ABERDEEN CITY COUNCIL

COMMITTEE	Council
DATE	11 May 2016
DIRECTOR	Pete Leonard
TITLE OF REPORT	Transport Implications – City Centre Masterplan Projects
REPORT NUMBER	CHI/16/061
CHECKLIST COMPLETED	Yes

1. PURPOSE OF REPORT

This report advises Members of the results of the transportation assessment and traffic modelling undertaken for the City Centre Masterplan (CCMP) interventions as instructed by Council on 16 December 2015.

2. RECOMMENDATION(S)

It is recommended that Members:

i) Note the contents of this report, and especially the optimum phasing of key transport proposals, and
ii) Agree that the wider transportation impact of the City Centre Masterplan can be accommodated on the road network subject to suitable enabling measures being introduced and
iii) Agree the design concepts for options for Broad Street for public consultation, and
iv) Instruct officers to report back to the Council in June 2016 on the responses to the Broad Street options public consultation.

3. FINANCIAL IMPLICATIONS

3.1 The design of the Broad Street options for the purposes of public consultation has been accommodated from the £1.12M set aside within the contract with Muse for public realm works. The public consultation costs have been absorbed within existing budgets. The on-going transportation assessment of specific and wider implications of the City Centre Masterplan (CCMP) continues to be funded from the Non Housing Capital allocation for Central Aberdeen Transport infrastructure, supported by contributions from Nestrans.

3.2 Further financial implications will be included in future reports as new information becomes available.

4. OTHER IMPLICATIONS

4.1 The ‘place’ to be created in Broad Street may be subject to planning permission if there are engineering works due to the setting of Marischal College as a listed building. The involvement of the public and stakeholders such as Historic Scotland would be part of the planning process.

4.2 Detailed traffic management and access requirement proposals will need to be developed for any option that is being progressed. This will require identification and promotion of Traffic Regulation Orders (TRO) for each CCMP project. The TRO processes can be undertaken using existing internal resource.

5. BACKGROUND/MAIN ISSUES

5.1 Reference is made to the decisions of the Council on 16 December 2015 and 2 March 2016 regarding the reports entitled ‘Transport Implications – City Centre Masterplan Projects’.

Reference is also made to the decision of the Council on 24 June 2015 in regard to the report entitled ‘Aberdeen City Centre Masterplan and Delivery Programme’, which was agreed unanimously. It was further resolved that each project will be subject to detailed scrutiny and the normal development control processes and to agree in principle the interventions set out in the City Centre Masterplan and Delivery Programme. It was also noted that due diligence will be undertaken in relation to the financial, legal and all other implications on each project or programme of activity contained within the City Centre Masterplan and that it falls to the Council to deliver, with the results of this due diligence being reported to committee ahead of any decision being taken to proceed.

5.2 This report provides details of the transport implications of the various City Centre Masterplan interventions and the proposals for the Broad Street options public consultation.

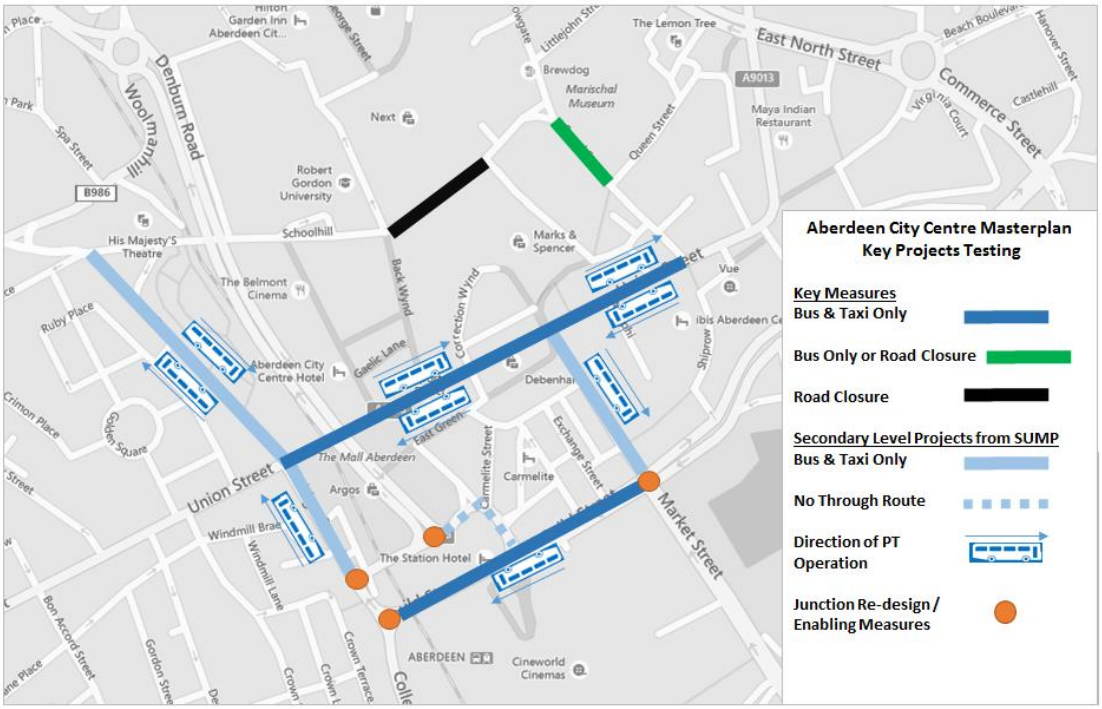
5.3 This report is complemented by the report entitled ‘Roads Hierarchy’ which is also being presented to Council and sets out the principles for distributing traffic into and around the city centre.

