

AUTOMATED AND ZERO EMISSION VEHICLES HOW THEY MIGHT RESHAPE OUR STREETS





**WATERGARDENS
TAYLORS LAKES**

**RINGWOOD
STATION**

**SIMPSON ST
YARRAVILLE**

**CHAPEL ST
SOUTH YARRA**

**MONASH
FREEWAY**



PROJECT BACKGROUND

In response to a request from the Special Minister of State, Infrastructure Victoria is providing advice on the potential infrastructure and land use planning requirements and opportunities to enable the operation of highly automated and zero emission vehicles. Infrastructure Victoria have commissioned a suite of integrated studies that are considering how to maximise benefits to society and avoid obsolescence of infrastructure investment. This report summarises the outcomes of one of these studies, undertaken by Urban Circus (visualisation) with Ethos Urban (urban design).

The emergence of Automated Vehicles and Zero Emission Vehicles (AVZEV) is likely to have significant impacts on the design of streetscapes, transport hubs and freeways, through changes to requirements for signage and signalling, road space allocation, parking, pick-up and drop-off areas, intersections, and interaction with non-automated road users (pedestrians and cyclists in particular). Considering and illustrating these changes is an important element in the consideration of the potential benefits and risks associated with the introduction of AVZEV technologies.

The impacts of AVZEV on the design of streetscapes will vary from one location to another, with the inner city raising somewhat different issues to suburban or regional centres, and local streets differing from transport

hubs and highways. For this reason, the study illustrates six locations (indicated on the attached map):

- Inner City – **Chapel Street, South Yarra**
- Suburban Centre – **Watergardens, Taylors Lakes**
- Regional Centre – **Sturt Street, Ballarat**
- Local Street – **Simpson Street, Yarraville**
- Transport Hub – **Ringwood Station**
- Highway – **Monash Freeway**

The degree and nature of technological take-up is also a variable factor. While there are differences in urban amenity between battery electric or hydrogen fuel cell vehicles, and the continued presence of fossil fuel vehicles, the more significant streetscape changes relate to the presence of human drivers or not. Human drivers need visual signals to guide them and are potentially more prone to error, requiring greater separation from other users and roadside objects like trees.

Even more fundamental is the issue of private ownership. If vehicles are shared, either as collective on-demand transport or used individually on a car-share basis, this likely reduces vehicle numbers on the road and avoids the need for local parking.

The study therefore contrasts the existing 2018 situation with two longer term scenarios, to

provide a vision of the potential differences:

- Slow Lane – Slow uptake of AVs and ZEVs, leading to a mix of shared, automated, electric vehicles and privately owned, petrol or diesel human-driven vehicles.
- Fleet Street – Rapid evolution to total AV uptake, with all vehicles shared, all zero emissions, and all connected, requiring less visual infrastructure to guide them.

It is also important to note that while this study has relied upon evidence as well as extensive urban design and planning experience and expertise, given the future under AVZEVs is highly uncertain, a degree of creative licence has been taken when designing these streetscapes.

Inquiry into automated mass transit
Submission 16, Attachment 6

CHAPEL STREET | SOUTH YARRA (TODAY) 2018



CHAPEL STREET | SOUTH YARRA

THE POSSIBLE FUTURE

What may have changed by the time our scenarios become reality

Chapel Street has grown in popularity as a retail destination serving an ever-growing population

No on-street parking in this busy area

New development provides offices and apartments at upper levels behind shops.

