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# Sustainable Transport and the Design of National Road Schemes

*Mike Evans Arup*

# Sustainable Mobility / Transport

*DTTaS: “What is Sustainable Mobility?”*

## Linking people and places in a sustainable way by supporting:

- Comfortable and affordable **journeys** to and from work, home, school, college, shops and leisure
- travel by **cleaner and greener transport**
- a **shift away from the private car** to greater use of active travel (walking and cycling) and public transport (e.g. bus, rail, tram)

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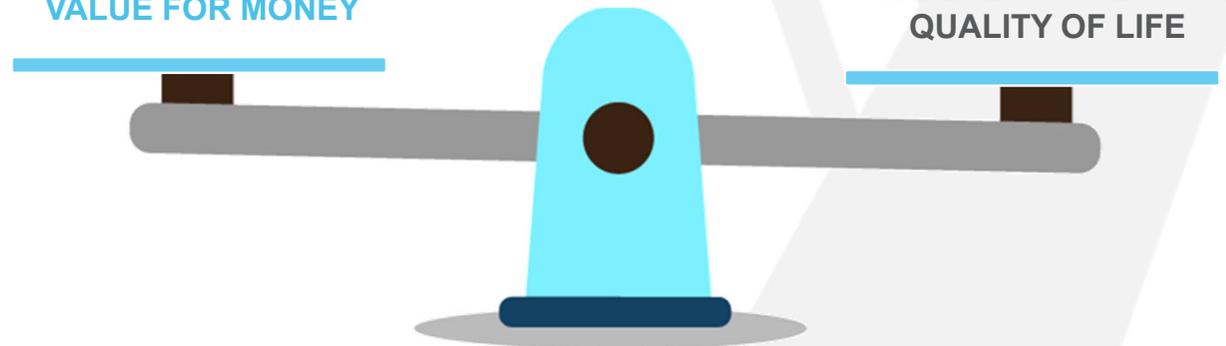


## DTTaS A new vision for Sustainable Mobility

*What priorities are we trying to balance?*

ACCESSIBLE  
PASSENGER COST  
INTEGRATED RELIABLE  
INCREASED CAPACITY  
VALUE FOR MONEY

MODAL SHIFT  
CLIMATE FRIENDLY  
SERVICE PROVIDERS SAFE  
RELIEVE CONGESTION  
QUALITY OF LIFE



# Sustainable Mobility / Transport

*The EU Transport Council's definition of sustainable transport system*

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- allows the basic access and development needs of society to be met safely and in a manner consistent with human and ecosystem health and promotes equity within and between successive generations.
- is affordable, operates fairly and efficiently, offers choice of transport mode, and supports a competitive economy, as well as **balanced regional development**.
- limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation and uses non-renewable resources at or below the rates of development of renewable substitutes while minimising the impact on the use of land and the generation of noise.

*(For me: we must live within Planetary Boundaries)*

# Sustainable Transport Modes

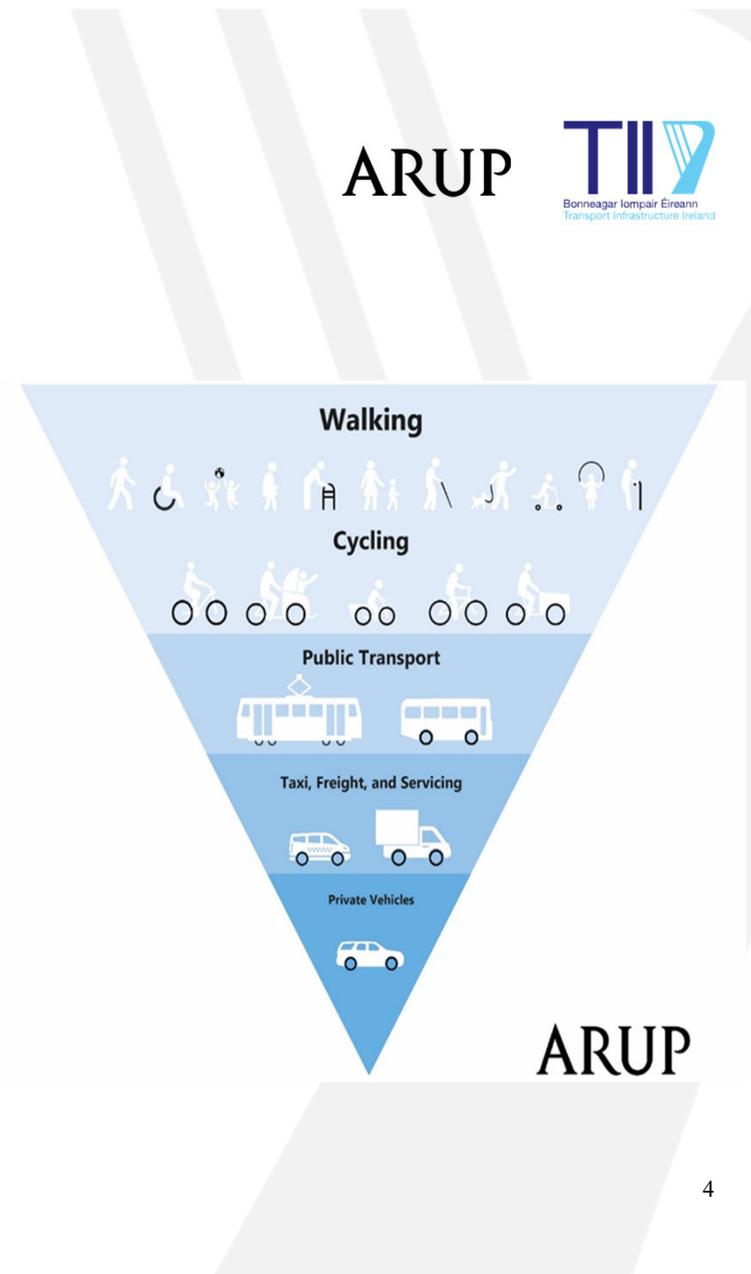
So when we use the term sustainable transport mode we generally think about :

- Active Travel - Walking & Cycling
- Public Transport

## But

Sometimes these modes might not be the most sustainable mode for the particular journey. Sometimes a car may still be the most sustainable option.

