AN AECOM BRILLIANT CITIES REPORT

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WE HAVE A RESPONSIBILITY TO EXPLORE MORE CREATIVE, EFFECTIVE AND ACCOUNTABLE WAYS IN WHICH TO SUPPORT OUR GROWING WORKFORCE IN AN EMERGING PERIOD OF RAPID TECHNOLOGICAL AND SOCIAL DISRUPTION.
Embracing the 4th Industrial Revolution

Melbourne is undergoing a period of unprecedented growth. With a population of approximately five million people, we must explore new and creative ways in which to support a growing workforce in an emerging period of rapid technological disruption. Fishermans Bend not only represents one of Australia’s biggest urban renewal opportunities, it provides Melbourne with the ability to ensure that it is economically competitive and technologically relevant in this new era of change, dubbed the ‘4th Industrial Revolution’.

Released in March 2018, AECOM’s report, *Transforming Melbourne and Victoria with Employment and Innovation Clusters (EICs)*, argued that EICs will be critical to fostering a successful, growing economy founded on innovation. As physical spaces that bring together startups, established high-value businesses, researchers and related service providers, an EIC is a catalyst for developing an innovation ecosystem that supports the commercialisation of research and results in an array of economic benefits and a higher standard of living for the community.

This paper creates a vision for Fishermans Bend as a functioning Employment and Innovation Cluster, and sets out recommendations for the infrastructure investment necessary to realise this transformative employment precinct.

To a large extent, Melbourne has developed around the economic industrial activity in Fishermans Bend. It has long been a focus for advanced manufacturing in Australia, and this is earmarked to continue with the precinct officially designed as a National Employment and Innovation Cluster (NEIC) in Plan Melbourne 2017-2050. How we embrace and deliver upon this vision will not only influence Melbourne’s standing in the global innovation race, it will also provide job creation opportunities for all levels of society who have a part to play in this emerging economy. While the current framework by the Fishermans Bend Taskforce sets out a strong vision and corresponding performance targets for 2050, this paper seeks to identify the interim targets required by 2030 to ensure we meet the 2050 targets and more — to transform Fishermans Bend into a successful EIC. In this shorter timeframe out to 2030, the planning undertaken in the next two years will be critical in order to achieve the desired infrastructure outcomes by that date.
### Scenarios for the development of Fishermans Bend

This paper sets out three different development scenarios for the Fishermans Bend employment precinct through to 2030, so we can more clearly understand how the vision can be realised and enhanced further.

They are:

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<th>Scenario</th>
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AECOM has created a preliminary assessment tool designed to better understand, compare and contrast the benefits of each of these development scenarios, which draws on their associated environmental, social and economic implications. This Urban Precinct Investment Tool (UPIT) informs the likely trade-offs between achieving the environmental and social policy and guidance targets and the cost of major public infrastructure required under each development scenario.

While not seeking to provide a business case, it is a decision support tool that provides guidance on the sequence, extent and purpose of investment required to fulfill different development scenarios. We hope that the UPIT will support a broader, more-open conversation on how all stakeholders can collaborate to further improve Melbourne for all Melburnians, and help ensure that our city can compete with the most economically successful global cities.

From our analysis of how to achieve the 2030 targets, we have found that the following 10 recommendations are most critical:

1. Develop a governing and coordinating authority
2. Invest in rubber-wheeled ‘pre-light rail’ transit solutions
3. Attract leading international universities to complement the local universities
4. Focus on the advanced industrial and manufacturing sector
5. Actively include the creative industries
6. Attract and support development along Salmon Street and the light rail corridor of Turner Street and develop these as distinctive urban boulevards
7. Look beyond the General Motors Holden (GMH) site and actively support the development of other ‘campus’ zones that complement the GMH ‘core’
8. Open up the waterfront in collaboration with the Port of Melbourne
9. Invest in the precinct as a test bed location to demonstrate emerging technologies
10. Engage with businesses, large and small.
Our investigation begins with a single question:
How can the Fishermans Bend employment precinct develop to become a globally significant Employment and Innovation Cluster, and thereby drive Melbourne into a prominent position within the emerging global ‘knowledge economy’?

To answer this question we have relied on two sources: the Fishermans Bend Taskforce’s recently published Fishermans Bend Framework, which clearly sets out the ‘end state’ for the precinct in 2050; and, our Transforming Melbourne and Victoria with Employment and Innovation Clusters (EIC) report, released in March 2018, which provides an understanding of the critical elements of a high-performing EIC. These two sources provide the elements that we believe need to be present in the Fishermans Bend precinct by 2030 to provide it with a strong foundation for underpinning Melbourne’s future competitiveness.

Therefore, the role of this paper is twofold:

1. TO IDENTIFY THE PROGRESS OF DEVELOPMENT NEEDED BY 2030 TO MEET THE FRAMEWORK’S CURRENT 2050 TARGETS

2. TO SET OUT THE ECONOMIC ADVANTAGES THAT A GLOBALLY SIGNIFICANT EIC OFFERS OVER ONE WITH A LOCAL FOCUS

We also asked the question:
What needs to be accomplished by 2030 to achieve the 2050 aspirations of the Fishermans Bend Framework?

A VISION FOR 2030

The year 2030 will be a critical point, as whatever we plan for and commit financing to in the next three years will only just be realised in the precinct by this time; 2030 is therefore our near future, and the point to which we must plan to set Melbourne up for success by 2050, as envisioned in the framework. The ‘living, breathing’ EIC of 2030 will need to have already achieved a significant amount of the framework’s targets for 2050. In fact, so significant are the changes required to framework status quo’ scenario of what might have happened if there were no framework and there were only ‘fragmented’ or isolated pockets of development, which is traditionally how most precincts have developed. This is for the purposes of comparing a more actively planned precinct with a usual, relatively unplanned development scenario.

We believe that we can provide a greater contribution to the Victorian economy by actively planning for and attracting local and international research institutes and research and development-heavy businesses of global significance to Fishermans Bend. If we can achieve this, then the argument for investment in both infrastructure and governance structures is far more compelling, and the result will be a stronger economy that is much better able to afford this increased investment.

MULTIPLE DEVELOPMENT SCENARIOS FOR FISHERMANS BEND

While the Fishermans Bend Taskforce’s framework sets out the ‘bones’ of the precinct, our EIC report sets out the additional attributes required to ensure the precinct is ‘enhanced’ and moves a step beyond to become a globally significant centre for the commercialisation of research, specifically within the advanced manufacturing sector. In this paper, we chart the development scenarios for both the framework and for a higher-performing EIC. We also consider a ‘pre-
To gain a better understanding of the cities we are competing with and how invested their workforces are in advanced industries, it is useful to look at global leaders. One such example is Los Angeles, a city of 13 million\(^5\), which has just over 500,000 employees engaged in this sector, representing approximately nine percent of the total workforce. Even though Australian cities do not yet distinguish economic activity specific to advanced or innovation-intensive sectors in this way, we have estimated that there are approximately 225,000 employees engaged in ‘advanced industries’ in Greater Melbourne\(^6\).

This is a roughly similar proportion compared to Los Angeles’s workforce.

A more aspirational set of benchmarks for our contribution to advanced industries can be found in San Francisco and Boston, whose worker engagement rate with advanced industries is closer to 14 percent\(^7\). If Melbourne, a city of five million, were to enjoy the same proportion of advanced manufacturing employment as these latter two cities we would be looking at having 330,000 jobs in this sector, or approximately 110,000 employees more than we have currently.

Fishermans Bend should, by 2030, provide about 55,000 of these jobs, and provide a hub for other advanced industries to develop from throughout the greater metropolitan region.

From our research, we know that advanced industries perform better when collocated with allied research institutes and when they are physically clustered with competing and collaborating organisations. Advanced industries also provide greater value to the economy per job than those that are not based on continual innovation and improvement. This ‘higher rate of return’ per employee is the central economic argument in our investigation for the development of a globally significant EIC at Fishermans Bend, as it is this economic bonus that provides the resources necessary for the investment in the EIC to pay off and to benefit the broader community of Melbourne.

To gain a better understanding of the cities we are competing with and how invested their workforces are in advanced industries, it is useful to look at global leaders. One such example is Los Angeles, a city of 13 million\(^5\), which has just over 500,000 employees engaged in this sector, representing approximately nine percent of the total workforce. Even though Australian cities do not yet distinguish economic activity specific to advanced or innovation-intensive sectors in this way, we have estimated that there are approximately 225,000 employees engaged in ‘advanced industries’ in Greater Melbourne\(^6\).

