

Game on

**Delivering sustained infrastructure outcomes
through major sports and cultural events**

Playing the long game

Major international events are a high-stakes game with tens of thousands of athletes and media, hundreds of thousands of volunteers and millions of visitors. The world is watching – and the investment is too big to fail.

Despite the risks, for the host there's glory up for grabs. The local economy gets a boost, and the international spotlight is an opportunity like no other for tourism and business promotion. But beyond this, there's the chance to catalyse urban and regional regeneration and transformation, and create or enhance venues, transport, housing and precincts that will deliver benefits to communities for generations.

Other wins are less tangible but just as profound. A major international event can spark connection, celebration and greater civic pride. It's an opportunity to innovate, to encourage new behaviours, address inequities, embed flexibility and resilience, and move towards greater social, environmental and economic sustainability.

To capture this ongoing value will take vision, collaboration and commitment. It will need clear short-term and long-term goals, and a strategy to achieve both. And at the heart of the strategy must be the community. When the community is involved in the planning and decision-making process and can help shape both the event experience and how best to utilise the infrastructure afterwards, major events will be supported as citizens will see their value.



Large-scale events have the power to bring forward investment and accelerate infrastructure on a compressed timeline – often achieving decades of development in only a handful of years.”

Chris Rogan, Brisbane Managing Partner



Playing the long game

How the Commonwealth Games accelerated investment in host cities

Hosting the Commonwealth Games has provided opportunities for previous host cities to accelerate or enhance capital investment in population-serving infrastructure projects to achieve wider objectives and enduring benefits.



Birmingham's 2022 Games saw £778 million of public investment accelerate the development of world-class venues, 5000 new homes, and major upgrades to transport infrastructure that will leave lasting benefits for the city and the region. Investments in facilities included a £72 million refurbishment of Alexander Stadium and £73 million to develop the new Sandwell Aquatic Centre. £60 million from an overall underspend on the 2022 event will now be invested in the region to increase community access and participation in sport and culture, enable hosting of future events, and boost tourism and business development. The core public funding unlocked further private-sector funding, and has helped revitalise the region's economy.



The Gold Coast 2018 Games catalysed economic development of the area and investment in key transport projects, including the investment of \$260 million for improving the airport, \$366 million for the extension of the Gold Coast light rail by 7.3 km, \$143 million for heavy rail duplication of 8.2 km of single track, and \$146 million for the acceleration of major road upgrades across the Gold Coast. Wider policy objectives included \$21 million spent on arts and cultural events, \$7 million on other legacy events, \$5 million spent towards public domain improvements and \$3.5 million on the Gold Coast Carrara Precinct.



In Glasgow, the City Council used the Games in 2014 to accelerate investment in transport infrastructure (£474 million) and regeneration of the East End (£96 million). Close to £580 million of investment was accelerated to improve access across and into the city. As part of the Culture 2014 program, £14 million was invested in community engagement and cultural events and another £14 million in ensuring legacy outcomes for communities.



Melbourne's investments for the 2006 Commonwealth Games included \$39 million for upgrading public transport and infrastructure around stadiums, resulting in improved pedestrian access to the Melbourne Cricket Ground and better facilities at Jolimont Station. It also invested \$52 million in business, community and environment programs with legacy benefits.

Venues

Sweating the assets 365 days a year

From some cities that hosted major events in the past, images have emerged of abandoned, decaying venues. Such relics are a serious risk to the reputation and economy of a city or country and to major events franchises themselves. To avoid expensive white elephants, cost blow-outs and community resentment, some changes are needed – and are now emerging – in the approach to venues.

Planning for generations, not weeks

Given that stadiums and other sports and cultural venues require enormous financial investment, planning these spaces needs a very long-term view of how to maximise the life of an asset across generations. How can the venue hum on event days as well as year-round? How can it remain vibrant for 30 to 50 years and continue to meet the needs of its community? This vision needs to be part of the business case from the start.

Planning must also carefully consider how the asset can be adapted and even improved over time. For example, many older facilities did not anticipate women's increasing participation in and engagement with sport, and the growing popularity of professional women's sports such as football and cricket. These venues now require significant upgrades of facilities to make them fit-for-purpose for sports and events, to raise their accessibility, and to ensure they can meet the diverse needs of participants and attendees.