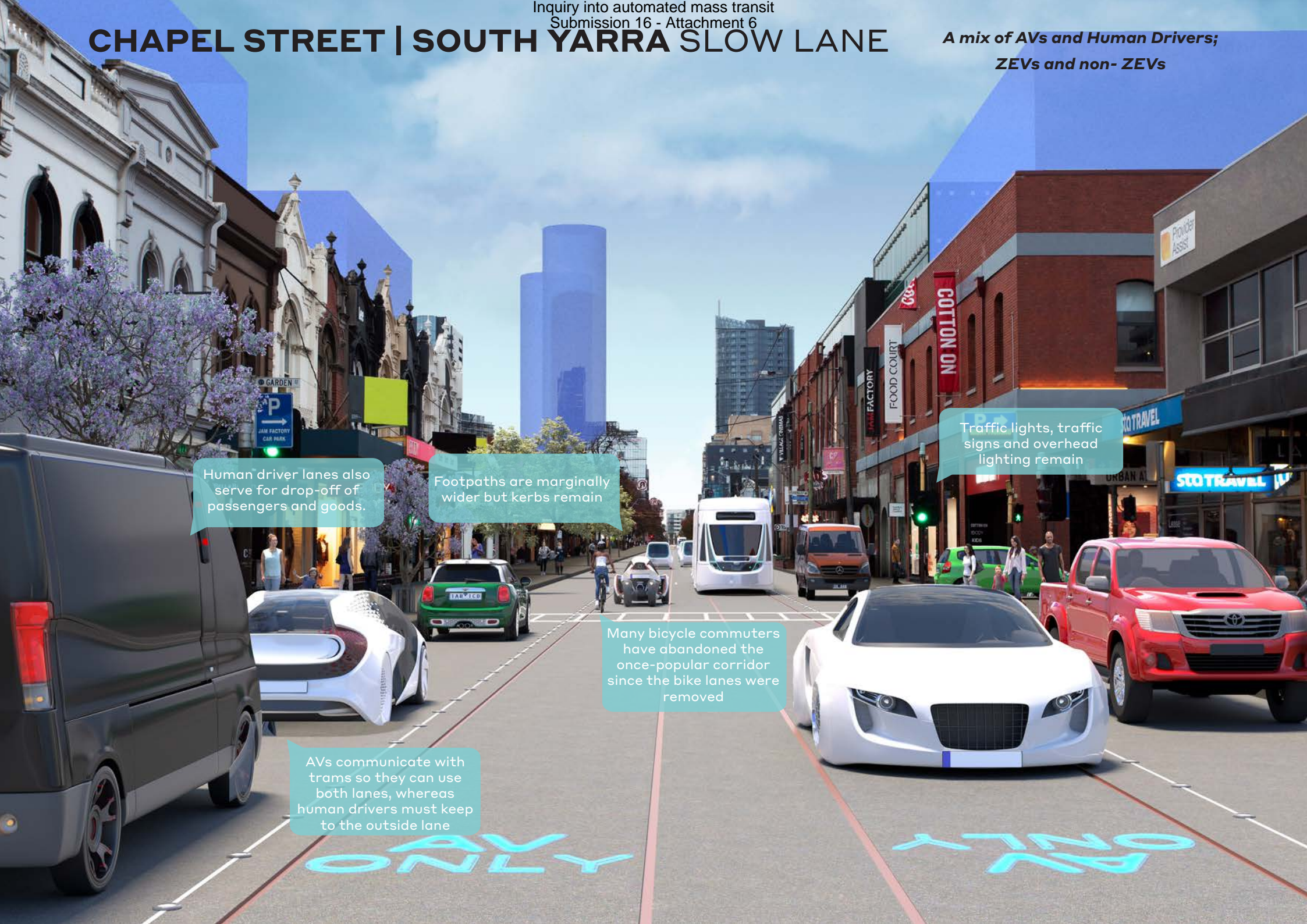
Vehicles and bicycles still enter for local access and drop-off, with fast movement routes provided on nearby corridors

Priority is given to trams and pedestrians

Note: For the purpose of clarity, automated vehicles are shown in white

CHAPEL STREET | SOUTH YARRA SLOW LANE

*A mix of AVs and Human Drivers;
ZEVs and non-ZEVs*



Human driver lanes also serve for drop-off of passengers and goods.