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BY 2030, WE ESTIMATE THAT THE FISHERMANS BEND EIC HAS THE CAPACITY TO CONTRIBUTE UP TO $12 BILLION\(^3\) TO THE VICTORIAN ECONOMY, WHICH WOULD REPRESENT FOUR PERCENT OF THE STATE’S ECONOMIC ACTIVITY IF IT WERE ACHIEVED TODAY\(^4\).

CONSIDERING THAT THAT COULD BE ACHIEVED WITH ONLY 55,000 EMPLOYEES WITHIN A 230-HECTARE STRETCH OF FORMER WETLANDS, THIS IS A SIGNIFICANT OPPORTUNITY DESERVING OF A HIGH DEGREE OF PLANNING AND INVESTMENT.
To better understand, compare and contrast the benefits of each of the three development scenarios, we rated them against each other and looked at their respective environmental, social and economic benefits. The purpose was to develop more than a simple financial benefit method of arguing for and against each of the development scenarios. The Urban Precinct Investment Tool we developed aims to measure the expected performance of each scenario against the Fishermans Bend Framework and other current standards and performance guidelines that support better environmentally and socially performing urban environments.

The additional employment developed from indirect jobs created by the advanced industries, or the ‘supply chain’, is also a significant factor. Advanced industries require a significantly larger supply chain given the scale and variety of materials and expertise required beyond the more-generic supporting industries, such as retail, food and beverage, and logistics, relied upon by other sectors. Looking once more at San Francisco and Boston, these indirect jobs are almost the same as those directly created by the sector. Furthermore, the wages paid to employees of advanced industries are almost double that of the average wages earned in each city. We have depicted this relationship between the ability to increase jobs and increase productivity through the two accompanying graphs. The first shows the expected growth of jobs, understanding that the global EIC and the fulfillment of the Fishermans Bend Framework scenarios are both focused on this aspect, whereas the fragmented development scenario is only interested in extracting value from land development regardless of use, and therefore not focused specifically on the creation of jobs. It is not surprising then to see a dramatic increase in employment for the first two scenarios. What is compelling, however, is that growth in economic activity for the global EIC is higher than the framework scenario, predominantly due to the greater value or higher productivity per job of advanced industries, manufacturing and research.

Figure 1 shows the expected growth of job numbers at Fishermans Bend across all three development scenarios (measured as full time equivalents). The EIC and framework scenarios assume a light-rail system is operational by 2022. The plateau from 2028 results from the need for a metro and an assumption that the General Motors Holden and Turner Street corridor areas alone could not easily accommodate higher numbers of workers.

Figure 2 outlines the estimated value to the economy created through the productivity of jobs within the precinct across all development scenarios. It can be clearly seen that both the global EIC and Fishermans Bend Framework scenarios can expect a high growth of jobs, although the global EIC stands out as delivering higher economic activity to the Victorian economy.

Figure 1

Figure 2

Comparing and Contrasting the Performance of Our Development Scenarios in 2030

We believe that a strong focus on advanced industries and associated research and development could yield as much as a 20 percent increase in economic activity than if the framework were to be fulfilled as a more locally focused and mixed-use employment centre by 2030.
Fishermans Bend provides the ‘growing space’ our central business district needs for the next three decades. While Docklands showcased the development ethos of the late 1990s, Fishermans Bend has the opportunity to draw upon lessons from the best of the world’s employment precincts. Due to Melbourne’s carefully surveyed and set out grids, our city is often said to have great ‘bones’. A similar aspiration for Fishermans Bend can be captured and can develop upon this legacy, drawing inspiration from the city Melbourne has become and combining it purposefully with Fishermans Bend’s unique heritage.

Fishermans Bend has played an important role in the commercial and industrial development of Melbourne, but its possibilities have never been fully realised. Despite its proximity to Melbourne and its historic role as a place of arrival, to some extent it has remained starkly removed, both physically and socially.

THE LAND AND FIRST NATION

The story of Fishermans Bend is deeply connected to the sea, the river and the land. Originally a delta rich with marine and bird life, this low-lying shrubby land has, since ancient times, been the Country of the Yalukit Willam. The earliest known inhabitants of Fishermans Bend included the Bunurong and Woiwurung language groups of the Kulin Nation, as well as clans known as Yalukit Willam and Wurundjeri Willam.

The wetland flora and fauna habitat meant the area was an important food resource for its inhabitants — the future changes to the landscape would have profound impacts on the Aboriginal people who lived here.

EUROPEAN SETTLEMENT

By all accounts, the area remained abundant with flora and fauna in the early years of settlement. The bend in the Yarra River near the confluence with the Maribyrnong River was filled with fish and so became known as Fishermans Bend. The lower reaches of the Yarra were seen as a barrier to Melbourne’s rapid growth as it became an important centre of finance and trade. This barrier was removed when the lower Yarra was diverted to form the Coode Canal to create safe and direct access from the city to the bay. Opening in 1887, the widened and deepened channel enabled the largest ships of the day to directly access the main port and railway terminal.

Fishermans Bend was plagued with poor soil. It contains Coode Island silt deposited by the Yarra and Maribyrnong Rivers which was overlaid with sand ridges from old beach dunes, originally separated by intervening swamps. Consequently, even during the gold rush boom years, Fishermans Bend did not benefit from the land speculation and development of those years that resulted in new suburbs for Melbourne. The result was an expanse of unsettled land close to the city, perfect for the growth of noxious trades such as rubbish dumps and a manure depot.
INDUSTRIAL DEVELOPMENT

The trend for noxious industries to locate on the river and in Fishermans Bend increased with the building of Williamston Road in the late 1800s. Unwelcome in residential Melbourne, the city’s first iron foundry and engineering works, soap makers, abattoir and boiling down works were drawn to the area by the river’s water and by the ease of discharging waste.

The aircraft industry was also attracted to the area given its industrial nature. In the early 1930s, a primitive grass airstrip was built followed by the Commonwealth Aircraft Corporation (CAC) factory and a long-sealed airstrip in 1935. Between 1935 and 1960, the CAC built many aircraft, and housed a major design, development, research and manufacturing group. All of this was attractive to other manufacturing companies that grew adjacent to the CAC in the 1940s.

General Motors (Holden) set up its own enterprise nearby in 1947, resulting in the first Holden car coming off the production line in 1948. In 1949, the Post Master General’s Department set up its Lineman’s Training School. Holden built Australia’s first locally mass-produced car at Fishermans Bend in 1953. Full car production was a significant national achievement for Australia. Eventually, the Victorian Government bought the General Motors site in 2016, but the company continues to operate its advanced international design and engineering studio from the site.

The Government intends to build on the significant legacy of the area through the creation of a hub for innovation and entrepreneurs, developing it as an aerospace, defence, marine and automotive design precinct. Planning for the 37.7-hectare site, designated a National Employment and Innovation Cluster, is orientated towards design, engineering and technology and encourages the re-use of existing buildings to recognise and incorporate the site’s rich industrial heritage.

CHALLENGES FOR FUTURE DEVELOPMENT

The ongoing and dynamic history of geographical formation at Fishermans Bend is intimately related to its human use and contributes to its challenges today.

Its poor soil has been further compounded by the industry that established in the area over time, resulting in the significant contamination of soil and groundwater. Heavy metals and solvents may be widespread as well as elevated levels of nutrients such as salts and metals in groundwater. This constrains activities requiring excavation for underground water storage, service trenching, underground car parks, groundwater extraction and for uses such as irrigating trees, green spaces and parks.

The water table is situated close to the surface, compounding the risks associated with groundwater contamination and its potential to come into contact with building foundations, basement structures and subsurface utilities. Ongoing groundwater management may also need to consider salt water intrusion.

Unlike other inner city industrial areas, there is a vision for Fishermans Bend as an employment precinct that requires a different approach to its planning. Infrastructure design and prioritisation must be driven by the diverse needs of the industries located there now and in the future. As a functioning EIC, Fishermans Bend will need to leverage its unique legacy to overcome and benefit from the challenges of its location, its geography and its past.
The range of development trajectories for the Fishermans Bend employment precinct are highly sensitive to the scale and form of infrastructure investment, governance arrangements, and the type of industry and development motivated to invest there.

Our investigation has drawn on three different development scenarios, which enable us to visualise and assess how they perform against the Government’s vision and ambitions for Fishermans Bend. In this paper, we assess the social, economic and environmental performance of each.

To give a strong sense of potential outcomes for Fishermans Bend, we have established a ‘baseline’ scenario based on the Fishermans Bend Framework, as well as two scenarios that would result in trajectories away from this baseline; those are the ‘enhanced’ and the ‘fragmented’ scenarios discussed earlier. We have taken the fulfilment of the framework as our baseline and the starting point for extrapolating the trajectories for all three to 2030. We can then measure the differences between all three scenarios to compare and contrast the advantages and disadvantages of each. While we are measuring attributes such as economic value and output based on the number and type of employees, we are also able to draw out social and environmental attributes and develop a strong sense of the infrastructure costs required to support each scenario up to 2030.

