

# Delivering Transit Activated Corridors

Final Industry Report, Project 1.74



September 2021

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**Sustainable  
Built Environment**  
National Research Centre  
AUSTRALIA

## Acknowledgments

This research has been developed with support provided by Australia's Sustainable Built Environment National Research Centre (SBEnc). SBEnc develops projects informed by industry partner needs, secures national funding, project manages the collaborative research and oversees research into practice initiatives. Core Members of SBEnc include BGC Australia, Government of Western Australia, Queensland Government, Curtin University, Griffith University, RMIT University and Western Sydney University. This research would not have been possible without the valuable support of our core industry, government and research partners.

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## Message from the Chair

The design and delivery of Transit Activated Corridors will increasingly become part of the practices that make our cities more liveable and meet the needs of a Net Zero future. This project has brought together academic literature and shared experiences around this topic. Our primary audience for this material is urban and transport professionals. The multimedia toolbox of materials, which covers planning, designing, assessing and delivering better urban places, is also accessible to anyone interested in the future of cities and how we get there. This summary report provides a valuable overview of the multimedia toolbox, including an introduction to the practices of delivering Transit Activated Corridors.

### **Rob Adams AM**

Chair, Project Steering Group  
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## Preface

The Sustainable Built Environment National Research Centre (SBEnc), the successor to Australia's Cooperative Research Centre for Construction Innovation, is committed to making a leading contribution to innovation across the Australian built environment industry. We are dedicated to working collaboratively with industry and government to develop and apply practical research outcomes that improve industry practice and enhance our nation's competitiveness.

We encourage you to draw on the results of this applied research to deliver tangible outcomes for your operations. By working together, we can transform our industry through enhanced and sustainable business processes, environmental performance and productivity.



A handwritten signature in black ink, appearing to read 'John V McCarthy'.

**John V McCarthy AO**  
Chair  
Sustainable Built Environment  
National Research Centre



A handwritten signature in black ink, appearing to read 'Keith Hampson'.

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## Executive Summary

This report presents the findings of the SBEnrc 1.74 project – Delivering Transit Activated Corridors. The focus of this project was to provide guidance, capacity building and professional development tools and case studies on how to deliver new transit technology and mobility systems based around urban regeneration along transit corridors through integrated Transit Activated Corridors (TACs).

In this project we have brought together a multimedia toolbox, which helps practitioners access information in the form of a searchable database comprising 185 TAC-related policy and practice tools. These resources along with two academic papers and 13 videos provide insights and stories to help deliver

TACs in cities and towns in Australia and around the world. Projects initiated by SBEnrc are now being developed into business cases in Pottstown (Pennsylvania, United States), Bulawayo (Zimbabwe) and the City of Stirling, Perth, Western Australia.

This report showcases the role of TACs in enabling denser development along key main road corridors. The focus is on enhancing the urban fabric in a linear series of Transit Oriented Developments as part of an overall urban regeneration approach to revitalising a whole corridor with multiple beneficial outcomes.





to Target Field  
move ahead to board



GREEN LINE

227B

Metro Transit

TRACK 1 3:34 PM  
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TICKETS

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TICKETS

## Introduction

For many years, a large part of the focus of improving how cities operate effectively has been on integrating urban planning and transport outcomes.<sup>1</sup> A major component of this activity was the delivery of Transit Oriented Development (TOD) around train stations. While beneficial, large parts of suburban areas remain without quality transit along main roads and primary corridors, which then experience repeated and growing congestion with associated reductions in urban value.

The aim of Project 1.74 was to create a new concept for how to integrate better urban outcomes into transport planning along main roads. We have called this concept 'Transit Activated Corridors' (TACs) and the project was set up to determine whether these TACs could be delivered. The journey from TOD to TAC is documented in the paper 'From TOD to TAC: Why and how transport and urban policy needs to shift to regenerating main road corridors with new transit systems.'<sup>2</sup> (See Box 1 for a summary of the key principles.) Other academic papers have also been produced.

The project worked in parallel with the global and local 'Movement and Place' initiative, which came out of Transport for London as a way of re-thinking main roads. This involved the development of various movement and place policies and strategies, for example the Guidelines for Sustainable for Urban Mobility Plans,<sup>3</sup> which seek to shift the focus to people, accessibility and place over simple mobility based on increasing the speed and capacity of main roads. The need to improve the balance between mobility and place has therefore become the next 'big agenda' item in transport and urban policy across the world and in each of the Australian cities where we have been working. This project has added to this journey with its focus on TACs.