Building fewer new, permanent venues

In the lead-up to their impending events, Paris and Los Angeles have announced ambitious targets to minimise new venues – as low as 5% or even zero 'new build'. This won't be possible or even desirable everywhere. Particularly in regional Australia – but also in some of our major cities – many new sports facilities are needed for the community, and the venues are easily justified. Bringing forward these investments will contribute to the long-term health, amenity, economy, reputation and appeal of these areas.

The solution to minimising new-build venues is in finding innovative approaches to retrofit, 're-wrap' and augment existing facilities, or to create temporary facilities or modular components that can be demounted, moved, re-used elsewhere or recycled in meaningful, sustainable ways. This can reduce the cost and duration of construction, but can also provide greater flexibility and reduce ongoing operational costs. The design challenge will be finding solutions that enable re-use, so that temporary facilities are not simply assembled, disassembled and scrapped.





A versatile and flexible design is central to the ability to sweat the asset – which unlocks the full social and commercial potential of investment in new major sporting venues.”

Clancy Mears, Partner, Integrated Infrastructure

Maximising optionality and activation, every day

Many major stadiums are only used between 30 and 50 times a year for sports or entertainment events, which means that for the other 300+ days they're lying idle. To get the most from these venues, they need to be places for communities and tourists to enjoy every day of the year. Design solutions with maximum flexibility and optionality are key to year-round activation and regular, ongoing community use.

It will be easier to use venues for functions and corporate events, and to attract patronage to retail, cafes, bars and restaurants, if these secondary uses are incorporated and integrated into the design from the start. This might mean thinking differently about the entry sequence, approaches to security, the location of kitchens, and more. Ideally, some components and sections can face both inwards and outwards on event days, while maintaining their outward availability 365 days of the year.

Securing supply chain and procurement

A major challenge on the horizon for creating and upgrading venues in Australia over the next decade will be procuring enough skilled workers and the necessary building materials when and where required. There is likely to be strong competition across the massive social infrastructure pipeline and across states and cities for a limited pool of tradespeople, contractors, architects, engineers, project managers and the many other skillsets involved in infrastructure.

Shortages may also make it difficult to achieve ambitions for prioritising local procurement and materials. Governments will need to keep an eye on what other projects are in the market, and look to innovation in workforce development, so that they can attract the right skills at the time that they're needed.



Venues

Long-term asset management and maintenance

Customer experience at venues counts for a great deal, and crowds expect that venues will be in good condition for many years. It is important to understand and budget for the long-term operational and capital costs to maintain venues to the desired standard. Good maintenance brings greater certainty that the assets and systems will perform to expectations and events won't be impeded by any critical asset failures.

Asset performance data can be used to optimise asset expenditure across venues and potentially extend the life of key components. Good asset management practice will also enable flexibility for the building to adapt and change with technology developments over time.

Venues for today's communities and the future

PwC has been involved in the upgrade of Melbourne's Marvel Stadium since 2018, including developing the functional and technical brief and serving as design manager across the large project. As part of the upgrade, state-of-the-art facilities were developed for male and female teams, including gender-neutral facilities for spectators. We also project-managed Perth's Optus Stadium, which also incorporated flexible spaces and facilities to cater for changing use patterns. For both stadiums, community and stakeholder consultation was extensive so that we could understand the many and various stakeholder needs and balance these with operational considerations, capacity objectives, project budgets and state requirements. Many different stakeholders were included from across sporting codes, operational staff, event promoters, access groups, media, emergency management authorities and sports fans.



Transport

Moving millions in the peak and beyond

Moving millions of people safely and seamlessly around cities and regions is a huge test, even in everyday circumstances. When we add hundreds of thousands of visitors, athletes, media and volunteers moving around event precincts and flooding in and out of venues, the logistical puzzle becomes extraordinary. The challenge is to plan and deliver targeted transport upgrades that will best support the demands of the event period, while also leaving optimum benefits for the long-term mobility of locals and visitors.

Every major city or region has a range of stakeholders to consult on transport priorities including governments and agencies, transport authorities and operators, venue and event operators, local communities, tourism, hospitality providers and other interest groups. The guiding principle needs to be providing a customer experience that spans the whole journey from start to finish with services that are flexible, accessible and easy to use. Stakeholders will share a desire to realise lasting value, including improved outcomes for the environment, communities, investment and economic uplift.