Predicting the future is always a high-risk undertaking and no model is perfect; however, we have based our scenario development on several constant factors common to all trajectories. While some are dependent on decision-making to remain constant, others are physical realities of the precinct, and are therefore only able to be altered at extraordinary cost.

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Critical to our analysis has been the articulation of the composition of businesses for each scenario over time. In this way, we can more clearly focus the critical elements of the scenario so that we can target their development over the next decade. Each business type provides a different level of productivity value to the Victorian economy.

The business typologies have been grouped into the following:

- Tertiary education, research, scientific services (TERSS)
- Advanced manufacturing (AD MAN)
- Standard manufacturing (SM)
- Wholesale trade, transport and warehousing (WTTW)
- Professional, financial and technical services (PFTS).

Our three scenarios are:

**AN ‘ENHANCED’, GLOBALLY COMPETITIVE EMPLOYMENT AND INNOVATION CLUSTER**
emerging to rival the EICs seen globally, this approach enables a longer-term opportunity, providing optimum conditions to maximise job creation, the value of innovation and strong overall economic activity within the precinct. This scenario has been modelled from observed behaviours of various EICs globally. A list of successful EICs that are often held up as examples can be found in the Appendix.

**A PROJECTION OF THE CURRENT FISHERMANS BEND FRAMEWORK TO 2030**
which serves as our baseline scenario — development of the Fishermans Bend employment precinct, including the establishment of local universities and active support of advanced and defence-based manufacturing.

**A ‘FRAGMENTED’ APPROACH TO DEVELOPMENT —**
urban property development is left to its own devices, with ordinary market pressure in the absence of a specific precinct-wide development authority coordinating the vision of the current framework approach. This results in a fragmented series of isolated developments enabling higher shorter-term financial benefits for individual interests, but potentially limits longer-term value creation.
The Development Scenarios

Fishermans Bend: the ‘enhanced’ Employment and Innovation Cluster

While this ‘enhanced’ scenario is based on the framework, it seeks to use specific aspects inherent in (or that can be readily created in) the precinct to make it more competitive with other global EICs. The aim is to create a large precinct dedicated to the commercialisation of research, specifically focused on advanced manufacturing. The rapid development of the tertiary education, research, and scientific service sectors is critical, and will usher in a dramatic increase in advanced manufacturing activities.

The scenario shows that doing this will boost the economic value of the precinct, which will be greater per employee as a result compared to a standard economic precinct not focused on advanced research and manufacturing. This increase in economic output and value per employee provides a strong argument for greater initial investment in establishing a sound governance structure and the infrastructure necessary to grow and sustain the precinct.

Connecting Australia to the Global Economy

This ‘enhanced’ scenario represents the highest aspiration for the Fishermans Bend employment precinct. Focusing on connecting Melbourne to the global economy over the next 20 years, this scenario aims to develop a nationally significant advanced manufacturing economic ecosystem that complements, rather than competes with, Melbourne’s CBD and other NEICs, including the biotech clusters at Parkville and Monash.

Knowledge and Research Led

Innovation comes from stronger collaboration between universities and research and development-reliant businesses. STEM-focused TAFE and government science and technology organisations form one of the nuclei of this multi-centred precinct, and will ensure that a highly skilled workforce is available to the employers and research institutes on the site. The availability of this skilled workforce will then attract further advanced manufacturing investment, in a virtuous circle.

All stakeholders will recognise and be motivated by the benefits of their collective and shared equipment and talent pool, and the ease of quickly sharing ideas, skills and people. The collocation of allied organisations creates a higher likelihood of innovation, high productivity and high-value economic benefits. This, in turn, creates confidence and will gradually raise the value of land, justifying additional major infrastructure investment that will facilitate further growth, expansion and investment of more allied industries.

This scenario seeks to maximise the commercialisation of locally conducted research. This means that the focus on developing advanced manufacturing, tertiary education, research and scientific services needs to be privileged above other sectors, and as early as possible. This relationship is depicted in Figure 3 on the next page, showing that tertiary education, research, scientific services and advanced manufacturing are all strongly supported.

A Diverse and Collaborative Workplace

The global EIC relies on a very diverse mix of employers and people working closely together so that planned and incidental collaborations emerge as a defining feature of the precinct. This encourages dense networks of facilities and collaborative spaces. Furthermore, access to data and high-speed and high-volume communication networks are shared within clusters of the precinct. Physically, the students, employees and visitors in the precinct are readily connected with the rest of the metropolitan area through a multi-modal transit system created through a mix of public and private investment.
This scenario considers the Fishermans Bend Framework to 2030 developed by the Fishermans Bend Taskforce, and takes into account other state government policy and strategic directions currently in place. As such, we have set this as our ‘baseline’ scenario from which the other two scenarios deviate.

The overall framework is a commendable document that sets a very clear set of directions and expectations, and describes essential methodologies for developing critical aspects of Fishermans Bend. While the majority of the attention in the document is focused on the ‘residential’ precincts of Montague, Sandridge, Wirraway and Lorimer, it does describe a basic requirement for the ‘employment precinct’, specifically around transit infrastructure and land use. It is these directions that we have built upon and extrapolated to 2030.

Figure 3 shows the expected growth of job numbers at Fishermans Bend for five distinct business types. The intention for the global EIC, or the ‘enhanced’ framework, is for the advanced manufacturing (AD MAN) and the tertiary education, research and scientific services (TERSS) to be the primary focus of the employment precinct.

Furthermore, the accompanying plan shows how these various key users are to be ‘mingled’ amongst each other to create an expanded campus involving space devoted to research and the businesses that will aim to commercialise it.

The Fishermans Bend Framework vision at 2030

THE GLOBAL EIC AT 2030:

exhibiting a high degree of integration between commercial and advanced manufacturing, and research and tertiary education. The Salmon Street (north–south) and the Turner Street corridors form the ‘spines’ along which multiple modes of transit run and provide a sense of hierarchy to the urban form of the precinct. The level of activity across the site demands that the light-rail corridor extend across the precinct and include multiple stops. This in turn allows for a speculative development corridor along Turner Street (from the eastern edge of the precinct to the GMH site in the centre).
THE FRAMEWORK BECOMES ‘BUSINESS AS USUAL’

In effect, this is the new ‘business-as-usual’ benchmark, as the framework changes the previous status quo (i.e., a ‘fragmented’ scenario) that is also being examined in our scenarios for the purpose of showing the comparison between them. Importantly, many of the broader targets set out in the framework are far from current practice and will prove challenging to achieve, requiring proactive and significant social, economic and technological changes. Having said that, these challenges are very much shared by the ‘enhanced’ global EIC scenario and should be seen as an exciting challenge to the innovative and advanced industries.

BENCHMARKING THE COMPETITION

The Government’s aspiration to achieve 80,000 jobs and 80 percent sustainable transport use by 2050 will not be achieved using conventional methods and technologies. Significant new sources of capital and careful curation are necessary to facilitate the scale and vision outlined in the planning for the Fishermans Bend employment precinct.

Our focus in this scenario is on the development of the strong base from which further growth and development can be assured so that the framework is eventually fulfilled. There is no particular bias in terms of business composition, allowing the currently formed direction of the General Motors Holden site to continue alongside existing businesses that operate in the remainder of the precinct. This relationship between business types can be seen in Figure 4. While business activities are more prolific than other activities in the precinct, there is no clear dominance by any particular business group.

However, a failure to achieve critical mass within key business types and market sectors may see less-productive and therefore less-valuable uses intrude and undermine longer-term success including, potentially, storage, big box retail and even residential uses. Commercial and social uses might saturate infrastructure before its ultimate productive economic capacity is reached. This scenario is likely to achieve initial success in attracting some key institutions and businesses — in fact, some of the ground work has already been laid, which is commendable. However, leveraging this investment to drive benefits across the precinct and the Victorian economy remains a challenge.

Figure 4 shows the expected growth of job numbers at Fishermans Bend for five distinct business types under our baseline or Fishermans Bend Framework scenario. Given the direction in the framework that universities and manufacturing are important, these uses do not necessarily form the focus for the employment precinct. We therefore have a balanced composition of business types with a slight bias towards the existing standard manufacturing and also see a rise in tertiary education activity in the precinct. The accompanying plan shows how the research and tertiary education buildings are located next to the manufacturing and business activities; however, they are not yet ‘mixed’ amongst them.

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A ‘fragmented’ approach to development

This scenario envisages a shorter-term market need that drives land use and development independently of the overall employment precinct, and at times inconsistently with the current Fishermans Bend Framework. We believe that this approach would result in the following outcomes for the employment precinct:

**Short-term interests prevail:**
This scenario sees a future where the immediate highest return for land value is sought by disparate interests. It represents the type of future that the employment precinct could have if opportunistic land transactions are prioritised above any strategic or policy outcome.