Throughout the project, we have brought together papers, tools, films and stories to build capacity for enabling TACs in cities and towns in Australia and around the world. Our aim was to showcase the role of TACs in enabling denser development along key main road corridors with a focus on enhancing the urban fabric in a linear series of TODs as part of an overall urban regeneration approach to revitalising a whole corridor with multiple beneficial outcomes.

Project 1.74 builds on and relates to two previous SBEnrc projects:

- SBEnrc 1.55: Integrated Cities: Procuring Transport Infrastructure through Integrating Transport, Land Use and Finance (<https://sbenrc.com.au/research-programs/1-55/>).
- SBEnrc 1.62: Sustainable Centres of Tomorrow: People and Place (<https://sbenrc.com.au/research-programs/1-62/>).

These previous SBEnrc projects have led to the development of business cases for Trackless Tram corridors in Pottstown (Pennsylvania, United States), Bulawayo (Zimbabwe) and the City of Stirling (Perth, Western Australia).

There is an exciting cumulative benefit of leadership visibility and increasing trust in TACs through these projects. This includes evidence-based support in procurement and technology decision making through to urban development design innovation and capacity building for implementation.

Project 1.74 delivers a package of practice and synthesised learnings from international and Australian experiences presented in a TAC multimedia toolbox. This toolbox includes:

- Three papers to aid understanding of the key concepts. These papers discuss:
  1. The theory of TAC
  2. How this idea can be understood as a 21st century boulevard (see Box 2)
  3. European urban corridor regeneration (see Box 3).
- A searchable database of 185 TAC-related policy and practice tools, including a narrated introduction of the database and the ways in which end users can engage with the resources.
- The use of virtual reality tools to visualise the 21st century boulevard concept (see Box 4).
- A composition of 13 videos based on interviews with leading practitioners to illustrate and share their learnings on how to deliver TACs.

This report provides a brief review of the core ingredients of TACs (or 21st century boulevards) and a summary of the deliverables. We also provide a brief discussion of a related case study that explores this topic in a regional setting – the corridor from Bunbury to Busselton in Western Australia.

<sup>1</sup> Newman, P., & Kenworthy, J. (2015). *The End of Automobile Dependence: How cities are moving beyond car-based planning*. Washington DC: Island Press.

<sup>2</sup> Newman, P., Davies-Slate, S., Conley, D., Hargroves, K., & Mouritz, M. (2021). From TOD to TAC: Why and how transport and urban policy needs to shift to regenerating main road corridors with new transit systems. *Urban Science*, 5(3), 52. <https://doi.org/10.3390/urbansci5030052>

<sup>3</sup> Eltis. (2016). *Guidelines for Sustainable for Urban Mobility Plans*. European Commission's Directorate General for Mobility and Transport.

### **Box 1: Principles for Delivering Transit Activated Corridors**

Below are the five design principles for delivering a TAC as presented in Newman et al. (2019).<sup>2</sup> Principles 1 to 3 are drawn from effectuation, the core of entrepreneurship theory, and Principles 4 and 5 are drawn from urban planning.

#### **Principle 1: Create partnerships from the start**

The first principle is to build a group of partners and stakeholders from the start, which reduces uncertainty and risk as a co-created vision is developed between all parties and is realised through collaboration. Just as expert entrepreneurs build partnerships from the start, TAC projects should begin with a partnership between land interests, communities, local authorities and financiers, and then an agreement should be reached with relevant local/state/federal Government parties. These partnership-first approaches have been growing rapidly around the world in recent years, replacing siloed professional practice.

#### **Principle 2: Value creation rather than prediction**

The second principle is to focus on what can be controlled to 'create value' rather than to act upon 'predicted outcomes'. In practice, this means expert entrepreneurs focus on the controllable aspects of an unpredictable future rather than acting on predictions of an uncertain future. Developing a more entrepreneurial approach could provide cities and nations with a way of breaking out of the gridlock of automobile dependence and under-financed transit by harnessing private investment to deliver integrated transit and land development along corridors. These can transition from the highest value-producing mechanism of a fully private entrepreneurial approach through to the lowest value-producing fully public approach with various levels in between.

#### **Principle 3: Begin with available means rather than predetermined ends**

The third principle is to 'begin with a set of available means, rather than predetermined ends'. This requires thinking differently about what constitutes a cornerstone for action, innovation and finance. During creation of a new venture, expert entrepreneurs tend not to decide upon a final product and then seek to assemble the required resources, but instead they begin with what is available, giving preference to actions that harness available resources or networks and appear to help with their perceived journey.