The event period: joy ride or nightmare?

Social licence to hold major events can hinge on the transport experience: it is hard to 'win' or to capitalise on, but it is extremely easy to 'lose'. That said, if the transport works well, it can add immensely to a city or region's reputation and the visitor experience. That's a terrific opportunity to go beyond achieving services that merely meet base-level expectations, and to harness innovation and creativity to deliver impressive and enjoyable journeys. Great transport can be an ambassador for the host city or region, and an enduring source of pride for locals, not to mention the environmental and economic benefits it can bring to a region.

“

If we get the transport right, it will go mostly unnoticed; if we get it wrong, it will be what everyone talks about and remembers.”

Steffen Faurby, Managing Director, Integrated Infrastructure

The twin challenge – routine vs events

During a major event and a massive influx of visitors, how can the local community continue to get to work and smoothly achieve the myriad other movements of daily life while also attending these events? Visitors and the community are tapping into the same assets and the same workforce who operate the assets – so at some point there's likely to be a crunch. Applying smart data analytics and transport modelling can help us understand the behaviour and resilience of the transport network and how it responds to new, post-pandemic travel patterns. It can predict and test use-patterns and pressure points, provide an agile and dynamic trigger to right-size and in-source assets when and where they're needed, and optimise the use of assets to reduce costs to organisers. There's already a great deal of usable data across all transport modes that can be used in a range of ways including enabling customers to make informed transport choices that will help manage the flow and ultimately create better experiences. The use of data is limited only by imagination.

Managing the peak

The experience of a major large-scale event begins on a mode of transport and doesn't end until we're home. The experience can easily be marred by long waits and queues, overcrowding, cancellations and strandings at the peak times close to an event, especially if this coincides with the commuter peak. To alleviate pinch points, it's best to try to widen the peak. Pressure on the system will be lessened if visitors can be encouraged to stay longer within the precinct, with better outcomes for local traders. When demand for event transport can be decoupled from routine peak travel and spread more evenly throughout the day and night, we can better utilise the existing fleet and unlock latent capacity in the system, reducing the need to in-source extra transport assets.





Resilience in the moment as well as in the tail

Service interruptions happen every day of the year and transport agencies generally do a great job managing them. The methods for dealing with local isolated incidents can be scaled up and applied to bigger challenges. However, when resilience is called for, there's often a long tail of implications. Once the emergency has been dealt with, are there still enough operators who are fit and rested to cover the next day's regular services? Are enough vehicles fuelled, cleaned and maintained for the next day's services? Real resilience runs deep – and it is measured not only in the moment of emergency, but even more so in the aftermath.

Showcasing innovation

Major events are an excellent opportunity to trial operational improvements as well as accelerate investment in transport innovation. It's an environment in which innovation is expected and can build reputation. This is the time to demonstrate zero-emissions buses, accessibility improvements, real-time user information, innovations in communication, and even inventive artistic or cultural elements – all adding extra layers to the visitor experience and building civic pride.

Long-term improvements for communities

A large-scale event can be a catalyst to bring forward public and private-sector investment in transport infrastructure to accommodate future growth and change, and to drive better outcomes for communities sooner rather than later. Upgrades of assets and stations, extensions to routes and services, enhanced capacity and accessibility, and improved wayfinding and communications will improve the visitor experience, but also provide long-term benefits for locals and cater for ongoing city and regional growth. These investments can also address equity and capacity issues in our current transport networks. The Munich Games, for example, is regarded as having brought forward the development of the city's metro network by more than a decade.

While it's much easier to futureproof transport systems in the design phase of precincts and regions than to retrofit solutions into existing precincts, all investment in improved transport can leave enduring benefits when designed through deep and ongoing engagement with communities and customers to understand their priorities and needs now and into the future.

An impending event should spur an even closer look at where to target upgrades to accessibility and inclusion. It's also an opportunity to invest in integrated, appealing and safe walking and cycling paths that will encourage active modes of transport, thereby reducing pressure on public transport and helping shift car dependency. This is the time to embrace place-based approaches where trips are not considered in terms of mode but as the optimum journey. Net zero goals can also be supported by rolling out and encouraging uptake of electric solutions powered by renewable energy.

