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DEVELOPMENT WA

Bentley Technology Park Needs Assessment:

Economic and Strategic Directions

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1 EXECUTIVE SUMMARY

This report outlines strategic and economic recommendations to support the Precinct Structure Plan being developed by Development WA for the Bentley Technology Park. In support of this report, stakeholder engagement interviews and workshops were conducted with Bentley Technology Park tenants and government agencies to inform a needs assessment for the specialised centre.

The purpose of a technology park is to drive research and development within key industries, providing opportunities for businesses, researchers and start-ups to collaborate and incubate export-oriented economic activity. Some of the key components of a high performing precinct are present in Bentley Technology Park, however little collaboration and spillovers of knowledge and expertise are occurring, due to a combination of factors including limited amenity and a lack of sufficient, shared use infrastructure.

The key industry clusters in Bentley Technology Park are data science, radioastronomy, pharmaceutical and medical research and manufacturing and resource industry research and development. These are closely aligned with the State's economic development framework, Diversify WA, which identifies several State significant stakeholders and equipment in Bentley Technology Park. Stakeholders who operate within these clusters provided input on the elements that should be allowed for in planning controls for the future development of the precinct, Figure 1.

Figure 1: Future Precinct Elements

Facility	Size/Built Form
Apartment Style Accommodation	6 to 10 storeys, indicative. To be market led.
Medical Manufacturing	Up to 3 storeys
Laboratory space	High ceilings, 200m^2
Shared office space	Not defined
Childcare	Demand-based
Greenhouses	Similar scale to uses at stakeholder's current site
Shared laboratory space	700m^2
Digital Manufacturing	Not defined
Supercomputing Centre of Excellence	500 – 1,000m^2 +
Battery network and power storage	Not defined
Pedestrian / transport link to Curtin	Not defined

Source: Pracsys 2024

These infrastructure and amenity elements would enable key stakeholders to expand their current activities and attract further business uses within key industry clusters and their relevant supply-chains to Bentley Technology Park, increasing employment opportunities and density. Employment estimates for most of these uses are not available and likely to fluctuate according to research need, however pharmaceutical

manufacturing can be expected to support up to 1,000 employees following expansion, and radioastronomy through the Square Kilometre Array (SKA) is expected to house 100 employees.

To understand the scale of potential growth in the long term, benchmarking of relevant high intensity technology parks and innovation precincts around Australia has informed floorspace projections. A low, medium and upper range estimate was developed based on Australian Bureau of Statistics employment data, mapped onto relevant Planning-Land-Use-Categories to estimate floorspace requirements, Figure 2.

Figure 2: Floorspace Projections

Floorspace Type	Lower (m^2)	Middle (m^2)	Upper (m^2)
ENT – Entertainment/Recreation/Culture	-	318	1,096
HEL – Health/Welfare/Community Services	8,517	89,329	96,356
MAN – Manufacturing/Processing/Fabrication	395	783	4,065
OFF – Office/Business	6,576	34,060	44,398
PRI – Primary/Rural	-	-	92
SER – Service Industry	1,012	4,646	4,742
SHP – Shop/Retail	767	1,307	2,945
STO – Storage/Distribution	2,385	3,584	11,724
UTE – Utilities/Communications	-	-	10,103
Total Floorspace	**19,652**	**134,028**	**175,429**

Source: Pracsys 2024, ABS 2021, DPLH 2017

Bentley Technology Park is expected to achieve between 19,000m^2 and 175,000m^2 of additional floorspace in the long term. The employment associated with this floorspace is 561 to 4,564 job opportunities (Figure 3).

Figure 3. Employment Projections

Employment Type	Lower	Middle	Upper
ENT – Entertainment/Recreation/Culture	-	5	18
HEL – Health/Welfare/Community Services	177	1,856	2,002
MAN – Manufacturing/Processing/Fabrication	7	14	74
OFF – Office/Business	319	1,652	2,153
PRI – Primary/Rural	-	-	2
SER – Service Industry	15	69	70
SHP – Shop/Retail	30	51	114
STO – Storage/Distribution	13	19	64
UTE – Utilities/Communications	-	-	66
Total Employment	**561**	**3,666**	**4,564**

Source: Pracsys 2024, ABS 2021, DPLH 2017

Amenity for Bentley Technology Park tenants and governance elements that foster high-performing technology precincts will be key to unlocking higher growth outlooks. The Precinct Structure Plan as a long-term outlook for development should allow for best-practice governance and policy-making in support of Bentley Technology Park. It is recommended that the PSP incorporate elements of a collective impact model to support the significant network connection opportunities that are present and need to expand for the Bentley Technology Park to develop into a successful innovation precinct.

2 SCOPE

2.1 Purpose

The purpose of this report is to provide land use planners and Development WA with a modified Needs Assessment to inform the Precinct Structure Plan that will communicate with planning framework(s) that apply to Bentley Technology Park.

Bentley Technology Park is a specialised centre with a different function from standard activity centres that serve a mixed use and retail focus for population driven uses. The mission of a technology park or innovation precinct is to growth innovation-rich, export focused businesses through collaborative research and development between private entities, academic institutions and government agencies. Accordingly, this report uses stakeholder and network analysis to inform how the PSP can best support Bentley Technology Park in achieving this purpose. The Needs Assessment has been undertaken through business network analysis to describe the current functions of Bentley Technology Park in comparison to best practice. To this end, the project has:

- Consulted with major Bentley Technology Park tenants
- Modelled the network members and connections for each major tenant
- Identified gaps in both technical features and urban amenities that need to be filled

This process has derived clear stakeholder needs that can inform the planning framework to ensure strategic development can occur through the lifetime of the precinct structure plan.

2.2 Needs Assessment

A standard needs assessment provides the evidence base to support decision making regarding current and future land use needs of communities, in terms of scale and mix of non-residential uses that will be needed within a defined catchment or study area over the period governed by a given planning instrument. It is intended to ensure that the needs of communities are catered for as population growth and demographic change occurs.

Bentley Technology Park is identified as part of the Bentley/Curtin specialised centre. Specialised centres are focused on State and Nationally significant economic and institutional activities, and planning aims to protect and grow these specialised uses. The purpose of the Bentley/Curtin specialised centre is to provide education, research and technology uses. Within the specialised centre, Bentley Technology Park's purpose is to provide spaces for collaboration, development and research between private industry, academia and government, providing technological innovation and export-oriented businesses.

Accordingly, the Needs Assessment methodology for activity centres has been adapted to meet the purpose of Bentley Technology Park and its role as a specialised node. An overview of how the modified Needs Assessment has been developed is outlined in Figure 4.

Figure 4: SPP 4.2 A1.3 Methodology Summary

Methodology		Bentley Technology Park
1	Purpose and objectives	Bentley Technology Park is a specialised centre which has strategic, and export oriented rather than population driven floorspace uses. Accordingly, need for floorspace within the precinct is driven by the need for facilities that will support further research, development and innovation activities based on market driven opportunities.
2	Study parameters	Bentley Technology Park does not have a defined study area or catchment as it does not serve a population driven need.
3	Floorspace drivers	Floorspace drivers have been assessed in consultation with tenants who are the cornerstones of industry clusters within the park. The drivers of expansion at Bentley Technology Park are market based and rely on new and existing businesses locating within the precinct in order to gain access to strategic shared-use infrastructure and collaborate with anchor tenants in the precinct. Innovation precincts grow by successfully fostering collaboration and interaction between private industry, government and academic research, and providing engaging spaces for social and professional interaction and the spillover of knowledge and expertise. Population, expenditure and visitation are not relevant to the expansion of Bentley Technology Park.
4	Property market profile	Not relevant to specialised uses at Bentley Technology Park.
5	Floorspace supply	Estimates of current floorspace and uses are determined using LUES data for Bentley Technology Park, and through consultation with stakeholders to determine their planned uses.
6	Floorspace demand	
7	Net demand assessment	Floorspace demand for the entire LGA is not relevant to Bentley Technology Park. Potential floorspace growth within the Park was modelled based on stakeholder inputs and benchmarks; it will not compete with surrounding centres given the highly specialised uses that are located in the park. Issues and constraints on development of Bentley Technology Park are outlined.
8	Land use development options	Modelled growth scenarios for Bentley Technology Park have been benchmarked based on technology parks elsewhere in Australia.