#### **Principle 4: Define Transit Activated Corridors**

The fourth principle is also the first planning tool for creating a high-quality transit system through a corridor, which is to declare it or zone it in strategic and statutory plans as primarily for transit and dense urbanism. This approach is increasingly being used in the United Kingdom and Europe more generally as part of 'Sustainable Urban Mobility Plans'.

#### **Principle 5: Walkable and sustainable station precinct design**

The fifth principle is that station precincts must be allowed to be dense and mixed use in the strategic and statutory zoning systems used to enable TACs. There are a number of design tools created to make station precincts or TODs into 'inclusive, safe, resilient and sustainable' places including walkable urban design, solar design, water sensitive design, biophilic design, affordable housing design and, most of all, integrated design.



### Box 2: 21st Century Boulevards – The Concept

Boulevards were the French way of regenerating their cities, especially in Paris. They provided new spaces that transformed the urban economies, brought trees into the cities and provided great cultural opportunities. They were used heavily for transport but the more popular they became for promenading, hanging out for coffee and living as close to as possible, the more they had to ensure they did not lose their amenity because of passing traffic.

The earliest boulevards in Paris were built in the late 1660s and since then they have been remodelled or extended every few decades. The Boulevard du Crime became the setting for multiple outdoor theatre performances with many displaying crime scenes that dramatised Paris life with great cultural significance. In the 20th century freeways descended on cities as the essential infrastructure for economic performance, and the boulevards were always seen as the best sites to send the traffic along with no concern for the adjacent land uses. However, this was invariably prevented due to powerful community processes that treasured their walkable Boulevards. Now, after the Covid-19 pandemic, the boulevards are being given extra width for walking and cycling and public transport.

The boulevard in concept is a main road with significant movement but even more significant place. It has accessibility but it also has the best of urban development along it. In the different precincts along the corridor, there are many different functions and mixes of activity, but all have a strong sense of walkability and fun. They are also very beautiful due to their architecture and landscape. Small pocket parks are oases of protected urban space and quiet reflection, despite being in the heart of a city.

Can the boulevard concept be applied to 21st century cities? Can the same principles be used to create accessibility plus the human spaces and economic spaces while integrating some of the latest 21st century technology?

### 21st Century Boulevard Components.

The 21CB is a TAC with new transit technologies, smart technologies and renewable energy, integrated into traditional boulevard design. The design thus incorporates the highest value options of:

- **Transit** – mid-tier transit and micro-mobility designed by the Curtin University Sustainability Policy Institute (CUSP) with professionals from transport agencies illustrate how the precincts will be major sites for managing micromobility as well as stations for mid-tier transit.
- **Density** – walkable precincts around designated stations, full of amenities and local services, designed with partners.
- **Energy** – photovoltaic systems on rooftops with recharge hubs designed into precincts using electricity grid modelling from agencies and utilities such as the Distributed Roadmap group in Perth.
- **Housing diversity** – affordable, and mixed density options, designed with housing agencies in particular sites.
- **Smart city** – apps, sensors, machine learning, designed with developer partners.
- **Biophilic** – street trees, green roofs and walls, small pocket parks designed with partners.

## Planning Basis for TACs or 21st Century Boulevards

The first planning tool for creating a high-quality transit system through a corridor is to declare or zone it in strategic and statutory plans as primarily for transit and dense urbanism. A series of such plans are being developed around the world after Transport for London declared their policy 'Street Families',<sup>4</sup> which sets out the streets that give priority to transit and where density will be given special encouragement. The movement and place framework enables the 'place' prioritisation of streets to create walkable, liveable centres. In Perth, the proposed approach is to create a 'Green Route' in the Metropolitan Region Scheme, which requires transit priority and density to be the joint focus along the road. Such routes could be specified as potential TACs with associated zoning along the corridor.

A core element when designing a TAC is a set of detailed design options for how a mid-tier transit service, such as light rail or a Trackless Tram, could travel at speed along a clearway where road space is available and then slow down when it enters a station precinct, where the design and place focus would be to facilitate walkability and pedestrian activity. The latter part of the road works could be the responsibility of the private sector partners. This would send the signal that dense urban development would be favoured as it would have a high-quality transit system linking it to the rest of the city with highly desirable urban design quality for attracting people-based activities in and around the stations.