5.4 **Transport Implications – City Centre Masterplan Projects**

5.4.1 When considering the masterplan there are four strategic transport projects which impact directly on the movement of everyone within and

out-with the city centre i.e. Broad Street, Schoolhill/Upperkirkgate, Union Street and Guild Street as these result in widespread redistribution of traffic beyond the city centre.

5.4.2 The following diagram identifies the locations and types of key transport measures that were assessed.



5.4.3 The less strategic parts of the transport network generally carry lower volumes and are mostly of a very local access nature.

5.4.4 The traffic modelling element of the assessment used the City Centre Paramics microsimulation model, which was updated in 2012 using a range of data gathering techniques including junction turning movement counts, ANPR (automatic number plate recognition) and bus stop dwell time surveys. The model was also informed by the strategic model for the region – Aberdeen Sub-Area Model (ASAM). Any outcomes form the detailed modelling process will be fed back into the ASAM model as a means of identifying the wider distribution impacts.

5.4.5 The following key statistics have been extracted from the 2012 model:

- Almost a third of traffic is simply passing through the city centre.
- Almost half of trips to car parks involve cross city centre movements.
- Nearly three quarters of city centre journeys are less than three miles.

High level conclusions from the above:

- Significant volumes of trips have no destination in the city centre
- Significant proportions of car parking trips generate cross city centre movements
- Significant volumes of trips are of a short distance nature (easily undertaken by means other than by car)

5.4.6 To test the impact of the CCMP, a 2023 Reference Case model was developed which includes assumptions for committed and future developments and the impact of the AWPR.

The volume of traffic growth predicted between 2012 and the 2023 associated with the above changes is predicted to be 5-8% in the city centre model area which equates to approximately 16,000 additional vehicles per weekday. This includes the 'with AWPR development' and is the base case against which the CCMP proposals are being assessed.

5.4.7 The testing includes modelling of each key transport project within the Masterplan as separate entities, followed by various combinations. This enables an optimal sequence of project delivery including mitigation at locations to offset traffic displacement to be developed.

5.4.8 The testing highlighted the need to change the layout and in some cases type of junctions to not only to cater for the displacement of traffic from the city centre but also to address existing poor arrangements for pedestrians and cyclists.

5.4.9 The following details the optimum delivery programme identified through the testing process and the reasoning for the implementation order being proposed.

1. Broad Street 'Bus Only' or 'Road Closure' – **Key Infrastructure Project**

- Interventions have minimal impact on the rest of the network and do not require a traffic demand reduction to be able to operate.
- 'Bus only' has the least impact on the travelling public.
- 'Full closure' will impact significantly on bus users.

2. Bridge Street 'Bus & Taxi Only'

- Required to facilitate Guild Street proposals.

3. Market Street (North) 'Bus & Taxi Only'

- Reduces traffic demand on Union Street (which is required when Guild Street is restricted).

- Required to facilitate Guild Street proposals.

4. South College Street Junction - enabling measure (still requires detailed assessment)

- Capacity improvements essential prior to the implementation of key east-west routes (Guild Street & Union Street).
- Traffic patterns at South College Street directly affected by the north-south traffic throughput at Denburn Road.

5. Guild Street 'Bus & Taxi Only' – **Key Infrastructure Project**

- Requires network traffic demand reduction of approximately 5%.
- Requires Bridge Street and Market Street interventions to already be in place.
- Guild Street has a lower impact on the surrounding road network than the Union Street project. In addition, if Union Street was restricted first, significant congestion would occur on Guild Street.

6. Eastern Corridor Improvements

- Union Street and Guild Street interventions both result in a significant relocation of traffic to the Eastern Corridor. Improved junction capacity is required through the Eastern Corridor (at Commerce Street/Virginia Street and Commerce Street/Beach Boulevard) prior to the implementation of both of these interventions. The Eastern Corridor enabling measures proposals are therefore required prior to the implementation of Union Street interventions but could be considered earlier.

7. Union Terrace 'Bus & Taxi Only'

- Interventions required in advance of the Union Street intervention to prevent significant levels of displaced traffic routing along Schoolhill. This would improve the operation of Public Transport in this area.

8. Union Street 'Bus & Taxi Only' – **Key Infrastructure Project**

- With above interventions already in place, this measure requires network traffic demand reduction of approximately 10%.
- Requires Broad Street and Union Terrace interventions in place to protect Schoolhill from significant increases in traffic.

9. Mounthooly Roundabout Improvements

- Forms part of the George Street area traffic management proposals but is also required to maximise the operation of the eastern corridor.

- Can be considered before or after Union Street interventions are implemented.

