmore Row business district area. Some of these differences in route choices are not easily explained, though may reflect the Paradise Circus junction working better and therefore taking pressure off the A38 northbound.

Overall, however, the difference plots show similar traffic patterns for both scenarios, while traffic increases on some links are balanced by similar decreases on other links.

Table 9.3 considers if there would be any net change between the Do Something and Do Minimum scenario in operational impacts on total journey time and total distance travelled (routing) for all vehicle movements during both peak hours.
Table 9.3: Net change in total travel time and distance travelled

<table>
<thead>
<tr>
<th>Period</th>
<th>Parameter</th>
<th>Do Minimum</th>
<th>Do Something</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>Total travel time (PCU hours)</td>
<td>6,952</td>
<td>6,955</td>
<td>+0.04%</td>
</tr>
<tr>
<td></td>
<td>Total distance travelled (PCU km)</td>
<td>142,952</td>
<td>142,919</td>
<td>-0.02%</td>
</tr>
<tr>
<td>PM</td>
<td>Total travel time (PCU hours)</td>
<td>8,297</td>
<td>8,280</td>
<td>-0.20%</td>
</tr>
<tr>
<td></td>
<td>Total distance travelled (PCU km)</td>
<td>143,985</td>
<td>144,095</td>
<td>+0.08%</td>
</tr>
</tbody>
</table>

*Note: PCU = Passenger Car Units*

From these results, it can be seen that the routing and journey time impacts in the Do Something scenario will be very similar to those of the Do Minimum scenario.

9.5.3 LinSig Results for Paradise Circus Junction

The traffic flows from the Do Something SATURN model formed the inputs to a LinSig model of the Paradise Circus junction to test the impacts of The Variation scheme on the performance of this junction. However, as the SATURN model does not model hackney cabs and service vehicles separately from general traffic, neither of these modes are represented on the restricted section of Broad Street and Paradise Street. Estimates for these flows have therefore been added to the SATURN flows on these two links to generate a robust assessment scenario.

As for the Do Minimum scenario, the service vehicle and hackney cab flow estimates are based on:

- Flows used for 2004 Transport Assessment VISSIM model;
- Advice provided by Argent re flows to the PCR development; and
- Manual hackney cab flow count on Broad Street undertaken by Mott MacDonald on 10 September 2013.

Full AM and PM peak hour LinSig modelling results for the Paradise Circus junction in the Do Something scenario are available on request from Centro. A comparative summary of the results, in terms of overall PRC, is provided in Table 9.4.

Table 9.4: LinSig overall comparative results for Paradise Circus junction

<table>
<thead>
<tr>
<th>Peak Hour</th>
<th>PRC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do Minimum</td>
</tr>
<tr>
<td>AM</td>
<td>-18.6%</td>
</tr>
<tr>
<td>PM</td>
<td>-7.6%</td>
</tr>
</tbody>
</table>

This shows that the junction works within capacity in the Do Something scenario in both peak hours, showing an improvement over the Do Minimum scenario. This is mainly due to the improvements to the junction layout in the Do Something scenario relative to the Do Minimum scenario, as described above in Section 9.5.1. It is noted that similar benefits would also be seen in the Do Minimum scenario results if these improvements were also applied to the Do Minimum junction layout.
Table 9.5 shows the links which are shown above as being over-capacity in the Do Minimum AM peak hour and compares the results against the Do Something scenario.

### Table 9.5: AM peak hour – Link result comparison

<table>
<thead>
<tr>
<th>Node</th>
<th>Arm</th>
<th>Lane</th>
<th>Deg Sat</th>
<th>Max Mean Queue (veh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Broad St</td>
<td>Left turn</td>
<td>106.7%</td>
<td>12.9</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus SB</td>
<td>Ahead / left turn</td>
<td>102.6%</td>
<td>65.0</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus SB</td>
<td>Right turn</td>
<td>91.6%</td>
<td>6.4</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus NB</td>
<td>Offside ahead lane / rt turn</td>
<td>103.1%</td>
<td>16.0</td>
</tr>
<tr>
<td>Suffolk St Queensway NB /</td>
<td>Suffolk St</td>
<td>Nearside ahead lane</td>
<td>106.6%</td>
<td>96.3</td>
</tr>
<tr>
<td>Paradise Circus</td>
<td>Queenway NB</td>
<td></td>
<td></td>
<td>15.5</td>
</tr>
</tbody>
</table>

This shows that all these links are predicted to operate within capacity in the AM peak hour in the Do Something scenario.

Table 9.6 shows the links which are shown above as being over-capacity in the Do Minimum PM peak hour and compares the results against the Do Something scenario.

### Table 9.6: PM peak hour – Link result comparison

<table>
<thead>
<tr>
<th>Node</th>
<th>Arm</th>
<th>Lane</th>
<th>Deg Sat</th>
<th>Max Mean Queue (veh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus SB</td>
<td>Ahead / left turn</td>
<td>96.9%</td>
<td>42.3</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Paradise Circus SB</td>
<td>Right turn</td>
<td>96.1%</td>
<td>7.6</td>
</tr>
<tr>
<td>Broad St / Paradise Circus</td>
<td>Development</td>
<td>Right turn</td>
<td>96.7%</td>
<td>16.7</td>
</tr>
</tbody>
</table>

This similarly shows that all these links are predicted to operate within capacity in the PM peak hour in the Do Something scenario.

### 9.5.3.1 Arena Pedestrian Bridge Sensitivity Test

The status of the Arena pedestrian bridge over Suffolk Street Queensway is currently under review and hence this scheme is not included within the main scenario results above. Its inclusion is however considered here as a sensitivity test.

The main impact of the inclusion of the footbridge is that it would require an ‘all-red’ pedestrian-only stage at the junction of Paradise Street and Paradise Circus Queensway. Without the footbridge, this would run on a two-stage arrangement, with Paradise Street running in one stage and Paradise Circus Queensway running in the other. The pedestrian crossing would therefore run during a third stage which would be called ‘on-demand’ by pedestrians pressing the crossing button.
A summary of the results for this scenario, in terms of overall PRC, is as follows:

**Table 9.7: LinSig overall Do Something scenario results for Paradise Circus junction – with Arena footbridge**

<table>
<thead>
<tr>
<th>Peak Hour</th>
<th>PRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>6.5%</td>
</tr>
<tr>
<td>PM</td>
<td>-2.5%</td>
</tr>
</tbody>
</table>

This shows that the extra stage required by the footbridge has a negligible effect on the AM performance and results in a small drop in the PRC level of the junction in the PM peak hour which causes the junction to operate slightly over capacity. However, it is noted that these scenarios are based on an overestimation of traffic flows relative to the SATURN flows, because extra taxi and service vehicle flows have been added on, while the model also simulates the pedestrian and tram stages being called every cycle, whereas this is unlikely to happen in reality. These results are therefore based on a worst-case scenario and are considered to present an acceptable outcome for a city centre junction operating in a weekday peak hour.