Source: Western Australian Planning Commission 2023, Pracsys 2024

3 INNOVATION PRECINCTS

Innovation precincts, also known as innovation districts or clusters, have gained increasing attention from policymakers, urban planners, and researchers as drivers of economic growth and urban revitalisation. This review examines key factors that influence the development and success of innovation precincts based on current literature. Planning controls should allow for these factors to develop as meets the needs of key stakeholders, and in line with the intended purpose of Bentley Technology Park which is to form an Innovation Precinct that fosters research and development through business, academic and government collaboration. Planning should also support integration with the main Curtin campus, a key strategic element in the surrounding area.

3.1 Location and Spatial Configuration

The geographic location and spatial layout of an innovation precinct play a crucial role in its development. Successful innovation districts are typically located in urban areas with good transportation links, a mix of housing options, and quality public spaces.[1] There is an emphasis in research on the importance of creating a compact, walkable environment that facilitates chance encounters and knowledge spillovers between workers and firms.

Proximity to universities and research institutions is another critical locational factor. Research found that close ties between universities and industry partners within innovation precincts can accelerate knowledge transfer and commercialisation of research.[2] It should be noted that geographic proximity alone is insufficient, and formal mechanisms for university-industry collaboration are necessary to maximise benefits.[3]

3.2 Infrastructure and Amenities

The presence of high-quality infrastructure and amenities is essential for attracting innovative firms and talented workers to an innovation precinct. This includes not only physical infrastructure like advanced telecommunications and shared research facilities, but also social infrastructure and quality-of-life amenities.

Several key infrastructure elements have been identified for knowledge-based urban development, including:[4]

- Quality transportation systems
- Advanced ICT networks
- Cultural and recreational facilities

[1] Katz, B., & Wagner, J. (2014). *The rise of innovation districts: A new geography of innovation in America.* Brookings Institution.
[2] Bramwell, A., Nelles, J., & Wolfe, D. A. (2012). *Knowledge, innovation and institutions: Global and local dimensions of the ICT cluster in Waterloo*, Canada. Regional Studies
[3] Phan, P. H., Siegel, D. S., & Wright, M. (2005). *Science parks and incubators: observations, synthesis and future research. Journal of Business Venturing*, 20(2), 165-182.
[4] Yigitcanlar, T., O'Connor, K., & Westerman, C. (2008*). The making of knowledge cities: Melbourne's knowledge-based urban development experience.* Cities, 25(2), 63-72.

- Green spaces and sustainable design

Several theories emphasise the importance of lifestyle amenities and a vibrant urban environment in attracting knowledge workers.[5] Subsequent research has generally supported the importance of quality of place in innovation precinct development.

3.3 Governance and Leadership

Effective governance and leadership are crucial for guiding the development of innovation precincts. Successful precincts require a collaborative governance model involving multiple stakeholders, including government, industry, academia, and community representatives.[6] A shared vision and strategy is critical to align diverse interests and resources.

Strong leadership, often in the form of a dedicated precinct management organisation, can play a vital role in coordinating activities and fostering a sense of community within the precinct. Such organisations can facilitate networking, organise events, and provide shared services to precinct members.[7]

3.4 Industry Mix and Specialisation

The composition of industries and firms within an innovation precinct can significantly impact its development trajectory. While some precincts focus on a specific industry or technology sector, others adopt a more diverse approach. The presence of complementary industries can enhance innovation and growth within clusters.[8] This suggests that innovation precincts may benefit from a mix of specialised and diverse firms that can create synergies and cross-pollination of ideas. Optimal industry mix however is likely to depend on regional context and existing strengths.[9] Smart specialisation strategies should be used to develop precincts that build on a region's unique assets and capabilities.

3.5 Social Networks and Culture

The development of strong social networks and a collaborative culture within an innovation precinct is crucial for fostering innovation. The concept of "local buzz" is commonly used to describe the information and communication ecology created by face-to-face contacts and co-presence of people and firms within the same industry and place.[10]

[5] Florida, R. (2002). *The Rise Of The Creative Class: And How It's Transforming Work, Leisure, Community And Everyday Life*. Basic Books.
[6] Pancholi, S., Yigitcanlar, T., & Guaralda, M. (2015). *Place making facilitators of knowledge and innovation spaces: insights from European best practices.* International Journal of Knowledge-Based Development, 6(3), 215-240.
[7] Inkinen, T. (2015). *Reflections on the innovative city: examining three innovative locations in a knowledge bases framework.* Journal of Open Innovation: Technology, Market, and Complexity, 1(1), 1-23.
[8] Delgado, M., Porter, M. E., & Stern, S. (2014). *Clusters, convergence, and economic performance.* Research Policy, 43(10), 1785-1799.
[9] Tödtling, F., Asheim, B., & Boschma, R. (2013). *Knowledge sourcing, innovation and constructing advantage in regions of Europe.* European Urban and Regional Studies, 20(2), 161-169.
[10] Bathelt, H., Malmberg, A., & Maskell, P. (2004). *Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation.* Progress in Human Geography, 28(1), 31-56.

Creating opportunities for formal and informal networking is essential. Shared spaces, events, and programs have important roles in facilitating knowledge exchange and collaboration.[11] However, building a collaborative culture takes time and effort. It is important to develop a shared identity and sense of community among precinct members.[12]

3.6 Policy and Support Mechanisms

Government policies and support mechanisms can significantly influence the development of innovation precincts. While the public sector cannot create clusters from scratch, it can play a crucial role in supporting their growth through targeted policies and investments.[13] Key policy areas identified in the literature include:

- Research and development funding
- Tax incentives for innovative firms
- Skills development and workforce training programs
- Support for entrepreneurship and start-ups
- Investment in enabling infrastructure

Government intervention should not stifle innovation, there is the need for policies that are responsive to local conditions and build on existing strengths.[14]

3.7 Findings and Relevance to Bentley Technology Park

The development of successful innovation precincts is a complex process influenced by multiple interrelated factors. While location, infrastructure, and industry mix provide the foundation, softer elements such as governance, social networks, and culture play an equally crucial role. Policymakers and precinct managers must consider these factors holistically and tailor strategies to local contexts to maximise the potential of innovation precincts as drivers of economic growth and urban revitalisation.

[11] Inkinen, T. (2015). *Reflections on the innovative city: examining three innovative locations in a knowledge bases framework.* Journal of Open Innovation: Technology, Market, and Complexity, 1(1), 1-23.
[12] Pancholi, S., Yigitcanlar, T., & Guaralda, M. (2015). *Place making facilitators of knowledge and innovation spaces: insights from European best practices.* International Journal of Knowledge-Based Development, 6(3), 215-240.
[13] Muro, M., & Katz, B. (2010). *The new 'cluster moment': How regional innovation clusters can foster the next economy.* Brookings Institution.
[14] Wolfe, D. A., & Gertler, M. S. (2004). *Clusters from the inside and out: local dynamics and global linkages.* Urban Studies, 41(5-6), 1071-1093.

Bentley Technology Park has strengths in some of these elements but weaknesses in other areas which are hindering its performance as a precinct, Figure 5.