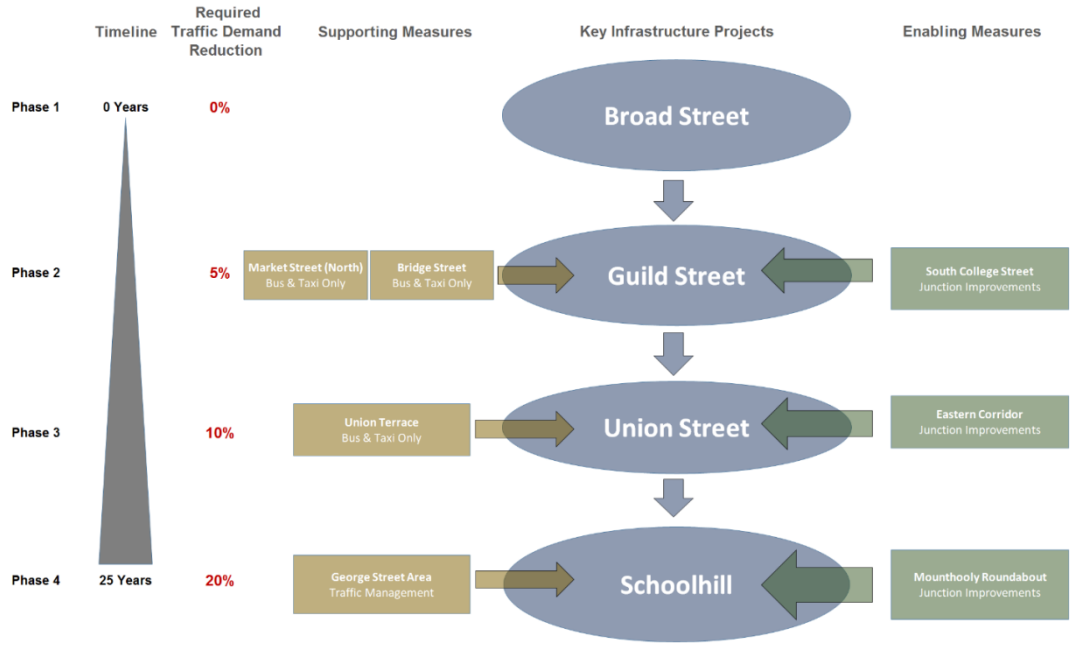
10. George Street Traffic Management Interventions

- Wide area traffic management required around George Street area (south of Hutcheon Street) to restrict through traffic but retain car park access. Required as part of the Schoolhill closure intervention.

11. Schoolhill 'Closure' – **Key Infrastructure Project**

- With above interventions already in place, this measure requires network traffic demand reduction of approximately 20%.
- Schoolhill closure would force high volumes of traffic through the John Street and Maberly Street corridors.

5.4.10 The summary of the key findings are represented diagrammatically below:



5.4.11 To deliver the full City Centre Masterplan (key measures), it is anticipated that there would require to be approximately a 20% reduction in the anticipated traffic demand. This traffic would have to relocate out-with the City Centre or change travel mode in order to allow the network to operate satisfactorily. Measures required to achieve this are covered in the 'Roads Hierarchy' report which considers a comprehensive range of measures, including:

- Information and communication.
- Making walking and cycling more attractive.

- Improvements to make public transport more attractive.
- Car Park access strategy – including traffic management to remove cross city trips.
- Removal of significant strategic trips from the City Centre – addressed through the development of a suitable Roads Hierarchy.

5.4.12 The modelling concludes that Broad Street is the natural start point for the CCMP transport proposals because it has the least impact on the strategic road network and the displaced traffic can be accommodated on the wider city centre road network.

The Executive Summary of the modelling testing report is attached as Appendix 1.

5.5 **Broad Street Options**

5.5.1 There are three options being considered for Broad Street: open to all traffic; open to bus and cycle only; or full pedestrianisation.

5.5.2 Prior to the Council meeting (2 March 2016) designs for Broad Street options were presented to Members to demonstrate what the space could look like for each option, showing a revised design with space for traffic limited to two lanes with no space for bus waiting, public transport and bicycle only access, and full pedestrianisation, respectively.

5.5.3 The designs for Broad Street also identify the space available for events/ special occasions (including access to Marischal Square Quad to connect to events at that location) and this has been informed by knowledge and experience of events planning across the City in terms of public circulation, emergency access, different types of events and their space requirements.

5.5.4 Limited additional temporary events space could be created on specific occasions via temporary road closures for options that maintain vehicular traffic in some way, subject to emergency access requirements. The types of events/ special occasions that could be considered for this space on Broad Street includes seasonal markets, concerts, significant cultural events i.e. tying in with events inside Marischal College Quadrangle, new annual festivals and sporting events.

Consultation

5.5.5 It is suggested that consultation at this stage should focus on the preferred design options: open to all traffic; part-pedestrianisation; or full pedestrianisation.

5.5.6 The public can also make comment on what they think is appropriate

with regards to the detail of the space – such as the materials, soft and hard landscaping, street furniture and any public art installations that might be included – should the space be transformed in any way from the status quo.

5.5.7 It is recommended that the consultation material is sent to a number of key stakeholders and partners (such as Aberdeen Inspired, Cycle Forum, Civic Forum, etc.) as well as it being made available on-line with the opportunity to comment through an on-line survey. For those without internet access, the consultation material will be distributed to a number of locations such as libraries with the opportunity to send in comments. A comments box will be made available in the Marischal College foyer along with the consultation material. It is anticipated that the consultation will take place for four weeks from Monday 16 May until Sunday 12 June 2016.

6. IMPACT

6.1 Improving Customer Experience:

The contents of this report and the recommendations relate to the delivery of the City Centre Masterplan, which is aimed at improving the City Centre for all those who live in, work in and visit it. This would include the following benefits:

- Quality of life - People could feel more content in a more pleasant environment, as reported in other cities with similar projects.
- Health – with more people walking in the area there could be a reduction in inactivity-related illness.
- Environmental - positive impact on air quality due to a reduction of emissions from vehicles in the area. Noise levels would be lower too.