### 9.5.4 VISSIM Results for Paradise Circus Junction

The Do Something VISSIM model covers the model extents shown in Figure 9.1.

**Figure 9.1: VISSIM model extents**

A VISSIM model was developed in order to better simulate the interaction between trams and traffic at the Paradise Circus junction, as VISSIM is able to model vehicle-actuated signal stages.

The VISSIM model reflects the following Do Something peak hour operation of the junction:

- The tram traverses the length of the extension with only minor delays in both peaks
Queues form when tram priority activates at the Broad Street / Paradise Circus / Suffolk Street signal controlled junction:

- Queues are formed on Suffolk Street Queensway, Broad Street, Paradise Queensway southbound in the AM peak; and
- Queues are formed on Suffolk Street Queensway, Broad Street, development access in the PM peak.

In both peaks these queues clear within one or two cycles of the tram clearing the junction in the eastbound direction.

Persistent long queues are not forecast by the VISSIM models in either peak, as indicated by the average queue lengths.

Pedestrians crossing Suffolk Street southbound and service vehicles at the Paradise Street signal often have long waits of three minutes or more due to the tram priority logic.

These results confirm the LinSig results for the Do Something scenario.

9.6 Traffic Impact Assessment Summary

The various committed transport schemes and committed developments which form part of the Do Nothing scenario will have an impact on city centre traffic flows relative to the baseline situation. The net impact is likely to be an increase in traffic flows overall.

The SATURN modelling shows an insignificant traffic flow impact of the Do Something scenario relative to the Do Minimum scenario in the AM peak hour and only localised changes around the Paradise Circus junction in the PM peak.

The net traffic impact of the Do Something scenario on the wider network, relative to the Do Minimum scenario, will therefore be neutral.

The LinSig modelling suggests that the Paradise Circus junction will operate over capacity in the Do Minimum (2005 Scheme) scenario in the weekday peak hours. Improvements to the junction layout allow the Do Something (The Variation) scenario to operate within capacity in the weekday peak hours. With the Arena footbridge in place, the junction is predicted to operate within capacity in the AM peak and slightly over capacity in the PM peak. The VISSIM Do Something model also reflects these results, showing the junction to work satisfactorily in the AM and PM peak hours.

The net traffic impact of the Do Something scenario on the Paradise Circus junction, relative to the Do Minimum scenario, will therefore be beneficial.
10 Road Safety Impact Assessment

10.1 Introduction

The purpose of this section is to review the road safety impacts of the Do Something (The Variation) scenario relative to the Do Minimum (2005 Scheme) scenario. The impacts of the Do Nothing scenario are also noted.

10.2 Do Nothing Scenario

The main change from the existing (2013) situation which could affect road safety in the Do Nothing scenario is the remodelling of Paradise Circus from a one-way gyratory to a two-way set of signalised junctions. It is assumed that a Road Safety Audit has been carried out on this design and appropriate road safety measures incorporated into the layout.

10.3 Do Minimum Scenario

As part of the 2004 Transport Assessment for the 2005 Scheme, a safety audit was carried out for the route around Paradise Circus. However, this is not relevant to the Do Minimum scenario as this scenario only considers the 2005 Scheme in the context of the remodelled Paradise Circus junction. Similarly, the safety audit carried out as part of the PCR Transport Assessment only considered the existing gyratory layout and not either the remodelled junction layout or the tram.

As part of the Do Something scenario assessment below, therefore, it is also considered to what degree the items raised would also have applied to the Do Minimum scenario, and only those impacts which are either unique to or more acute in the Do Something scenario are considered.

10.4 Do Something Scenario

10.4.1 Safety Audit

A Stage 1 Safety Audit has been undertaken by qualified Safety Auditors for The Variation and remodelled Paradise Circus junction. This raised five items for consideration, of which four are either unique to the Do Something scenario or are more acute than would be observed in the Do Minimum scenario. These four items are described in Table 10.1.
Table 10.1: Do Something scenario road safety impacts

<table>
<thead>
<tr>
<th>Ref</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lack of provision for cyclists through Paradise Circus</td>
<td>The needs of cyclists need to be taken into consideration as there is potential for them to be ‘squeezed’ by trams at narrow points on the network. In addition, cyclist tyres can become trapped in the tracks if they are required to cycle parallel / in close proximity to tram tracks or cross over tram tracks at an acute angle.</td>
</tr>
<tr>
<td>2</td>
<td>Potential mistaken use of Paradise Street (eastbound) by through traffic</td>
<td>The tie-in with the existing road network at the eastern end of the scheme is unclear. No information has been provided about predicted traffic flows or controls on the access of private vehicles. The proposed scheme requires private vehicles and trams to run along the same sections of road through areas of high pedestrian flows. As a consequence, if the route is used by through traffic there will be an increase in conflicts between private vehicles and pedestrians and private vehicles and trams. This may lead to an increase in accidents.</td>
</tr>
<tr>
<td>3</td>
<td>Conflict between trams and stationary traffic queues through Paradise Circus</td>
<td>The proposed layout of the Suffolk Street Queensway and Paradise Circus Queensway junction includes a number of conflict points between tram movements and moving / stationary traffic. This could lead to conflicts between trams and vehicles resulting in accidents. The junction layout is such that once a westbound tram passes the first tram signal on the eastern approach to the junction it will need to pass through the junction without stopping to prevent the junction from becoming blocked. Westbound trams will also require that no traffic is queued on the northbound approach to the Broad Street / Paradise Circus junction.</td>
</tr>
<tr>
<td>4</td>
<td>Level differences could create adverse camber for right turning trams and buses in and out of Broad Street</td>
<td>There are significant level differences at the existing junction of Broad Street and Paradise Circus Queensway. The level differences are caused by the need to rise over the crown of a pedestrian subway immediately to the south of the junction and to ensure sufficient clearance height under a pedestrian footbridge immediately to the north of the junction. The level differences are currently addressed by having a different level profile for each carriageway of Broad Street and creating the height difference in the central reserve. The current design proposals will not allow this approach to be copied and could lead to significant adverse camber for trams and buses turning right out of Broad Street.</td>
</tr>
</tbody>
</table>

10.4.2 Proposed Measures – Item 1

This net impact of the Do Something scenario on cycle routes through the junction is recognised in Section 5.4.2 above in the Cycling Impact Assessment. The measures proposed for this item are therefore as referenced to in that section. With these measures in place, it is considered that this item presents a low risk of occurrence and so no further measures are required.

10.4.3 Proposed Measures – Item 2

The concern raised by this item is that a vehicle following an eastbound tram through the Paradise Circus junction may continue to follow into Paradise Street instead of turning right onto Suffolk Street Queensway as required. This risk would not arise in the Do Minimum scenario as the tram would run off-street through this section on the 2005 Scheme alignment.