World-class transport systems put cities and regions on the map, encouraging tourism, immigration and investment.



One of the great opportunities of a major international multi-day event is teaching the community to love public transport in what may traditionally have been a car town.”

Tim Reardon, National Transport and Precincts Leader

Housing

Designing villages to ease the housing crisis

Housing is a hot topic, and not only in Australia's major cities. With increasing costs of living, inflation and interest rates, homes are harder than ever to buy and expensive to rent. Even finding a secure room for the night is out of reach for a growing number of Australians experiencing homelessness. In this troubling context, how can we approach the development of athletes' villages in a way that will leave optimal, enduring benefits for the many hundreds of thousands of Australians struggling with the housing crisis?

Planning the right typology and location

Housing that is built to serve the temporary needs of events must be able to be repurposed to meet the needs of those who will live in it over the long term. To understand these needs takes wide consultation and engagement across the community, stakeholder groups and all levels of government, as well as a deep understanding of the catchment of the area, existing and future demand, the components of liveability, and the factors driving change. It is also critical to think about what we want the community to look like for many more generations of residents who will move in.

For example, how much social and affordable housing is needed in comparison to private ownership? Is there potential to incorporate crisis housing to build community resilience to future shocks? How many 1, 2, 3 or 4 bedroom dwellings might be needed, and could the design of the temporary accommodation be easy to modify to achieve this? How many dwellings should be fully accessible to people with mobility challenges in the short and long term? What public transport, parking and active transport connections are needed in the area? What sorts of community facilities, services and open spaces are needed to provide greater liveability and social connection? And what about fundamentals such as access to healthcare, jobs and education?

“

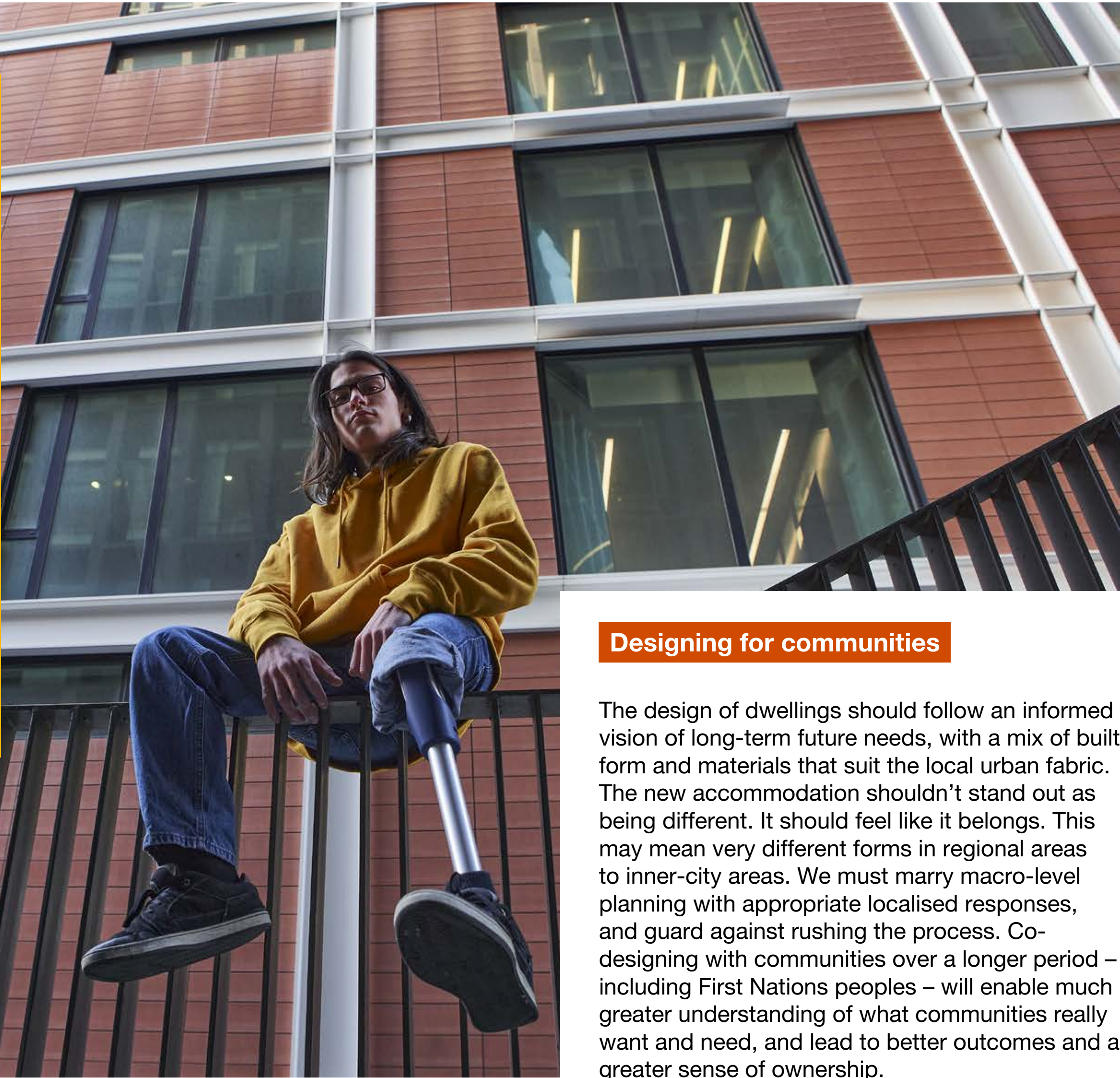
Rather than focusing our thinking on creating athletes' villages, let's start by deeply considering how to meet long-term housing needs. What we build for temporary events needs to deliver the right typologies in the right locations to help communities thrive long into the future.”