The responsibility for enabling TACs would be given to an agency or cross-agency group with the

responsibility for delivering transit and for delivering urban regeneration, including affordable housing. Therefore, roads chosen for this category would shift their priority from providing mobility services for through traffic to a focus on how they could enable quality transit and urban design along the corridor that delivers value to both developers and the community. This would increase the focus on accessibility, sustainability and equity. Compared with car-only lanes, such routes could carry the equivalent of six lanes of traffic,<sup>5</sup> which would ease congestion issues while increasing activity along the corridor through transit and urbanism.

Station precincts must be allowed to be dense and of mixed use in the strategic and statutory zoning systems used to enable TACs. A number of design tools have been created to make station precincts or TODs into 'inclusive, safe, resilient and sustainable' places, including walkable urban design, solar design, water sensitive design, biophilic design and affordable housing design, but most importantly, there is the integrated design tool as set out in the multimedia toolbox. Statutory requirements are needed to include such best practice outcomes. This may include how micro-mobility and on-demand electric shuttle buses could carry people to the station precincts (providing first and last kilometre solutions) without ruining the walkability qualities of the area,<sup>6</sup> providing the basis for what we have also been calling 21st Century Boulevards, which integrate the latest 21st century technologies.

<sup>4</sup> Transport for London. London's Street Family: Theory and case studies. Retrieved from <https://tfl.gov.uk/corporate/publications-and-reports/rtf-supporting-documents> (accessed 31 May 2021).

<sup>5</sup> Newman, P., Hargroves, K., Davies-Slate, S., Conley, D., Verschuer, M., Mouritz, M., & Yangka, D. (2019). The Trackless Tram: Is it the transit and city shaping catalyst we have been waiting for? *Journal of Transportation Technologies*, 9, 31–55. doi:10.4236/jtts.2019.91003

<sup>6</sup> Glazebrook, G., & Newman, P. (2018). The city of the future. *Urban Planning*, 3(2), 1–20. doi:10.17645/up.v3i2.1247

## Practices for Delivering TACs: A Searchable Database

This part of Project 1.74 was undertaken to share knowledge and experiences in delivering the urban regeneration qualities previously outlined. We sought to highlight the importance of context, including the growth of place and movement strategies and other contemporary forms of integrated planning practice that set a greater emphasis on place and transit.

The resultant database includes insights from previous SBEnrc industry projects, in addition to urban practice examples from Australia and internationally. The searchable database can be found at the following web link: <https://sbenrc.com.au/category/toolbox-resources/>

The database comprises a curated assortment of 185 tools, case studies and best practice examples that

can be easily accessed by industry and government. The database is organised into 21 categories within five overarching themes that follow the development life cycle: 1) Planning, 2) Assessment, 3) Procurement & Delivery, 4) Engagement & Governance, and 5) Management & Maintenance.

By exploring the database through these themes and categories, authorities and practitioners can learn from the latest in knowledge and experiences on refurbishing main road corridors, providing higher capacity new technology transit integrated with higher density urban regeneration and affordable housing projects. Such ease of access is intended to help strengthen capacity building and assist in informal and formal professional development initiatives.

### (I) Method overview

The study adopted a comprehensive literature and practice review of the spectrum of contemporary tools and practices available to decision-makers and practitioners, including Place and Movement strategies, Sustainable Urban Mobility and Transport Plans, Active Mode Appraisal methods, Benefit-Cost Analysis, Value Uplift and other relevant practices. It covered the five key project life cycle phases

associated with the delivery of urban regeneration and delivery of transit corridors; 1) Planning, 2) Assessment, 3) Procurement & Delivery, 4) Engagement & Governance, and 5) Management & Maintenance. A three-phased process was adopted by the research team, comprising a desktop review, three brainstorming sessions and one project steering group meeting.



## (II) Key findings

Under the five themes and the 21 categories, the research team found 185 discrete examples of tools, best practices and case studies. This suite includes 46% Australian examples and 54% international examples (see Figure 1 for the country of origin of the tools and best practices).