The mitigation proposed to discourage this outcome is as follows:
1. Clear signage on approach to Paradise Street to make access restrictions evident;
2. Clear change in surface treatment to delineate the right-turning general-access highway route from the straight-ahead limited-access Paradise Street route; and
3. Number plate recognition cameras on tram-only section of Paradise Street to identify offenders.

It is also noted that the signal staging for an eastbound tram will be timed such that the tram must clear the junction to Paradise Street in one movement, during which the only traffic stages running will be the development right-turn egress or the Broad Street arm. The former of these stages will not result in traffic following the tram, while the latter may do but these will only be public service vehicles and not general traffic. The frequency of an eastbound tram being followed through the junction should therefore be very low.

Overall, therefore, with the above mitigation measures in place and with the junction staged appropriately, it is considered that this item presents a low risk of occurrence.

10.4.4 Proposed Measures – Item 3

The concern raised by this item is that opportunities for conflict within the junction between tram and traffic will be increased if the tram is prevented from passing through the junction in one movement, as the tram is too long to store between stop lines. This issue is unlikely to arise with the Do Minimum layout as the tram passes around the junction on a mainly segregated alignment in this scenario.

This issue will be resolved through appropriate signal control and staging at the junction. Tram detection systems will detect a westbound tram approaching the first stopline. Once this turns to green, the next two signals will also turn to green. Because this will involve the northbound Suffolk Street Queensway stopline going to red, the flow of traffic to the northbound Paradise Street Queensway stopline will have been halted so that any queuing at the latter stopline will be cleared by the time the tram moves through.

The only way that this mode of operation will not clear a queue at this stopline is if traffic is backed up from the next junction downstream (Parade). To avoid this eventuality, queue detection loops will be required upstream of the northbound Paradise Street Queensway stopline so that the northbound Suffolk Street Queensway stopline will not go to green unless this loop clears.

For eastbound tram movements, a similar system would be required, whereby tram detection systems would detect approach and turn both downstream stoplines to green to ensure the clearance of queuing in the junction. It is unlikely that queues would back up on the southbound Suffolk Street Queensway on-slip to such a degree that queues could not be cleared from the southbound Paradise Street Queensway stopline, but queue detectors could be installed on the on-slip as a precaution to ensure against this eventuality.

Overall, therefore, with the junction staged and operated appropriately, it is considered that this item presents a low risk of occurrence.
10.4.5 Proposed Measures – Item 4

The concern raised by this item is that the level changes along Paradise Circus Queensway should not generate unacceptably negative camber for bus and trams travelling across this section to and from Broad Street. This issue is also a concern for the Do Minimum layout design, but not to the same degree, as the tram infrastructure within the highway formation adds greater design constraints in the Do Something layout.

Since the Safety Audit was completed, an outline vertical design of this section of highway has been completed. As expected, the design will generate negative camber for buses and trams, but these will be within acceptable design limits.

It is therefore considered that this safety risk will be duly mitigated through the design process so that any residual risk falls within acceptable limits.

10.5 Road Safety Assessment Summary

The main change from the existing situation which will affect road safety in the Do Nothing scenario is the remodelling of Paradise Circus from a one-way gyratory to a two-way set of signalised junctions. It is assumed that a Road Safety Audit has been carried out on this design and appropriate road safety measures incorporated into the layout.

A Safety Audit is not available for the Do Minimum scenario but has been conducted for the Do Something scenario. Of the items raised, therefore, only those which are either unique to or more acute in the Do Something scenario have been considered in this section. The four items considered are:

1. Lack of provision for cyclists through Paradise Circus;
2. Potential use of Paradise Street (eastbound) by through traffic;
3. Conflict between trams and stationary traffic queues through Paradise Circus; and
4. Level differences could create adverse camber for right turning trams and buses in and out of Broad Street.

The assessments conclude that, with the described mitigation applied, the residual impacts of these items falls within acceptable limits and hence the net road safety impacts of the Do Something scenario compared with the Do Minimum scenario will be neutral.
11 Construction Impact Assessment

11.1 Introduction

The purpose of this section is to review the net transport-related construction impact of the Do Something (The Variation) scenario compared to the Do Minimum (2005 Scheme) scenario. The impacts of the Do Nothing scenario are also noted.

11.2 Do Nothing Scenario

The main committed development and committed transport scheme which will generate construction impacts within the area of assessment is the PCR and associated remodelling of the Paradise Circus junction. In particular, the latter remodelling will generate impacts on pedestrian, cycle, bus, taxi and general traffic routes and access in the local area. This will be dealt with through appropriate Construction Management Plan measures.

11.3 Do Minimum Scenario

11.3.1 Description

As described in the 2004 Transport Assessment for the 2005 Scheme, the construction of the scheme will be accompanied by a Construction Management Plan which will include:

- Implementation of a Code of Construction Practice that will minimise the impact of construction activities on local residents, businesses, the general public and the surroundings in the vicinity of the works; and
- Implementation of a Construction Traffic Management Plan which will manage construction impacts on:
  - Pedestrians
  - Cyclists
  - Buses
  - Metro Line One
  - Heavy rail
  - Emergency access traffic
  - Local access traffic
  - Construction traffic
  - General traffic

The 2005 Scheme will be constructed through Paradise Circus at the same time as the Paradise Circus junction is remodelled. This will minimise the net impact of constructing the scheme. However, the new bridge across Suffolk Street Queensway and the elevated alignment along the west side of Paradise Circus will add to the construction works required at this location.

This will, in turn, result in increased construction traffic movements. It is estimated that the works required for the 2005 Scheme within The Variation Site area will require 434 to 475 HGV trips over a period of
between 27 to 30 days to bring materials to site and to remove spoil. This assumes an average of three HGV movements per hour, between 10am and 4pm, six days per week.

11.3.2 Do Minimum Transport-Related Construction Impacts

Due to the extensive works required for the construction of a bridge over the Paradise Circus Queensway Tunnel, new retaining structures near Alpha Tower and realignment of Suffolk Street Queensway on/off slip road, traffic management measures will be required. These measures would have included the closure of Paradise Street and Broad Street to traffic, temporary alterations to road infrastructure, and route diversions for the A38 Bristol Road traffic.

The transport-related construction impacts of the Do Minimum scenario at Paradise Circus are as listed in Table 11.1.