6.2 Improving Staff Experience:

A defined, fully resourced programme of delivery for the City Centre Masterplan with key stage decision making, committed to by the Council, will enable staff, with stakeholders and the public, to confidently and timeously realise the City Centre Masterplan. The recent appointment of the City Centre Director will assist this process.

6.3 Improving our use of Resources:

Internal resources and partnership working with developers have already been identified to continue to deliver the instructions of Council in December 2015 and March 2016. Further resources will continue to be required for the wider delivery of the transport network plan to support the successful delivery of the City Centre Masterplan, which has identified a range of benefits for citizens and business across the

City. Internal resources will also be used to undertake the public consultation for Broad Street.

6.4 Corporate:

Positive decision making informing the progressive implementation of the City Centre Masterplan directly supports a range of policies and strategies including:

Aberdeen – the Smarter City vision:

- We will encourage and support citizens to participate in the development, design and decision making of services to promote civic pride, active citizenship and resilience.
- We will improve access to and increase participation in arts and culture by providing opportunities for citizens and visitors to experience a broad range of high quality arts and cultural activities.
- We will provide a clean, safe and attractive streetscape and promote bio-diversity and nature conservation. We will encourage wider access to green space in our streets, parks and countryside.
- We will invest in the city where that investment demonstrates financial sustainability based on a clear return on investment
- We will encourage cycling and walking.
- We will provide and promote a sustainable transport system, including cycling, which reduces our carbon emissions.

Single Outcome Agreement:

The 2013 Single Outcome Agreement has been informed by a range of public engagement exercises, including the 'City Voice' questionnaires, one of which reflected that '*61% of respondents stated that things had got a bit or much worse in relation to an 'attractive city centre"*. Delivery of the City Centre Masterplan will aim to address this.

Strategic Infrastructure Plan:

Stakeholder engagement which informed this Plan revealed that the 'poor state' of the City Centre is one of a number of issues identified as a common theme '*In terms of the attractiveness and marketing of the city to attract workers, visitors and investment…*'. This Plan also states that '*A high quality of life is integral to attracting and retaining the talent and investment needed to grow the economy. This sense of place, with a key emphasis on the city centre, is crucial in underpinning economic growth and essential in underpinning the necessary infrastructure requirements.*' One of the key goals of this Plan is City Centre Regeneration and the delivery of the City Centre Masterplan will contribute significantly to achieving this. Specific wider benefits would include:

- Improved safety as a result of less road traffic;
- Improved access - as a result of easier access and parking for cyclists, bus passengers, pedestrians and the vehicles that remain on the roads in the area, the cumulative reduction in journey times would be used more productively elsewhere.
- Economic growth - The project could provide a more pleasant environment which would increase the footfall in the area increasing retail sales, spending, employment and the number of businesses operating in the city centre.
- Competitiveness – For Aberdeen to maintain its global competitiveness, the quality of the 'place', the commercial space and the public realm around it all have a role. These proposals all contribute to that quality. Investors recognise the positive correlation between their business development and growth and the quality of the public realm, which becomes a virtuous circle with more people wanting to live as well as work in the city centre and increased residential opportunities.

This Plan also recognises that a range of traffic management and transport network improvements in and around the City Centre, delivery of air quality, road safety and economic benefits and support for the key strategic priority around City Centre Regeneration. The development and delivery of a Sustainable Urban Mobility Plan for the City Centre, as part of the wider Masterplan, are also recognised as key to improving accessibility to all, increasing walking and cycling opportunities and improving public transport.

6.5 Public:

The contents of this report are likely to be of public and media interest as it relates to the City Centre, a significant economic asset for the City and Region. An Equality and Human Rights Impact Assessment has been undertaken as part of the Aberdeen City Centre Masterplan and Delivery Programme presented to Council on 24 June 2015. A Privacy Impact Statement is not required for this report.

7. MANAGEMENT OF RISK

7.1 The risks inherent in not addressing the regeneration of the city centre are set out in the Strategic Infrastructure Plan. In view of the fact that the regeneration of the city centre is widely supported, there is a reputational risk to the Council if no improvements are made.

7.2 There is also a risk in not delivering the public realm works on Broad Street for the completion of Marischal Square in July 2017. Officers have been made aware that the contractors need a 52 week lead in time to deliver the public realm works for the scheduled completion of the development. Therefore, a decision must be made by July 2016.

7.3 If a decision is not made then there are the following risks:

- Reputational risk – undermines the Council investment into Marischal Square and the public/ stakeholders could perceive that the Council is unable to deliver improvements to the city centre on time or deliver the projects within the masterplan;
- Cost of delivery – although the £1.12M is safeguarded for works on Broad Street it would cost more and take longer to work through an agreement with another contractor at a later date;
- Attractive investment – there may be some risk in letting the spaces with the lack of a decision on the public realm and how this will tie in with the development;
- Traffic disruption – works at a later date will cause traffic disruption in the city centre and this is likely to be worse with Marischal Square in use; and
- Aesthetics – when Marischal Square is opened, Broad Street will look as it does at the moment as there will have been no improvements to the public realm.