**Competes with (not complements) the CBD and residential growth areas:**
The employment precinct does not have the high-value appeal of other central city commercial and residential areas, such as Southbank and Docklands. The high latent demand for residential land close to the CBD could drive pressure for large apartment complexes beyond the existing residential neighbourhoods of Fishermans Bend.

**Authority is undermined:**
While not supported by current policy or intent for the precinct, it is important to consider the outcomes in the absence of clear direction supporting targeted development of the precinct. It reflects the type of incremental creep of development and change that has occurred in other precincts not supported with a clear vision, organising framework or governance structure to effectively plan for adequate transport and social infrastructure provision.

**Industry gets squeezed:**
In this scenario, industrial uses ultimately are unable to compete with residential or commercial development returns, which would undermine the economic potential of the whole employment precinct. Furthermore, land buffers are encroached on and some activities become limited. Social and residential uses prevail as we fail to provide the enabling public infrastructure required to support a significant, flexible and diverse employment base.

Figure 5 shows the expected growth of job numbers at Fishermans Bend for five distinct business types under our ‘fragmented development’ scenario. Given the desire under this scenario to pursue high and more-immediate financial returns from land development, we would expect a proliferation of professional services and retail would start to accompany the eventual rise in the residential land uses.
The year 2030: the employment and innovation precinct is in the early phases of evolution under our ‘enhanced’ scenario.
Fishermans Bend has the best opportunity to realise its full economic potential when planned and developed as a fully functioning and globally relevant Employment and Innovation Cluster. In this section, we present our analysis of what we believe the Fishermans Bend EIC should be aiming to achieve by 2030, with reference to the four key pillars of any successful inner city precinct:

**IMPLEMENTATION OF THE EIC**

Fishermans Bend was once the largest employment precinct for manufacturing adjacent to Melbourne’s CBD and a major contributor to the national economy. However, when the motor industry fell into sharp decline, no readymade replacement existed to occupy the skilled employment that had evolved on the site over many decades. This loss of industry and the advancement of technology resulted in the redistribution of economic activities. Despite this, a core hub of aerospace engineering, defence and light manufacturing remained and grew in place. This now provides a backbone from which to support and complement a thriving, growing and diverse employment community. Even General Motors Holden, while retreating from heavy manufacturing, is committed to establishing their remaining land holdings as a global centre for automotive design excellence. This strongly signals faith in Fishermans Bend as a location that has the potential to be globally significant as a centre for innovation.

“...WITH CAREFUL AND TARGETED GOVERNMENT PLANNING, INVESTMENT AND CURATION, THE SITE WILL BECOME AUSTRALIA’S NEW HOME FOR DESIGN, ENGINEERING AND ADVANCED MANUFACTURING, PROVIDING A SHOWCASE FOR COORDINATED WORLD CLASS URBAN RENEWAL AND ECONOMIC DEVELOPMENT.”

FISHERMANS BEND DRAFT FRAMEWORK, PAGE 48.
BUSINESS COMPOSITION AND HIGHER-VALUE ACTIVITIES

A critical aspect of the future employment narrative on Fishermans Bend is the change in the composition of business. The emergence of an EIC will shift this toward businesses of greater value per job to the local economy. To better measure how this composition of business needs to move from its current state to that of a mature EIC, we have grouped orthodox business activity types into the following categories:

1. Advanced manufacturing (AD MAN) — Those that revolve around the innovative application of technologies, processes and methods to product design and production

2. Tertiary education, research and scientific services (TERSS) — Universities, private institutes, research and development groups of private businesses, STEM-focused TAFE and government-based research organisations

3. Standard manufacturing (SM) — Those that use orthodox methods and processes

4. Wholesale trade, transport and warehousing (WTTW)

5. Professional, financial and technical services (PFTS).

Through comparing similar business compositions for global examples of EICs, we have found that, in general, the emergence of the research and primary commercialisation activities need to be not simply present, but rather to dominate the land use of the precinct.

By 2030, Fishermans Bend will need to support over 55,000 research and advanced manufacturing jobs if it is to establish itself as a world leader in innovation and the application of advanced technologies.

CONSOLIDATING OUR HOME-GROWN TALENT

While the specialisation of economic and business activity at this scale in a single location is new to Australia, the federal government has seen the emergence of advanced industries as important and is currently supporting the development of them through various well-funded programs. A prime example is the Advanced Manufacturing Growth Fund (AMGF) which has, since 2006, been investing in organisations such as Victorian firm MiniFab, an advanced medical technology producer, and LeMond Composites, which specialises in the application of advanced carbon-fibre technology, in an effort to increase the presence of commercially led, innovative research in Australia. In addition, the establishment of the not-for-profit Advanced Manufacturing Growth Centre (AMGC), head-quartered in Sydney, further assists businesses to better equip themselves to take their ‘proof of concept’ to full production. The results of these initiatives have yielded some success; however, as they tend to be stand-alone innovators, the ability to maximise the effectiveness of the federal government’s support through combining advanced industry leaders together, as seen in other countries, is yet to be realised. The lessons from the AMGC should be applied and replicated in the development of Fishermans Bend if Melbourne is to successfully create a conglomerate of innovation leaders and produce a ‘supercharged’ innovation cluster.

AVERTING A SKILLS SHORTAGE

An EIC is only as good as its skilled workers, thought leaders, talented researchers and lab technicians, creators, and entrepreneurs. Currently in Melbourne, a growing concern amongst universities and the biotech industry is the decreasing rate of secondary and tertiary students studying subjects and courses that will qualify them for high-tech STEM careers. If left unchecked, this represents a major headache for all of Australia’s ‘smart’ industries, including those that will be centred at Fishermans Bend EIC. Therefore, the EIC needs to become active in the education of the best and brightest Melbourne has to offer, regardless of economic advantage or background. This should include the development of several social and economic resilience initiatives aimed at ensuring a strong skills base is fostered and maintained to help the precinct thrive. Initiatives should include vocational training and support of secondary education STEM facilities, such as the Victorian Government’s Tech Schools initiative.  

Figure 6 shows the expected growth of job numbers at Fishermans Bend for five distinct business types. The intention for the global, or ‘enhanced’, EIC is for advanced manufacturing and tertiary education, research and scientific services to be the primary focuses of the employment precinct.
A CONGLOMERATION OF UNIVERSITIES

The lack of secondary students entering the tertiary STEM environment is one challenge facing our universities. So too is the attraction of international tertiary students, particularly at the post-graduate level. These are the people who will be initiating and directing much of the truly innovative research that the EIC will depend upon. The likely presence of at least two major local universities is critical to Fishermans Bend; however, the further inclusion of international institutes would allow a greater relevance of the precinct to global ‘knowledge’ markets. Conglomerations of similar universities have many distinct advantages, with the development of Western Sydney’s ‘Aerotropolis’ and innovation precinct attracting the commitment of four local universities. The University of Newcastle, University of NSW, the University of Wollongong, and Western Sydney University have all agreed to collaborate to create such a conglomeration in the coming decade. Fishermans Bend should be setting its sights on attracting a mix of local and global universities with the aim of creating ‘the’ place to study and research advanced manufacturing.

INNOVATION BORN THROUGH CREATIVITY

While it is critical to focus advanced manufacturing and allied research and teaching activities, a true EIC requires the ability to connect between the traditional ‘silos’ of any one technical discipline. Innovation is a ‘collision sport’ and a compelling part of why the best and brightest choose to work in a thriving EIC is so that they can ‘collide’ with curious, creative, innovative and naturally collaborative people, and learn from their experiences. In Australia, this does not happen as often as it should. In fact, as identified by the Australian biotech sector14 and comments made by Melbourne University’s Director of Innovation, Rose Hiscock15, much of the chronic skills shortage seems to result not simply from a shortage of technical brains, but also from a variety of all skills. The highly technical world of STEM research in Australia seems to be seriously lacking in influence and skills from the more entrepreneurial and creative industries, which is quite likely why we have not yet developed a strong culture of commercialising our research.

GOVERNMENT HELPS TO SET UP A COMMERCIALY SUSTAINABLE CENTRE

Using global precedents, such as the University of Sheffield’s Advanced Manufacturing Research Centre, which has developed into the much-larger Sheffield Advanced Manufacturing Park, we can gain insights into how Fishermans Bend could be better supported by several tiers of government and develop into a commercially sustainable collection of cooperating and competing businesses. Sheffield now hosts major advanced aerospace, automotive, energy storage and nuclear technology research and manufacturing facilities all within the same location. The ‘Park’ is only slightly larger in land area than the Fishermans Bend General Motors Holden site and, since 2004, through coordinated efforts from government and industry, has grown to be a centre of global significance, successfully commercialising the research conducted at the university and providing significant economic uplift to its region. The UK government has realised the incredible value of supporting these focused centres for the commercialisation of advanced technology research, dubbing it ‘high-value manufacturing’ and applying the ‘formula’ to four other locations across the country, in Bristol, Coventry, Middlesbrough and Glasgow.