Footpaths are marginally wider but kerbs remain

Traffic lights, traffic signs and overhead lighting remain

Many bicycle commuters have abandoned the once-popular corridor since the bike lanes were removed

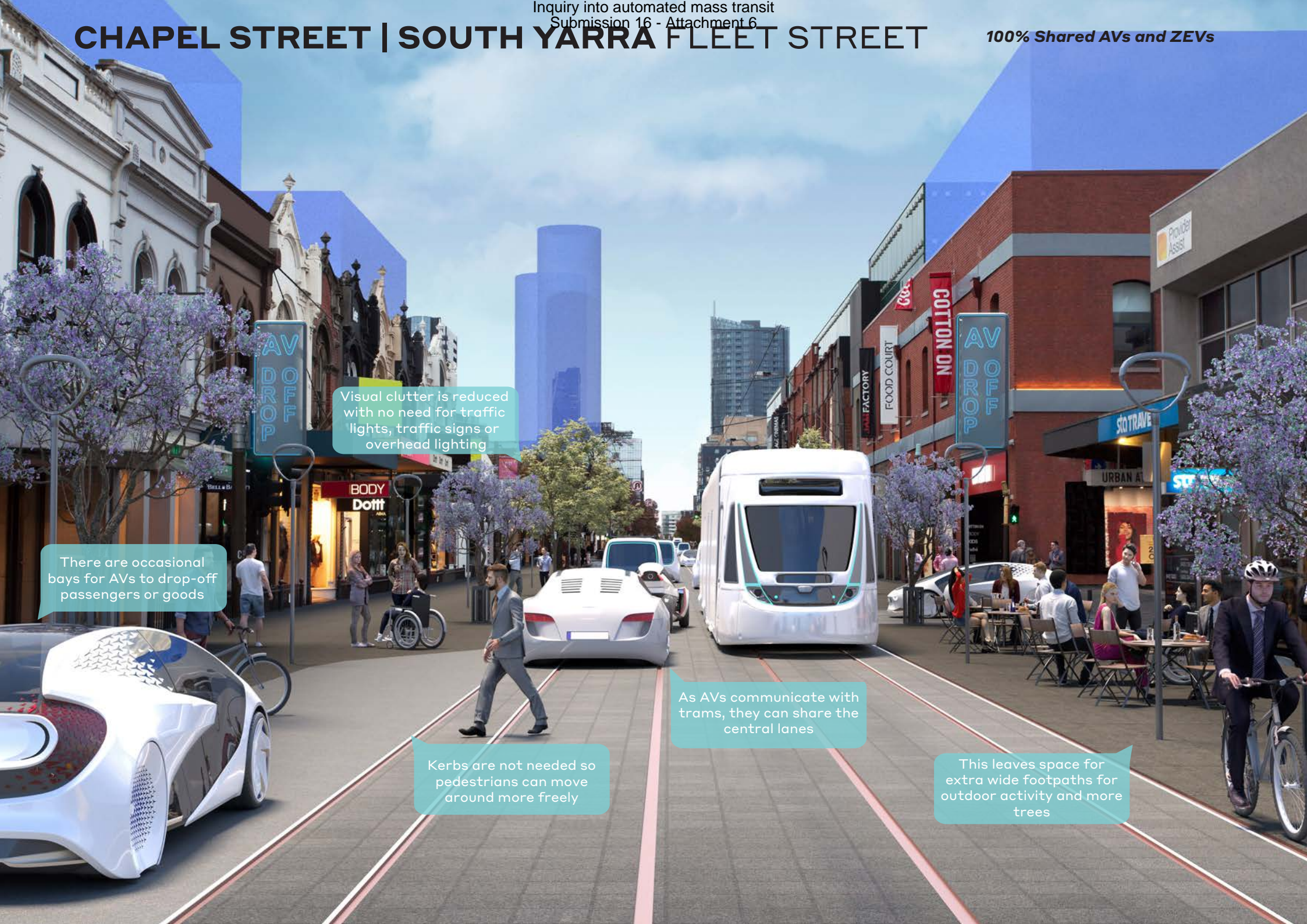
AVs communicate with trams so they can use both lanes, whereas human drivers must keep to the outside lane

