**Auckland City Centre Advisory Board**

**OPEN MINUTE ITEM ATTACHMENTS**

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**Note:** The attachments contained within this document are for consideration and should not be construed as Council policy unless and until adopted. Should Councillors require further information relating to any reports, please contact the relevant manager, Chairperson or Deputy Chairperson.
Monitoring air quality impacts in Auckland’s proposed zero emission area

Dr Nick Talbot – Air Quality Scientist, RIMU

Auckland City Centre Advisory Board

27 February 2019
Attachment A

Item 5

Overview

- Identify transport as the major polluter in Auckland City Centre
- The rationale for change
- Monitoring the impacts of land use and design changes
- What will be achieved with air quality monitoring
Transport is the major anthropogenic emission source across Auckland

......however, within the City Centre

<table>
<thead>
<tr>
<th>PM$_{2.5}$</th>
<th>NO$_x$</th>
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<tbody>
<tr>
<td>(total = 3,000 t/yr)</td>
<td>(total = 20,800 t/yr)</td>
</tr>
<tr>
<td>Domestic</td>
<td>9%</td>
</tr>
<tr>
<td>Industry</td>
<td>11%</td>
</tr>
<tr>
<td>Transport</td>
<td>80%</td>
</tr>
</tbody>
</table>
The need for change

- Downtown Auckland has the highest air pollution measurements across the Auckland network.
Nitrogen Dioxide (NO₂) trends

- Decreased significantly since 2006
- Now increasing slightly: The question is WHY?
Nitrogen Dioxide (NO₂) 2017 and 2018

Recent increases MAY reflect bus / trucks and building work going on through the City Centre area.
Diesel = 39% PM$_{2.5}$

Diesel = 66% of BC

Source apportionment data from filter measurements on Queen Street that identified PM$_{2.5}$ (Left) and Black Carbon (Right) (Davy and Trompetter 2017).
The surface area of BC combustion is large, allowing for more nasties to condense on: Including 12 poly-aromatic hydrocarbons (PAHs) - All are carcinogenic (1).

**Adults:** Access brain via bloodstream through alveoli air exchange in lungs.

**Children:** Epithelium under developed allows direct access via nasal passage (2). Resulting in impaired cognitive function and increase the risk of developing dementia and Alzheimer’s disease.

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**That’s the issue with Black Carbon?**

- **Combustion particles:**
  - Endotoxin
  - Organic compounds
  - Inorganic compounds
  - Metals

- **Mineral particle:**
  - 0.5-10 μm
  - Variable mineral and metal content

- **NEUROINFLAMMATION**
  - Passage of pollutants in blood-brain barrier (BBB)
  - Inhaled airborne PM via metal endotoxin

**Pathways:**

- Exposure
- Breakdown of epigenetic markers
- Increase in inflammation
- Neuronal loss

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## Black Carbon international comparison

<table>
<thead>
<tr>
<th>Region</th>
<th>Network</th>
<th>Year</th>
<th>Black Carbon µg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Urban</td>
</tr>
<tr>
<td>Queen Street: Auckland</td>
<td>Auckland Council</td>
<td>2006-2016</td>
<td>0.2 – 5.3</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td>5 (~200 sites)</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
<td>0.8 (12 sites)</td>
</tr>
<tr>
<td>Europe</td>
<td></td>
<td></td>
<td>0.8 (4 sites)</td>
</tr>
<tr>
<td>UK</td>
<td></td>
<td></td>
<td>0.9 (19 sites)</td>
</tr>
<tr>
<td>China</td>
<td></td>
<td></td>
<td>4.2 (5 sites)</td>
</tr>
</tbody>
</table>

*Soil or Black carbon is something to be aware of in Auckland’s Queen St. It is emitted from diesel vehicles and can irritate airways. Photo: RNZ News.*
Why are air pollution levels elevated downtown?