8. BACKGROUND PAPERS

Report to Council – 16 December 2016 – Transport Implications – City Centre Masterplan Projects –CHI/15/299

Report to Council – 2 March 2016 – Transport Implications – City Centre Masterplan Projects –CHI/16/006

Full Technical Traffic Modelling Report (available on request)

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APPENDIX 1

Traffic Modelling Testing Report - Executive Summary

Aberdeen City Council
Aberdeen City Centre Masterplan Testing – Phase 2 & 3
Traffic Model Testing Report – Executive Summary

Date :	**8 April 2016**	*Distribution :*	
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1. INTRODUCTION

Study Brief

Under the Scotland Excel Framework, Aberdeen City Council (ACC) commissioned SIAS Limited (SIAS) in September 2015 to undertake transport model testing of key transport related elements of the proposed Aberdeen City Centre Masterplan, using the Aberdeen City Centre S-Paramics Model.

This Summary Report will provide an overview of the assessment undertaken for each key infrastructure proposal in isolation (Phase 2 testing) and in combination with other proposed infrastructure measures in the City Centre (Phase 3 testing), leading to a proposed implementation strategy for the full Masterplan infrastructure.

Purpose of Study

The purpose of modelling various infrastructure proposals and combinations of proposals, relating to the City Centre Masterplan is that it:

- Provides guidance into the development of a logical framework for implementation of the full scheme infrastructure.
- Seeks to limit the impact of re-locating traffic from the City Centre
- Identifies potential enabling measures to assist the City Centre road network to function, and when such enabling measures would be required
- Identifies where best to initiate the implementation programme

Background

The Aberdeen City Centre Masterplan proposals were proposed by independent consultants BDP and accepted by Aberdeen City Councillors at their full council meeting of 24 June 2015. The full Masterplan proposals include the restriction to general traffic through most of the core area of the city centre area. The implementation of the Masterplan will develop incrementally over the next 20 - 25 years. ACC is, therefore, required to consider the development and infrastructure measures as packages or phases of implementation in the coming years.

Traffic Modelling

ACC currently has a traffic model covering Aberdeen City Centre area. This traffic forecasting tool is to be utilised to assist in the development of these phases of Masterplan implementation. The development of the Aberdeen City Centre Paramics Model (ACCPM12) is detailed in a separate Report, *Aberdeen City Centre: 2012 Base Model Development Report (SIAS Ref. 75883, November 2013).*

SIAS was required to develop a 2017 and 2023 Reference Case Network, which includes the Berryden dualling proposals as previously detailed in the report *Berryden Corridor Study – Traffic Modelling (SIAS Ref. 71550, July 2009)* and also includes the South College Street junction (with QEII Bridge) proposals as previously detailed in *South College Street Junction – Phase 4 Testing (SIAS Ref. 67586, April 2007).*

The City Centre Masterplan proposals were required to be assessed on the 2023 Reference Case Model network as this model scenario includes all currently known committed developments within the City Centre and surrounding network.

Further updates to the committed development content of the 2023 model network are detailed in the report '*Aberdeen City Centre Masterplan – Phase 1, Traffic Model Testing Report* (Ref: TPXACCM1\77681, December 2015),

During the Phase 1 model test programme, changes to the detailed design of the Berryden Rd dualling scheme were being developed. Prior to the next phase of testing, the 2023 Reference Case model was again updated to include junction design changes at Elm Place / Berryden Road and Rosemount Place / Skene Square to reflect the latest designs. This is detailed in the report '*Aberdeen City Centre Masterplan – Phase 2 & 3, Traffic Model Testing Report* (Ref: TPXACCM1\77953, April 2016),

2. TRAFFIC MODEL TESTING

Introduction

As detailed above, the City Centre Masterplan proposals were required to be assessed on the 2023 Reference Case Model network.

It would be impossible to develop and assess all the public realm detail in each model scenario within the study timeframe, therefore the Phase 2 and 3 model testing was undertaken as a 'high level' assessment, which included:

- All interventions modelled
- Key junctions assessed and signal timings / phases amended if necessary
- Bus route revisions applied
- Indicative junction enabling measures (signalisation of existing roundabouts)
- Global model traffic demand reduced until the model is able to run without network 'failure' – i.e. significant congestion causing model gridlocking.

Approximately 45 separate network scenarios were assessed in the AM (06:00-10:00), PM (15:00-19:00) and Saturday (12:00-16:00) Peak models

Phase 1 Testing – Summary

As detailed in the Report '*Aberdeen City Centre Masterplan – Phase 1, Traffic Model Testing Report* (Ref: TPXACCM1\77681, December 2015), the following conclusions were drawn from the study:

- The Broad Street interventions have a low impact on traffic flow changes through the City Centre
- Bus & Taxi only interventions on Union Terrace are recommended as a complimentary measure. This would reduce the impact of displaced traffic and further improves the operation of public transport in this area of the network.
- Broad Street restriction options include full closure, Bus & taxi only, or bus only.
    - Full closure significantly affects the PT network coverage, particularly if Schoolhill were to also be closed to all traffic in the future
    - Low volume of taxis currently use Broad St, if it were restricted to buses only, this would help create a more pedestrian friendly area on Broad St whilst Union Terrace would be still available for taxi routing.
- Schoolhill road closure has implications to increased traffic demand through the shopping area north of the Bon Accord Centre
    - Traffic restriction measures are therefore required throughout the George St shopping area to restrict rat-running but retain car park and local access
    - These measures require a significant reduction in traffic demand through the city centre and are therefore not a short term option

Phase 2 Testing – *Assessing Interventions in Isolation*

Phase 2 model testing was developed to assess the implications of applying each key restriction in isolation on the model network to determine the impact on the wider network. There are no interventions in place on Broad Street or Union Terrace in these scenarios.