AV ONLY

ONLY

CHAPEL STREET | SOUTH YARRA FLEET STREET

100% Shared AVs and ZEVs



Visual clutter is reduced with no need for traffic lights, traffic signs or overhead lighting

There are occasional bays for AVs to drop-off passengers or goods

As AVs communicate with trams, they can share the central lanes

Kerbs are not needed so pedestrians can move around more freely

This leaves space for extra wide footpaths for outdoor activity and more trees

WATERGARDENS | TAYLORS LAKES (TODAY) 2018



WATERGARDENS | TAYLORS LAKES

THE POSSIBLE FUTURE

What may have changed by the time our scenarios become reality

Population and land values have boomed so development now occupies open lots and at-grade parking areas

Home delivery is now the norm for most goods, but people continue to flock to shopping centres for social purposes

Logistics is big business and goods warehousing abounds with dedicated freight hubs

Note: For the purpose of clarity, automated vehicles are shown in white

WATERGARDENS | TAYLORS LAKES SLOW LANE

A Mix of AVs and Human Drivers;
— ZEVs and non-ZEVs

Shopping centre parking is multi-storey with infill offices and apartments on other sites

The AV space efficiencies are not fully realised, and so there is not much road space reduction

Rapid public transit enjoys dedicated lanes, but these are interrupted by intersections

Traffic lights, traffic signs and overhead lighting remain

Tree planting is limited by space, sightlines and buffer distances



WATERGARDENS | TAYLORS LAKES FLEET STREET

100% Shared AVs and ZEVs

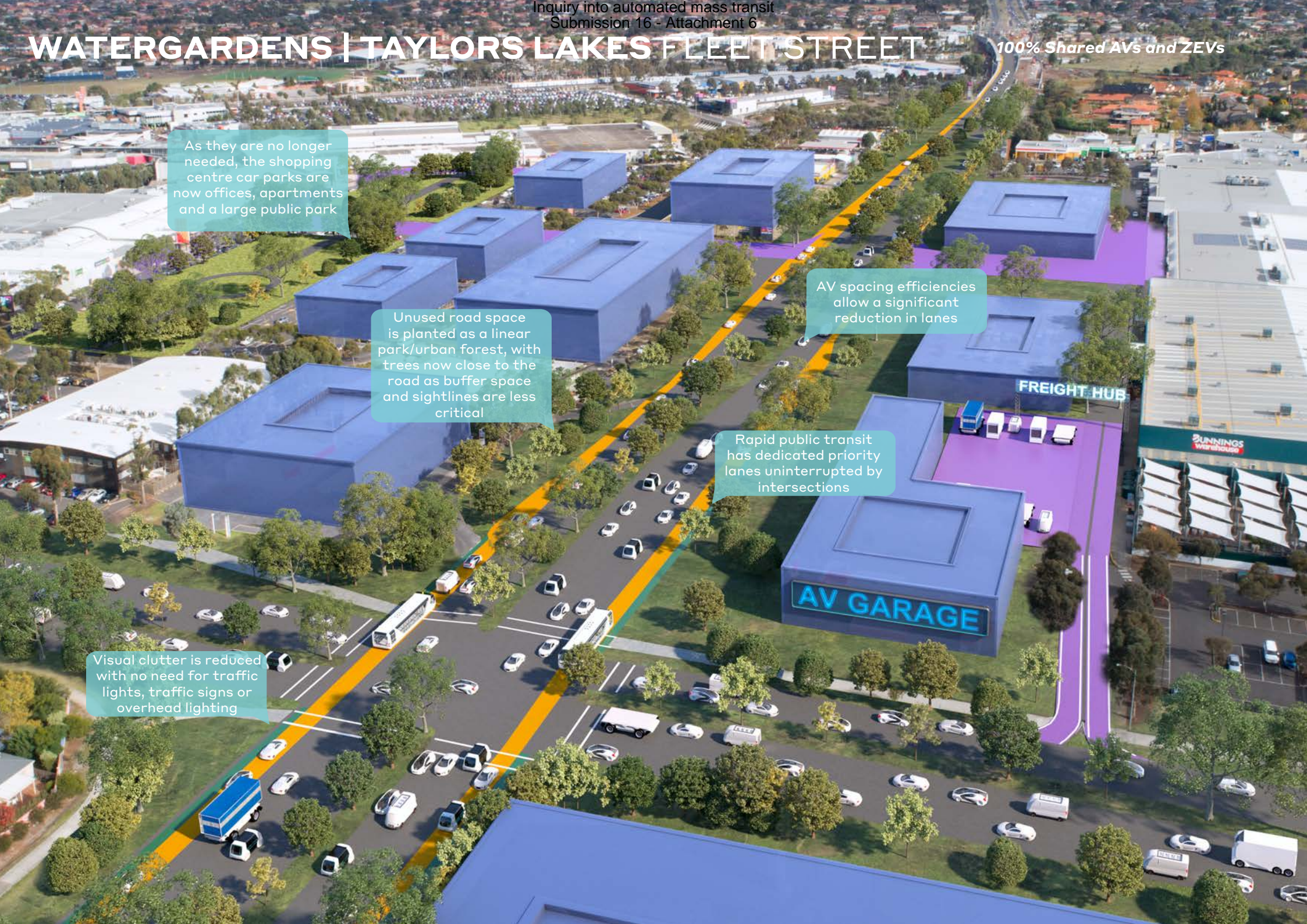
As they are no longer needed, the shopping centre car parks are now offices, apartments and a large public park