Table 11.1: Traffic and transport impacts during construction in the ‘Do Minimum’ scenario

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Impact</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian / Cyclist</td>
<td>Temporary closure and rerouting of footways / cycleways and crossing points</td>
<td>Low, adverse, temporary</td>
</tr>
<tr>
<td></td>
<td>Reduction in amenity due to construction vehicle movements</td>
<td>Low, adverse, temporary</td>
</tr>
<tr>
<td>Buses</td>
<td>Rerouting of bus services and relocation of bus stops as Paradise Street, Paradise Circus Queensway and Broad Street are closed</td>
<td>Moderate, adverse, temporary</td>
</tr>
<tr>
<td></td>
<td>Increased journey time delay during construction</td>
<td>Moderate adverse, temporary</td>
</tr>
<tr>
<td>Hackney cabs</td>
<td>Rerouting of Hackney cab journeys as Paradise Street, Paradise Circus Queensway and Broad Street are closed</td>
<td>Low, adverse, temporary</td>
</tr>
<tr>
<td></td>
<td>Increased journey time (delay) during construction</td>
<td>Low, adverse, temporary</td>
</tr>
<tr>
<td>Access and servicing traffic</td>
<td>Temporary access and servicing arrangements required to premises on Paradise Circus Queensway during construction</td>
<td>Moderate adverse, temporary</td>
</tr>
<tr>
<td>General traffic</td>
<td>Construction traffic flows affecting local highway capacity</td>
<td>Moderate adverse, temporary</td>
</tr>
<tr>
<td></td>
<td>Reduced routing options for general traffic with the closure of Paradise Street, Paradise Circus Queensway and Broad Street</td>
<td>Moderate adverse, temporary</td>
</tr>
<tr>
<td></td>
<td>Increased journey time delay during construction</td>
<td>Moderate adverse, temporary</td>
</tr>
</tbody>
</table>

11.4 Do Something Scenario

11.4.1 Description

The Do Minimum Construction Management Plan measures will be implemented for the Do Something scenario also.

To enable the construction of The Variation against the highway changes that have been created by the PCR, temporary traffic management measures will be required at the junction of Paradise Circus.
Queensway West, Broad Street and Suffolk Street Queensway, in order to allow continuous operation of this junction (albeit at reduced capacity) during scheme construction. These measures, which form an important element of the Construction Traffic Management Plan (CTMP), will include the provision of single lane traffic in all directions and a three-way traffic signal operating at the junction with Broad Street.

The reduced works compared to the Do Minimum scenario will also result in fewer construction vehicle trips. It is estimated that the works required for the 2005 Scheme within The Variation Site area will require 200 to 475 HGV trips over a period of between 12 to 16 days to bring materials to site and to remove spoil. This assumes an average of three HGV movements per hour, between 10am and 4pm, six days per week.

11.4.2 Do Something Transport-Related Construction Net Impacts

Table 11.2 lists the above identified Do Minimum scenario construction-related transport impacts and compares the magnitude of impacts in both the Do Minimum and Do Something scenarios.

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Impact</th>
<th>Do Minimum Magnitude</th>
<th>Do Something Magnitude</th>
<th>Net Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian / Cyclist</td>
<td>Temporary closure and rerouting of footways / cycleways and crossing points</td>
<td>Low, adverse, temporary</td>
<td>Low, adverse, temporary</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Reduction in amenity due to construction vehicle movements</td>
<td>Low, adverse, temporary</td>
<td>Low, adverse, temporary</td>
<td>Neutral</td>
</tr>
<tr>
<td>Buses</td>
<td>Rerouting of bus services and relocation of bus stops as Paradise Street, Paradise Circus Queensway and Broad Street are closed</td>
<td>Moderate, adverse, temporary</td>
<td>Moderate, adverse, temporary</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Increased journey time delay during construction</td>
<td>Moderate, adverse, temporary</td>
<td>Moderate, adverse, temporary</td>
<td>Neutral</td>
</tr>
<tr>
<td>Hackney cabs</td>
<td>Rerouting of Hackney cab journeys as Paradise Street, Paradise Circus Queensway and Broad Street are closed</td>
<td>Low, adverse, temporary</td>
<td>Low, adverse, temporary</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Increased journey time (delay) during construction</td>
<td>Low, adverse, temporary</td>
<td>Low, adverse, temporary</td>
<td>Neutral</td>
</tr>
<tr>
<td>Access and servicing traffic</td>
<td>Temporary access and servicing arrangements required to premises on Paradise Circus Queensway during construction</td>
<td>Moderate, adverse, temporary</td>
<td>Moderate, adverse, temporary</td>
<td>Neutral</td>
</tr>
<tr>
<td>General traffic</td>
<td>Construction traffic flows affecting local highway capacity</td>
<td>Moderate, adverse, temporary</td>
<td>Low, adverse, temporary</td>
<td>Beneficial</td>
</tr>
<tr>
<td></td>
<td>Reduced routing options for general traffic with the closure of Paradise Street, Paradise Circus Queensway and Broad Street</td>
<td>Moderate, adverse, Temporarily</td>
<td>Moderate, adverse, Temporarily</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Increased journey time delay during construction</td>
<td>Moderate, adverse, temporary</td>
<td>Moderate, adverse, temporary</td>
<td>Neutral</td>
</tr>
</tbody>
</table>
11.4.3 Do Something Transport-Related Construction New Impacts

The Do Something scenario will not generate any new construction related impacts compared to the Do Minimum scenario.

11.5 Transport-Related Construction Impact Assessment Summary

The PCR and remodelling of Paradise Circus junction in the Do Nothing scenario will generate construction phase transport impacts within the assessment area. These would be managed through an appropriate Construction Management Plan.

The main difference in transport-related construction impacts between the Do Minimum and Do Something scenarios is that the Do Minimum impacts will take place over a longer construction period and will therefore generate an increased level of construction vehicle movements.

The net transport-related construction impacts of the Do Something scenario, compared to the Do Minimum scenario, will therefore be beneficial.
12 Conclusions and Recommendations

12.1 Assessment Background

Midland Metro Line One currently runs for approximately 20km from Wolverhampton St George’s to Snow Hill Railway Station in Birmingham, predominantly along a former railway alignment with 2km of street running tramway in Wolverhampton. A further 1.3km extension to the tramway is currently being constructed from Snow Hill to New Street Station which diverges from the existing route close to St Paul’s tram stop running parallel to the existing route into Snow Hill station. This scheme is a shortened version of the 2005 scheme from St Paul’s through to Five Ways (Edgbaston) which has been granted a Transport & Works Act Order (TWAO).

Mott MacDonald is preparing reference design and contract documentation for a further extension to the shortened 2005 scheme through to Centenary Square under the 2005 Order, which will be funded through the Birmingham City Centre Enterprise Zone. The proposed CSQ extends the network by approximately 800m from the New Street Station tram stop on Stephenson Street via Pinfold Street to Victoria Square where a tram stop will be located adjacent to the Town Hall. The route continues via Paradise Street and Paradise Circus Queensway to a terminus on Broad Street adjacent to the International Convention Centre (ICC), Symphony Hall, REP Theatre and the new Central Library within Centenary Square.