MOBILE RESEARCH TEAMS ROVING THE GLOBE

In Germany, the Fraunhofer-Gesellschaft group does not focus on one specific ‘park’; rather, its combined 22,000 staff, with an annual budget of AUD$4 billion, work with a range of centres developing advanced technology and manufacturing solutions ‘ahead of society’s need’. This illustrates another model, whereby a partly government-funded organisation (approximately 30 percent of total funding)16 seeks to establish privately and publicly funded research projects with the aim of successfully developing commercial outcomes across a range of locations. Fraunhofer-Gesellschaft is currently active in Australian regional areas such as Bendigo, and should be included in considerations as a potential partner when developing the Fishermans Bend EIC.
Mobility

Currently, 95 percent of the employment precinct’s workforce arrives by private vehicle, and yet the Fishermans Bend Framework is seeking to achieve a target of 80 percent sustainable transport by 2050. Considering that the framework also aims to increase the working population to 80,000 employees this will mean that by 2050 we will see 128,000 daily trips being made by bus, tram, train, bicycle, walking (or other, as yet unconceived of, technology). This demand for sustainable transport is almost double the number of people who moved through Melbourne’s busiest train station, Flinders Street Station, each day last year.\(^1\)

Clearly, the way in which people move to, from and around the precinct will need to be dramatically transformed. The inclusion of ‘turn up and go’ services also assumes that the employment precinct will have incredibly good access to transit that is so frequent that it does not require a timetable — the hallmark of a true ‘metro’ network.

"Turn up and go public transport to be within 400 metres of 90% of dwellings and places of work and 80% of all journeys to be made by sustainable modes of transport like trains, trams, buses, cycling and walking." (Fishermans Bend Framework)

If the 2050 targets are to be achieved, we believe that by 2030 much of the ‘heavy lifting’ will already need to have been done. To support the dramatic increase in worker population expected by 2030, significant infrastructure will need to be in place earlier than this to cope with demand. If this infrastructure lags behind demand, then the precinct will always be playing ‘catch up’ right through until 2050.

THE YEAR 2019 PRESENTS A RARE WINDOW OF OPPORTUNITY TO ‘IMPRINT’ THE FUTURE TRANSIT SYSTEM OF 2030, AND THEREBY ESTABLISH A STRONG BASE FOR 2050.
By 2030, the establishment of both the transit route corridors through and to the site, as well as their role as major parts of the metropolitan transit network, will be critical. Furthermore, setting the behaviours and expectations of employees and the people of Melbourne in general as to the ‘culture of transit’ in Fishermans Bend must also be firmly established. And, by 2030, such an advanced system of sustainable transit based on ‘schedule-less transit services’ will be critical to the attraction and retention of innovative global institutes and businesses. We know from recent cases that major global technology firms are demanding this level of connectivity18. Their motivation is driven by their focus on recruiting and retaining the smartest and most-creative people on the planet. It is these individuals who require this infrastructure corridors.

A ‘FREIGHT RICH’ PRECINCT

Fishermans Bend already sits to the edge of a major port and freeway and has access to a major heavy logistics network which, by 2030, will most likely include a freight rail link that will connect the largest port in the southern hemisphere to the mainline rail route serving the rest of the Australian continent. If by 2030 Fishermans Bend is constructing heavy advanced equipment sought after across the world, then logistics will be one of its distinct advantages.

BUILDING THE TRAM LINK

We recognise that the challenges with a tram connection are more significant than simply bridging the Yarra. Connecting the Fishermans Bend light rail to the metropolitan system will require a significant rearrangement of the tram network at the Flinders and Swanston Street interchange. Therefore, we recommend that a progressive development of various ‘rubber wheeled’ transit services in the interim, both scheduled and on-demand services, be developed prior to completing the light-rail link. The future tenants are already developing their own plans for shuttle bus services. While this represents the start of a partly coordinated set of transit solutions, a proliferation of separate bus services serving the needs of single organisations will most likely make an integrated transit system more difficult to achieve in the future. By 2030, such an ad hoc system will be counterproductive to the aspirations of the framework’s sustainability targets.

BALANCING HEAVY FREIGHT WITH COMMUTER ROUTES

Fishermans Bend is aiming to be a manufacturing centre and trucks are integral to this vision. What they will mean is that research is being built and ideas are coming to life and being transported to customers. However, the mixture of desirable and amenity-driven workplaces with a complex web of major freight routes needs to be delicately balanced and very carefully managed. The clear way forward is to designate Lorimer Street as the primary ‘through’ freight corridor. Trucks, particularly during the extensive construction phase of the precinct, will always need to use other streets; however, the primary urban and transit corridors of Salmon and Turner Streets will need to be protected. When the heavy rail freight route from the Webb Dock is constructed it will most likely be along the Lorimer Street corridor, further reinforcing this as the ‘through’ route for heavy logistics serving the port.

SOLVING ITS OWN MOBILITY CHALLENGES

Given the low-density urban environment and ability to design for various transit modes, Fishermans Bend could also provide an ideal environment for testing a range of autonomous vehicles. La Trobe University has recently completed successful trials of its ‘Autonobus’ shuttle at its Bundorara campus19. It was able to achieve this partly due to the university’s ability to run the tests in its very own larger-scale road network. Perhaps La Trobe, with General Motors Holden, could be invited to develop the next generation of the Autonobus at Fishermans Bend? By 2030, it should be expected that the precinct will be trialling artificial intelligence-guided vehicles and teaching them how to drive through various urban areas in a partially controlled environment, and perhaps more importantly teaching Melburnians how to interact with them.

And why stop at autonomous cars and buses when there is currently a proliferation of other mobility systems being conceived? By 2030, we should expect to see light-freight ‘aerial remotely piloted vehicles’ (FARPVs) taking delivery vehicles off the roads, magnetic levitation (‘mag-lev’) streetscape travelators, or just simply advanced versions of electric bikes and scooters, accommodated with charging points and transit lanes.

The Fishermans Bend precinct has an inherent advantage over many others — its broad road reserves would allow the inclusion of multiple modes of transport simultaneously, with bus, light rail, cycling and walking all being easily accommodated. This is an advantage that will need to be maximised through careful planning in creating major infrastructure corridors.

By 2030, the establishment of both the transit route corridors through and to the site, as well as their role as major parts of the metropolitan transit network, will be critical. Furthermore, setting the behaviours and expectations of employees and the people of Melbourne in general as to the ‘culture of transit’ in Fishermans Bend must also be firmly established. And, by 2030, such an advanced system of sustainable transit based on ‘schedule-less transit services’ will be critical to the attraction and retention of innovative global institutes and businesses. We know from recent cases that major global technology firms are demanding this level of connectivity18. Their motivation is driven by their focus on recruiting and retaining the smartest and most-creative people on the planet. It is these individuals who require this infrastructure corridors.

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WATER TRANSPORT

By 2030, water transport should also be a part of the transit network of the precinct, though this would require close collaboration with the Port of Melbourne and use of part of their current leased port land. The benefits could make this negotiation worthwhile, with a connection directly to Docklands, and could include multiple ferry stops along Fishermans Bend’s Yarra edge. Even though this section of the Yarra is limited to five knots, the trip between ANZ’s national corporate headquarters and Fishermans Bend’s Salmon Street would take under 15 minutes.

SECTION SUMMARY

By 2030, the following will need to be achieved in order to meet the framework’s 2050 targets:

- Planning for heavy vehicle routes immediately, ensuring that all future industry has clarity over where these critical, but disruptive, vehicles can access the sites they need to
- Attracting innovative business and research institutes through the support of a ‘test bed’ precinct, allowing technologies being developed in the precinct to be applied and tested across the 230-hectare site
- Providing a connection to the Melbourne mass-transit network via light rail, and either achieving or having advanced preparations in place for a heavy rail ‘metro’ connection.

CONSTRUCTING THE ‘BONES’ OF THE PRECINCT

Given that the transit system will also need to play a major role in the development of the precinct, the movement corridors should begin to set the framework for the movement hierarchy, and therefore define how the urban form of the precinct develops. Using the existing axis of Salmon Street, connecting the residential precincts to the south to the Yarra River in the north, and Turner Street, along which the tram will run, we can begin to develop a robust macro structure.