Unused road space is planted as a linear park/urban forest, with trees now close to the road as buffer space and sightlines are less critical

AV spacing efficiencies allow a significant reduction in lanes

Rapid public transit has dedicated priority lanes uninterrupted by intersections

Visual clutter is reduced with no need for traffic lights, traffic signs or overhead lighting



STURT STREET | BALLARAT (TODAY) 2018



STURT STREET | BALLARAT

THE POSSIBLE FUTURE

What may have changed by the time our scenarios become reality

Regional cities are flourishing as they are more accessible than ever

Some parking has been retained as many regional residents and tourists travel long distances, and need to charge their vehicles

New development provides offices and apartments

Note: For the purpose of clarity, automated vehicles are shown in white

STURT STREET | BALLARAT SLOW LANE

*A Mix of AVs and Human Drivers;
ZEVs and non-ZEVs*

The petrol station remains but now includes electric vehicle charging

Both sides of the boulevard remain open to accommodate increased traffic and parking

One lane is closed so footpaths are wider, but kerbs remain

Traffic lights, traffic signs and overhead lighting remain

EAST ROAD
HEAVY TRAFFIC



STURT STREET | BALLARAT FLEET STREET

100% Shared AVs and ZEVs

Efficient use of road space allows one side of the boulevard to be closed to traffic and converted to a linear park incorporating the median