The Paradise Circus gyratory and the immediate surrounding area encompassing the Copthorne Hotel, existing Central Library and Paradise Forum is due to be redeveloped by a joint venture company (Birmingham City Council, Argent and Altitude); this is known as the Paradise Circus Redevelopment (PCR). This has provided the opportunity for Centro to review the 2005 Scheme alignment and investigate the option of routing the Metro closer to the development by utilising the revised highway layout to provide a shorter, lower cost Metro alignment. Over a short section, this alternate alignment falls slightly outside the current 2005 Order and Centro are making a new TWAO application to gain powers to construct the alternative alignment through Paradise Circus (‘The Variation’).

As described above, there is already a consented Metro CSQ scheme alignment (the ‘2005 Scheme’) with powers for construction. A Transport Assessment was prepared in 2004 which considered the transport-related impacts of the 2005 Scheme and proposed, where necessary, due mitigation measures. Such measures became part of the package of scheme proposals. It would also revive the powers of compulsory acquisition gained under the 2005 Order and which expired in 2010, and would authorise the acquisition of the small additional amount of land required to facilitate the change to the route.

The purpose of this Transport Assessment is to identify the net transport-related impacts of The Variation scheme relative to the 2005 Scheme and, where net impacts arise, to consider how these might affect the level and type of mitigation proposed for the 2005 Scheme.
12.2 Summary of Impacts

The 2004 Transport Assessment measured impacts in the following transport-related areas:

- Pedestrians
- Cyclists
- Heavy rail
- Buses
- Coaches
- Hackney cabs
- Traffic
  - Access and servicing
  - Emergency services
  - Car parking
  - Park & Ride
  - Changes in patterns and flow
- Road safety

It has been identified without requiring an assessment that the Do Something scheme will not result in any change in impact for the following of the above areas:

- Heavy rail
- Coaches
- Emergency services
- Car parking
- Park & Ride

The scope of this Transport Assessment is therefore limited to measuring the net impacts of the Do Something scenario on the remaining areas (noise and air quality is considered in the Environmental Statement). Table 12.1 summarises the overall result of these individual impact assessments.

Table 12.1: Summary of overall net impacts of the Do Something scenario relative to the Do Minimum scenario

<table>
<thead>
<tr>
<th>Assessment Area</th>
<th>Overall Net Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian routes and movement</td>
<td>Beneficial</td>
</tr>
<tr>
<td>Cycle routes and movement</td>
<td>Neutral</td>
</tr>
<tr>
<td>Bus routes and operation</td>
<td>Neutral</td>
</tr>
<tr>
<td>Hackney cab routes and operation</td>
<td>Neutral</td>
</tr>
<tr>
<td>Access and servicing</td>
<td>Neutral</td>
</tr>
<tr>
<td>Highway network performance</td>
<td>Beneficial</td>
</tr>
<tr>
<td>Road safety</td>
<td>Neutral</td>
</tr>
</tbody>
</table>
12.3 Conclusions and Recommendations

The conclusion of this assessment is that the net transport-related impacts of The Variation relative to those of the 2005 Scheme are either neutral or beneficial. For this reason, the mitigation works proposed as part of the 2005 Scheme are also considered appropriate to facilitate The Variation. The only mitigation works recommended to support The Variation which are identified as additional to those proposed for the 2005 Scheme concern road safety at the Paradise Circus junction, as follows:

- Signage on westbound traffic approach to Paradise Street, visible change in road surface treatment and number plate recognition cameras to deter general traffic from following tram into Paradise Street (see Section 10.4.3); and
- Traffic signal control and staging to allow trams to pass through Paradise Circus junction in one movement, to minimise tram/traffic interactions and to prevent tram from blocking traffic movements in junction (see Section 10.4.4).
Appendices

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2 Assessment Scenario Assumptions

2.1 Introduction

The purpose of this section is to describe the Transport Assessment scenarios which will be assessed in order to identify and measure the net impacts of the revised-alignment Metro scheme compared with the consented-alignment Metro scheme.

2.2 Assessment Need

In 2005, Centro secured TWAO powers to extend Line 1 of the Midland Metro from Snow Hill to Five Ways in Edgbaston. The application for powers was supported by a full Transport Assessment (TA) and Environmental Statement (ES).

The consented scheme passes around the south side of Paradise Circus, on a largely segregated alignment which includes a new bridge over Suffolk Queensway. The TWAO powers were executed when Centro started the existing Metro extension to Gateway.

Since consent was gained in 2005, permission has also been granted by Birmingham City Council for the Paradise Circus redevelopment which will remodel the Paradise Circus gyratory so that it becomes a two-way link. This will therefore allow the Metro scheme to traverse the junction on a shared rather than segregated basis, thus removing the need for the new bridge over Suffolk Queensway.

Achieving this, however, requires the alignment to run on land which falls outside the current TWAO limits of deviation as shown in Appendix A. An amendment to the existing TWAO is therefore being pursued.

In order to support the TWAO amendment application, a new TA and ES are required to identify and assess the net change in impacts which the new alignment would generate compared to the consented alignment.

2.3 Assessment Parameters

2.3.1 Objective

The objective of the Transport Assessment is to identify and measure the net change in transport impacts generated by the revised-alignment scheme, compared to the consented-alignment scheme. Where an increase in impact is identified, due mitigation to minimise or neutralise this increase will therefore be considered.

2.3.2 Timeframe

Construction of the revised alignment, from Stephenson Street to Centenary Square, is proposed to commence in 2015.

Completion and operation of the revised scheme is programmed for 2017.
2.4  Committed Schemes and Developments

2.4.1  Committed Transport Schemes

It is understood from the City Council that the following relevant committed transport schemes should have been implemented by 2017:

- Metro Line 1 extension to Stephenson Street
- Remodelling of Paradise Circus junction (part of Paradise Circus redevelopment proposals)
- Arena Central pedestrian bridge over Suffolk Street Queensway (subject to ongoing negotiation)
- Birmingham New Street Gateway
- Birmingham City Centre Interchange
- Albert Street closure
- New access to Grosvenor Street / Jennens Road
- Residents Controlled Parking Zones (Calthorpe Rd, Gilbey Rd & Tennant St areas)
- Bath Row / Cregoe Street junction signalisation (part of the Attwood Green and Park Central works)
- Hollliday Street / Bridge Street junction improvement (part of the Arena Central development)
- Improved left-turn from Holloway Head into Suffolk Street (part of Pinch Points bid)
- Other Pinch Point schemes at: Ashted Circus, Curzon Circus, Bordesley Circus and Haden Circus

It is assumed that all of the above schemes are already included within Birmingham City Council’s 2017 SATURN model. This needs to be confirmed by Birmingham City Council.

2.4.2  Committed Development

It is understood that the following relevant committed developments may be operational by 2017:

- Paradise Circus redevelopment
- Birmingham New Street Gateway, including John Lewis Department Store
- Arena Central and the V-Building
- The New Library Birmingham

It is assumed that all of the above developments are already included within Birmingham City Council’s 2017 SATURN model. This needs to be confirmed by Birmingham City Council.