Figure 5: Bentley Technology Park Assessment

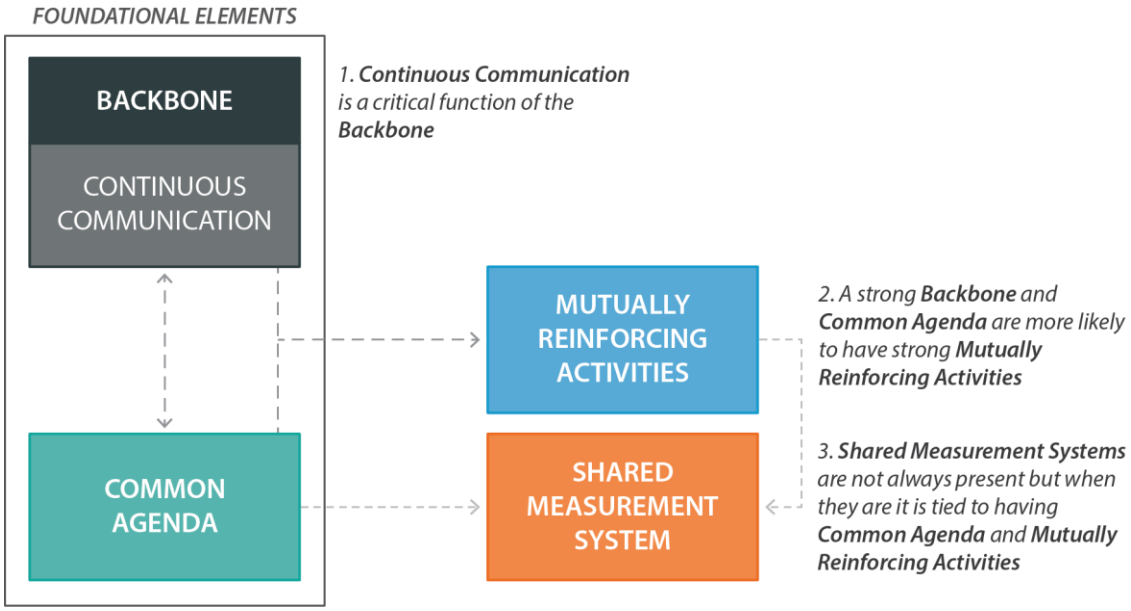
Element	Bentley Technology Park Assessment
Location & Spatial Configuration	Located adjacent to Curtin University in an urban area with road network access, however, lacks walkability, compactness and mid-tier transport connections.
Infrastructure & Amenities	The Hub has seen significant investment as shared space with attached amenities. Other retail and shop amenities are limited. Childcare is available within the precinct in limited supply. There is greenspace and natural amenity present, but little public green space with amenity for users.
Governance & Leadership	The Hub is operated by a management organisation with the intent of activating & bringing together stakeholders, but leadership is limited beyond this.
Industry Mix & Specialisation	There are significant anchor tenants in the pharmaceutical, data science/supercomputing and mining/Mining Equipment, Technology and Services (METS) research sectors, with other businesses in these sectors also being present. Many tenants are not aligned to these industries, and the focus of Bentley Technology Park is not clear.
Social Networks & Culture	The Hub acts as a shared space for events and programs, however there are few social spaces or other collaborative elements to build 'local buzz'.
Policy & Support Mechanisms	Bentley Technology Park is governed by an act of state parliament, however targeted growth and investment in key industries for research and development are absent. Stakeholders identified the act as inhibitive to potential expansion of strategic uses. DevelopmentWA have invested in developing the Hub as a central node for Bentley Technology Park.

Source: Pracsys 2024

3.8 Best Practice Innovation Precinct Policy and Governance

Best practice in network design and operation often refers to the Collective Impact Model. Collective Impact is a structured approach to addressing complex economic social or environmental networks through the collaboration of multiple organisations, sectors, or stakeholders. It is based on the idea that no single organisation can solve these problems alone, and that a coordinated, systematic effort is required to create significant and lasting change.

Figure 6: Collective Impact Model



Source: Pracsys 2024

The key components of collective impact systems are:

1. **Common agenda:** All participating organisations and stakeholders agree on the outcomes they want to achieve and commit to a shared vision for change. This includes a clear understanding of the issue, the desired outcomes, and the strategies to achieve those outcomes.
2. **Shared measurement systems:** Participants agree on the metrics and indicators that will be used to track progress and measure success. Shared measurement systems enable organisations to align their efforts, monitor progress, and learn from each other's experiences. This helps to ensure that resources are used efficiently and that the collective impact initiative is on track to achieve its goals.
3. **Mutually reinforcing activities**: Each organisation involved in the collective impact initiative carries out specific activities that support and complement the efforts of the others. These activities are aligned with the common agenda, and they are designed to create synergies and maximise the collective impact of the group.
4. **Continuous communication**: Open and continuous communication is essential to build trust, maintain motivation, and share learnings among the participating organisations. This can include regular meetings, progress reports, and information-sharing platforms to keep everyone informed and engaged.
5. **Backbone organisation:** A separate, dedicated organisation, often referred to as the "backbone organisation," is responsible for coordinating and managing the collective impact initiative. This organisation takes on tasks such as planning, data collection and analysis, communication, and collaboration. Its role is to ensure that the collective impact efforts are well-organised, focused, and effective.

4 CURRENT USES

4.1 Floorspace

The most recent and detailed available data for current business uses and employment within Bentley Technology Park is taken from the Department of Planning, Lands & Heritage's 2015 Land Use & Employment Survey (LUES). The total floorspace recorded in the LUES is show in Figure 7.

Figure 7: Floorspace within Bentley Technology Park

Source: DPLH 2015, Pracsys 2024

Planning Land Use Categories (PLUC) are used in LUES to group commercial uses, the breakdown of floorspace uses within Bentley Technology Park is shown in Figure 8.

Figure 8: PLUC breakdown in Bentley Technology Park

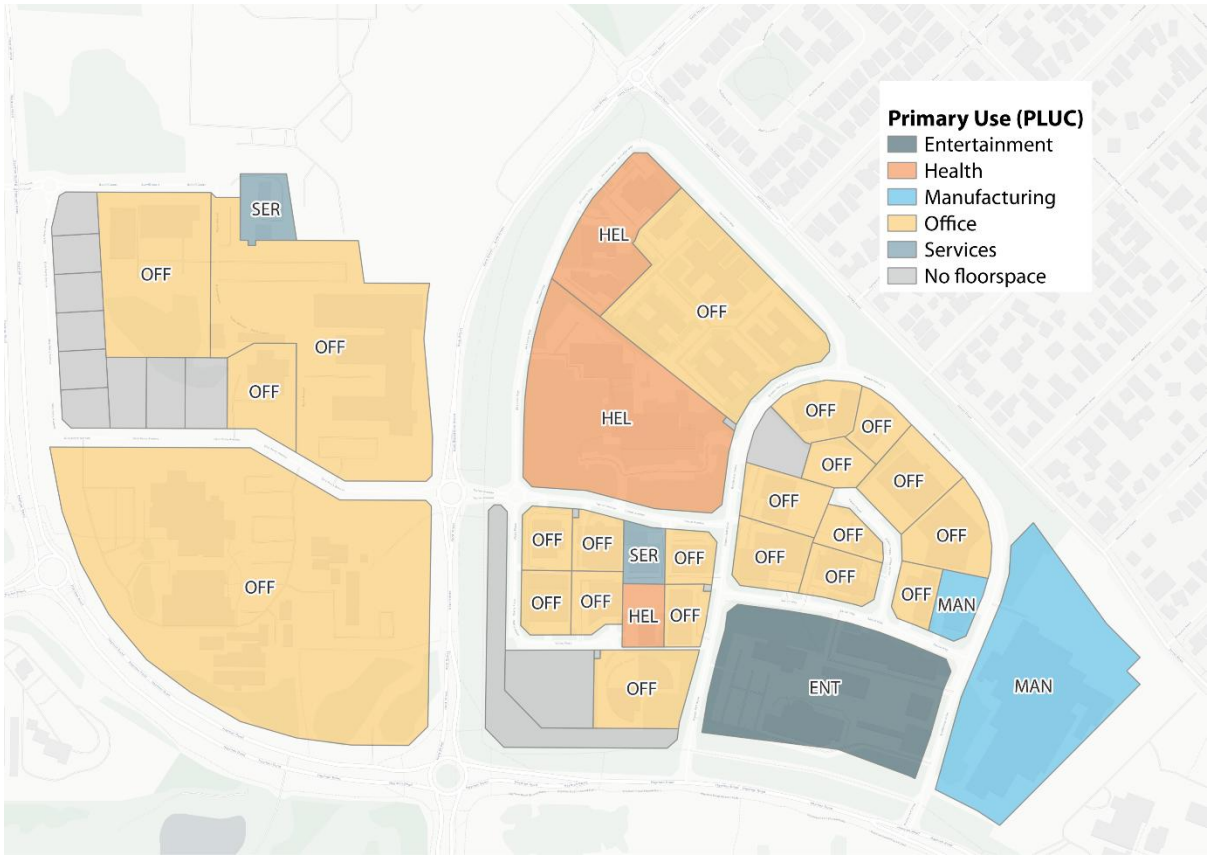
PLUC	Floorspace (m²)
ENT – Entertainment/Recreation/Culture	2,694
HEL- Health/Welfare/Community Services	10,308
MAN – Manufacturing	13,920
OFF- Office/Business	66,386
SER – Service Industry	10,747