The petrol station is now a new mixed-use building

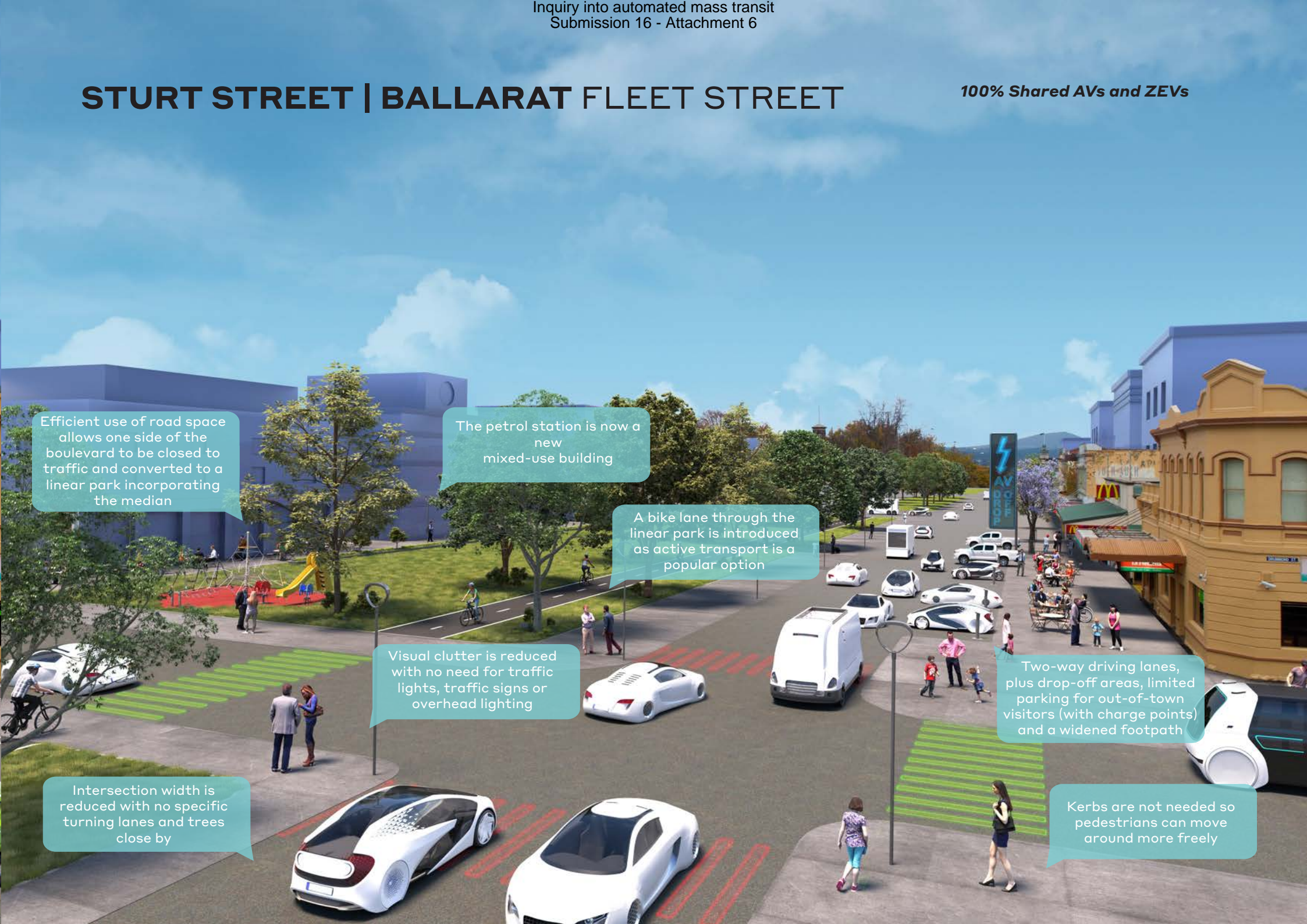
A bike lane through the linear park is introduced as active transport is a popular option

Visual clutter is reduced with no need for traffic lights, traffic signs or overhead lighting

Two-way driving lanes, plus drop-off areas, limited parking for out-of-town visitors (with charge points) and a widened footpath

Intersection width is reduced with no specific turning lanes and trees close by

Kerbs are not needed so pedestrians can move around more freely



SIMPSON STREET | YARRAVILLE (TODAY) 2018



SIMPSON STREET | YARRAVILLE

THE POSSIBLE FUTURE

What may have changed by the time our scenarios become reality

New townhouse and apartment developments accommodate the booming population

Home delivery is now the norm for all goods

Tree-planting is promoted to reduce urban heat island effects

Note: For the purpose of clarity, automated vehicles are shown in white

SIMPSON STREET | YARRAVILLE SLOW LANE

*A Mix of AVs and Human Drivers;
ZEVs and non-ZEVs*

Traffic signs and
overhead lighting remain

Even so, some road
space has been re-
purposed for gardens
and trees to serve
increased demand for
green space