- Think about how cars will use the network





# Why must we consider Sustainable Transport in the design of National Road Schemes?

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## *Policy*

- **Smarter Travel**  
We should not be facilitating growth in commuting to work in private cars.
- **Ireland Project 2040**  
Whilst Enhanced Regional Accessibility is a National Strategic Outcome so are Compact Growth, Sustainable Mobility and Transition to a Low-Carbon and Climate-Resilient Society.
- **Regional Spatial and Economic Strategies**
- **Programme for Government.**

*On the face of it reducing journey times will increase the amount of travel. So when stated as an objective, that is problematic, as we must acknowledge that it is likely to increase the mode share of private car in the absence of other measures.*

*Providing for one person's Regional Accessibility enables another's long distance commute.*

# Why must we consider Sustainable Transport in the design of National Road Schemes?

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## *Alternatives*

Habitats Directive and EIAR requirements to

- describe **reasonable alternatives and indicate** main reasons for the option chosen, taking into account the effects of the project on the environment ”.
- “a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics and an **indication of the main reasons selecting the chosen option**, including a comparison of the environmental effects” (Annex IV).

# Why must we consider Sustainable Transport in the design of National Road Schemes?

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*Wider Sustainability – Getting the balance right – Value Capture*



The case for your project needs to be about more than the business case



Remember Transport is supposed to improve the Quality of Life



Thinking about Sustainability will give you a framework to do that

## WHERE WE HAVE MOST IMPACT:

### IMPROVING LIVES

- 1 NO POVERTY**
- 2 ZERO HUNGER**
- 3 GOOD HEALTH AND WELL-BEING**

### FAIR, JUST SOCIETY

- 5 GENDER EQUALITY**
- 10 REDUCED INEQUALITIES**
- 16 PEACE, JUSTICE AND STRONG INSTITUTIONS**

### ECONOMIC PROSPERITY

- 4 QUALITY EDUCATION**
- 8 DECENT WORK AND ECONOMIC GROWTH**

- |  |  |
|--|--|
| <b>6 CLEAN WATER AND SANITATION</b><br>              | <b>7 AFFORDABLE AND CLEAN ENERGY</b><br>         |
| <b>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</b><br> | <b>11 SUSTAINABLE CITIES AND COMMUNITIES</b><br> |