PLUC	Floorspace (m²)
SHP – Shop/Retail	800
STO – Storage/Distribution	1,083
UTE – Utilities/Communications	1,900
VFA – Vacant Floor Area	11,583
Total	119,421

Source: DPLH 2015

Sub-areas of Bentley Technology Park categorised by primary Planning Land Use Category are show in Figure 9. These are the uses that make up the greatest proportion of floorspace in that spatial area.

Figure 9: PLUC Heatmap



Source: DPLH 2015, Pracsys 2024

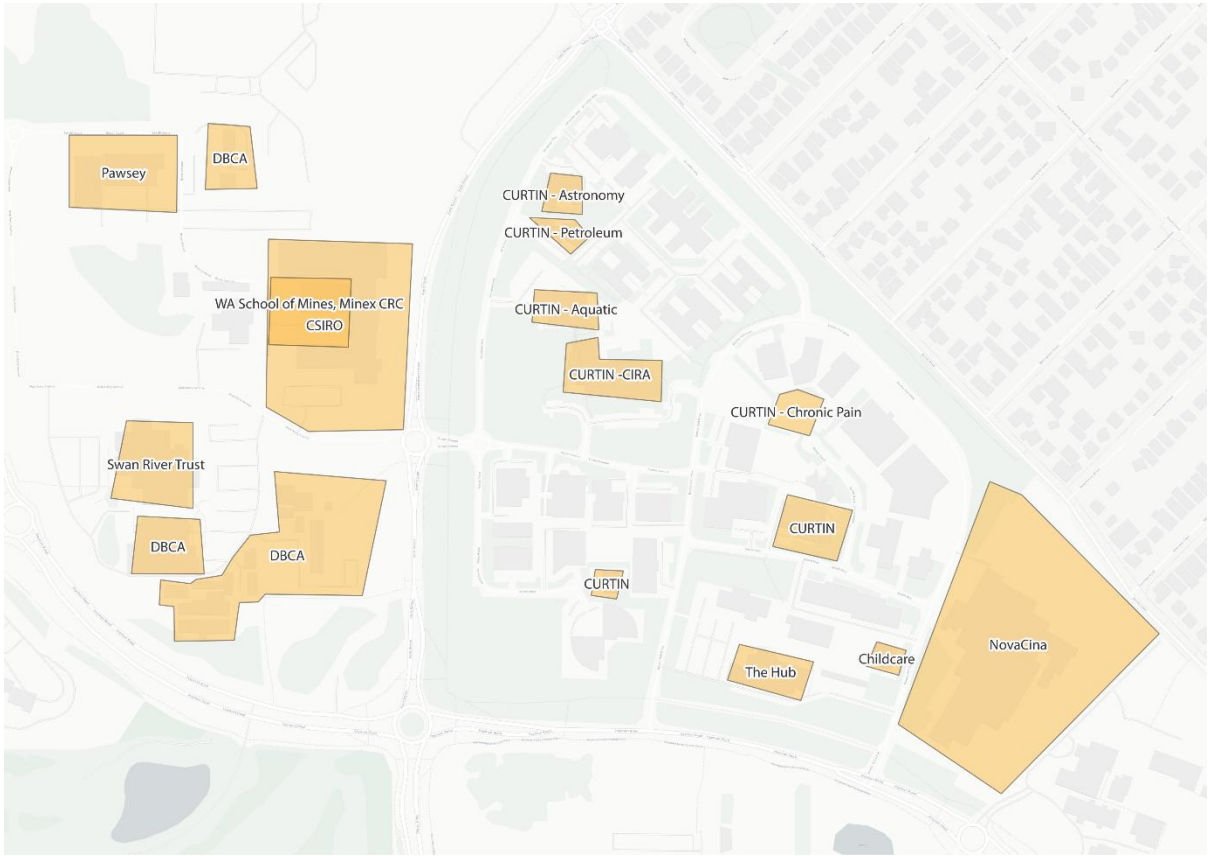
4.2 Stakeholders

The priority clusters identified within Bentley Technology Park are

- Pharmaceutical & Medical science: Research & development & manufacturing
- Mining & Mining Equipment, Technology and Services (METS)
- Radio-Astrology/Space
- Data Science & Supercomputing

There are a number of significant landholders within Bentley Technology Park in these clusters, including private industry, academia and government departments, Figure 10.

Figure 10: Significant Landholdings within Bentley Technology Park



Source: Pracsys 2024

These tenants could act as anchors and form the backbone of a successful and thriving technology park, if allowed to expand and with the opportunity to collaborate within their respective industry clusters, Figure 11.

Figure 11: Stakeholders by relevant clusters

Stakeholder	Cluster(s)			
	Mining & METS	Pharmaceutical & Medical	Radio-Astronomy	Data-Science
CSIRO	✓	✗	✓	✓
CURTIN	✓	✓	✓	✗
Pawsey	✗	✓	✓	✓
SKA	✗	✗	✓	✓
NovaCina	✗	✓	✗	✗

Source: Pracsys 2024

5 STAKEHOLDER CONSULTATION

Interviews were conducted with key organisation representatives to understand the network functionality of Bentley Technology Park tenants and stakeholders. Many stakeholders also attended a network mapping workshop, where they created models of their networks by identifying network partners, infrastructure and the relationships between them. The following key (Figure 12) is used to classify various network members and infrastructure types.

Figure 12: Network Map Key

Symbol	Model Element	Description/Function	Example
	Existing Bentley Technology Park Stakeholder	A stakeholder already within Bentley Technology Park, these are the central points of each individual model.	e.g. CSIRO
	Boundary Spanner	A coordinating entity	e.g. the operator of a shared-use lab facility
	Technical Specialist	Provides technical expertise or input to a stakeholder's activities within Bentley Technology Park	e.g. clinical trials consultants
	Amenities & Supportive Infrastructure	Provides elements to Bentley Technology Park that make working there more attractive, provide support for collaboration between stakeholders indirectly.	e.g. a childcare facility
	Shared Infrastructure	Provides a flexible and shared space or piece of infrastructure that enhances stakeholder's current or future activities	e.g. shared use laboratories
	Strategic Relationship	Relationship with another stakeholder	e.g. CSIRO hosts CRCs within their facility
	Strategic Relationship with existing Bentley Technology Park Stakeholder	Relationship with another stakeholder within Bentley Technology Park	e.g. CISRO hosts Pawsey within their facility

Source: Pracsys 2024

5.1 CSIRO

The Commonwealth Scientific and Industrial Research organisation (CSIRO) is the Australian Government agency responsible for scientific research and its commercial and industrial applications. CSIRO operates multiple locations throughout WA, including its Kensington facility which is located within Bentley Technology Park. The Kensington facility was initially built for mining and METS research but has since adjusted to be inter-disciplinary and includes collaborations and nested partner organisations including the MinEx Cooperative Research Centre (this CRC may have concluded) and Pawsey Supercomputing Centre.