All model test scenarios were able to operate at the full predicted traffic demand for 2023, with the exception of the Guild St, Wapping St, & Carmelite St Test, where the network failed around the South College Street area unless the overall traffic demand was reduced by 5%. This highlighted the linkage between the Guild St, Wapping St, & Carmelite St proposals and South College Street improvements,

The following summarises the key implication of each restriction:

<u>Union Street Interventions (Bus & Taxi Only)</u>

- wide implications to re-routing traffic

- Migration of traffic to Schoolhill – pedestrian safety issues
- Congestion issues around South College St & Berryden Rd / Hutcheon St

Guild Street (East of Carmelite St) Interventions (Bus & Taxi Only)

- Migration of traffic to Market Street (north) and Union Street
- Therefore increase in traffic demand through Air Quality Management Area (AQMA)
- Migration of traffic from Denburn Corridor to 'Eastern Corridor' (Commerce St, East & West North St)

Bridge St Interventions (Bus & Taxi Only)

- Little impact on the operation of the wider network
- Interventions will assist the operation of Guild St, Wapping St, & Carmelite St

Market Street (North of Guild St) Interventions (Bus & Taxi Only)

- Low impact on the operation of the wider network
- Forces traffic out to Eastern Corridor
- Reduces traffic demand on Union Street & Broad St (could offset negative impact of Guild St interventions)
- Interventions will assist the operation of Guild St, Wapping St, & Carmelite St

Guild St, Wapping St, & Carmelite St Road Infrastructure (Wapping St closure, Guild St East as bus only westbound)

- Migration of traffic to Union St & Market St (AQMA areas)
- Migration of traffic also to South College Street – significant congestion area
- Scheme requires a reduction in routing lanes from the existing 2 lane gyratory to one lane in each direction at Wapping St / Bridge St.
- The scheme includes a one-way bus route clockwise on Market St, Guild St and Bridge St
- Additional testing has shown that 2 way bus routing would also work and may be more beneficial for catchment and stopping arrangements

Junction Enabling measures

The Phase 2 model testing highlighted the need to improve the traffic capacity through the Eastern corridor to cater for the displacement of traffic from the city centre. The Masterplan also highlights this requirement and the need to improve the junctions of Commence St /

Virginia St and Beach Boulevard / Commerce St for traffic capacity and also for pedestrian and cyclist crossing facilitates

Through a series of model tests, junction improvements were developed and proposed at these two locations to improve the operation of the network for all traffic modes. The Commerce St / Virginia St junction proposals require the Hanover St / Castle Terrace arm to be closed off and an addition traffic lane on Virginia St to allow 2 routing lanes for the north-south movement.

The Beach Boulevard / Commerce St junction proposals include the signalisation of the junction with Park Street closed off to facilitate a 4 arm signalised junction.

The above measures were collectively deemed the Eastern Corridor Improvements and were carried forward through the Phase 3 model testing.

Phase 3 Testing – *Combination Testing*

Objectives

Phase 3 model testing was developed to assess various combinations of City Centre traffic interventions associated with the Masterplan proposals. The objective of assessing the impact of the various traffic interventions in this way is to:

- Identify a logical framework for implementation of the scheme road infrastructure
- Sees to limit the impact of relocating traffic
- Identify enabling measures and when it would be required
- Identify where best to start in the short term

Test Programme

ACC and SIAS developed a model testing programme which enabled all the key infrastructure measures to be assessed in numerous combinations with other measures. Appendix A details the model testing programme.

In all test scenarios, Broad Street was assessed with both a bus only restriction and also with full closure (between Upperkirkgate and Queen Street).

Criteria for Assessment

The criteria for assessment for each model test scenario was to identify the level of traffic demand that the model could run at in each peak period. For example, if a scenario ran at 80% demand, then this suggests that there would need to be a 20% reduction in traffic within the city centre network to enable the network to operate without significant congestion and network instability.

Model Test Results

Appendix A also shows the demand level at which each network scenario was able to run. It can be seen from the table, that as more interventions are included within the City Centre network, the lower the overall traffic demand the network can accommodate.

The following key points for each proposed City Centre restriction / Enabling measures have been drawn from the model testing:

Broad Street Interventions

- Does not significantly impact on the rest of the City Centre (except Union Terrace)
- Retaining bus only operation, as opposed to a full closure, is recommended as it allows significantly better coverage for public transport through the city centre area, particularly when Schoolhill is closed to all traffic.