George Housakos, National Housing Leader



Learning lessons from the past

Consolidating the learnings from previous events villages, such as Melbourne’s Heidelberg West and Parkville Gardens, can help future investments in events-related housing to deliver enduring positive outcomes for communities, both in the cities and the regions. Getting the policy and strategies right is critical to achieving lasting benefits for generations. Melbourne’s 1956 athletes’ village, now known as the suburb of Heidelberg West, saw cheap housing stock repurposed as social housing, and became an enclave of entrenched intergenerational disadvantage. However, Melbourne’s purpose-built 2006 village in Parkville heeded many of Heidelberg’s lessons. Parkville Gardens now serves an important purpose by providing 1600 dwellings, including 20% social housing and an aged care facility. Although it will take time to become more deeply embedded, established and diverse, and would benefit from improved access to public transport and shops, Parkville Gardens did embrace a strong and positive sustainability ethos, incorporating 6-star energy ratings, recycled materials, rainwater collection and recycling, solar lighting and tree planting. The inclusion of sustainability features and universal design will continue to be expected as a baseline for events-related accommodation developments, in keeping with the values of local and state governments.



Designing for communities

The design of dwellings should follow an informed vision of long-term future needs, with a mix of built form and materials that suit the local urban fabric. The new accommodation shouldn’t stand out as being different. It should feel like it belongs. This may mean very different forms in regional areas to inner-city areas. We must marry macro-level planning with appropriate localised responses, and guard against rushing the process. Co-designing with communities over a longer period – including First Nations peoples – will enable much greater understanding of what communities really want and need, and lead to better outcomes and a greater sense of ownership.



Who pays?

The cost of providing accommodation tends to fall very heavily on the host city or state, but it shouldn't be seen as a burden to offload to the market and sell down once the event is over. With a good understanding of demand, connections can be built in advance with private sector capital, agencies or other partners who can contribute early (whether in time, money or debt provision), with the housing deployed as soon as the event concludes. The more that these players are included in the early conversations, the stronger the legacy will be.

First Nations housing must be a priority

With a chronic undersupply of First Nations housing, it is crucial that any planning for new housing includes more than token consultation with First Nations people. Given the context of prior dispossession and displacement from Country and ongoing disadvantage, addressing First Nations housing can be a step towards Reconciliation. But this will take genuine, unhurried conversation and community-led processes. We've recognised through our work with Aboriginal-controlled community organisations, land councils, and other Aboriginal agencies that these conversations need to be much broader than physical form – extending out to what housing really means to the community. We've observed through focused consultation that culturally aware and well-designed housing can enhance Aboriginal cultural and family life.