### SUFFICIENT RESOURCES

- 12 RESPONSIBLE CONSUMPTION AND PRODUCTION**

### HEALTHY ENVIRONMENT

- 14 LIFE BELOW WATER**
- 15 LIFE ON LAND**

### STABLE CLIMATE

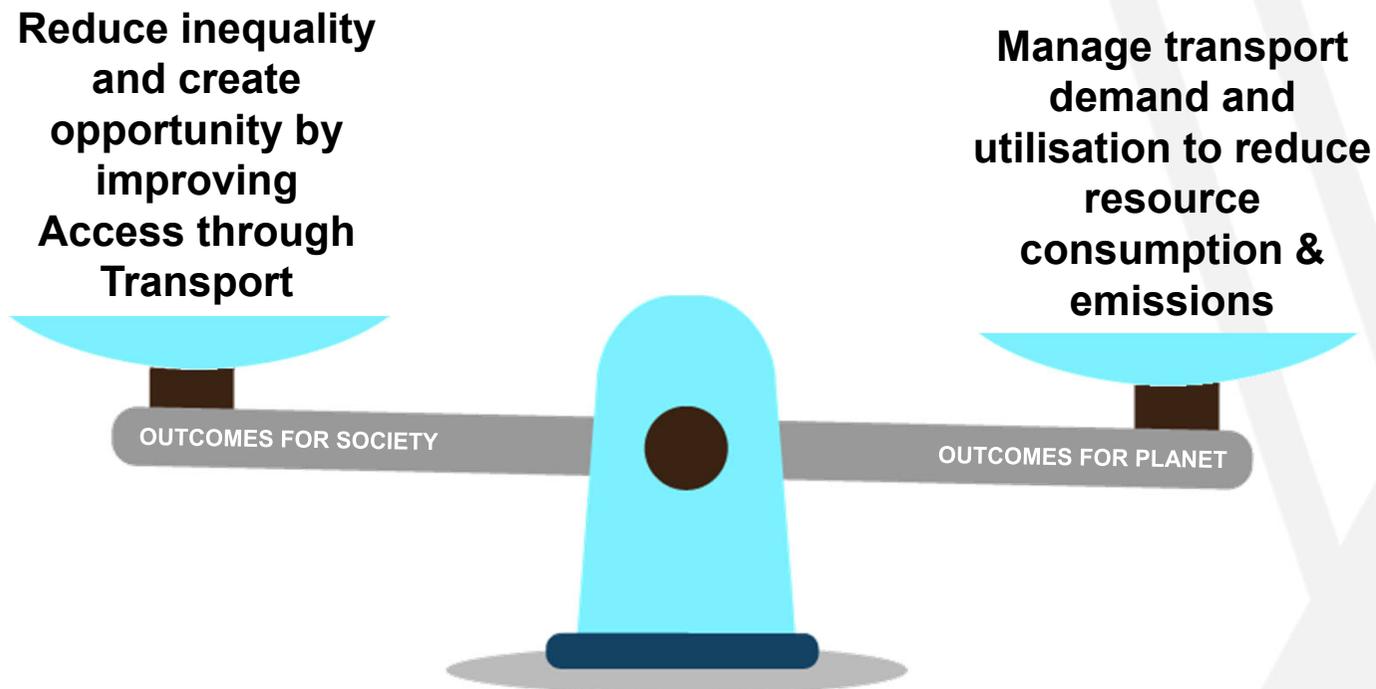
- 13 CLIMATE ACTION**

## OUTCOMES FOR SOCIETY

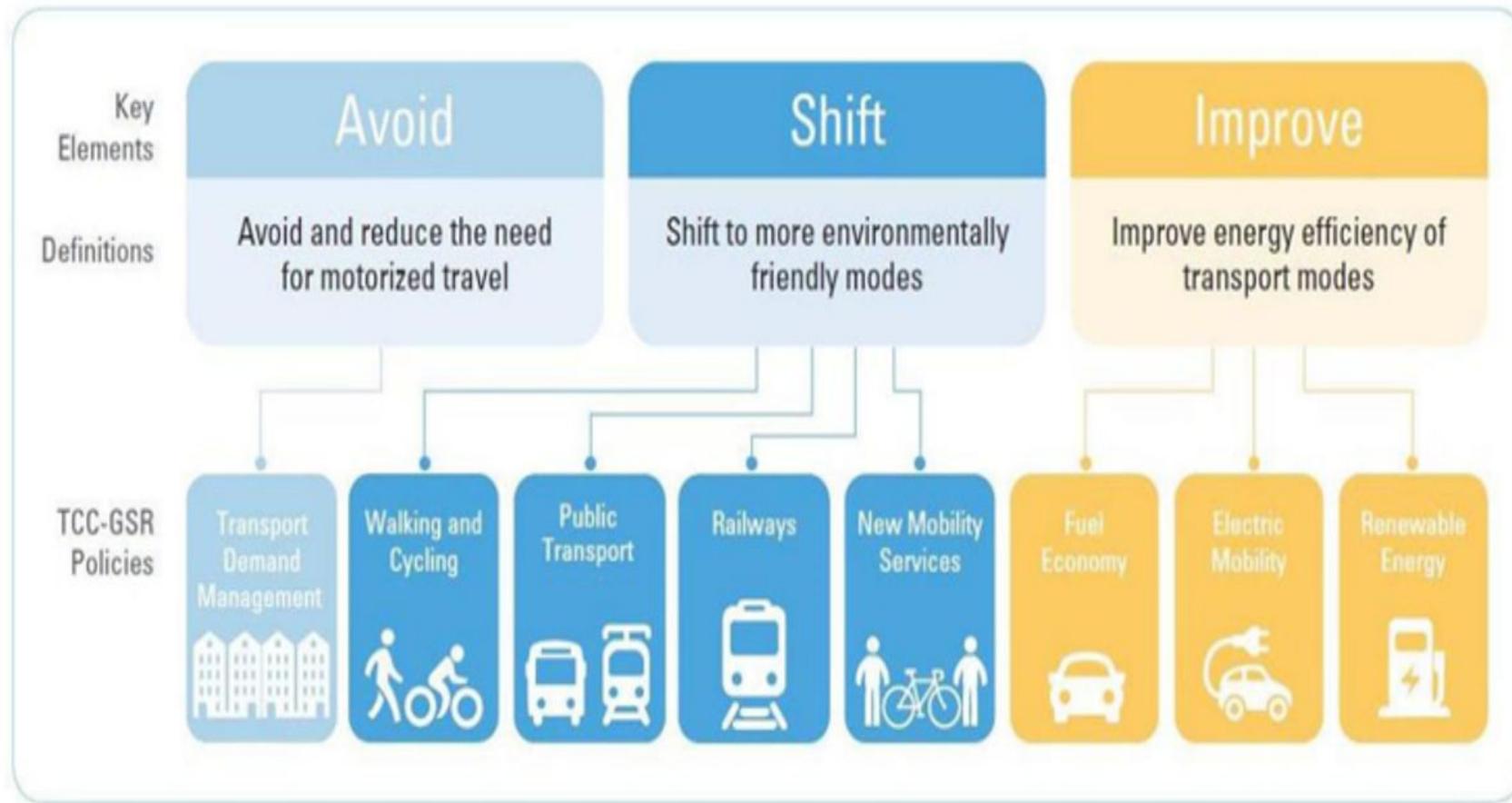


## OUTCOMES FOR PLANET

# It's about Striking a Balance ....



# Designing Roads – thinking about Sustainable Transport

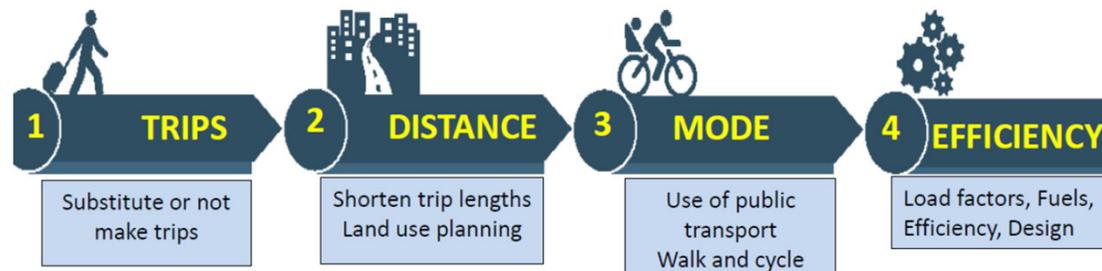


# Designing Roads – thinking about Sustainable Transport

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## The Sustainable Mobility Paradigm



### SEVEN MAIN COMPONENTS OF THE SUSTAINABLE MOBILITY PARADIGM

1. **Reasonable travel time** – not minimisation of travel time
2. **Seeing travel as a valued activity** – not only a derived demand
3. **Reducing the need to travel** – through distance reduction and working remotely
4. **Achieving significant modal shift** – to walking, cycling and public transport
5. **Lower levels of pollution and noise** from transport, and greater energy efficiency
6. **More efficient management** and use of infrastructure and capacity through higher occupancy and load factors, and through pricing
7. **Increasing the quality** of places and spaces within cities

Source: D.Banister



# Designing Roads – thinking about Sustainable Transport

*Think about the Transport Corridor you are serving*



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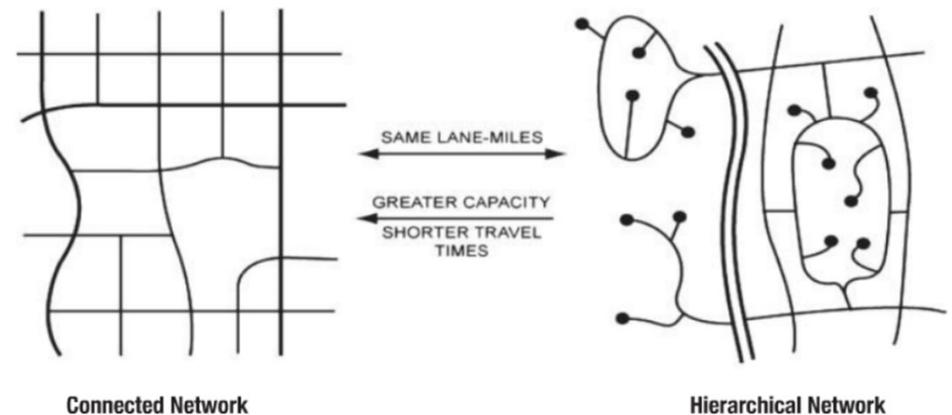
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# Designing Roads – thinking about Sustainable Transport

## *Distance Matters*

There is a tendency amongst road planners to **aggregate different components of the demand and put them on the same corridor**. The thinking was to gather together different desire lines and provide one high capacity facility. There are a number of problems with this approach:

- There is need to consider the amount of energy needed to undertake journeys not just journey time.
- It leads to a concentrated network rather than a distributed network.