Bridge Street Interventions

- Does not significantly impact on the rest of the City Centre network
- Will require consideration of potential rat running through Crown St area
- Required to facilitate Guild St, Wapping St, & Carmelite St proposals

Market Street (north) Interventions

- Forces traffic out to the Eastern Corridor
- Reduces traffic demand on Union Street (which is required when Guild Street is restricted as this has the opposite effect)
- Required to facilitate Guild St, Wapping St, & Carmelite St proposals

Guild St, Wapping St, & Carmelite St

- Key Measure
- Requires Bridge Street and Market Street interventions in place to limit traffic conflict points at Wapping Street and to facilitate a one-way clockwise bus operation
- Closure of this east-west route impacts on the other east-west routes in the network, particularly at South College Street junction (to North Esplanade West)
- Impacts on the traffic demand that the network can operate at

Union Terrace Interventions

- Manages potential traffic displacement from Broad Street interventions if Bridge St is unrestricted
- Broad Street and Union Terrace together assist in keeping traffic volumes lower on Schoolhill when Union Street is restricted
- Improves the operation of public transport in this area

Union Street Interventions

- Key Measure
- Has a significant impact on the wider network due to its current function as a strategic traffic corridor and impacts on the traffic demand that the network can operate at
- Requires Broad Street and Union terrace interventions in place to protect Schoolhill from significant increases in traffic
- Impacts on the traffic demand that the network can operate at (and more than Guild St, Wapping St, & Carmelite St)
- Union Street plus Guild St, Wapping St, & Carmelite St infrastructure proposals require approximately 10-15% overall traffic reduction in the PM peak to allow the network to operate

Schoolhill & George Street Area Interventions

- George Street area traffic management required in combination with Schoolhill closure to restrict strategic traffic from the George St shopping areas
- With all Schoolhill & George St interventions in place, this has a significant impact on the east-west routing choices and therefore affects the demand level at which the network can operate

Eastern Corridor Enabling Measures

Each Test series was considered both with and without the Eastern corridor enabling measures to assess at which level of restriction within the City Centre would their enabling measures be required.

The conceptual scheme was able to provide approximately 30% more traffic through Commerce Street in the PM peak hour than the existing roundabout. This allowed the overall network to operate at 5% more capacity in some PM peak and Saturday Peak scenarios. The testing also suggested that the Eastern Corridor Enabling measures was required prior to both Union Street and Guild Street interventions being in place.

Mounthooly Roundabout Enabling Measures

With the Eastern Corridor enabling measures included with all the key Masterplan road interventions, the need for further junction enabling measures was identified for Mounthooly Roundabout. Again, this has also been identified within the Masterplan itself.

Conceptual options for Mounthooly Roundabout were developed through model testing, each based upon a signalised junction configuration. A signalised junction option also provides benefits to active travel in terms of accessibility and road safety.

The conceptual schemes were able to provide between 5-10% greater capacity through the junction and reduce the overall congestion in the area. Further changes to the George Street area were identified from the network running more free at Mounthooly and further traffic management amendments were made in this area of the network.

South College Street Enabling Measures

Throughout the model testing, congestion issues are noted around the South College St / Ferryhill / Fish Precinct area. The current proposed scheme (developed in 2008-9) cannot cater for the proposed traffic displacement from the city centre plus the increase in traffic generated from Union Square Shopping Centre and the new office developments off North Esplanade West. Conceptual revised designs have been considered but not in line with the City Centre Masterplan proposals. This area therefore still requires further detailed assessment.

Berryden Dualling Corridor Enabling Measures

Throughout the model testing, congestion issues are noted around the Berryden Road / Hutcheon Street area. The Berryden Dualling scheme is included within all the model scenarios. The detailed design for this junction is currently being re-assessed which may or may not provide additional traffic capacity benefits.

Issues

From Appendix A, it can be seen that the final model scenarios which includes all the key Masterplan interventions requires a reduction of at least 20% of the predicted traffic demand to allow the network to operate. This is a significant traffic reduction which cannot be achieved through mode shift alone.

The traffic modelling has shown a general movement of traffic out to the western model extent of Westburn Road / Argyll Place and beyond, as the interventions within the city centre area are incrementally increased. With the 'locking in the benefits' proposals to limit north-south routing on Anderson Drive (to give more time over to pedestrians, cyclists and east-west routing Public Transport), the impact of the migration of traffic from the city centre to areas on the periphery of the city centre is not currently known.

Berryden Road / Hutcheon St remains a congestion point in the network even with the current dualling and junction proposals. Unless strategic traffic demand through Berryden Road can be significantly reduced or a revised junction design promoted which can cater for the anticipated demand, this location will remain a pinch point in the road network.

The current South College St junction design cannot cater for the city centre interventions associated with the Masterplan infrastructure proposals plus the increases in traffic demand from Union Square and the office developments off North Esplanade West.

3. RECCOMENDATIONS

Implementation Proposal

Appendix B details the proposed implementation process which as been developed from the series of traffic model scenarios.

The following details the reasoning for the framework of implementation as proposed.

1. Broad Street Bus Only

- Interventions have minimal impact on the rest of the network and do not require a traffic demand reduction to be able to operate
- Full closure not recommended due to PT coverage implications

2. Bridge Street Bus & Taxi Only

- Required to facilitate Guild St, Wapping St, & Carmelite St proposals

3. Market Street (N) Bus & Taxi Only

- Reduces traffic demand on Union Street (which is required when Guild Street is restricted as this has the opposite effect)

- Required to facilitate Guild St, Wapping St, & Carmelite St proposals

4. South College Street Junction Enabling measures (still requires detailed assessment)

- Capacity improvements essential prior to the implementation of key east-west routes (Guild St & Union St)

- Traffic patterns at South College Street directly affected by the north-south traffic throughput at Wapping Street as part of the Guild St, Wapping St, & Carmelite St

5. Guild St, Wapping St, & Carmelite St Road Infrastructure

- Requires network traffic demand reduction of approximately 5%

- Requires Bridge St and Market St interventions to already be in place

- Guild St, Wapping St, & Carmelite St road interventions have a lower impact on the surrounding network than the Union St interventions. In addition, if Union St was restricted first, significant congestion may occur through Guild Street

6 Union Terrace Bus & Taxi Only

- Both Broad St & Union Terrace interventions are required to keep traffic volumes on Schoolhill lower prior to restrictions being placed on Union Street

- Broad Street interventions may result in increased traffic demand on Union Terrace prior to Bridge Street interventions being implemented. Monitoring of Union Terrace may therefore result in the requirement for the proposed Union Terrace restrictions to be implemented earlier in the programme.