Precincts

Making places for people and posterity

The experience of a major, multi-day international event should extend far beyond what happens inside a stadium. Although venues can be the ‘glue’ of a precinct, it is areas around these buildings that can create vibrant, welcoming sites of celebration, connectedness and civic pride. Precincts need to be carefully planned and designed so that they’re great places during an event but also maintain a strong, ongoing pulse once the crowds go home.

At a minimum, a venue should serve as an anchor for a precinct and provide a smooth, enjoyable experience for participants, volunteers and visitors. But a major international event is an opportunity to aim much higher.

This is the time to bring forward new investment in ambitious, future-focused place-making and renewal. With good planning, precincts can delight and impress visitors while also creating the kinds of spaces that the local community need and want, establishing a distinctive character, attracting visitors and tourists to return, and enticing new businesses and residents to the area over time. One of the most successful examples of this is Barcelona, which used 1992 as a springboard that has made it one of the most visited and desirable destinations in Spain. The Here East precinct in London is another example of enduring benefit, where the event’s media centre, with all its communications and digital connectivity, was converted after the event into a technology and innovation hub and incubator.

The key to making precincts great is engaging the community and the many stakeholders (such as all levels of government, businesses and institutions) as early as possible. Many communities are wary of the impacts on their amenity of a major event in the area, so they need to be reassured and genuinely consulted about the kinds of enhancements to the area that will make their lives better in the immediate future as well as far beyond.

“

Meaningful engagement starts early, with a really good understanding of who makes up the community and a creative approach to encouraging their input into the planning process. This leads to the creation of places designed by the people who bring them to life.”

Fleur Laurence, Partner, Integrated Infrastructure

Designing for events, and for afterwards

Sports and events precincts need a defined and distinctive identity during the events period, but they also need to be flexible, viable and sustainable for the long term. Planners and governments need to think about how the precinct might look and function in 10 years, 20 years, 50 years and more – and learn from the threads that previous precincts have woven over time through the fabric of our cities.

Without strong connections to the places in which residents will continue to work, live and play, precincts risk becoming underutilised, lifeless spaces once the major events have ceased. An important focus of planning and design should be how to keep the precinct lively, attractive and safe on weekdays, on weeknights and on weekends after the main show is over. This may be comparatively easy if the precinct is already strongly integrated with existing civic facilities and the mixed urban fabric that makes a city feel alive – but will be more difficult to achieve on greenfield or brownfield sites. A criticism sometimes levelled at Sydney's Olympic Park precinct is that the massive space feels empty, particularly during the week and at night when the many recreational facilities and parklands aren't in high use. The design challenge is to accommodate crowds but also maintain a sense of intimacy rather than alienation when the event is over and when visitation is low.



Showcasing the local and welcoming the global

During a major event, precincts offer seemingly limitless opportunities to showcase distinctiveness, inclusion, innovation and sustainability. Visitors will be keen to engage with what makes a place unique.

Future Australian events could consider ways to increase the presence, visibility and celebration throughout the event of First Nations people, history, culture, language, place names, art forms (visual arts, dance, storytelling, music) and food – and explore strategies to create training, employment, participation and business opportunities for First Nations people during the event as well as beyond.

Given the great diversity of visitors during a major international event, it will be important to ensure optimal support for different language groups and to provide facilities that cater to diverse cultures and faiths.

An often under-recognised area for greater inclusion is the digital realm. Major events are often a site of innovation: new apps and bots, e-ticketing and in-game information, virtual and augmented reality experiences, and an increasingly dizzying array of digital options and opportunities. But not everyone has a smartphone, Wi-fi, data or digital literacy. Providing free Wi-fi, recharging stations and friendly technical support throughout precincts could help bridge the divide for greater digital inclusion.

Accessibility for all

One of the social benefits that a major event can catalyse is greater attention to the broad accessibility of transport, venues, accommodation and all the many places and facilities that form the fabric of a precinct. While universal design principles are likely to be embedded in things that are new, how will we work with and adapt what already exists? Extensive consultation with various user groups and disability communities is needed to ensure investment not only achieves compliance with standards, but ultimately provides a more accessible and inclusive environment for all users.



With the focus for major events shifting from newly built venues and facilities to leveraging existing assets, an understanding of existing accessibility will be key. As will identifying the small investments that can deliver big wins.”