The Salmon and Turner Street axes should then be the focus for the majority of the development, with the larger buildings and investment in the public realm being focused to create a strong set of urban corridors with the movement of freight vehicles to be established through Lorimer Street, thereby avoiding Salmon and Turner Streets. Major policies and strategies already in place, such as the City of Melbourne’s Urban Forest Strategy for Fishermans Bend, will need to be refreshed in response to the emerging precinct and should look to reinforce the likely key movement corridors through the investment of green infrastructure and the installation of significant canopy vegetation. By 2030, the beginnings of these boulevard-like corridors will need to have been established and to form the heart of the precinct.

Urban design

One of the most compelling aspects of the Fishermans Bend employment precinct’s urban form is also its biggest challenge: the built heritage fabric of the site. The Tonsley Innovation District in Adelaide provides an excellent example of how a repurposed heavy manufacturing facility can be converted, roof and all, into an innovation and employment precinct. The developers of Tonsley reused almost the entire long-span roof of the former Mitsubishi plant to create a five-hectare, weather-protected area within which businesses and universities ‘slotted’ their permanent and temporary buildings. While the giant sheds of Fishermans Bend do not lend themselves as easily to this ‘adaptive reuse’ due to their form and fabric, there are many significant cues to the way in which these buildings were designed and operated that should form the basis for a range of innovative architectural responses for the site.
BUILDING IN A FORMER WETLAND

The most-influential factor on the future built form of Fishermans Bend will be its ground condition. Fishermans Bend is located on what was once a swamp, and its ground is composed of what geologists call Port Melbourne Sands over Coode Island Silt. Fishermans Bend is unable to easily support buildings taller than eight to ten levels. It is possible to build significantly higher than this if the supporting piling structures are driven deeper to reach the harder bedrock, which in this case is over 30 meters below the surface and therefore a significant extra cost. Furthermore, if the wetlands were to be reincorporated into the precinct, as a type of restorative gesture, it is highly likely that the combination of groundwater contamination and acid sulphate soils would make a viable wetland habitat very difficult to achieve. With regard to the creation of adequate open space in the precinct, it would be far more effective to invest in the existing Parks Victoria managed wetlands to the west of the precinct, focusing on both sustainable habitat health and as an important part of the regional open space network.

SMART SHEDS, NOT GLASS BOXES

Given the need for highly collaborative uses of the site, including advanced manufacturing, research and tertiary education, the buildings will not be the blank-walled glass and steel business park forms of the 1990s, such as are common in some EICs like Silicon Valley. The need to create ‘loose fit’, ‘smart sheds’ that are able to adapt to the developing needs of teaching, learning, research and manufacturing will require a very different architectural and urban design response. Much like the robust versatility of a car chassis, these new forms will need to host a variety of additions that can be added to, extended or replaced. Uses such as ‘life labs’, commercial offices, heavy equipment testing areas, exhibition spaces and a range of communal spaces designed to allow ad hoc meetings will evolve, and so must the urban form. The buildings and open space then allow the precinct to support the ‘purging’ and emergence over time of the redundant and useful functions, typical of a ‘healthy’ innovation ecosystem.

AN ARCHITECTURAL RESPONSE TO INNER-CITY RENEWAL

Over the past century, the emerging urban form of Fishermans Bend has been one of large-scale sheds, factories, a port and an airfield; uses that are not at all reminiscent of the cosy and character-filled laneways that typify inner Melbourne and feature in our tourism brochures. As the area develops, the ‘post-industrial campus’ will emerge as an urban typology new to Melbourne. The insertion of new teaching, learning, research, and heavy engineering labs, studio space and allied commercial buildings will need to grow from the existing ‘over-sized’ urban environment, rather than simply ‘write over’ sections of the precinct. The temptation to simply erase the past in an effort to recreate business park forms of the 1990s, such as are common in some EICs like Silicon Valley. The ‘post-industrial campus’ will emerge as an architectural and urban typology new to Melbourne. The Parkville or City campuses of Melbourne University and RMIT, respectively, is neither a clever use of existing resources nor a culturally resilient way of developing ‘new’ parts of Melbourne. As much as the creation of a truly global EIC is an economic and social challenge, it is equally an enormous opportunity to develop a ‘new Australian’ architectural response to post-industrial inner city renewal.

THE MANY SHADES OF PUBLIC AND PRIVATE

The City of Melbourne’s detailed public and private space typologies provide an excellent framework from which the many emerging open spaces, coffee houses, mobile parklets, foyers, and weather-protected public areas of Fishermans Bend can be developed. As observed in recent research, successful EICs rely on a range of stimulating, comfortable, easily accessible spaces within, on top of, alongside and away from buildings, and the City of Melbourne already has the beginnings of a framework that can describe these.

WATER IN THE LANDSCAPE

These open spaces will also need to perform a serious water-management function. As a low-lying river-side precinct, Fishermans Bend also has a very high water table (one to one-and-a-half metres below the surface), meaning that when the area does flood it becomes difficult to drain conventionally through ‘pits and pipes’. Holding the stormwater in various smaller, specifically designed and planted ‘bio-retention’ areas will decrease the volume and velocity of water flowing across large areas of the site, which can often cause damaging flooding. These bio-retention areas could be considered ‘mini urban wetlands’ designed not to expose the acid sulphate soils or the groundwater contamination, but to soak up excess rainwater, hold on to it for a few hours and release it back into the drainage system. If approximately three to five percent of the
open space area were to be dedicated to bio-retention, the effect of damaging localised flooding could be significantly reduced alongside the additional benefit of cleaning all stormwater before it drains into the Yarra.

OPENING UP THE WATERFRONT

Once the Fishermans Bend EIC and the residential precincts start to develop, the desire for increased public access to the Yarra River is inevitable. The reality is, however, that as a working port the full northern edge of the precinct is currently required for port use. However, if smaller strategic sections, such as the northern end of Salmon Street, were to be developed as key transit, commercial and possibly high-value research locations, and once they delivered a higher financial return than the current uses, there would be an economic imperative to open up sections to public and non-port use.

SECTION SUMMARY

By 2030, the following will need to be achieved:

• Establishing the Salmon and Turner Street boulevards as the primary movement and orientation axes for the site
• Establishing a statutory planning framework by which to recognise the geotechnical constraints and the need for a new composition of urban land uses
• Seizing the opportunity to develop the precinct as a test bed for a new form of post-industrial inner-city architecture and urban design responses
• Ensuring that water management is prioritised in infrastructure and general master planning, that it is used to support the resilience of vegetation and that it demonstrates how water can be managed successfully in a challenging environment
• Refreshing policy and strategic documents, such as the City of Melbourne’s Urban Forest Strategy
• Opening up the waterfront and achieving this through a robust commercial argument and at locations that support the functioning of the EIC and residential communities to the south
• Taking the well-cultivated urban character of Melbourne as a cue for the design quality of the precinct’s development, while also making a distinctive environment suited to the functional needs of the EIC’s intended activities.

There is an incredible opportunity for Fishermans Bend to become a space for innovative infrastructure — a place where research leads to technological advancement that is developed, applied and commercialised within the precinct. Yet without planning, Fishermans Bend will struggle to support progressive industry needs, and the dramatic increase in activity expected for the precinct will see “business as usual” predominate, along with high levels of resource consumption. In essence, there is a real danger that it may become yet another consumptive, rather than a productive, precinct.

To be part of the progressive city of the future, four critical areas must be embedded into the precinct’s development:

• Energy
• Waste
• Water
• Communications.

Across these core utilities, the focus should be towards building resilience and autonomy, which will provide for business continuity and aim to achieve or exceed targets set by the Fishermans Bend Framework.

Infrastructure and utilities

As the framework states:

“ZERO NET GREENHOUSE GAS EMISSIONS BY 2050, VIA SMART BUILDINGS AND INFRASTRUCTURE, A STATE-OF-THE-ART SEWER MINING FACILITY WILL HALVE THE AREA’S WATER FOOTPRINT, DROUGHT-PROOF PUBLIC SPACES, AND REDUCE RELIANCE ON POTABLE WATER TO LESS THAN 100 LITRES PER PERSON PER DAY, AND 100% HIGH CAPACITY WIRELESS OR INTERNET ACCESS.”

FISHERMANS BEND DRAFT FRAMEWORK, P. 64

The targets set by the framework for 2050 are clear and require reasonable interim targets to be established and the necessary infrastructure investment by 2030 required to achieve them. The measures we believe are needed to achieve each of these targets are as follows:
For 2030, there are numerous technologies available today for immediate deployment and integration, including Solar PV (flat panel, Building Integrated (BIPV), concentrated), waste to energy, piezoelectric roads and pathways.

A precinct-wide water strategy can clearly articulate the role of water in the landscape and use highly visible ‘green systems’ water infrastructure to catch, convey, filter and store water as part of the built and natural landscape.