It is also noted that there are plans to convert the ‘Beneficial Building’ for hotel uses. This building, located on the southbound on-ramp to the A38 at Paradise Circus, is currently an office development. Conversion to hotel use will require some improvements to the layby on the on-ramp, which will affect local kerb alignments. The implications of this on the Metro scheme, the Arena pedestrian bridge and the Paradise Circus remodelling needs to be considered as part of the TA process.
2.5 Metro Scheme Details

2.5.1 Consented Alignment Scheme

The consented alignment Metro scheme runs from Stephenson Street to Edgbaston, via: Pinfold Street; Paradise Street; the south side of Paradise Circus on a new bridge over Suffolk Street Queensway; and Broad Street. The alignment therefore runs on-street for all its length except across Paradise Circus.

By 2017, it is proposed that Metro will be constructed and operational as far as Centenary Square. This is the case with either the consented or revised scheme. The stop at Centenary Square will be a terminus until such time as the full TWAQ powers to construct to Edgbaston are implemented. The Transport Assessment is therefore concerned only with the deviated section of the scheme between Stephenson Street and Centenary Square. Other elements of the scheme can be built out through the existing consented TWA powers.

Following award of TWA powers, Centro and the City Council agreed Heads of Terms for a proposed Development Agreement to facilitate implementation of the Metro extension. This included a list of highway works to enable and/or mitigate the proposed consented scheme. The list is attached in Appendix B.

It is noted that this list includes all schemes required to facilitate the Metro extension all the way to Edgbaston. The list therefore also indicates whether or not each highway work is required to facilitate the extension to Centenary Square, as some of the measures are only required to facilitate the full scheme.

Of the highway works relevant to the Centenary Square extension, the list in Appendix B identifies the construction status of these, in terms of:

1. Already implemented
2. Metro-independent committed scheme
3. Metro-dependent committed scheme

The Item 2 works listed in Appendix B will be implemented by 2017 irrespective of whether the Metro scheme is implemented. These are therefore already included in the list of Committed Schemes above in Section 2.4.1. The Item 3 works, however, are directly to facilitate the Metro scheme so form part of the ‘consented alignment scheme’ package of works. These schemes are:

- Additional pedestrian direction signage to stops
- Navigation Street Link Road
- Broad Street traffic management to accommodate Metro
- Five Ways roundabout signalisation

In addition, it is also proposed to amend strategic signing in the area to reflect the changes required to accommodate the new scheme.
2.5.2 Revised Alignment Scheme

The net changes between the consented Metro scheme and the revised Metro scheme are those required to facilitate a shared running arrangement through the remodelled Paradise Circus junction. This therefore means a revised alignment between Paradise Street and Broad St, Centenary Square, where the alignment runs a few metres to the north of the consented scheme through that section. Either side of this section, the consented scheme alignment still applies. The above listed package of highway works is also assumed to be implemented to support the revised alignment scheme.

2.6 Assessment Scenarios

2.6.1 Baseline Scenario

The Baseline Scenario for the purpose of this assessment is defined as being the scenario which would exist in 2017 without the Metro extension to Centenary Square. This is therefore defined as follows:

- 2017 Baseline Scenario = Existing Scenario + Committed Schemes + Committed Developments

2.6.2 Metro Net Impact Scenarios

As the existing Metro TWA Order already has consent to be built, the impacts of this scheme are already effectively permitted. As noted above, the purpose of this assessment is to identify and quantify any change in impacts arising from the revised scheme, as compared to the consented scheme. As also noted above, this means specifically the net impacts arising from the alignment changes between Paradise St and Centenary Square only.

In order to identify these impacts, it is therefore necessary to compare the following assessment scenarios:

- 2017 ‘Do Minimum’ Scenario = Baseline Scenario + Consented Metro Scheme (as far as Centenary Square and including package of highway works listed in Section 2.4.1)
- 2017 ‘Do Maximum’ Scenario = Baseline Scenario + Revised Metro Scheme (as far as Centenary Square and including package of highway works listed in Section 2.4.1)

The only physical difference between these two scenarios is the revised alignment through Paradise Circus. The difference in impacts between them will therefore isolate the impacts of the revised section only, be that adverse, neutral or beneficial.

The latest remodelled Paradise Circus with Metro layouts, for both the consented and revised Metro alignments, are attached in Appendix C. These represent the highway layouts for the section of Metro alignment under consideration for the Do-Minimum and Do-Maximum scenarios respectively.

It is not proposed to represent the Metro scheme as far as Edgbaston, despite the current TWAO providing the powers to construct this far, as it will only be built as far as Centenary Square by 2017. Also, as the assessment is only required to establish the net impacts of the revised section, including the same extended alignment to Edgbaston in both scenarios would have no bearing on this outcome.
3 Net Impact Assessment

3.1 Introduction

The purpose of this section is to describe the scope of impacts to be considered by the Transport Assessment.

3.2 Consented-Scheme Transport Assessment Impacts

The Transport Assessment for the consented scheme adopted a combination of the NATA approach and the then Scottish Government Transport Assessment Guidance. This resulted in the following impact receptors/causes being considered:

- Pedestrians
- Cyclists
- Heavy rail
- Buses
- Coaches
- Taxis
- Traffic
  - Access and servicing
  - Emergency services
  - Car parking
  - Park & Ride
  - Changes in patterns and flow
  - Noise and air quality
- Accidents
- Construction

3.3 Revised-Scheme Transport Assessment Impacts

3.3.1 Relevant Guidance

Since the first Transport Assessment was issued, the DfT issued ‘Guidance on Transport Assessment’ in 2007, which remains the most up-to-date Transport Assessment guidance presently available in the UK. Though mostly applicable to land use development schemes, the guidance confirms that the impacts considered in the consented scheme Transport Assessment are still the most relevant for the revised alignment scheme.