Britomart Bus Station

Ports/Ship Contribution

Note the airflow – straight from Upper Queen Street

This makes up over 12% of on-road traffic

New Air Quality monitoring site: Real-time BC data
Proposed design, transport and infrastructure changes in Auckland’s City Centre
Modeling the impacts of a congestion charge

With C40 healthy cities initiative, we modelled what would happen if we removed 11000 private vehicles from the City Centre.

- **PM2.5**: 4% reduction
- **NO₂**: 15% reduction

With congestion pricing we are not removing the major emitters - Buses/ trucks / delivery vans etc. Small decreases prove this!
New Transport Investment for Central Auckland

**SOCIAL IMPACT**
Number of deaths averted annually across the total population:

0 days per person

Life expectancy across the total population increased by:
0 days per person

**ECONOMIC IMPACT**
Approximate costs avoided due to reduced premature mortality from change in PM2.5 levels:

NZ $40,291.15 Per Year

**SOCIAL IMPACT**
Number of deaths averted annually across the total population:

6

Life expectancy across the total population increased by:

31 days per person

**ECONOMIC IMPACT**
Approximate costs avoided due to reduced premature mortality from change in NO2 levels:

NZ $1,051,099.51 year
The impacts of Auckland City Centre changes

The A4E programme helps resolve air quality issues from the city centre.

Current investment in CRL and light rail will also help reduce vehicle numbers.

Most importantly: is an urgent need to electrify the bus fleet as per the fossil fuel free streets agreement.
establishing a smart sensor network

- Mercury Lane
- Top of Nelson St
- Queen St / Mayoral Dr.
- Wellersley/Hobson St.
- Victoria / Queen ST
- Albert Park
- Gore St / Customs St.
- Ports / Quay St.
- Britomart
- Fanshawe / Hobson St
- Wynyard Quarter
Sample of parameters measured

- Air Pollution data ...includes
  - PM$_{10}$
  - PM$_{2.5}$
  - NO$_2$
  - SO$_2$
  - CO

- Noise
- Pedestrian counts
- Traffic counts
- Social data – Foot fall number / crime / accidents..
Concluding Statement

“Policy decisions that promote safer streets, climate action, active and public transportation modes as well as congestion mitigation strategies have multiple and interdependent benefits.

This includes increased economic activity, vibrant social spaces and a cleaner, more sustainable environment, including cleaner air.”
Councillors’ Office
Shane Ellison
Chief Executive, Auckland Transport
Shane.Ellison@aucklandtransport.govt.nz

17 December 2018

Dear Shane

RE: BLACK CARBON LEVELS ON QUEEN STREET

As a signatory to the C40: Fossil Free Streets declaration, Auckland has pledged to significantly reduce greenhouse gas emissions generated by transport and traffic. The transition to Fossil-Fuel-Free-Streets will occur by 1) procuring zero-emission buses from 2025; and 2) ensuring a major area of our city is zero emission by 2030.

However, one of our busiest streets - with more than 10 million pedestrians counted in 2017, records dangerously high levels of harmful air pollutants. The long-term average concentrations of Elevated Black Carbon (BC) on Queen Street are two to three times higher than in internationally comparable cities. This street sits at the heart of our city centre and is a strategic pinpoint of transformation plans – especially those outlined in the City Centre Master Plan 2040.

This morning, Council’s Research and Evaluation Unit (RIMU) released The Impacts of Transport Emissions on Air Quality in Auckland’s City Centre [TR2018/28]. The draft report, released in early November, highlighted exposure to high levels of ‘black carbon’, or ultra-fine particles associated with a number of health problems.

The main reason for high air pollution levels on Queen Street is emissions from transport vehicles – particularly diesel fuelled buses, which make up 12 per cent of the on-road vehicles (a higher proportion that any other Auckland road). Although many turn off near Wellesley Street, the pollution flows down Queen Street towards the densely populated waterfront area.