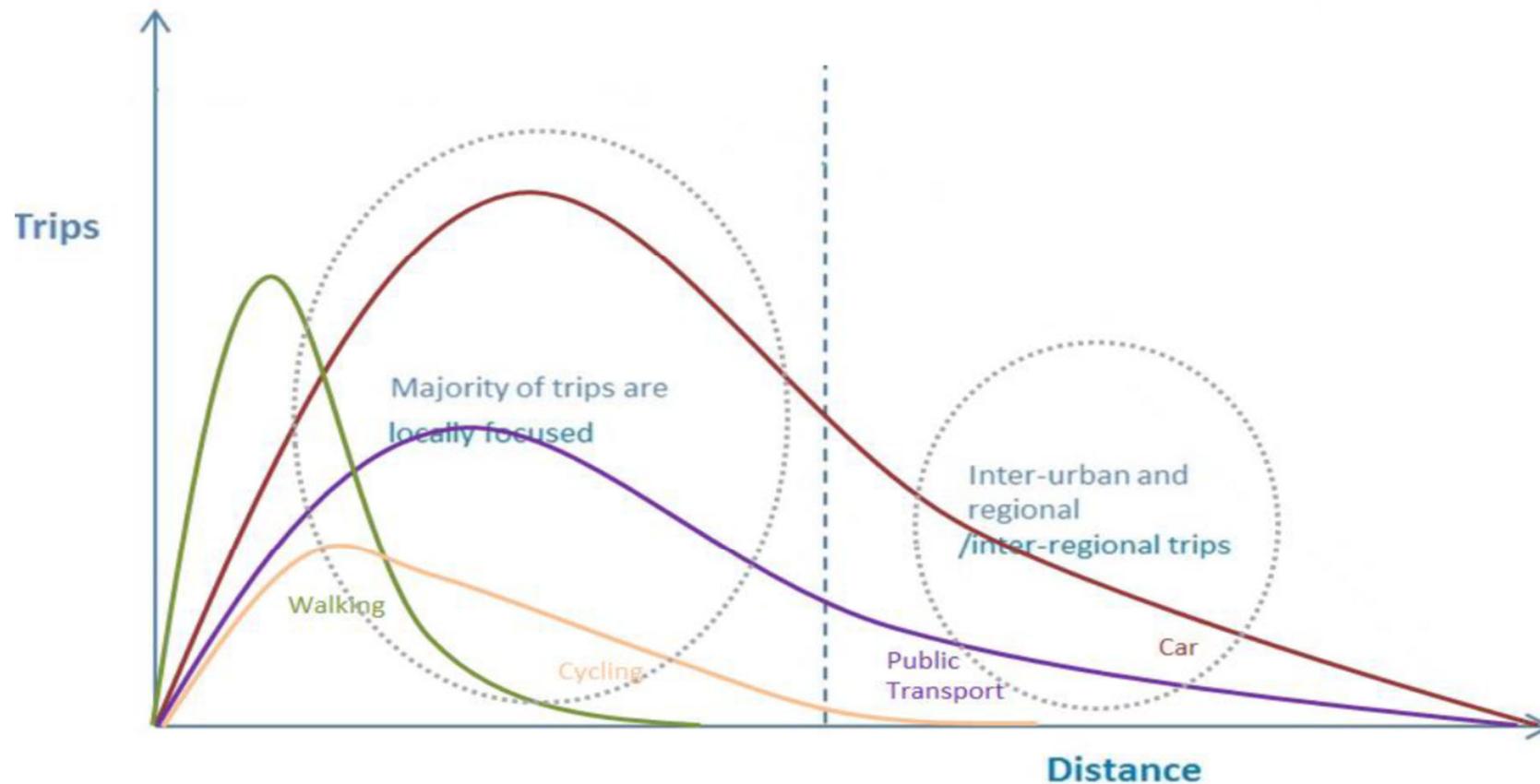
Dense, connected road networks allow more direct travel to destinations, which reduces travel distances, increases active transport accessibility, and improves overall safety. Hierarchical road networks channel traffic onto higher speed arterials, which increases travel distances, congestion, and crashes.

Source: Todd Litman

# Designing Roads – thinking about Sustainable Transport

*Distance Matters (Eoin Farrell NTA 2019 Conference)*

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# Designing Roads – thinking about Sustainable Transport