7 Eastern Corridor Improvements

- Union Street and Guild Street interventions both result in a significant relocation of traffic to the Eastern Corridor. Improved junction capacity is required through the Eastern Corridor (at Commerce St/Virginia St and Commerce St/Beach Boulevard) prior to the implementation of both of these interventions. The Eastern Corridor enabling measures proposals are therefore required prior to the implementation of Union Street interventions but could be considered even earlier.

8 Union Street Bus & Taxi Only

- With above interventions already in place, this measure requires network traffic demand reduction of approximately 10-15%

- Requires Broad Street and Union Terrace interventions in place to protect Schoolhill from significant increases in traffic

9 Mounthooly Roundabout Improvements

- Forms part of the George Street area traffic management proposals but is also required to maximise the operation of the eastern corridor

- Can be considered before or after Union Street interventions are implemented

10 Schoolhill Closure & George St Traffic Management Interventions

- Further impacts on the demand level that the network can operate at (requires 20% traffic reduction in PM and Saturday Peaks)

- Schoolhill closure on its own would force high volumes of traffic through the John St and Maberly St corridors

- Wide area traffic management required around George St area (south of Hutcheon St) to restrict through traffic but retain car park access

Implications for Delivery

To deliver the full City Centre Masterplan (key measures), it is anticipated that there would require to be approximately a 20% reduction in the anticipated traffic demand. This equates to approximately 4750 vehicles in the PM peak hour and over 42,500 vehicles in a full day which require to either relocate outwith the City Centre or change travel mode in order to allow the network to operate.

Achieving this will require a multifaceted approach over the full 20-25 year lifespan of the implementation programme through means such as:

- Inform & educate road users in Aberdeen – through consultation and marketing

- Modal shift to public transport – radial routes / corridor improvements required

- Modal shift to active travel – safe and attractive walking & cycling routes

- Car Park access strategy – to reduce cross city trips

- Removal of significant strategic traffic from the City Centre – addressed by above points, plus as part of a separate network hierarchy study

It is anticipated that the infrastructure delivery programme will be split into separate infrastructure projects as shown in Appendix B. Within each project, the following process will need to be undertaken:

- Plan - detailed planning and design for all public realm elements
- Consultation
- Implementation - strategy & delivery
- Review – assess the impact of the measures against the predicted impact. Mitigate network or implementation strategy as necessary

Further Analysis

In terms of traffic modelling, this study has been undertaken as a high level assessment as detailed in Section 2.1. As part of the detailed planning and implementation strategy for each project, the following elements may require to be assessed within a traffic modelling environment:

- Re-assess South College Street scheme design within the context of Guild St, Wapping St, & Carmelite St proposals
- Development of full public transport network and bus stop arrangements
- Detailed assessment of signal junction phasing / staging / timing and linkage review
- Model more specific travel pattern changes – mode shift, strategic trip reduction / redistribution etc.
- Cross City Car Parking – as part of a City Centre parking Strategy
- Other Masterplan minor route proposals – i.e. Rose St Pedestrianisation, Golden Square public area etc.
- Bus Gate proposals into the City Centre
- Construction traffic management requirements

APPENDIX A - MODEL TEST PROGRAMME & RESULTS

Location	Measure	Phase 1 Testing				Phase 2 Testing					Phase 3 Testing																				
		101	102	103	105	201	202	203	204	205	301 series		302 series		303 series		304 series		305 series		306 series		307 series		308 series		309 series			310 series	
Broad St	Bus Only / Closed	✓	✓	✓	✓						✓	✓					✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	
Union Terrace	Bus & Taxi			✓	✓						✓	✓					✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	
Bridge St	Bus & Taxi								✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Market St	Bus & Taxi									✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Guild St	Bus & Taxi						✓								✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Carmelite St	Closure							✓							✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Union Street	Bus & Taxi					✓							✓	✓			✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Schoolhill	Closed		✓		✓																				✓	✓	✓	✓	✓	✓	
George St Area	Restrictions				✓																				✓	✓	✓	✓	✓	✓	
East/West North St	Junction Improvements											✓		✓		✓		✓		✓		✓		✓		✓	✓	✓	✓	✓	
Mounthooly Mitigation	Junction Improvement																										✓	✓	✓	✓	
George St Area	Traffic Management																													✓	
AM Peak		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95%	100%	100%	100%	95%	95%	90%	95%	90%	95%	90%	95%	95%	95%	
PM Peak		100%	100%	100%	90%	100%	100%	95%	100%	100%	100%	100%	95%	100%	100%	100%	95%	100%	95%	95%	90%	90%	80%	85%	75%	80%	80%	80%	80%	80%	
SAT Peak		100%	100%	100%	90%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95%	95%	95%	100%	95%	95%	90%	90%	70%	70%	75%	75%	75%	80%	

APPENDIX B – PROPOSED IMPLEMENTATION PROGRAMME