Downward trends in particulate and nitrogen dioxide pollutants have recently reversed and are now slowly increasing. These pollutants negatively impact the rapidly growing number of people who live, work, learn and socialise in our city centre, particularly those most vulnerable, such as older persons and those with pre-existing respiratory conditions.

We note and acknowledge Auckland’s Low Emission Bus Roadmap and the pathway it provides to eliminating diesel buses from the city’s roads, with a full zero-emission bus fleet in 2040. While we generally support the key milestones (continue low emission bus trials between 2019 and 2025, and procure only zero emission buses from 2025), we would like to see the 2040 date advanced considerably.

In addition to Auckland’s commitment to Fossil-Fuel-Free Streets, there are numerous benefits to be gained from improving the air quality on Queen Street. The upcoming APEC, and AMCUP36 both provide opportunities to showcase Auckland’s quality of life, and quality of environment. A prominent, popular street in central Auckland with remarkable air quality is another way for Auckland to demonstrate its enviable position in the world.
We are particularly interested in the immediate steps, or quick-wins, that Auckland can take to bring a dramatic improvement in the quality of air in Queen Street.

At a glance, these might include:

1. **Reduce diesel buses - transition to E-buses faster.**

   Currently, a number of buses with routes on Queen Street are older, diesel-powered models (Euro III to Euro V).

   Dramatic, instant improvements to air quality can be achieved through:
   
   - A review of all service contracts, ensuring that only Euro VI buses are permitted on Queen Street
   - Faster transition to e-buses (2019 from 2020)
   - Removal of all non-commuter bus services, e.g. the Kiwi Experience
   - Implementation of automatic stop/start technology for buses
   - A review of the ‘motor off’ policy, reducing the time limit from five minutes of idling to one minute

2. **Disincentivise private vehicles on Queen Street**

   Investigate removal of all short term (P15) parking bays on Queen Street (Customs Street to Mayoral Drive), which will consequently eliminate private vehicles generating congestion and pollution through parking searches and holding up bus services

   This should have the benefit of reducing idling and improving the productivity of buses and service vehicles. Furthermore, modelling work undertaken with C40 in London has shown that if we remove a third of private vehicles from the city centre, nitrogen dioxide reduces by 15%, with notable social and economic benefits.

3. **Reduce rat running in and around Queen Street**

   - Investigate removal of all right-hand turns from and to Queen Street, between Customs Street and Airedale (inclusive)
   - Consider traffic flows and rat running implications around Fort Street, Fort Lane, Jean Batten Place, High Street, Darby Street, Elliot Street and surrounds
   - Investigate opportunities to work with Google Maps to remove Queen Street and thoroughfares as recommended routes.

4. **Reallocation of road space from parking**

   Following removal of short term parking, the road space can be reallocated to provide for additional pedestrian movement, parking facilities for active transport modes (bike and e-scooter share) and parking for a possible e-cargo delivery system. Examples include parking for Lime scooters, Big Street Bikers rechargery centres and general bike parking.
Next steps

We invite you to consider the above proposals and any other opportunities that you are aware of. We urge you to take immediate action to alleviate the risk of more premature deaths, contributed to by atrocious air quality on our busiest street.

Multiple and interdependent benefits result from policy decisions that promote safer streets, climate action, active and public transportation modes, and congestion mitigation strategies. These benefits include increased economic activity, vibrant social spaces and a cleaner, more sustainable environment - including cleaner air.

Finally, your strong commitment to delivering on Auckland’s Climate Action Plan and the associated actions – particularly those that will be worked through as part of Auckland’s Climate Symposium – is also imperative as we work together to make tangible and ambitious progress in the short and long-term.

We look forward to hearing from you.