On-street parking
continues to be a major
issue and off-street
garages and driveways
are still needed

A dedicated cycle lane
is needed for safety and
kerbs remain



SIMPSON STREET | YARRAVILLE FLEET STREET

100% Shared AVs and ZEVs



As no-one needs parking, garages and driveways are turned into tenancies and gardens

Substantial road space is now used for community gardens, grass and tree planting

Visual clutter is reduced with no need for traffic signs or overhead lighting

Paving is continuous with no kerbs, so pedestrians move freely, children play in the street and cyclists don't need a separate lane

Local parking is not needed and delivery and drop-off AVs move at slower and safer speeds

RINGWOOD STATION (TODAY) 2018



RINGWOOD STATION THE POSSIBLE FUTURE

*What may have changed by the
time our scenarios become reality*

The station has become a busy public transport hub with trains, large buses, shuttles and AVs

Bicycles have grown in popularity with the provision of protected lanes

The number of station and shopping centre drop-off and pick-ups has increased since the introduction of AVs, requiring separate pick-up/drop-off areas

No on-street parking in this busy area

Note: For the purpose of clarity, automated vehicles are shown in white

RINGWOOD STATION SLOW LANE

*A Mix of AVs and Human Drivers;
ZEVs and non-ZEVs*

Public transport big and small continues to mingle with other vehicles on the station side

Traffic lights, traffic signs and overhead lighting remain

Both sides of the boulevard remain open to accommodate mixed traffic and drop-off/pick-up

The median is unchanged, so has no trees and kerbs remain

The shopping centre side has a heavily-used drop-off/pick-up lane



RINGWOOD STATION FLEET STREET

100% Shared AVs and ZEVs



Efficient use of road space allows the train station side of the boulevard to be used as a public transport hub for all modes, big and small

The other side becomes two-way for AV through traffic and a heavily-used drop-off/pick-up lane, but the efficiency of AVs means congestion is rarely an issue

The median is widened with more trees now that buffer space and sightlines are less critical

Kerbs are not needed so pedestrians can move around more freely

Visual clutter is reduced with no need for traffic lights, traffic signs or overhead lighting



MONASH FREEWAY (TODAY) 2018



MONASH FREEWAY

THE POSSIBLE FUTURE

What may have changed by the time our scenarios become reality

Freeway traffic has increased significantly, bolstered by the increase in population and freight vehicles

Note: For the purpose of clarity, automated vehicles are shown in white

MONASH FREEWAY SLOW LANE

*A Mix of AVs and Human Drivers;
ZEVs and non-ZEVs*

Tree planting is limited by space, sightlines and buffer distances

Dedicated lanes for AVs provide some efficiencies, but interactions entering and leaving the lanes with conventional vehicles cause delays.

Gantries, traffic lights (including on-ramps) and traffic signs remain

The mix of AV and non-AVs mean the full benefits of AVs are not realised, and so all the road space is required

A central barrier remains necessary



MONASH FREEWAY FLEET STREET

100% Shared AVs & ZEVs



On-ramp queues are a problem of the past and separate lanes for freight or public transport are unnecessary