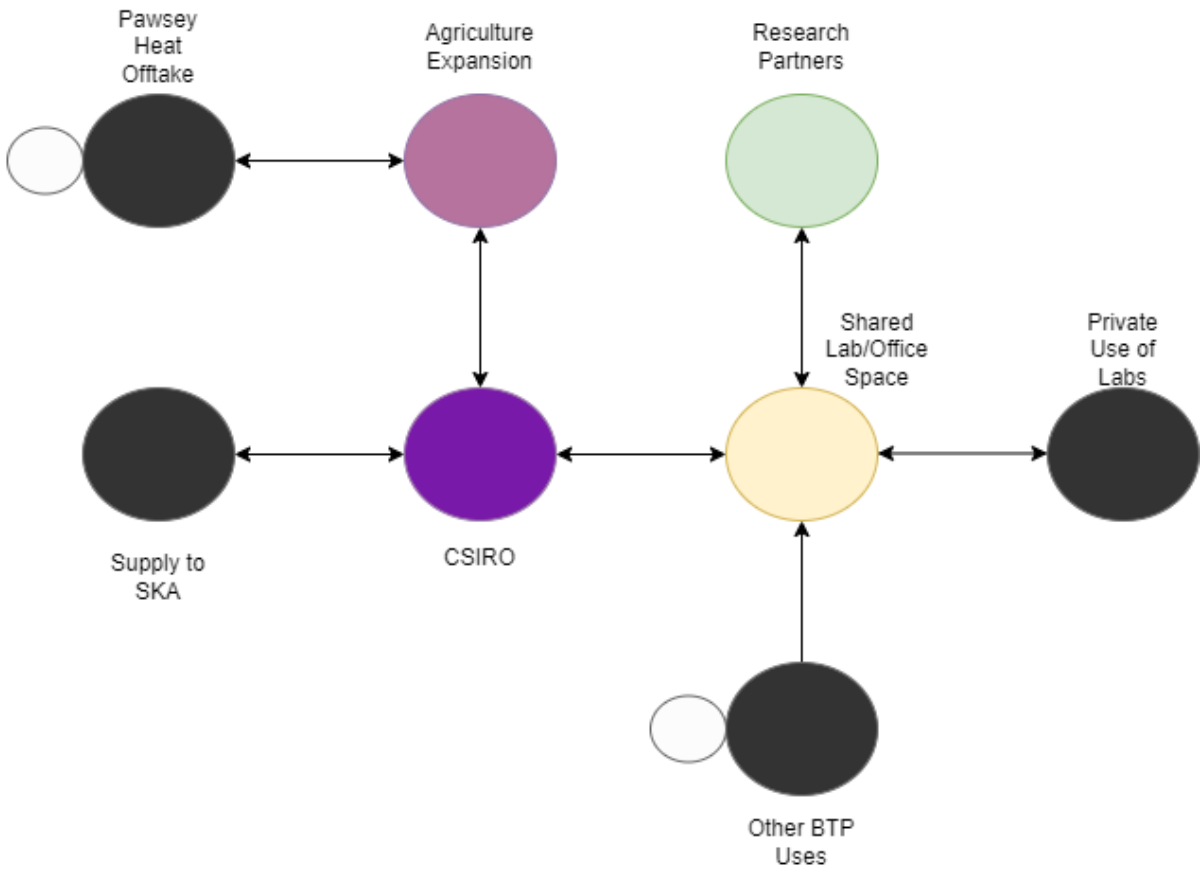
CSIRO will consolidate their footprint in WA, with plans to divest their agricultural facility in Floreat, which could move to Kensington or Waterford. This is yet to be determined. CSIRO estimates there are 50 persons

working in Floreat to be accommodated elsewhere. Additionally, to the south of the Pawsey centre is an undeveloped parcel of CSIRO land, the future use is yet to be determined but this could be the site of greenhouses and/or agricultural research uses relocated from Floreat.

The Square Kilometre Array will have their head office within Kensington, an estimated 100 people. 40 SKA staff are already embedded within CSIRO's Kensington footprint. SKA staff are enthusiastic to be in proximity to CSIRO and Pawsey and would like an area of higher amenity and collaboration.

Collaboration is important for CSIRO. Usually collaborators, such as the MinEx CRC, are hosted within CSIRO, but the flexibility to do this is shrinking within CSIRO's site. Flexible spaces are required that can adapt to changing needs and be modified for different research uses, as well as collaborative or 'activity-based' office workspaces. CSIRO finds it difficult to motivate staff to work on-site. Lab spaces should be both shared-use and private, and be bump-in bump-out style, so that teams can expand and contract their usage as needed.

Figure 13: CSIRO Network Map (Pracsys interpretation)



Source: Pracsys 2024

5.2 Pawsey Supercomputer

Pawsey is an unincorporated joint venture between CSIRO, Perth's major universities and the Western Australian Government, providing infrastructure to support supercomputing applications and research primarily in geosciences and astronomy.

Pawsey is the most powerful supercomputer in the southern hemisphere and has significant opportunity for collaboration and to provide support to research and commercial applications. Pawsey feels that there is the need for enhanced connections to facilitate research partnerships and commercial agreements. The long-term aim is to create a collaborative environment where researchers can easily access flexible office space and engage with Pawsey's resources. Currently, collaborations can be medium and long term over months or years, and research teams require private self-contained office space while undertaking projects with Pawsey. Apartment style accommodation for research collaborators who need to set up for weeks or months at a time would be ideal.

Pawsey would like a greater ability to demonstrate the capabilities and opportunities in supercomputing to potential researchers, employees and collaborators. A proposed facility could be a 'Centre-of-Excellence' (CoE) or similar for Quantum computing with a range of private and collaborative office space for research, students, industry to interface with Pawsey and be able to provide training in supercomputing, quantum computing and other applications.

Pawsey provide training, education on supercomputing but do not have access to spaces optimised for this purpose, they would like to foster interaction with universities and industry to provide an understanding of how supercomputing can be used in research. The CoE would also be suited to supporting these activities, although Pawsey has limited capacity itself to expand its current training activities. Partnerships with university professors and private sector experts could provide additional training opportunities.

There is a need for a more active governance model or more collaboration between Bentley Technology Park stakeholders, as tenants do not interact with each other or understand potential collaborations, with 'water-cooler' conversations between tenants, which might lead to collaboration, not occurring.