Yours Sincerely,

Chris Darby
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Penny Hulse
Chair I Environment and Community Committee
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Alf Filipaina
Deputy Chair I Environment and Community Committee
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Pippa Coom
Chair, Waitakere Local Board
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e.Pippa.Coom@aucklandcouncil.govt.nz
Resolution number PLA/2018/121

MOVED by Chairperson C Darby, seconded by Mayor P Goff:

That the Planning Committee:

a) agree the proposed process for updating the Auckland City Centre Masterplan 2040:
   i) digitisation in time to inform Auckland Council’s 2021 – 2031 Long Term Plan
   ii) the use of rolling updates rather than six-yearly updates

b) agree on the development of the following new content for public consultation and committee approval by July 2019:
   i) Māori Outcomes
   ii) Grafton Gully Boulevard
   iii) Access for Everyone

c) endorse the use of trials and “tactical urbanism” initiatives in order to test and consult on the initiatives in clause b) ii) and iii) above

d) request staff to trial an “open streets” initiative in the City Centre and work with interested Local Boards to trial it in other centres

e) consider an indicative programme of a rolling review of the City Centre Masterplan by July 2019, ensuring the development of the programme and vision is undertaken collaboratively across the council family and with external stakeholders.
Digital Plan: Proposed approach

Combined, updated and digitised online version of City Centre Masterplan and Waterfront Plan.

Image: The Waterfront Vision.
Māori Outcomes

Mana Whenua Kaitiaki Forum:

1) Developing a Mana Whenua Outcomes Plan for the City Centre

2) Integrating it into the City Centre Masterplan
Grafton Gully

- Better Port-Motorway links
- Improve connections to eastern suburbs
- Improve walking & cycling environment
- Unlock landholdings
- Deliver new workspaces
- Enable regional rail
- Respond to Ports Master Plan
Grafton Gully

Better Port-Motorway links
Improve connections to eastern suburbs
Improve walking & cycling environment
Unlock landholdings
Deliver new workspaces
Enable regional rail
Respond to Ports Master Plan
THAT’S GOING TO NEED TO FIT IN WITH OUR OTHER PLANS
While meeting other City Centre transport needs.
Attachment A

Item 6

Access FOR Everyone
Attachment A

VEHICLES CAN ENTER A SERIES OF ZONES
Attachment A

Item 6

3

VEHICLES ENTERING A ZONE LEAVE THE SAME WAY

EXCEPT FOR SPECIAL VEHICLES
4
THIS FREES UP SPACE FOR PEOPLE ON PUBLIC TRANSPORT
6

A BETTER PLACE FOR EVERYONE
Albert Street Bus Bays Update
Bus bay capacity

- Two bus bays are proposed, one northbound, one southbound. Albert St will have fewer bus stops than previously, so these will be busier and need to work well.
## Albert St bus volumes by year

Buses per hour during busiest peak of day

<table>
<thead>
<tr>
<th>Year</th>
<th>Buses per hour / indent required</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Northbound</strong></td>
<td><strong>Southbound</strong></td>
</tr>
<tr>
<td>2018</td>
<td>65 / yes</td>
<td>57 / yes</td>
</tr>
<tr>
<td>2021</td>
<td>72 / yes</td>
<td>64 / yes</td>
</tr>
<tr>
<td>2024</td>
<td>62 / yes</td>
<td>54 / yes</td>
</tr>
<tr>
<td>2028 with LRT</td>
<td>53 / yes</td>
<td><strong>27 / no</strong></td>
</tr>
<tr>
<td>2028 without LRT</td>
<td>73 / yes</td>
<td>61 / yes</td>
</tr>
<tr>
<td>2038 with LRT</td>
<td>61 / yes</td>
<td><strong>29 / no</strong></td>
</tr>
<tr>
<td>2038 without LRT</td>
<td>81 / yes</td>
<td>69 / yes</td>
</tr>
</tbody>
</table>

Bus routes, volumes and bus bay operations have been peer-reviewed
Southbound bus stop

- Indented bays bus stop capacity
- Inline bus stop capacity

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>2018</td>
<td>50</td>
</tr>
<tr>
<td>2021</td>
<td>60</td>
</tr>
<tr>
<td>2024</td>
<td>40</td>
</tr>
<tr>
<td>2028 (with LRT)</td>
<td>70</td>
</tr>
<tr>
<td>2028 (without LRT)</td>
<td>60</td>
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<tr>
<td>2038 (with LRT)</td>
<td>50</td>
</tr>
<tr>
<td>2038 (without LRT)</td>
<td>60</td>
</tr>
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Context