All surfaces are harnessed for stormwater runoff collection and utilisation according to the level of water filtration, and appropriate treatment is applied.

Waste-to-energy systems can be trialled in the precinct so that they are fast-tracked to become an effective supplement to the precinct-wide generation system and support waste as a resource.

A centralised waste facility for the precinct should include localised, low-impact collection vehicles that limit the movement of larger trucks throughout the precinct.

Waste is minimised and valued as a resource used for recycled products and energy (similar to nearby residents, currently over 70 percent of commercial and food waste is diverted from landfill).

A precinct-wide water strategy can clearly articulate the role of water in the landscape and use highly visible ‘green systems’ water infrastructure to catch, convey, filter and store water as part of the built and natural landscape.

World-average standard, high-speed digital communication infrastructure will enable Fishermans Bend to compete globally and attract the best and brightest from outside of Australia. This means that Fishermans Bend will need to find methods of far exceeding the performance provided by the 100 mbps National Broadband Network and search for alternative ways of supplying this increasingly important infrastructure.

With multiple universities and government organisations located in key parts of the site, it will be necessary to include access to the AARNET23 communications system running at 100 Gbps data transfer rate, 1,000 times faster than the NBN. Research and development-centric commercial operations and research institutes will also be able to use these systems so that Victoria’s, and Australia’s, global competitiveness is promoted and data can be easily exchanged at the required volumes without unnecessary impediments.

The Fishermans Bend site should strive to become the standard followed by others who want to obtain the benefits of the early adoption of technologies that result in the effective combination of academia, government and industry. We envision the placement of low-resistance, highly adaptable and scalable systems to assist the staged and progressive development of the precinct. Implementing the above strategies and supporting the resilience targets and power security needs would ensure that the associated carbon reduction and commercial benefits continue through the life of the precinct, thus positively contributing towards the overall resilience of Melbourne.
BUILT ENVIRONMENT RESOURCE COST AND CARBON CONTRIBUTION FOR FISHERMANS BEND (2030):

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>FRAGMENTED DEVELOPMENT</th>
<th>CURRENT FRAMEWORK</th>
<th>ENHANCED EIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>+50% increase in cost *</td>
<td>BASELINE</td>
<td>-20% decrease in cost *</td>
</tr>
<tr>
<td>GHG emissions</td>
<td>+50% increase in carbon emissions</td>
<td>BASELINE</td>
<td>-20% decrease in carbon emissions</td>
</tr>
<tr>
<td>Water</td>
<td>+65% increase in cost *</td>
<td>BASELINE</td>
<td>-0.4% decrease in cost *</td>
</tr>
</tbody>
</table>

* This costing is based on current market rates for the resource and assumed usage under the different scenarios.

**ENERGY FACTS**

- **FRAGMENTED DEVELOPMENT SCENARIO**
  - Expected use by 2030: 610 GWh/annum
  - Expected generation: 655 GWh/annum

- **CURRENT FRAMEWORK SCENARIO**
  - Expected use by 2030: 530 GWh/annum
  - Expected generation: 530 GWh/annum

- **ENHANCED EIC SCENARIO**
  - Expected use by 2030: 330 GWh/annum
  - Expected generation: 50% waste-to-energy diversion

**WATER FACTS**

- **FRAGMENTED DEVELOPMENT SCENARIO**
  - Expected use — 1.9 GL/annum
  - Harvested — 1.1 GL/annum

- **CURRENT FRAMEWORK SCENARIO**
  - Expected use — 1.1 GL/annum
  - Harvested — 1.1 GL/annum

- **ENHANCED EIC SCENARIO**
  - Expected use — 1.1 GL/annum
  - Harvested — 1.1 GL/annum

**WASTE FACTS**

- **FRAGMENTED DEVELOPMENT SCENARIO**
  - Of waste to landfill: 7.0 KT
  - Waste-to-energy diversion: 4.4 KT

- **CURRENT FRAMEWORK SCENARIO**
  - Of waste to landfill: 5.3 KT
  - Waste-to-energy diversion: 4.4 KT

- **ENHANCED EIC SCENARIO**
  - Of waste to landfill: 4.4 KT
  - Waste-to-energy diversion: 4.4 KT

The information developed above is based on the following sources:

- Nabers Reverse Calculators
- TEFMA Benchmarking Guidelines
- University of Melbourne Live Energy Metering
- City of Melbourne Waste Generation Rates
To better understand the advantages presented by each of our development scenarios, we have undertaken a preliminary assessment that draws on environmental, social and financial considerations as a ‘triple bottom line’. The assessment is structured to provide a high-level comparison of the scenarios, showing the extent to which each performs in relation to this triple bottom line. It is intended to provide an early indication of the order of magnitude of the trade-offs required under each of the development scenarios. This process we have dubbed the Urban Precinct Investment Tool.

Table 1: Assessment goals, criteria, indicators and metrics

<table>
<thead>
<tr>
<th>TYPE</th>
<th>REFERENCE GOAL</th>
<th>CRITERIA</th>
<th>INDICATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCIAL</td>
<td>A connected and liveable community</td>
<td>Sustainable transport</td>
<td>Eighty per cent of trips are made via sustainable transport</td>
</tr>
<tr>
<td>SOCIAL</td>
<td>A connected and liveable community</td>
<td>Accessibility</td>
<td>A walkability score of 90% from homes and workplaces</td>
</tr>
<tr>
<td>SOCIAL</td>
<td>A connected and liveable community</td>
<td>Community interaction</td>
<td>A focus for community interaction</td>
</tr>
<tr>
<td>SOCIAL</td>
<td>A prosperous community</td>
<td>Employment</td>
<td>Fishermans Bend’s economic resilience and diversity is improved</td>
</tr>
<tr>
<td>SOCIAL</td>
<td>A prosperous community</td>
<td>Business support</td>
<td>High-capacity wireless or internet is provided across all of Fishermans Bend</td>
</tr>
<tr>
<td>ENVIRONMENTAL</td>
<td>A climate ready community</td>
<td>Climate resilience</td>
<td>The community is resilient to the shocks and stresses of climate change</td>
</tr>
<tr>
<td>ENVIRONMENTAL</td>
<td>A water sensitive community</td>
<td>Water use</td>
<td>Potable water demand of less than 100 litres per person per day</td>
</tr>
<tr>
<td>ENVIRONMENTAL</td>
<td>A low-carbon community</td>
<td>GHG emissions</td>
<td>Fishermans Bend will achieve zero net greenhouse gas emissions by 2030</td>
</tr>
<tr>
<td>ENVIRONMENTAL</td>
<td>A low-waste community</td>
<td>Waste management</td>
<td>50% of all food waste is diverted from landfill</td>
</tr>
<tr>
<td>ECONOMIC</td>
<td>Development costs</td>
<td>Capital costs</td>
<td>Estimated cost</td>
</tr>
<tr>
<td>ECONOMIC</td>
<td>Operating costs</td>
<td>Estimated cost</td>
<td></td>
</tr>
</tbody>
</table>

METHODOLOGY

In developing the assessment methodology, we have drawn heavily from the Fishermans Bend Sustainability Strategy. We have identified a range of environmental and social assessment criteria that are aligned with the strategy. We have developed indicators and metrics that have allowed us to understand the extent to which the criteria may be met under each development scenario.

Table 1 contains the goals, criteria and indicators used to undertake the assessment. The elements include the anchor points to the Fishermans Bend Sustainability Strategy, which have been further developed by AECOM. We will ‘test’ these through future workshops with key stakeholders.
The nature of the information provided in each of the masterplans has purposely been 'high level' and is intended to provide an indication of the relative performance of each of the scenarios against the criteria. In a number of areas, the assessment has been qualitative. As the assessment tool is further developed, we anticipate being able to draw on quantitative assessment to a greater extent. This will improve the transparency and robustness of the assessment.

Our ambition is to extend the assessment framework so that it can provide greater decision-making power in the form of an assessment tool. To gain a greater understanding of the return on investment, we want to be able to consider both the direct and indirect (or ‘off-set’) costs and benefits associated with a development of this scale. We believe this is critical for establishing the evidence base necessary to confidently support investment in Fishermans Bend.

This more-advanced assessment tool will allow the expected performance of a scenario to be estimated. It will help determine the effect of major infrastructure investment at specific points in time. In this way, we aim to optimise the return on investment over the course of the Fishermans Bend’s development up until 2030.
Fishermans Bend has intrinsic attributes that are critical to the success of any EIC, including its highly accessible location between the city and the bay, enjoying direct access to freeway and port facilities and easy access to rail, coupled with its role as the current home to leading, innovative enterprises. Indeed, it has been a critical force for Australia’s industrial development and employment for over a hundred years.