3.3.2 Net Impacts Overview

However, since the revised scheme Transport Assessment is only considering the net impacts of the revised alignment section, this realigned section will not generate any change in impacts for some of the above listed receptors. The following table considers this further.
Table 3.1: Estimate of net impact assessment requirements per receptor

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Net Impact?</th>
<th>Reason</th>
<th>Assessment Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrians</td>
<td>Potentially</td>
<td>Realignment through Paradise Circus could affect pedestrian routes and safety.</td>
<td>Consideration of pedestrian routes and safety</td>
</tr>
<tr>
<td>Cyclists</td>
<td>Potentially</td>
<td>Realignment through Paradise Circus could affect cycle routes and safety</td>
<td>Consideration of cycle routes and safety</td>
</tr>
<tr>
<td>Heavy rail</td>
<td>No</td>
<td>Revised route has no net impact on rail operations or on access to rail.</td>
<td>None.</td>
</tr>
<tr>
<td>Buses</td>
<td>Potentially</td>
<td>Realignment will have small impact on bus movements through the junction and past Centenary Square</td>
<td>Consideration of impacts on bus routing, stop positions and delay.</td>
</tr>
<tr>
<td>Coaches</td>
<td>No</td>
<td>Revised route has no net impact on coach operations, other than the impact common to all general traffic (see below).</td>
<td>None.</td>
</tr>
<tr>
<td>Taxis</td>
<td>Potentially</td>
<td>Realignment could have a small impact on taxi movements through the junction and past Centenary Square</td>
<td>Consideration of impacts on taxi routing, rank positions and delay.</td>
</tr>
<tr>
<td>Access and servicing</td>
<td>Potentially</td>
<td>Realignment needs to accommodate access and servicing arrangements of adjacent Paradise Forum and Arena Central developments.</td>
<td>Consideration of adjacent access and servicing arrangements.</td>
</tr>
<tr>
<td>Emergency services</td>
<td>No</td>
<td>Revised route has no net impact on emergency service routes or access.</td>
<td>None.</td>
</tr>
<tr>
<td>Car parking</td>
<td>No</td>
<td>Revised route has no net impact on parking or on access to parking.</td>
<td>None.</td>
</tr>
<tr>
<td>Park &amp; Ride</td>
<td>No</td>
<td>Revised route has no net impact on Park &amp; Ride or on access to Park &amp; Ride.</td>
<td>None</td>
</tr>
<tr>
<td>Changes in traffic patterns and flow</td>
<td>Yes</td>
<td>Shared running through Paradise Circus will have an impact on junction capacity.</td>
<td>Strategic and local modelling assessment of impacts (see Sections below).</td>
</tr>
<tr>
<td>Noise and air quality</td>
<td>Yes</td>
<td>Changes in traffic patterns and flow will result in corresponding changes to noise and air quality impacts.</td>
<td>Noise and air quality assessments.</td>
</tr>
<tr>
<td>Accidents</td>
<td>Potentially</td>
<td>Shared running through Paradise Circus could result in an increase in modal conflict opportunities.</td>
<td>Road safety assessment.</td>
</tr>
<tr>
<td>Construction</td>
<td>Yes</td>
<td>Shared running means less off-highway construction impact, but greater on-highway impact.</td>
<td>Construction impact assessment.</td>
</tr>
</tbody>
</table>

### 3.4 Revised-Scheme Impact Assessment Methodology

For the receptors listed in the above table where a net impact is definitely or potentially expected to be generated by the revised alignment scheme, the following sub-sections provide further detail on the methodology to be applied in their assessment.

#### 3.4.1 Impacts on Pedestrians

The pedestrian impact assessment will focus on how the realigned-scheme through Paradise Circus...
affects the consented-scheme impacts on the pedestrian environment through and around this junction.

We will firstly consider what pedestrian measures were proposed for this junction within the consented scheme TA. Then we will plot all the pedestrian routes and infrastructure through the junction, based on the consented and revised layouts attached in Appendix C, and assess the impact of the changes. Impacts will be considered in terms of changes to:

- Route length
- Availability of walking routes
- Number of crossing points
- Crossing distances and delays
- Accident exposure and risk

Where adverse impacts are identified, the assessment will consider what mitigation is appropriate.

### 3.4.2 Impacts on Cycling

The cycling impact assessment will focus on how the realigned-scheme through Paradise Circus affects the consented-scheme impacts on the cycling environment through and around this junction.

We will firstly consider what cycling measures were proposed for this junction within the consented scheme TA. Then we will plot all the cycling routes and infrastructure through the junction, based on the consented and revised layouts attached in Appendix C, and assess the impact of the changes. Impacts will be considered in terms of changes to:

- Route length
- Availability of cycling routes
- Management of conflict points
- Tram rails within cycle routes
- Accident exposure and risk

Where adverse impacts are identified, the assessment will consider what mitigation is appropriate.

### 3.4.3 Impacts on Buses

The bus impact assessment will focus on how the realigned-scheme through Paradise Circus affects the consented-scheme impacts on bus infrastructure, routes and delay through this junction.

We will firstly consider what bus measures were proposed for this junction within the consented scheme TA. Then we will plot all the bus routes and infrastructure through the junction, based on the consented and revised layouts attached in Appendix C, and assess the impact of the changes.

However, it is not expected that the revised alignment through this junction will materially affect bus routeing or infrastructure provision (in terms of stop locations etc). The main impact is expected to be changes in priority and delay for buses through this junction and this will be assessed in detail through the VISSIM microsimulation modelling proposed and described in Section 3.4.6 below.
Where adverse impacts are identified, the assessment will consider what mitigation is appropriate.

3.4.4 Impacts on Taxis

The taxi impact assessment will focus on how the realigned-scheme through Paradise Circus affects the consented-scheme impacts taxi infrastructure and delay through this junction.

We will firstly consider what taxi measures were proposed for this junction within the consented scheme TA. Then we will plot taxi routes and infrastructure through and around the junction, based on the consented and revised layouts attached in Appendix C, and assess the impact of the changes.

However, it is not expected that the revised alignment through this junction will materially affect taxi routing or infrastructure provision (in terms of rank locations etc). The main impact is expected to be changes in delay for taxis through this junction and this will be assessed in detail through the VISSIM microsimulation modelling proposed an described in Section 3.4.6 below.

Where adverse impacts are identified, the assessment will consider what mitigation is appropriate.

3.4.5 Impacts on Access and Servicing

The access and servicing impact assessment will focus on how the realigned-scheme through Paradise Circus affects the consented-scheme impacts on access to and servicing of the adjacent Paradise Circus and Arena Central developments. Where adverse impacts are identified, the assessment will consider what mitigation is appropriate.

3.4.6 Impacts on Traffic Patterns and Flow

The traffic impact assessment will focus on how the realigned-scheme through Paradise Circus affects the consented-scheme impacts on local traffic patterns and flow. It is expected that these net impacts will only materialise within the locality of the alignment revision, i.e. at and immediately around the remodelled Paradise Circus junction.

The recent planning consent for the Paradise Circus redevelopment was based on the use of the Council’s City Centre SATURN model. It is understood that the Paradise Circus ‘with-development’ modelling scenario reflects the proposed Baseline Scenario described in Section 2 above, though confirmation of this is required by the City Council.

By effectively then adding the consented and revised alignment Metro schemes to the Baseline Scenario SATURN model, as well as the associated package of highway works listed in Section 2.5.1, we will therefore respectively model the Do-Min and Do-Max scenarios described in Section 2.6.2 above. The difference between the two model runs will reveal the net traffic impact of the revised alignment scheme.