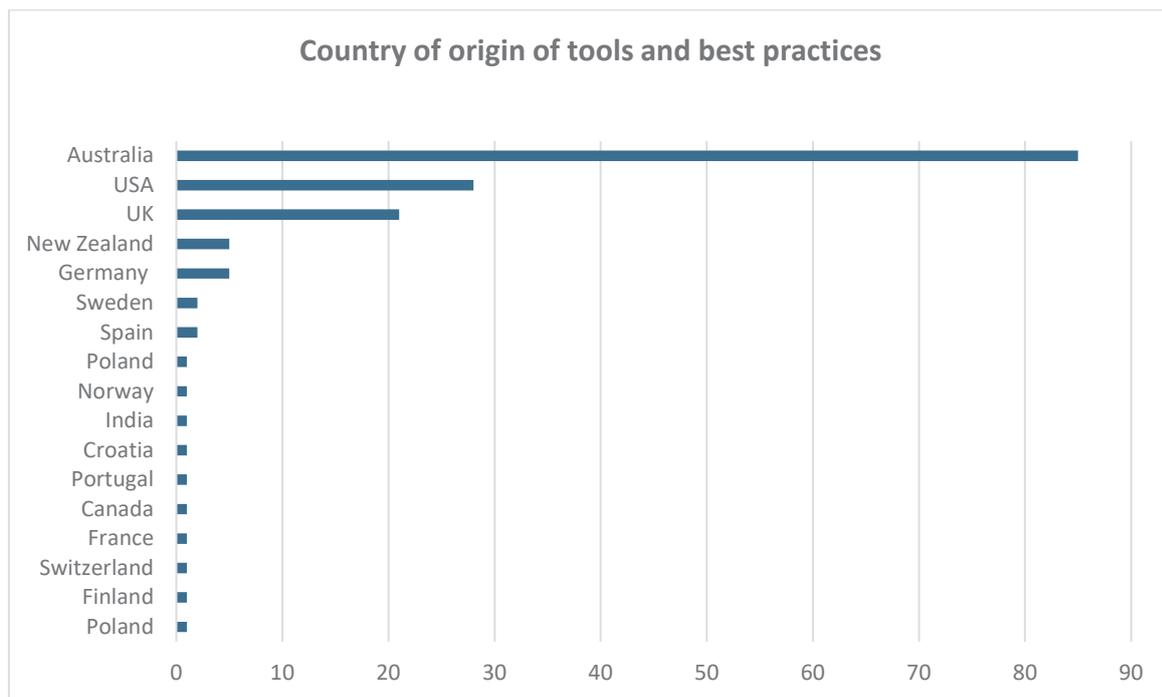


Figure 1: Country of origin of tools and best practices

## (III) Summary of findings by category and theme

Table 1 summarises the accessibility of the resources according to the source availability. There were 162 open access resources and 23 resources accessible for subscribed users.

Table 1: Accessibility of sources

Type of Resource	Open Access	User Pay Access (Subscription)
Report	61	1
Presentation	1	-
Tool	14	18
Media Article	7	-
Web Page	51	-
Academic Article	28	4
<b>Total</b>	<b>162</b>	<b>23</b>

The tools and best practices are presented as a matrix in Table 2 under the five themes of 1) Planning, 2) Assessment, 3) Procurement & Delivery, 4) Engagement & Governance, and 5) Management & Maintenance.

**Table 2: Summary of the tools and best practices**

Theme & Category		Total	By country		By source type					
			Australia	International	Report	Presentation	Academic Article	Tool	Webpage	Media Article
Theme 1 Planning	Place and movement strategies	8	6	2	3	-	-	-	5	-
	Urban regeneration design packages	24	12	12	13	-	3	2	3	3
	Health and wellbeing indicators	33	5	28	13	-	5	1	13	1
	Electromobility with recharge hubs	4	4	-	1	-	-	-	3	-
	Social housing	11	8	3	4	-	-	5	1	1
Theme 2 Assessment	Infrastructure assessment systems	2	2	-	1	-	-	-	1	-
	Stakeholder integration	4	2	2	-	-	1	2	1	-
	Corridor modelling for all modes	4	1	3	1	-	-	3	-	-
	Transit network modelling	12	5	7	2	-	1	6	3	-
	Full value benefit-cost assessments	8	4	4	7	-	1	-	-	-
	Land value capture tools	4	-	4	-	-	4	-	-	-
Theme 3 Procurement & Delivery	Alliances	7	4	3	2	-	1	2	2	-
	Multi-partnerships	5	5	-	1	-	-	-	4	-
	Market-led proposals	5	5	-	3	1	-	-	1	-
	Delivery models	5	3	2	3	-	1	-	1	-
Theme 4 Engagement & Governance	Online cloud-based interactions	7	-	7	-	-	5	2	-	-
	Deliberative processes	3	2	1	-	-	3	-	-	-
	Public participation	9	1	8	1	-	2	2	4	-
Theme 5 Management & Maintenance	Digital	17	9	8	1	-	3	5	7	1
	Monitoring	5	3	2	1	-	1	-	2	1
	Evaluation	8	4	4	3	-	1	2	-	-
<b>Total</b>		<b>185</b>	<b>85</b>	<b>100</b>	<b>62</b>	<b>1</b>	<b>32</b>	<b>32</b>	<b>51</b>	<b>7</b>