One century on from the government’s first push that drove the rapid expansion of Fishermans Bend, the time for conscious and coordinated action has come again.

While the vision for the employment precinct may be clear, there is a lot of work to do to develop and deliver a necessary and detailed idea of ‘what, how and who’ in the next one-to-ten years. Our recommendations, consistent with our research into EICs and our previous report, Transforming Melbourne and Victoria with Employment and Innovation Clusters, establish the early actions that are critical to success, which we have summarised in the list of recommendations below.

To drive higher value from the precinct and create the globally significant EIC Fishermans Bend aspires to, we will need to accomplish the following:

1. **Develop a Governing and Coordinating ‘Authority’**
   - tasked with actively seeking international tenants, articulating the economic benefits of investment, administering all actions related to achieving the framework’s targets, streamlining planning and decision-making processes, managing financial resources and acting as an international ‘champion’ for the precinct

2. **Invest in Rubber-Wheeled ‘Pre-Light-Rail’ Transit Solutions**
   - and engage with light-rail operators to develop a more-detailed understanding of how a Fishermans Bend extension will benefit and challenge the broader network, including value creation and co-financial models

3. **Attract International Universities**
   - to complement the local universities and drive global collaboration and access to international ‘knowledge economy’ markets

4. **Focus on the Advanced Industrial and Manufacturing Sector**
   - building upon the clear strengths of the existing businesses and an authentic connection to the history of the site, working reciprocally with the existing globally renowned bio-medical research clusters of Parkville and Monash

5. **Actively Include the Creative Industries**
   - (e.g. film, interactive media, publishers, advertising, and dramatic arts) in considerations for major tenancies to foster a thriving local culture based on the tolerance, curiosity and self-directed exploration that is so attractive to entrepreneurs and knowledge workers and to engender more cross-disciplinary collaboration that is often key to developing and applying innovative designs and processes

6. **Strongly Support the Salmon Street ‘Spine’**
   - and the light rail corridor (Turner Street) as priority EIC land use development areas, negotiating major enabling works to support development along these spines and ensure that these are developed as distinctive urban boulevards providing character and orientation to the precinct. In addition, begin planning for Lorimer Street as a ‘freight route’

7. **Look Beyond the General Motors Holden Site**
   - and actively support the development of other ‘campus’ zones that complement the GMH ‘core’

8. **Open Up the Waterfront**
   - by negotiating with the Port of Melbourne to profitably reinvigorate underutilised waterfront land for public amenities, including, possibly, ferry access, and new office and research space

9. **Invest in the Precinct as a Test Bed Location**
   - to demonstrate emerging technologies, such as 5G communications, autonomous vehicles, and resource management infrastructure (e.g. energy, waste and water)

10. **Engage with Businesses, Large and Small**
    - that are currently active in the precinct, allowing them the opportunity to understand, take advantage of and grow into the longer-term advanced industrial vision for the precinct.
ENDNOTES

1. For the purposes of this report, we refer to advanced industries, which include advanced manufacturing, and we use the definition supplied in a Brookings Institution report, America’s Advanced Industries (2015), which defines advanced industries as: having R&D spend in the top 20 percent across all national business; requiring 20 percent of all workers to have a higher degree in STEM; investing heavily in technology innovation; and employing skilled technical workers to develop, diffuse, and apply new productivity-enhancing technologies.


3. This includes the estimate of the value added by economic activity generated by direct employment associated with advanced industries, research and its commercialisation.


5. Across the Los Angeles Metropolitan Statistical Area, which includes Los Angeles, Long Beach and Anaheim.

6. Information used to develop these estimates has primarily been derived from sources, such as the ID Community Profile for Australia, the ABS and CLUE Data.


8. Ibid. See the chart on p. 5.


11. All development scenarios initially allow for an increase in employment. However, given its relatively weak land controls, the ‘fragmented’ development scenario will allow for greater use of land that does not support significant employment growth and therefore will not result in the creation of as many jobs as the other two scenarios.

12. For the purposes of this paper, we are using a definition of ‘advanced manufacturing’ as involving, “the use of technology to improve products and/or processes, with the relevant technology being described as advanced, innovative, or cutting edge”, which is found in the following Wikipedia article: https://en.wikipedia.org/wiki/Advanced_manufacturing. The (US) National Institute of Standards and Technology also offers a lengthier definition, that can be found here: www.coursera.org/lecture/advanced-manufacturing-enterprise/advanced-manufacturing-defined-AKnZW


14. As spoken about by representatives of the sector, such as Dr Krystal Evans, CEO of the BioNetwork Melbourne.


In Sydney, Google famously backed out of their relocation to White Bay in 2017 citing the lack of public transport provision. In addition, Amazon’s HQ2 brief calls for a strong connection to public transport.

Mobile public realm furniture, often including vegetation and seating and built within a surplus shipping container or large skip. See: www.envisiondowntown.com/project-blog/2017/8/10/mobile-parklet

Brookings Institution’s The rise of Innovation Districts (2016) and AECOM’s Transforming Melbourne and Victoria with Employment and Innovation Clusters (2018).

As outlined by the Urban Stormwater: Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999) bio-retention units should be designed to remove significant amounts of nitrogen, phosphorous and the ‘total-suspended solids’ from urban runoff to make a significantly positive impact on waterway health.

The AARNET is a government-supported digital communications network supporting Australia’s academic and research institutions. More can be found at www.aarnet.edu.au/

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As discussed in greater depth in AECOM’s Transforming Melbourne and Victoria with Employment and Innovation Clusters (2018) report.
APPENDIX

LIST OF EIC PROJECTS

UNIVERSITY OF SHEFFIELD ADVANCED MANUFACTURING RESEARCH CENTRE (AMRC), SHEFFIELD, UK

The AMRC specialises in research into advanced machining, manufacturing and materials, with more than 100 industrial partners, including Boeing, Rolls-Royce, BAE Systems and Airbus. It has 11 core capabilities ranging from integrated manufacturing to medical to design and prototyping, to virtual reality, and employs about 500 researchers and engineers.

It includes a number of subcentres, such as the Rolls Royce Factory of the Future and is also part of the ‘High Value Manufacturing Catapult’, which is “an alliance of seven leading manufacturing research centres backed by the UK’s innovation agency, Innovate UK”.

KENDALL SQUARE, MASSACHUSETTS, USA

A four-hectare, award-winning, development of offices, labs, apartments, restaurants, retail space and open and cultural space next to Harvard University and the Massachusetts Institute of Technology (MIT).

Precinct planning relied on collaborating closely with MIT, the community and other stakeholders, and MIT’s links with local government and industry is having positive benefits for growth in the precinct.

TECH CITY, LONDON, UK

In 2010, the UK Government pledged £200 million to support technology and innovation centres and Tech City in East London benefited from this, as well as private-sector funding, particularly from the professional services sector. It is home to 1,340 companies, including 137 technology companies, such as Cisco, Google, Intel and Facebook, and 700 public relations and design agencies.

22@BARCELONA, BARCELONA, SPAIN

22@Barcelona comprises 220 hectares of former industrial land east of the city centre that has been renewed to create an innovation precinct that is expected to be home to 4,500 companies (of which 50 percent are expected to be startups) and 130,000 new jobs by 2020. It includes new road links, office facilities, social housing and green spaces.

AUSTRALIAN TECHNOLOGY PARK, SYDNEY, AUSTRALIA

Created in 1995 by the NSW Government and local universities, the ATP’s 14 hectares of land house 100 firms and 5,500 jobs and research positions. Through the ATP’s relationships with the community, including business schools and Indigenous groups, it demonstrates how inclusive planning can transform a local economy. In 2015, the ATP was sold to a private developer that will privately fund new construction on the last three development sites.

MACQUARIE PARK: INNOVATION DISTRICT, SYDNEY, AUSTRALIA

Macquarie Park’s 350 hectares are home to Macquarie University, a CSIRO centre, 180 large companies — including the 6,000-person Optus campus — and 200 smaller companies, comprising a total of 45,000 jobs and a $9.2 billion per annum contribution to Australia’s economy. It features a range of initiatives designed to bring people together in ‘collision spaces’, and through hackathons and other events that mix large companies, startups, researchers and students.
ABOUT AECOM

Whether it is helping cities to prioritise capital asset reliability, plan for climate adaptation, protect assets or provide for sustainable economic development, we see the opportunity to not just build resilience but achieve brilliance. We believe that cities positioned to excel in this time of global change are pursuing broad, integrated strategies to tap hidden value, celebrate ecology and culture, attract people and investment, and overcome financial and operational inefficiencies. These are brilliant cities. Brilliant cities aren’t just smart. They are visibly vibrant and delightful. They shine.