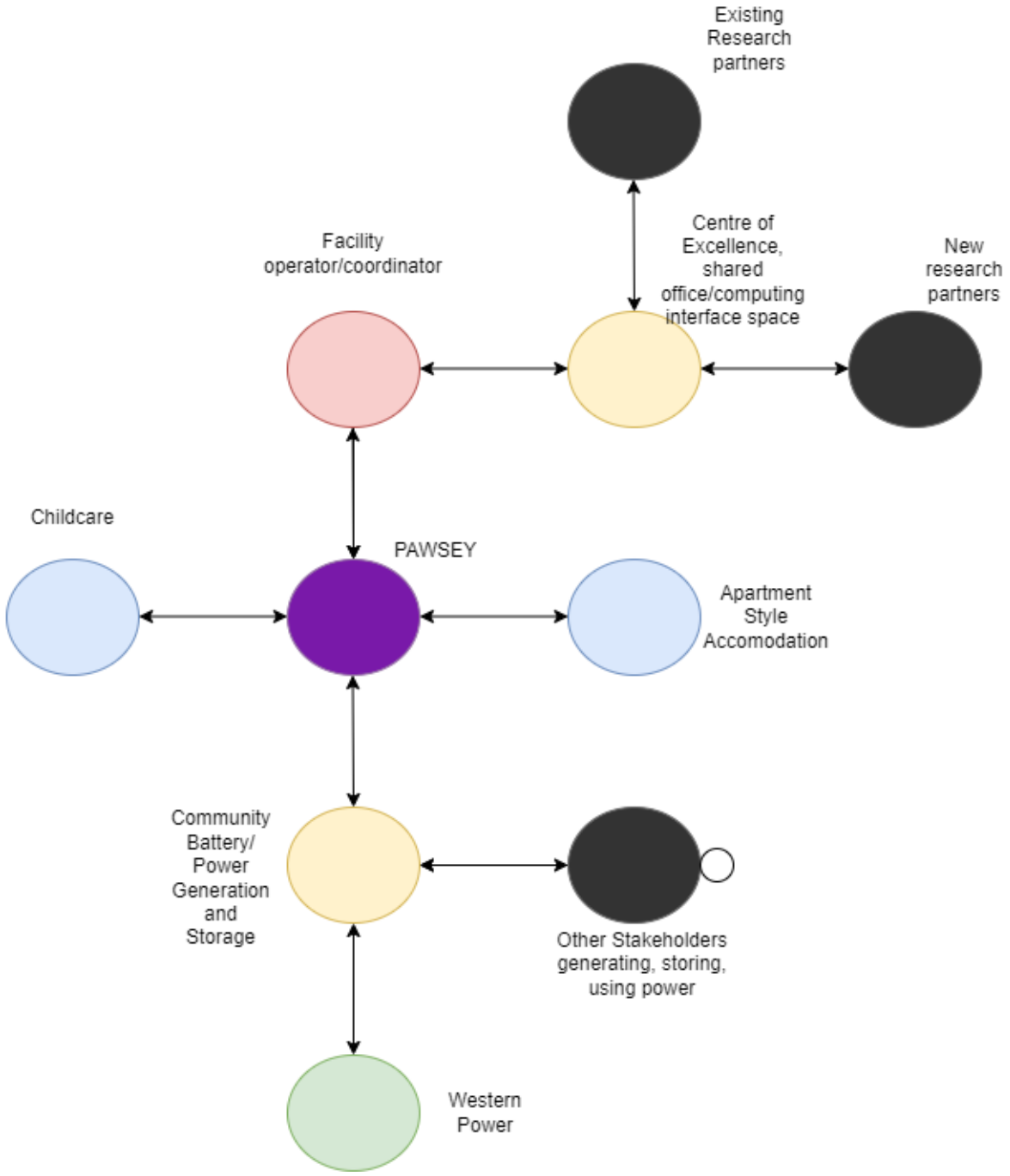
Accessing and using the volume of data that Pawsey contains requires an extremely high bandwidth and consumes a large amount of electricity. Internet and power infrastructure at high volume and high stability are important for Pawsey.

Renewable energy generation and storage are topics that Pawsey are exploring, and they would support a community battery or precinct wide coordinated power system. Pawsey has the processing power and capability to potentially support a precinct-wide digital twin project to manage these resources.

Employees at Pawsey struggle with the lack of amenities and in particular childcare, with a creche model and allowance for older children being preferred to a term-by-term standard childcare centre.

Secure, environment-controlled storage would be ideal for component and hardware storage, but it is unlikely that Pawsey's suppliers would be best located within Bentley Technology Park.

Figure 14: Pawsey Network Model (Pracsys interpretation)



Source: Pracsys 2024

5.3 Curtin University

Curtin accommodates activities that support learning and teaching, research, industry and workplace in its facilities within Bentley Technology Park, including those that support the Faculty of Science and Engineering and Faculty of Health Sciences.

It is vital that Curtin is able to continue its current uses in Bentley Technology Park – particularly critical minerals and industrial type activities.

Curtin welcomes the process of supporting Bentley Technology Park's current activities and seeking to relocate/foster networks to the Park, driving higher quality strategic planning / structure planning outcomes for the Park.

Curtin is undertaking its own masterplan update, the framework within the masterplan has been the catalyst for change on the campus including the new Main Street, Bus Interchange and 'Exchange' Innovation Precincts.

As the masterplan is developed, new space typologies needed to support Curtin's activities will be developed.

Initial considerations for Bentley Technology Park are:

- Potential growth areas: growth is outside of university control in some sectors; however, growth is expected in critical minerals, AI and sustainability. The alternative energy sector is also growing. These create the need for flexible spaces from clean labs to 'dirtier' pilot labs
- Flexibility: there is a need for flexibility in floorplates, heights and spaces to support 'plug and play' research activities, including those that are 'heavier', 'dirtier' industrial uses not suited to the Bentley Campus
- Services infrastructure: review and improvement of infrastructure to support the range of activities intended in Bentley Technology Park.
- Logistics: consideration of logistics particularly waste management and storage.
- Onerous encumbrances on land titles and limitations on development parameters (setbacks, density, plot ratios, and building heights) in current planning policies restrict strategic development.
- Review of branding, signage, wayfinding can drive short term improvements
- Urban design approach should respond to Curtin master plan and road network, including proposed north/south route at north of campus.

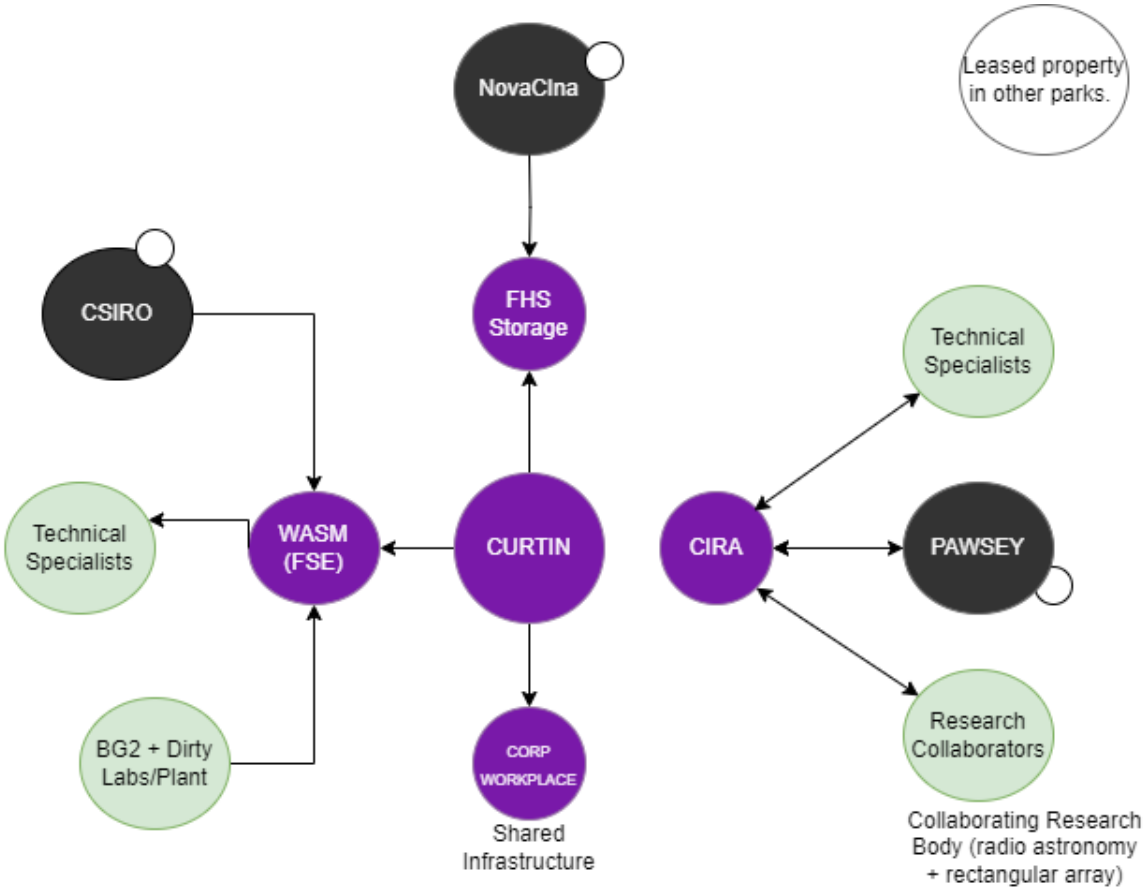
Curtin shared that the governance of Bentley Technology Park is a constraint, and a 'rethink' has been tried before unsuccessfully. There are the necessary ingredients for a successful precinct, but physical spaces need to be provided for expansion, and to continue to encourage government in implementing what needs to be done to achieve growth and innovation. Collaboration among stakeholders through a 'third-arm' or coordinating body would be useful, to push the precinct toward outcomes while adhering to guidelines actively.