*Distance Matters – the emissions criteria*



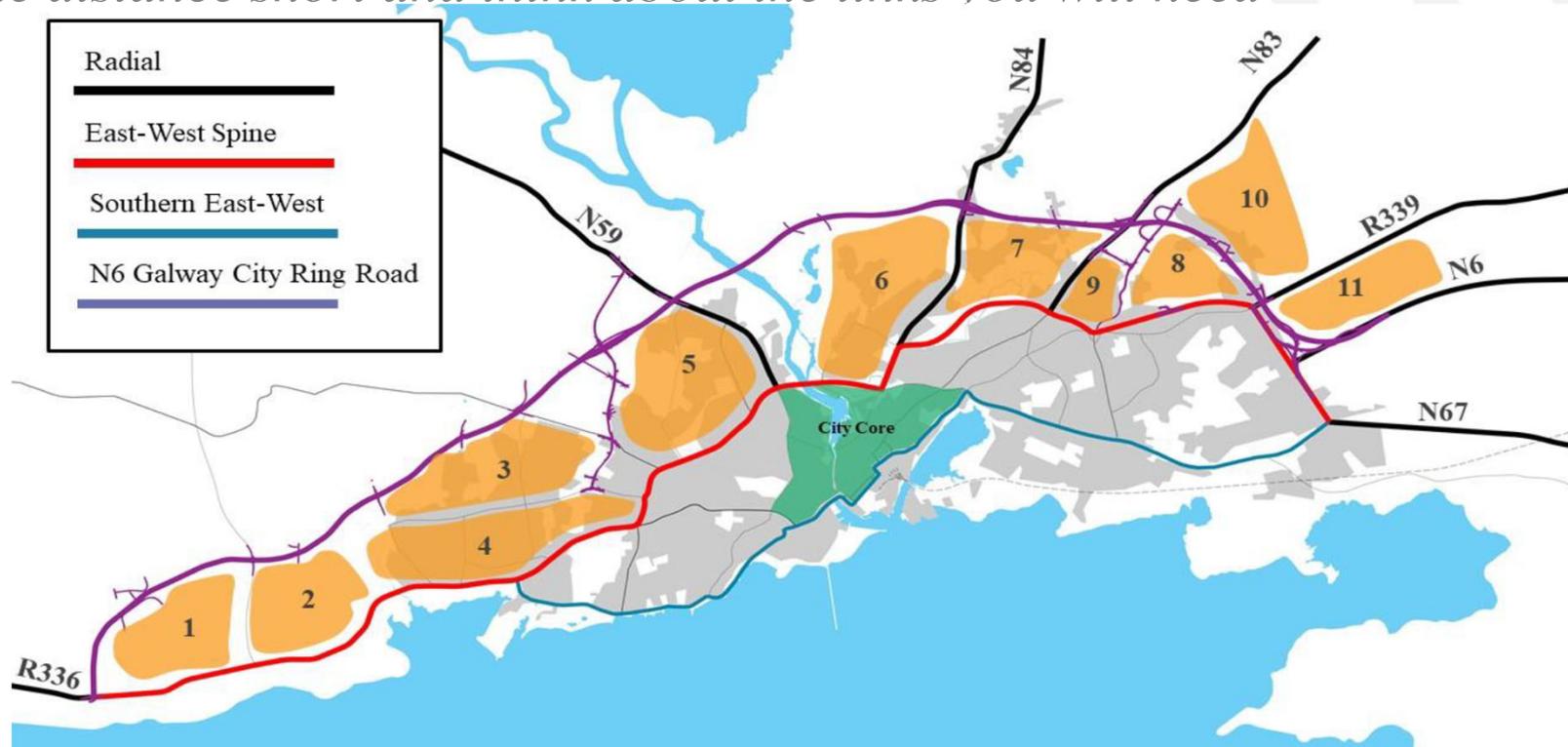
# Designing Roads – thinking about Sustainable Transport

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*Distance Matters:*

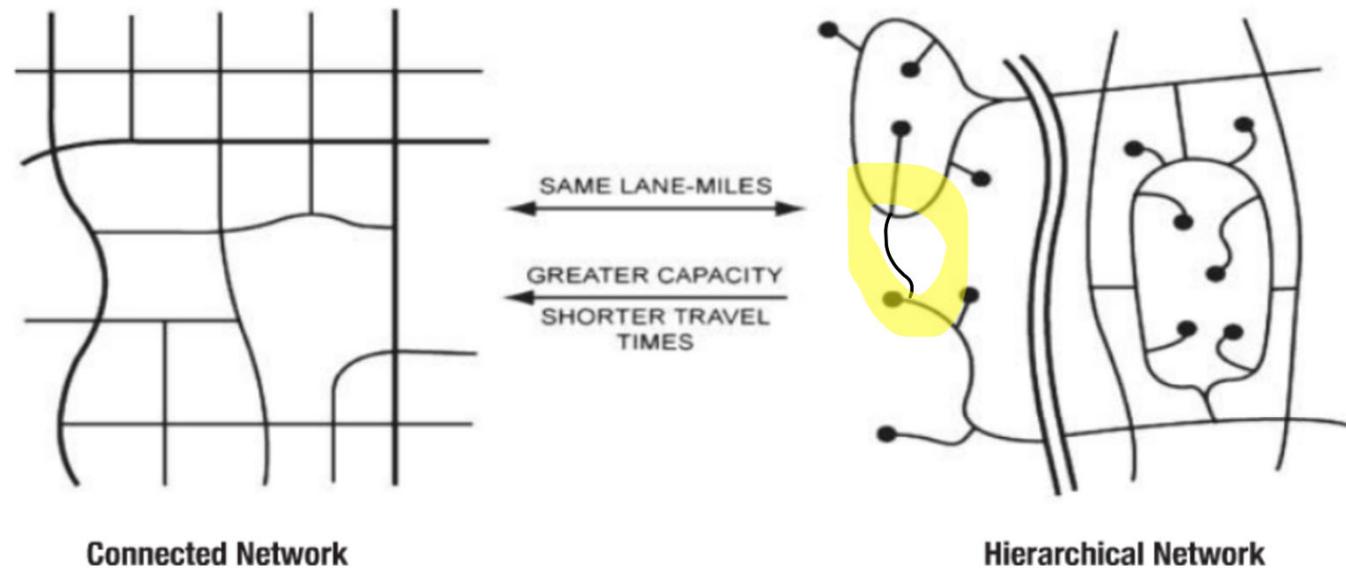
*Keep the distance short and think about the links you will need*



# Designing Roads – thinking about Sustainable Transport

*Distance Matters – to reduce emissions and for active travel*

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Dense, connected road networks allow more direct travel to destinations, which reduces travel distances, increases active transport accessibility, and improves overall safety. Hierarchical road networks channel traffic onto higher speed arterials, which increases travel distances, congestion, and crashes.