## Practices for Delivering TACs: Video Interviews

We have found that the best way to share experiences around delivering TAC is to bring together these insights into an easily accessible video format, which primarily involves interviews with researchers and practitioners sharing their

experiences. Table 4 outlines the topics covered in these videos, which as a package covers most of the fundamentals of delivering TACs. They also provide some good experiences on the ground with case studies in Perth, Melbourne, Europe and North America.

**Table 4: Video production summary**

Video Title	Brief Description
'TACs – 21st Century Boulevards' with Project Leader, CUSP Professor Peter Newman: <a href="https://vimeo.com/575715110">https://vimeo.com/575715110</a>	Peter overviews the theory and practice of TACs or 21st century boulevards with their key characteristics and how they integrate transit and urban regeneration.
'TACs – 'Delivering through a Searchable Database' with Associate Professor Cheryl Desha, Griffiths University: <a href="https://vimeo.com/616830055">https://vimeo.com/616830055</a>	Cheryl introduces the purpose and scope of the searchable database and how it can be used to help deliver a TAC.
'TACs – The Perth Project' with Project Manager and CUSP researcher, Dr Mike Mouritz: <a href="https://vimeo.com/575710041">https://vimeo.com/575710041</a>	Mike provides insights into the challenges and opportunities of transforming existing road corridors into a TAC using a guided tour by car along a main road in Perth.
'TACs – Lessons from Melbourne' with Project Chair, Professor Rob Adams, City of Melbourne: <a href="https://vimeo.com/575713738">https://vimeo.com/575713738</a>	Rob takes us on a walk through some of Melbourne's newly regenerated main roads that have been guided through a planning process, which has led by him over many years.
'TACs – Lessons from Europe' with Barcelona based CUSP/RMIT researcher, Dr Jan Scheurer: <a href="https://vimeo.com/554585061">https://vimeo.com/554585061</a>	Jan presents on film the paper on newly completed European corridors that have extended the idea of a 21st century boulevard with clear demonstrations of multiple urban benefits.
'TACs – Lessons from North America' with Sebastian Davies-Slate, introduced and interviewed by Professor Peter Newman: <a href="https://vimeo.com/584723994">https://vimeo.com/584723994</a>	Sebastian explains how light rail has been used to revive corridors in Seattle, Portland and Vancouver using new partnership processes with land developers. He shows how this was achieved and how it is related to the history of entrepreneur-based rail building and how this could be revived for TACs everywhere.
'TACs – 21st Century Technology' with Dr Jemma Green, interviewed by Professor Peter Newman: <a href="https://vimeo.com/579220806">https://vimeo.com/579220806</a>	Jemma explains how the new technology of blockchain can integrate shared solar into precinct-scale urban development allowing local management to be enabled. The idea of a Net Zero corridor based on TAC and a microgrid is outlined in the discussion.
'TACs – Political Partnerships' with City of Stirling Mayor Mark Irwin, interviewed by Professor Peter Newman: <a href="https://vimeo.com/585241798">https://vimeo.com/585241798</a>	Mark shows how as the mayor of the City of Stirling, which has a long history of attempting to bring a TAC into the car-dependent middle suburbs, he used political partnerships as the means to deliver it.
'TACs – Agency Alliances' with Stirling Mayor Mark Irwin and CUSP researcher Marie Verschuer, interviewed by Professor Peter Newman: <a href="https://vimeo.com/585588859">https://vimeo.com/585588859</a>	This includes further insights from Mark and Marie's experience with an alliance of state government agencies, local government and community, and shows how the core concept of a TAC was worked out well before the present phase of discovering its value in multiple ways.