Raelee Meyers, Partner, Integrated Infrastructure

A simple yet powerful game-changer for visitors with disabilities

People with mobility-related disabilities face multiple unknown obstacles – especially in unfamiliar cities. With advances in technology, design, advocacy and awareness, things continue to change for the better. The AXS Map, originally developed by Jason DaSilva and AXS Lab, is an app in which users rate the accessibility of locations such as train stations, shops and cafes. Working side-by-side with the AXS team and volunteers with disabilities, PwC found that the rating system needed to be uncomplicated, objective and uniform. *Is there a ramp? Yes or no? Room for a wheelchair at all tables? Does the restroom door swing out?* We found that ratings should be helpful and inclusive for all users, from parents with strollers to people with visual impairments. PwC’s digital team put end users at the heart of design to help transform the platform into a user-friendly web app that can rapidly expand, engaging new audiences worldwide. Apps such as this could be put to use in the context of an international multi-day event, easing the challenges of navigating the world for people with disabilities.



Embedding sustainability

From waste to energy to transport to construction materials, opportunities abound for major events to stimulate awareness and action for a healthier and more sustainable future.

Over 400 tonnes of waste and recycling were collected at the 2022 Birmingham Games. Circular and sustainable infrastructure design make an immense impact on the emissions footprint of a major event, and for users of the infrastructure for decades to come. Planning should consider innovative waste management, connected public and active transport, and decarbonised construction materials.

Even seemingly trivial items (a ticket here, a wrapper there) add up to mountains of waste. Circular economy principles facilitating closed loops of water, nutrients, materials and energy can be applied across the spectrum of the event, from rejecting single-use plastics and donating surplus food to those in need, through to using bio-based, recycled or low-footprint materials for signage and temporary facilities. Net zero principles can be showcased in electric transport options from trains, trams and buses through to e-bikes and e-scooters – and all the better if there's renewable energy generation onsite to reduce operational carbon.

Providing options for active modes of transport around the precinct is an investment in healthier communities into the future – and incorporating sensitive water design and biodiversity-enhancing measures will create healthier places in the long term, both for people and for nature.



Actions towards a greener and more sustainable event will leave a long-term positive legacy – and all can be highlighted to visitors to engage, educate and encourage change.”

Janice Lee, Partner, Integrated Infrastructure



Solving the infrastructure equation for major sports and cultural events

It will take holistic, consistent and sustained planning and action to extract the maximum long-term benefit from the investment in venues, transport, housing and precincts that is made in the lead-up to a major international event. Success won't happen by accident, and failure is not an option.

Solving complex equations, such as this, takes a team. We call it a community of solvers, and that's exactly what we are.

The game is on and we're ready.

pwc.com.au/integratedinfrastructure

Contacts

Adrian Box

Partner, National Integrated Infrastructure Leader, PwC Australia

adrian.box@pwc.com

Chris Rogan

Brisbane Managing Partner
PwC Australia

christopher.rogan@pwc.com

Suji Kanagalingam

Melbourne Managing Partner
PwC Australia

suji.kanagalingam@pwc.com

Ross Hamilton

Partner, Integrated Infrastructure, VIC Leader
PwC Australia

ross.a.hamilton@pwc.com

Sean O'Meara

Partner, Integrated Infrastructure, QLD & NT Leader
PwC Australia

sean.omeara@pwc.com

Clancy Mears

Partner, Integrated Infrastructure, Capital Projects
PwC Australia

clancy.mears@pwc.com

George Housakos

Managing Director, Integrated Infrastructure, National Housing Leader, PwC Australia

george.housakos@pwc.com

Tim Reardon

Managing Director, National Transport & Precincts Leader
PwC Australia

tim.reardon@pwc.com

Janice Lee

Partner, Integrated Infrastructure, National Strategy and Planning Leader, PwC Australia

jc.lee@pwc.com

Fleur Laurence

Partner, Integrated Infrastructure, National Stakeholder and Community Engagement Leader, PwC Australia

fleur.laurence@pwc.com

Raelee Meyers

Partner, Integrated Infrastructure, PwC Australia

raelee.meyers@pwc.com

Steffen Faurby

Managing Director, Integrated Infrastructure, PwC Australia

steffen.faurby@pwc.com