# Public Transport on National Road Schemes

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*Our National Road network is an opportunity for Public Transport*

- High Quality Roads offer an unparalleled resource to **provide high-quality regional transit** services.
- Understanding the components of successful transit guides the design of running lanes, stations or stops, and **policies and partnerships**.
- **People are mode-agnostic; they choose the mode that works best for them.** It is no mystery why, after significant investment in an interurban road network, people in Ireland overwhelmingly choose cars. However, when presented with reliable, fast transit, the same users have demonstrated willingness to shift modes.
- Giving passengers safe, reliable, and time-competitive services increases ridership. Such qualities are associated with rail services in exclusive guideways but less so with bus systems. There is no reason why a bus service – especially an intra-urban or regional service operating on limited-access roadways – cannot emulate the speed, reliability, station quality, and brand recognition of rail.

# Public Transport on National Road Schemes

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## *The elements of Public Transport on National Road Schemes*

### Key issues to understand:

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**What is the origin destination and purpose of the demand?**

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**How can that demand be provided for?**

Some trips can be provided for by Public Transport Modes.

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In the case of Public Transport there has to be a volume of demand to justify the cost (capital & operating) of providing the service.

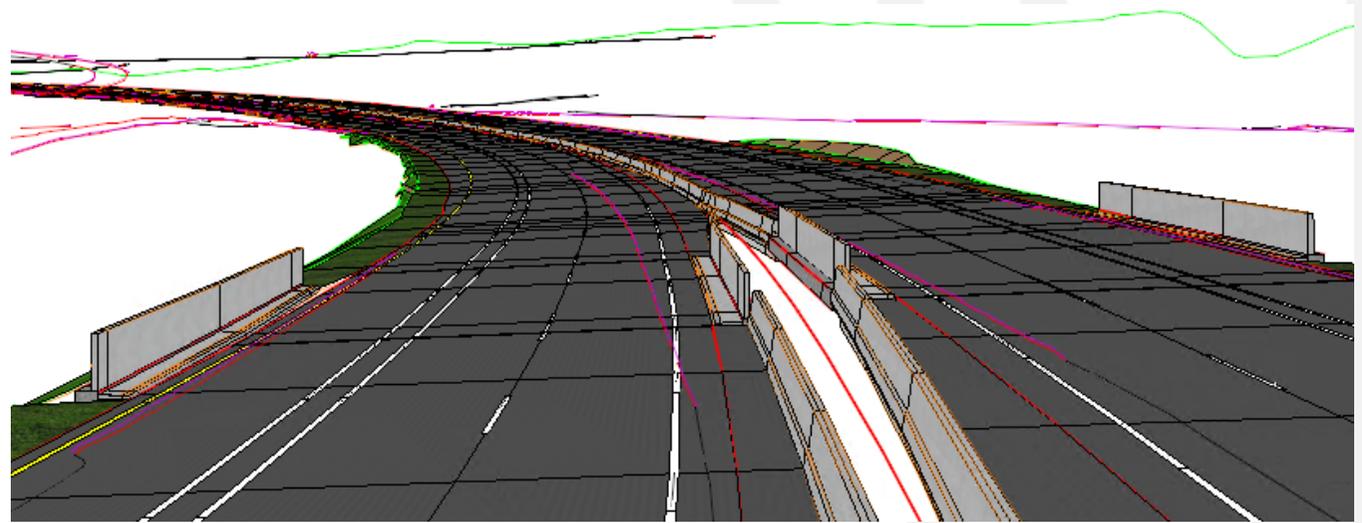
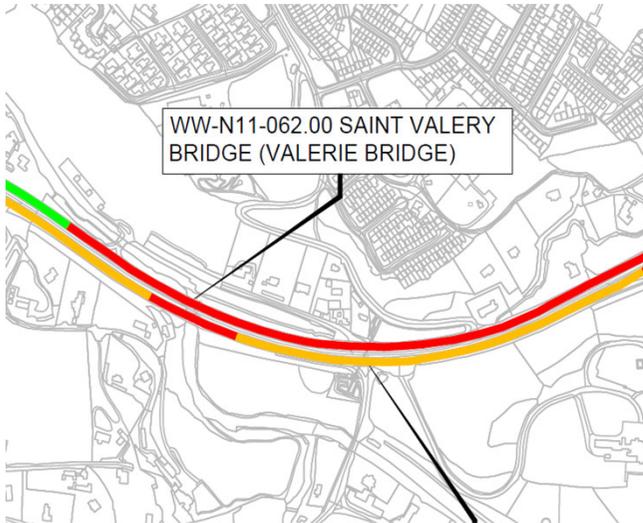
If the service does not have the following characteristics:

1. Usability: Safety & Proximity
2. Frequency & Speed
3. Reliability

it will not be used.

**Providing alternatives to the private car is not enough.** It is very hard to persuade people to use the alternative unless the journey will be as convenient. Where the population is located in places that are small or low density (all of Ireland except Dublin and maybe Cork) you actually have to remove the car or the opportunity to use it from people to achieve mode shift. **Parking**