<p>‘TACs – Assessment’ with Dr Rohit Sharma, introduced and interviewed by Professor Peter Newman:  <a href="https://vimeo.com/586104946">https://vimeo.com/586104946</a></p>	<p>Rohit explains how the assessment of a TAC will need to emphasise health and land-related issues as these have become critical to how Transport for London have worked out the significance of place over movement in their corridor strategies.</p>
<p>‘TACs – Transport and Land Use Interactions’ with Dr James McIntosh, Director LUTI Consulting, introduced and interviewed by Professor Peter Newman:  <a href="https://vimeo.com/584685782">https://vimeo.com/584685782</a></p>	<p>James shows the critical new role that land value creation is playing when it is integrated into rail proposals. The potential for improving benefit-cost ratios is therefore a major opportunity with TACs that have such land value opportunities as a major goal.</p>
<p>‘TACs – Civic Partnerships: Case Study Leederville Connect’ with Dr David Galloway and Anna Kelderman, interviewed by Professor Peter Newman:  <a href="https://vimeo.com/585176058">https://vimeo.com/585176058</a></p>	<p>Dave and Anna show their relaxed style of enabling community partnerships to become a major part of any TAC process. They suggest that having parties can enable the process to begin and that sophisticated multi-criteria analysis can be a result.</p>

## Case Study: Connecting the South West – Mid-Tier Transit and Integrated Electromobility Opportunities Study

The aim of this case study was to identify a 21st century transit solution that would support city growth and regional economic development through improved accessibility for tourist and residents in the cities of Bunbury and Busselton in the South West of Western Australia, with linkages between them.

The 21st century boulevard concept applied in this study is most relevant to the Bunbury and Busselton urban corridors where new urban development can incorporate smart technology and the nodes created and existing major destination points can be linked. The project was guided by the following elements:

- Mid-tier transit options including a preferred route from Bunbury station to the CBD, between Bunbury and Busselton and intracity routes; vehicle and technology options; and complementary micromobility and electromobility solutions.
- Precincts, housing and development opportunities around designated stations.
- Integrated renewable energy (solar, wave, waste and wind) aggregated into virtual power plants and distributed energy hubs.
- Digital city opportunities for demonstrating state of the art communications, apps, sensors, data, machine learning and other smart systems

that enable integration and management of the innovative urban and transit system.

- Biophilic (nature loving) opportunities for enhancement of place through integrating greenways and landscape-oriented design.
- Tourism opportunities providing services that meet the needs of tourists without the need for private vehicles. Identifying tourism development opportunities.
- Implementation pathway opportunities including funding and partnerships.

The routes and staging identified through stakeholder and officer workshops and investigations included four short-term options for review. The report of this case study is available on the SBEnrc project website:

<https://sbenrc.com.au/app/uploads/2022/02/2.2.22-Connecting-the-South-West-Mid-Tier-Transit-and-Integrated-electro-Mobility-final-draft.pdf>

The next step will examine the feasibility of these four options through examination of design considerations and provide a high level 15% design-costed proposal and a benefit-cost analysis for social and economic impact assessment. It will also consider local manufacturing opportunities and the link to renewable energy storage and management.

### **Box 3: European Case Studies – Re-Establishing Boulevards**

Below is a summary of a forthcoming paper that presents a number of lessons learnt across different European countries as they have sought to re-establish boulevards or what we have called Transit Activated Corridors.

#### **Case Study 1: Boulevardisation in Helsinki (Finland)**

In 2016, the Finnish capital of Helsinki adapted an urban strategy, the Helsinki City Plan, which envisioned a future development direction as a polycentric, rail-based agglomeration. A prominent element of this vision included the conversion of the inner sections of radial, arterial multi-lane roads and expressways into multimodal boulevards including tram or light rail extensions, bicycle infrastructure and significant urban intensification. The overall goal of this polycentric agglomeration was shared between the core city of Helsinki and the 13 surrounding suburban municipalities without any centralised governance structure. Unfortunately, the program of boulevardisation has not been without controversy, with tensions emerging over interpretations of what exactly was meant by polycentricity differing between the planning actors and different tiers of government. The scheme still looks set to go ahead at a reduced scale and in the context of a revised regional plan that attempts to establish a policy consensus.

#### **Case Study 2: Transforming public transport networks with medium-capacity modes in Skåne (Sweden)**

The agglomeration of Skåne in southern Sweden, of which Malmö (340,000 inhabitants), Helsingborg (150,000 inhabitants) and Lund (120,000 inhabitants) are the principal urban centres, has traditionally been serviced by a public transport network consisting of regional rail and buses, which were planned and managed by a regional transport association. In recent years, network reorganisations and simplifications culminated in a comprehensive rollout of buses at a high level of service (Malmö) and the introduction of a light rail transit (LRT) route (Lund). Both cities appeared to suffer from a degree of co-option of the transport mode decision-making process by political actors who, in Lund's case, favoured LRT to the exclusion of possible alternatives even though the buses' capacity may not have been exceeded if the anticipated urban growth were less focused on the LRT corridor. In Malmö, the political process appears to have placed LRT in the 'too hard' basket due to the associated controversial impacts on traffic management and streetscapes and used this diversion to distract from a debate about public transport capacity. This case study highlights that a lack of political consensus over the most suitable type of public transport upgrades can significantly undermine the potential for urban transitions to occur.