- Lower Albert Street 2nd busiest PT interchange in NZ – large swathes of Auckland rely on its reliability.
- 31,000 passengers/day on bus services using Albert St.
- AT design standard (ATCOP) does not recommend indented bus bays adjacent to general traffic lanes as buses find it difficult to merge from the bus bay.
- However, indented bus stops adjacent to bus lanes provide greater reliability for buses than inline stops, as buses are able to arrive and depart independently and not travel in platoons at the speed of the slowest service.
Busy bus stops can have safety issues if insufficient room for buses to pull in and out around each other

Photograph 2 shows passengers stepping off the bus directly onto the carriageway as a bus was unable to stop within the bus stop.
Albert St was previously 6 lane cross-section. Current plan reduces to 4 lanes, except short sections at busbays.
• Narrowsness of general traffic lanes makes it difficult for buses to use them attempting to overtake a bus in front of them
• Tree pits beneath bays future-proofed for bay removal
Footpath width

- The entirety of Albert St streetscape will be upgraded through CRL reinstatement. Targeted Rate funding allows higher quality materials and better amenity.
- The footpath width with bus bays is 4.7m on that side, 7.5m on the opposite side.
- 4.7m is greater than many streets with high pedestrian volumes, including Wellesley St, Queen St, Symonds St.
- Difficult to accurately project Albert St pedestrian volumes, as bus passenger volumes are modelled but background pedestrian activity is unknowable. However everyone agrees Albert St will be busy and needs good quality, functional footpaths.
Example: Wellesley St, outside The Civic

Double decker able to pull out and pass two stopped buses
Albert St footpath width will be similar but with fewer pedestrian
Example: Symonds Street

Less busy than Wellesley St, approx. 4.5 – 5m width
Build now vs. build later

- AT has already agreed to monitor bus performance and remove the bus bays if possible

- It is possible to reinstate Albert St post-CRL *without* the two indented bus bays and build them later if required. No trees could be planted initially (but tree pits provided)

- High bus volumes from Day One, so if bus performance is unreliable or a safety risk appears, AT would need to dig up brand new footpaths to create the 2 indented bus bays, whilst trying to operate busy bus services

- This is disruptive and poor customer experience
Summary
1. High bus volumes (>45 buses/hour/direction) make it critical that buses can pass each other
2. Reliability issues will affect journeys of 31,000 people/day
3. Try to strike a balance between good quality pedestrian space and the needs of a reliable transport system
4. Footpath width at bus bays will be wider than before and is comparable to other busy city centre streets
5. Risks/impacts from not building bus bays upfront
6. AT has agreed to monitor bus performance and remove bus bays if possible, and commits to working together on better urban realm
AT still keen to work with ACCAB, Council and CRL Ltd on best urban outcome for Albert St - more space, greenery and shelter
1.2 DESIGN CONTEXT
CONCEPTUAL IDEAS - ALBERT ST DESIGN FRAMEWORK (ADO)

The following are some conceptual organising ideas from the Albert St Design Framework made to guide design responses for Albert St.

- Major east-west streets take precedence over Albert St.
- Albert St broken up into distinct sections pivoted around Aotea Station block.
- Recognised as a celebrated civic pt street consistent in quality with other major bus streets in the CBD.
- Street trees and surface materials provide continuity + consistency.
1.6 DESIGN STRATEGY
TREES

Proposed trees are predominately situated along the bus bays. This relates to the initial analysis of the zones, creating a visual cohesion through similar character areas and further enhancing the corridor.

* deleted footpath extension and trees
Item 7

Attachment B

Up to five double deckers occupy full length of city block and "enclose" pedestrian spaces between station, buses and building facade.