# St Valery Bridge N11



- Geometric cross section optimised to maximise sight distance



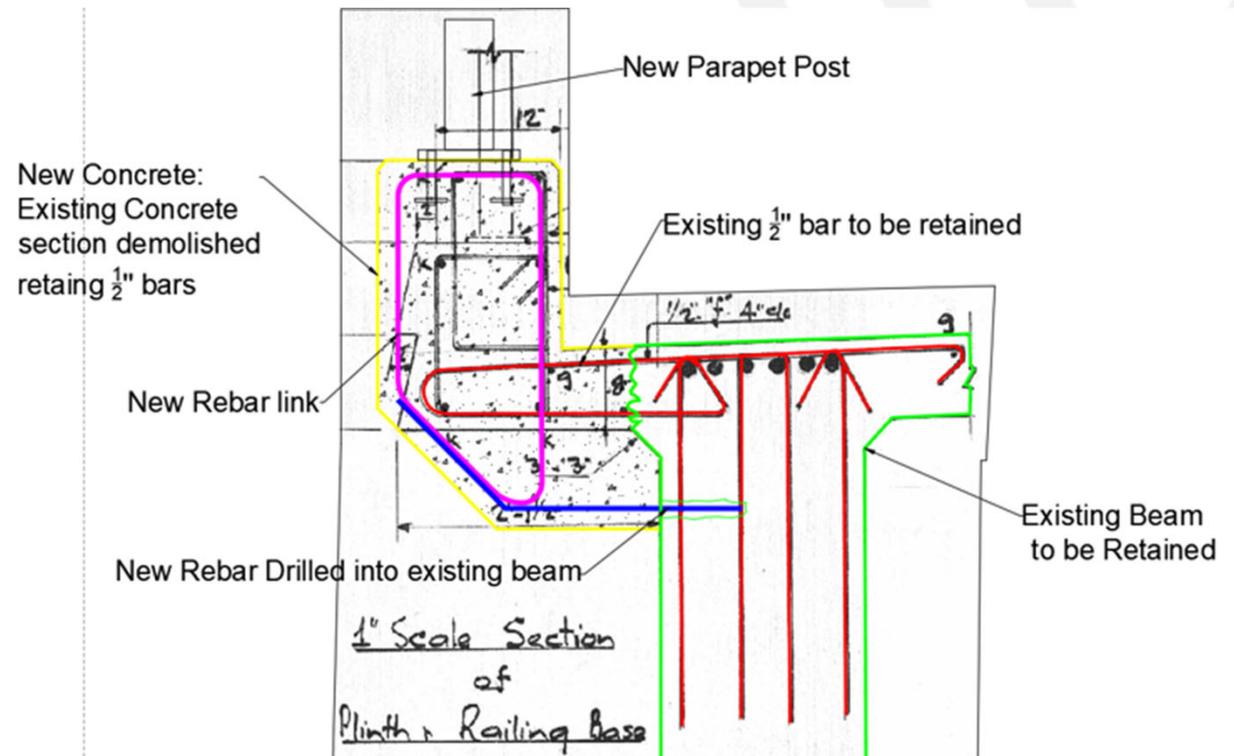
# St Valery Bridge

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## Structural investigation:

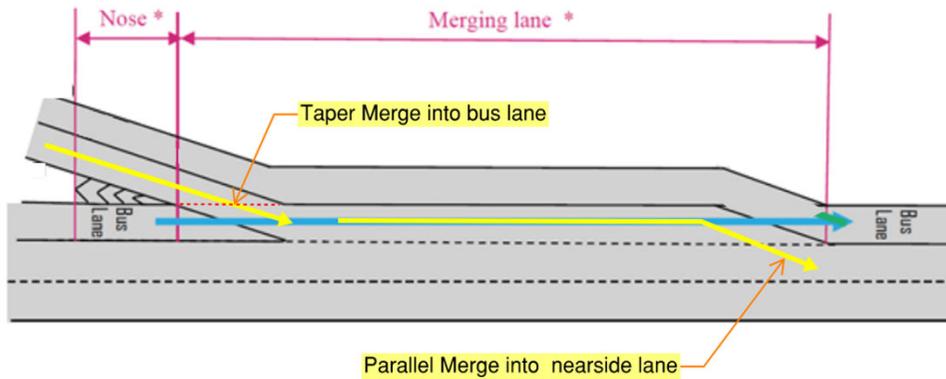
- Current bridge parapet will be removed, original steel railing to be replaced
- Current deck does not have sufficient capacity, would require deck strengthening to allow for new vehicle restraint barrier
- Strengthening works required:



# Merge / Diverge treatments

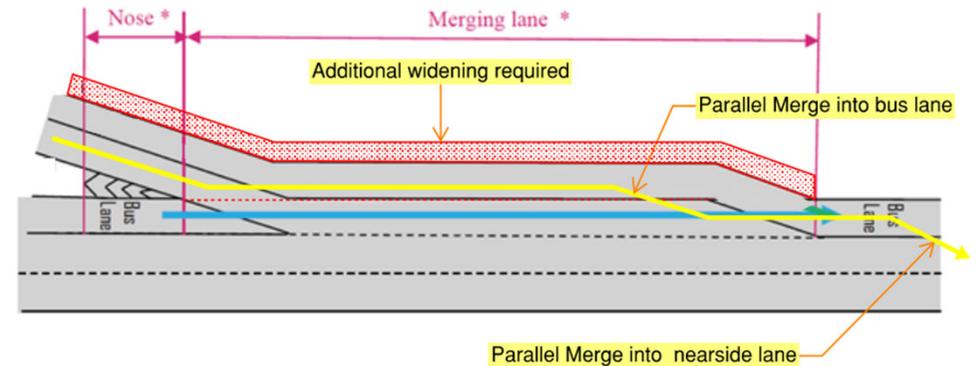
## Typical merge treatment

Direct taper merge (no ramp metering)