Curtin advocated strongly for a north-south road link between Bentley Technology Park and Curtin, with mid-tier transport connections and a high level of walkability. The provision of end-of-trip facilities was also raised to allow for different commuter types.

Curtin would like to see technical labs that are flexible pack-up/pack-down. Both collaborative spaces and private spaces for IP-protected research. Options for leases, tenure and size need to be flexible – often research programs duration and funding are unknown or insecure. For example, a researcher who secures grant money and needs a space to conduct research in order to fulfill requirements often leaves Curtin scrambling to find a suitable space. Supporting infrastructure includes, three-phase power, sewage, emissions, waste, heat, cooling controlled environments. Spaces should be able to accommodate or store large equipment and machinery, with high ceilings for some labs or spaces.

Curtin would also like to see alternative education models within Bentley Technology Park, which are separate from the main campus. This might be a year 11/12 transition school for neuro-diverse students, a secure and safe studio-style model with links to workplace and university to allow smoother transition for these students (Figure 15).

Figure 15: Curtin Network Model (Pracsys interpretation)



Source: Pracsys 2024

5.4 NovaCina

NovaCina is a manufacturer of sterile liquid pharmaceuticals, covering the full production cycle at scale. NovaCina has limited suppliers relevant to its operations that could locate in Bentley Technology Park but aims to cultivate relationships with researchers and startups interested in developing similar products.

Within Bentley Technology Park NovaCina has multiple production lines and seeks to expand its existing facility both in height and footprint to accommodate additional lines and infrastructure. Restrictions on height and setbacks are not supported. Also crucial for NovaCina is that large truck movements are able to be maintained at the southwest corner of their site.

Childcare is an issue for NovaCina, and they would support expanded or more flexible childcare operations, along with other amenity improvements for workers within the precinct, parking is also a concern.

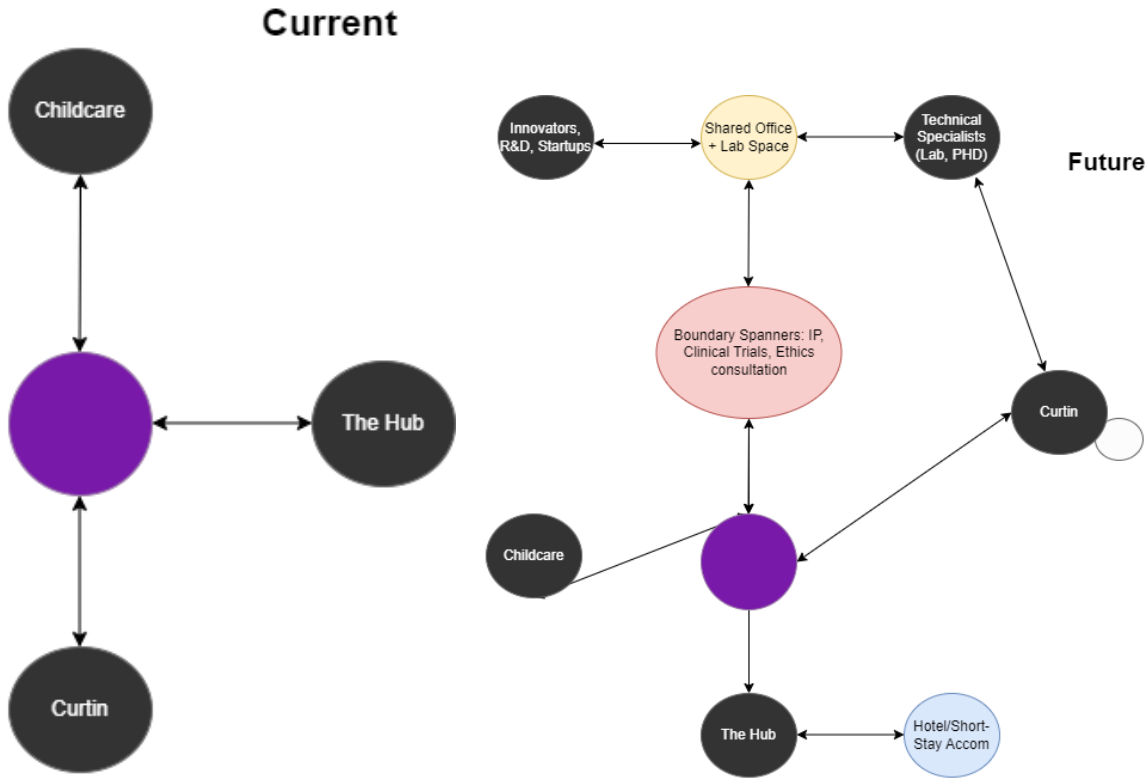
Shared laboratory space outside NovaCina's own controlled labs could support startups and academic research projects, to which NovaCina could provide expertise. There is a need for office space for supporting

regulatory, legal, administrative or consultant support for the kinds of Start-Ups and biotech companies that would collaborate with NovaCina or make use of its facilities.

Opportunity to run clinical trials, testing within Bentley Technology Park could be supported by NovaCina using their expertise. NovaCina can't house within their facility as they have regulatory standards to uphold in manufacturing, and generally don't conduct clinical trials themselves.

Within shared-use facilities, NovaCina could make use of training and presentation facilities to showcase what they do to students and provide training to other organisations.

Figure 16: NovaCina Network Model



Source: Pracsys 2024

5.5 Department of Jobs, Tourism, Science and Technology

JTSI are positive on the idea of a 'concierge service' or central coordinating body that makes connections between park stakeholders and champions the precinct overall. JTSI has a trade and investment team, but this operates on higher level and is not regional/local specific – none of JTSI's current functions fit what is required for Bentley Technology Park. The Australian Automation and Robotics Precinct (AARP) is a successful implementation of what Bentley Technology Park could become. Industry-led with government support. The Hub should be 'on-purpose', in acting as a facilitator between Bentley Technology Park tenants and curating uses toward key industries.

5.6 SpaceCubed

SpaceCubed operate flexible coworking, office spaces and other workplace facilities around Australia.

SpaceCubed operate the Hub within Bentley Technology Park, which provides shared use conferencing, events and workspaces. SpaceCubed were motivated by the opportunity in the park, the original purpose of the hub was to generate more start-up activity and innovation within Bentley Technology Park.