It is understood that the Council will undertake these model runs and provide us with the output results.
The outputs of the SATURN model run will then be input to a VISSIM model of the revised Metro alignment through Paradise Circus in order to determine what measures are required to mitigate the net impacts of the revised scheme and provide detail on the impacts of Metro on the localised highway network.

It is also recognised that, though the scope of the Transport Assessment is limited to the assessment of the net impacts arising from the revised alignment Metro scheme compared to the consented alignment scheme, a wider study is nonetheless desirable so that the full cumulative impacts of the Do-Maximum scenario can be better understood. These impacts are therefore being considered separately by the City Council and by Mott MacDonald through the current Westside Movement and Access Strategy Study.

3.4.7 Impacts on Noise and Air Quality

The noise and air quality assessment will focus on how the realigned-scheme through Paradise Circus affects the consented-scheme impacts on noise and air quality.

The relevant guidance for air quality and noise assessments is as follows:

- DMRB Volume 11 Section 3 Part 1 HA 207/07 Air Quality
- DMRB Volume 11 Section 3 Part 7 HD 213/11 – Revision 1 Noise and Vibration

According to guidance, an air quality assessment is required for links where, as a result of the scheme:

- Road alignment will change by 5m or more;
- Daily traffic flows will change by 1,000 AADT or more;
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more;
- Daily average speed will change by 10 km/hr or more; and/or
- Peak hour speed will change by 20 km/hr or more.

Likewise, a noise assessment is recommended on links where the scheme results in a change in road traffic noise of 1 dB $L_{A_{10,18h}}$ in the short term (e.g. when a project is opened). This is the smallest change that is considered perceptible and equates to a 25% increase or 20% decrease in traffic flows).

It is considered unlikely that the revised-alignment scheme will generate any of the above level of changes compared to the consented-alignment scheme. However, it is noted that the Metro alignment passes through a sensitive area for noise and air quality, so the traffic flow, composition and speed changes returned by the modelling assessment scenarios will be reported for the full SATURN modelling area. This data will then be input to the Environmental Assessment process in order to identify whether these changes equate to any material noise and air quality net impacts which require mitigation.

In accordance with guidance, the data to be provided on each model link for the air quality assessment is as follows:

- Change in 24-hour AADT
- Change in daily average speed
- Change in % of HGVs (vehicles greater than 3.5 tonnes) and buses

Similarly, the data to be provided on each model link for the noise assessment is as follows:
- Change in 18-hour AAWT
- Change in daily average speed
- Change in % of HGVs (vehicles greater than 3.5 tonnes) and buses

We will use an appropriate local permanent Automatic Traffic Counter site data (EX01 – Aston Expressway) to derive factors to convert the SATURN model’s peak and inter-peak hour data into AADT and AAWT data, as follows:

1. 12 months of data (2012) will be taken from SPECTRUM and inserted into an MS Excel spreadsheet. The data will be cleaned to remove any incomplete days and other inconsistencies;
2. The data will then be averaged to obtain an annual average 18 hour and 24 hour value (the 18 hour annual average will include weekdays only);
3. The data will also be averaged to obtain an annual average AM, IP and PM peak flow; and
4. The three hour peak period totals will be divided by the 18 hour and 24 hour totals to obtain factors that can be applied to the SATURN output flows (AM, IP and PM peak) to obtain 18 hour AAWT and 24 hour AADT flows.
5. Calibration – other sites with one week of data will be compared to the relevant month of the EX01 data in order to demonstrate data reliability.

Average speeds and the proportion of HGVs will be taken directly from the SATURN model. According to guidance, inter-peak hour speeds provide a reasonable proxy for daily average speeds.

### 3.4.8 Impacts on Road Safety

The road safety assessment will focus on how the realigned-scheme through Paradise Circus affects the consented-scheme road safety impacts.

We will firstly consider what road safety measures were proposed for the consented-scheme alignment through this junction. We will then undertake Stage 1 Safety Audits of the consented and revised layouts attached in Appendix C, and compare them to identify any changes in road safety impacts. Where adverse impacts are identified, the assessment will consider what mitigation is appropriate.

### 3.4.9 Impacts During Construction

The construction impact assessment will focus on how the realigned-scheme through Paradise Circus affects the consented-scheme construction impacts.

We will firstly consider what construction enabling/mitigation measures were proposed within the consented-scheme TA. We will then consider the construction traffic management implications of building the revised-scheme through this junction instead of the consented scheme.

It is expected that the revised alignment will have a net positive impact on construction traffic impacts, as most of the alignment can be installed as part of the wider remodelling of Paradise Circus instead of requiring a new bridge alignment installation across Suffolk Street Queensway. However, where adverse impacts are identified, the assessment will consider what mitigation is appropriate.
Appendix B. ‘The Variation’ Scheme Layout
1. Do not scale from this drawing.
2. All dimensions are in metres unless otherwise stated.
3. This layout has been designed to provide a preferred feasibility Metro alignment that ties in as far as possible with the Paradise Circus 'with Metro' layout as indicated on Peter Brett Associates PBA drawing 23256-030-007A considering highway and tramway geometry constraints.
4. This drawing does not represent an agreed Metro alignment. BCC and Argent are requested to comment on the design produced.
5. The Developed Kinematic Envelope (DKE) of the tram is based upon the updated Generic Tram DKE Model for 'Type A Vehicles'. Refer to Mott MacDonald Ltd report reference MMD-300207-SL02-DOC-0001.
6. The proposed channel line to accommodate the highway layout shown is 4.5m closer to the development than the channel line shown on Peter Brett Associates drawing 23256-030-007A. Please note this design does not include consideration for cant, a clearance of 300mm between DKE to a kerbline is required as per RSP2 guidance. If there is a continuous obstruction (such as the bridge parapet) then a minimum clearance of 600mm from the DKE will be required. A derailment assessment may require an increase in this clearance value.
7. The unconstrained layout shown on this drawing is designed to suit the Centenary Square Terminus layout as shown on Mott MacDonald drawing MMD-300207-CS11-DRA-0001-0003.
Appendix C. Cycle Route Plans
C.1  Birmingham Cycle Revolution – Birmingham City Centre Quadrant Plan
C.2 Proposed Cycle Route Drawing MMD-300207-CS99-DRA-1200-0021 P1
Appendix D. Do Minimum Bandwidth Plots

D.1 Do Minimum AM Peak Hour Bandwidth Traffic Flow Plot
D.2 Do Minimum PM Peak Hour Bandwidth Traffic Flow Plot
Appendix E. Do Something Bandwidth Plots
E.1 Do Something AM Peak Hour Bandwidth Traffic Flow Plot
E.2 Do Something PM Peak Hour Bandwidth Traffic Flow Plot
Appendix F. Saturn Difference Plots
F.1 AM Peak Hour Traffic-Flow Difference-Plot
F.2  PM Peak Hour Traffic-Flow Difference-Plot