#### **Case Study 3: Rubber-tyred and conventional trams in France**

During the 1990s to the 2000s, two types of rubber-tyred tram technologies (tramways sur pneus) were developed by Bombardier (Transport sur Voie Réservée or TVR; also referred to as Guided Light Transit or GLT in an English-speaking context) and Translohr (later acquired by Alstom). Both were based on electric vehicles using overhead catenary and a central guide rail for power supply (although TVR systems also offered the option of battery and hybrid diesel-electric propulsion, combined with the ability to leave the guideway). TVR systems were put in place in the medium-sized cities of Nancy (2000) and Caen (2002). Translohr systems emerged in Clermont-Ferrand (2006) and on two geographically separated lines in the Paris metropolitan region (2013 and 2014).

The French experience highlighted a wide range of experience including costs, operating experiences and service levels.

#### Box 4: Using Virtual Reality Tools to Visualise 21st Century Boulevards

There is a growing demand for the use of gamified immersive experiences beyond the traditional field of games and entertainment. These technologies and approaches are now applied across diversified fields from tourism, education and training to urban and transport planning. The technology can be used not just for communication purposes but also to help with digital design on the intricacies of a project that needs three-dimensional interpretation.

This project used these tools to demonstrate how a 21st century boulevard might look using the Curtin Campus as test case.

The research was conducted with staff and students studying through Curtin's HIVE laboratory. The research project provided an opportunity to leverage the multidisciplinary approach that used co-design across the disciplines of Animation and Games, Architecture, Smart Cities and Urban Development that has been used to produce meaningful immersive experiences in design of major construction projects.

This research used gamified technology to illustrate the possibilities of a Trackless Tram through the Curtin campus and to the new bus terminal, which is now part of Curtin Exchange. This has led to exploring the application of these tools with Main Roads WA to investigate innovative approaches to engage and communicate effectively with its stakeholders through the use of gamified immersive technologies on a range of their projects. The potential to create design opportunities with engineers on complex projects will also be enabled.

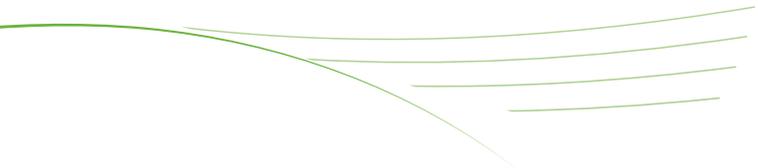


## Conclusion

The TAC project with its papers, films and searchable database collated research outcomes and examples of industry best practice and how the Trackless Tram could be the catalyst for seeking urban regeneration, including affordable housing, along several corridors. It will provide the resources to use in the business

cases currently underway and in the future. It is also the basis for future research that enables new elements such as Net Zero to be integrated into urban and transport planning.





## Moving Forward

The next project in this series is ‘Net Zero Corridors: The Business Case and Engagement Process’ (Project 1.84), which will build on previous projects related to mid-tier transit solutions, TACs and housing diversity. It will illustrate how Net Zero transit corridors can be delivered through integrating Net Zero mid-tier transit with Net Zero precincts, which are connected with surrounding suburbs through microgrids, micromobility and electromobility solutions. The aims of the project are to: 1) create a

business case for Net Zero transit corridors based on the requirements of Infrastructure Australia; and 2) create an engagement process to capture the community’s imagination in how these transitions to Net Zero could unfold. The business case and engagement process will draw on evolving TAC and transit solution initiatives through a case study approach.



**Find out more:**

Project website (including link to YouTube video):  
<https://sbenrc.com.au/research-programs/1-74/>

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**Recommended citation:**

Newman, P., Mouritz, M., Desha, C., Caldara, S., Scheurer, J., & Verschuer, M. (2021) *Delivering Transit Activated Corridors – Final Industry Report, Project 1.74, Sustainable Built Environment National Research Centre (SBEncr), Australia.*



**This research would not have been possible without the ongoing support of our core industry, government and research partners:**