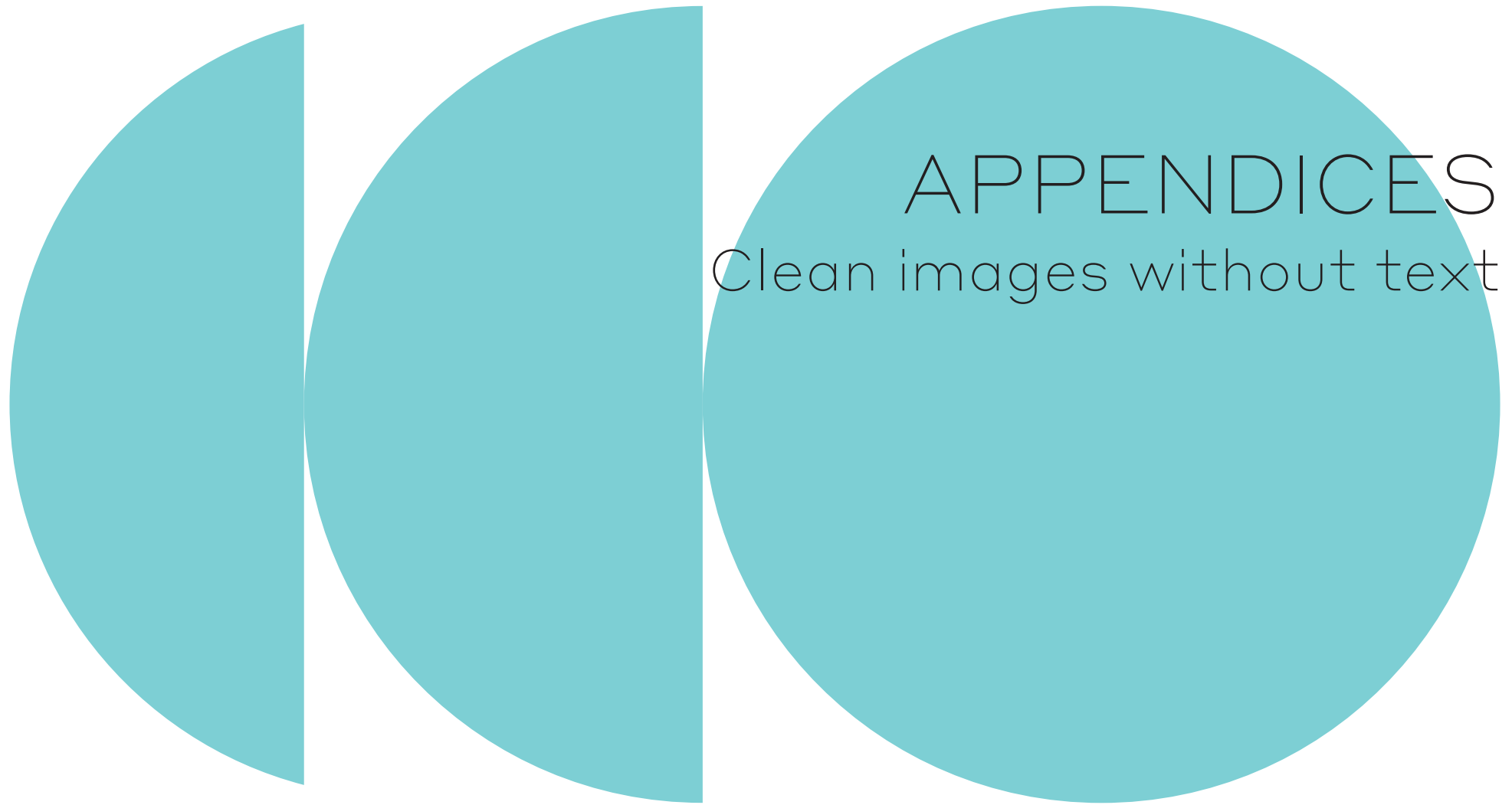
Visual clutter is reduced as there is no need for gantries, traffic signals and traffic signs

AV space efficiencies allow a reduction in traffic lanes

A central barrier is unnecessary as all vehicles are connected. Counter-flow lanes are easily introduced to match peaks

Unused road space is planted as a linear park/urban forest with a cycle trail. Trees are planted close to the road as buffer space and sightlines are not critical





APPENDICES

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Urban Circus

Ethos Urban

Lv2 / 140 Bourke Street

Lv8 / 30 Collins Street

Melbourne Vic 3000

Melbourne Vic 3000

urbancircus.com.au

ethosurban.com