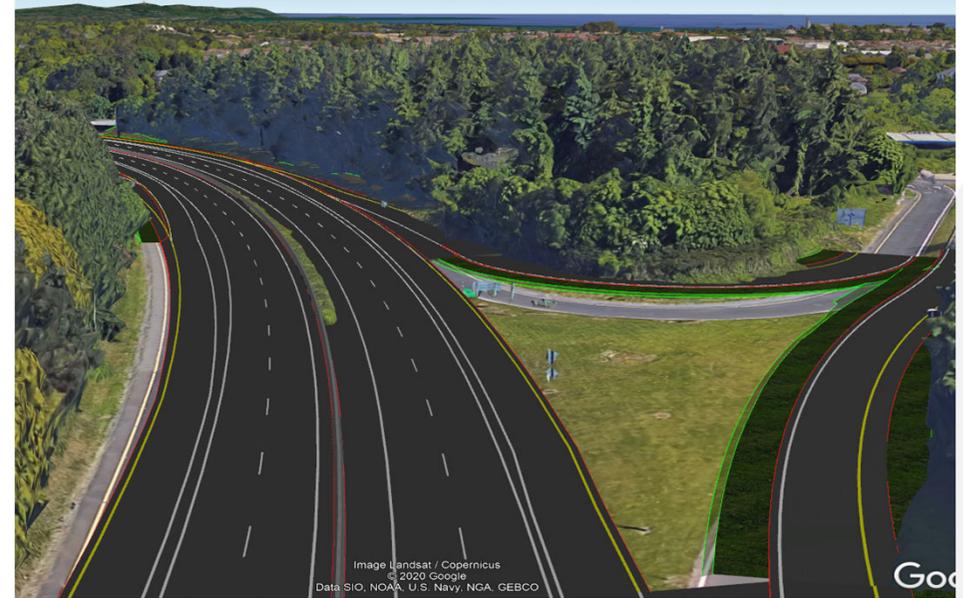
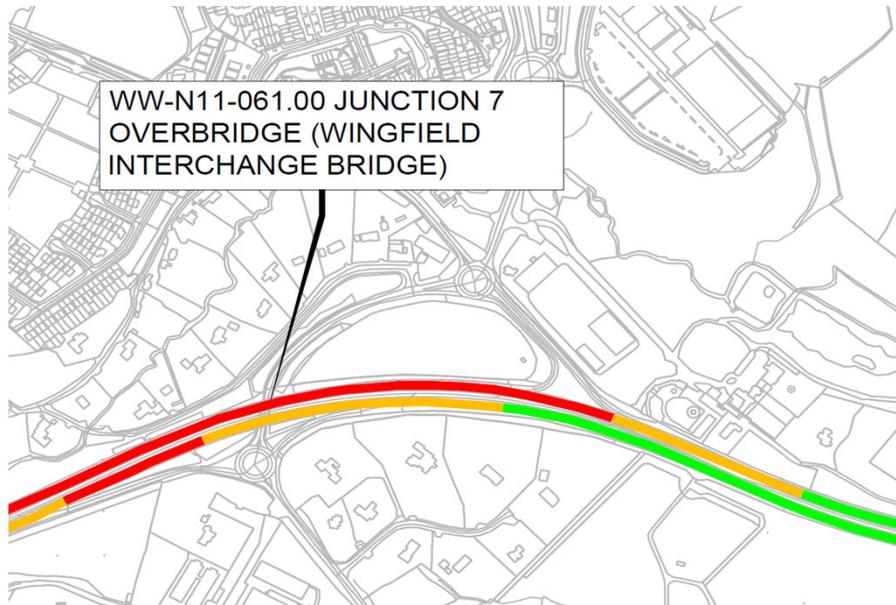


## Typical merge treatment

Parallel merge (no ramp metering)



# Possible junction 7 southbound diverge



## Constraints:

- Existing diverge treatment
- Small nose, doesn't allow for standard fork diverge treatment to be applied
- Slip road loop geometry

# Active Travel on National Road Schemes

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## *Think Link and Place or Movement and Place*

When designing for vehicles we think more about the road as a movement conduit.

When designing for Active Travel we need to think about the place.



**LINK**  
street as a  
movement conduit

Design objective:  
**save time**



**PLACE**  
street as a  
destination in its  
own right

Design objective:  
**spend time**

# Active Travel on National Road Schemes

*Think about Link and Place or Movement and Place*

## Place

What type of type of Street

- Exchange
- Connect
- Live
- Serve

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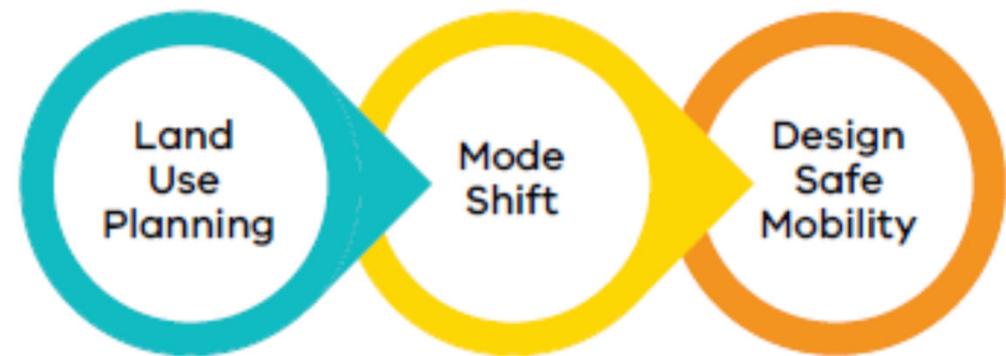
# Active Travel on National Road Schemes

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## *Design Approach*

- People First
- Integrated Network
- Design for the Future Deliver Today
- Safe
- Connected and Direct
- Comfortable & Attractive



- Avoid the need for trips
- Lower vehicle numbers reduce the risk for all

- Public transport is the safest vehicle mode
- Walking and cycling causes the least harm to others

- Use the safe system approach to improve safety of all remaining trips

↑ **Three scales of actions for Towards Zero**  
Adapted from Auckland Transport Urban Street and Road Design Guide.

# Active Travel on National Road Schemes

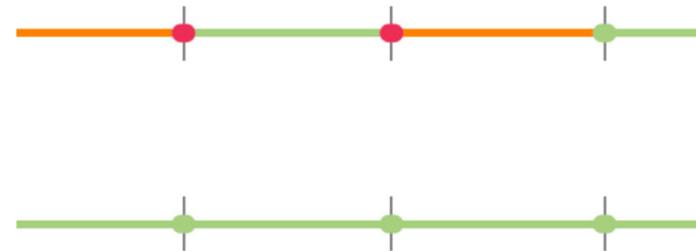
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## Design Approach

- It all does not have to happen straight away
- Pathway to permeant
  - Allocate the space
  - Protect temporarily
  - Permanent protected space
- Think Network

↓ **The weakest link** A cycle route is only as good as the weakest link

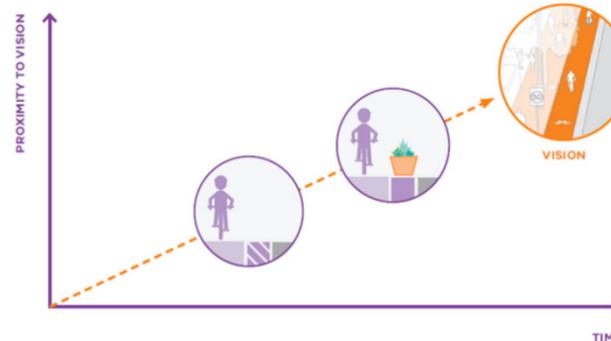


Low comfort  
Moderate comfort  
High comfort

← Challenging intersections compromise the entire network by reducing the potential for a seamless journey

← A connected experience occurs only when all sections of the cycling route provide certainty and comfort

↑ Incremental steps to achieve the vision





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Thank you

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