SpaceCubed finds that tenants are 'doing their own thing' and are not seeing or taking advantage of the benefit arising from co-location within Bentley Technology Park. SpaceCubed perceive that '80% of the stuff is there', but the ecosystem that links these elements together is absent, which SpaceCubed believe could be brought together by strategy and unified branding for the precinct, or for its key industries. The lack of curation and density in the park has led to very disparate uses and little interaction between users.

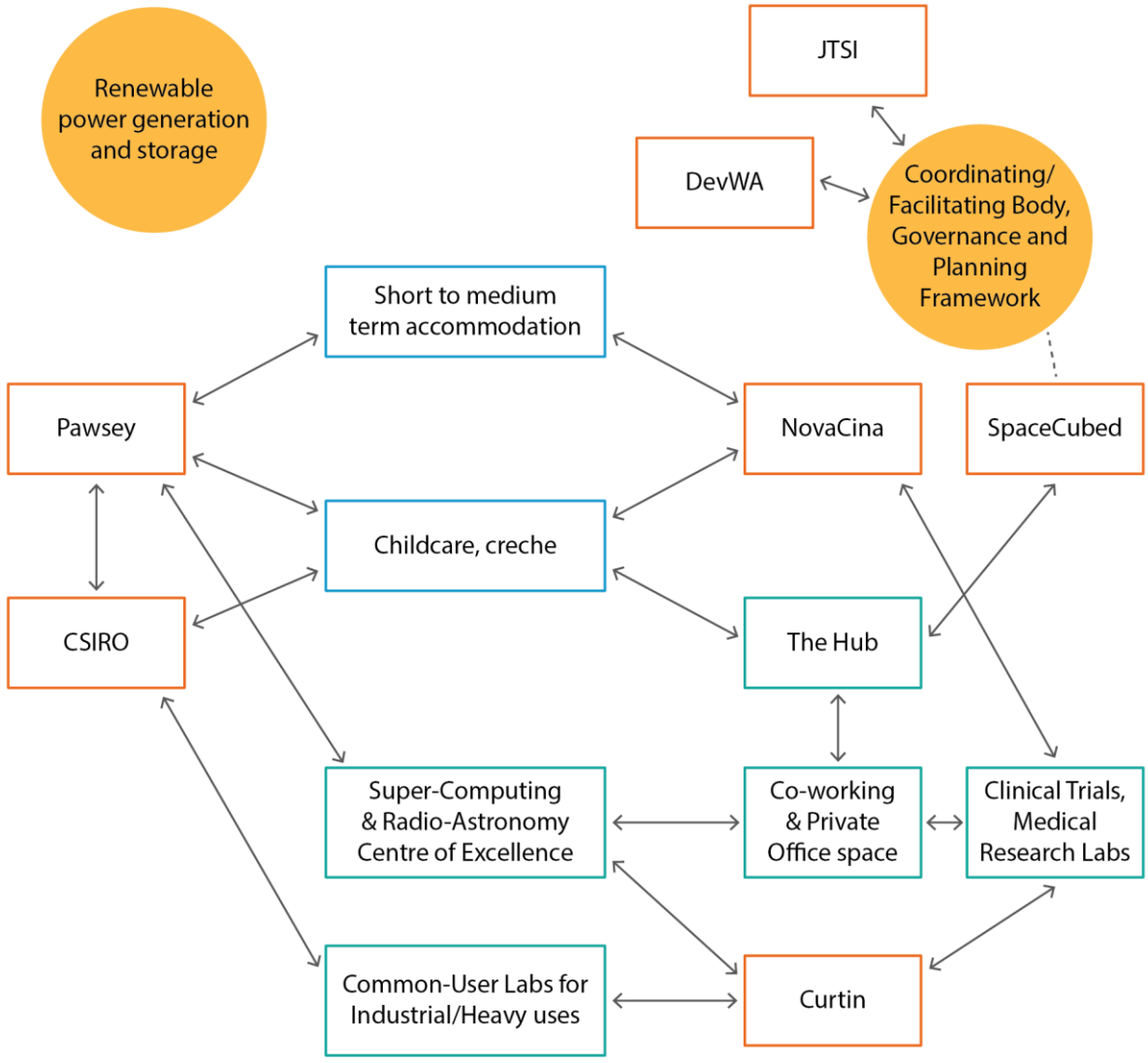
In their view the activation of the park should be industry-led, to drive innovation and ensure that shared use infrastructure and facilities serve a business purpose and have real use cases for industry.

6 DEVELOPMENT PRIORITIES

6.1 Summary

The result of the consultation and network modelling work is the summary model shown in Figure 17 below. The major stakeholders are shown in purple; governance issues are shown in blue, amenity priorities in green and new shared infrastructure in yellow.

Figure 17: Overall Bentley Technology Park Network Model



Source: Pracsys 2024

6.2 Infrastructure

Shared Use laboratories

Flexible-duration, affordable access to researchers and start-ups requiring modern, top quality, certified laboratory space and associated office space. Labs are required to Increase opportunities for international research projects and industry partnerships. Laboratory sizing and functionality differs across sectors, with different factors like size, environment controls, waste management and power needs depending on the use case. A range of different types need to be accounted for, as the needs of researchers and businesses change and evolve with different technologies and methods. Spaces should be multi-functional and be able to easily change configuration for short- and long-term projects.

High-Speed Internet & Large Bandwidth

For supercomputing research and other technology to take place, reliable high-speed internet is required across the park. In particular the volume of data generated by radio-astronomy requires wide bandwidths in order to effectively transport, transform and analyse data.

Renewable Energy & Battery Infrastructure

Stakeholders identified opportunities to generate and store energy from renewable energy would enhance Bentley Technology Park and could be managed at a precinct wide scale to ensure efficient usage. Stakeholders who generate excess power or who require additional power at peak loads may be willing to sell or purchase electricity amongst each other as necessary.

Waste & Emission Storage and Management

Many of the uses at Bentley Technology Park generate chemical and other waste products that cannot be managed by standard municipal waste collection. Managing waste products, including gas emissions, heat, chemical and emissions products carries significant cost for businesses and researchers, an industry wide approach to waste management with shared-use facilities to allow for disposal and management of waste products would lower the barrier-to-entry for some research and industry uses within the park.

6.3 Amenity

Streetscape and Layout

The general urban design is wide streets, large setbacks and parking dedicated to each building. The streetscape is clearly car-based with little to no pedestrian infrastructure. Major road crossings are a challenge for any person on foot, which signals that it is safer and more convenient to travel in a vehicle. By contrast, best practice innovation precincts are built around the pedestrian. Buildings are close to the street, carparking is centralised and common-user infrastructure is at the core. A more compact and dense urban form is certainly desirable, as is an expansion of the range of services offered around the Hub.

Medium-stay Apartment Accommodation

Accommodation is an essential to the proper functioning of Bentley Technology Park. Visiting researchers, conference delegates, general tourists and academics require apartment style accommodation for extended stays. This addresses a different market from the hotel accommodation in the Curtin University Exchange Precinct and should not be set up in competition.

Restaurants, Cafes, Shops

Local retail and household service shopping is required to offer convenient amenities to local workforce and visitors. The Hub café is a useful facility, but a greater range of goods and services are required. This should be developed with a mix and at a scale that addresses the local workforce demand over time and does not compete with the retail offering on the Curtin University campus.

Pedestrian access to Curtin

Pedestrian links with Curtin University main campus are essential to building closer network relationships. Curtin University's master planning intends for a north-south pedestrian route from the Bentley campus to the Bentley Technology Park in alignment with Brodie-Hall drive. The best long-term solution may be a grade separated pedestrian crossing.

Childcare

Supporting working parents with appropriate childcare continues to be a top priority for Bentley Technology Park stakeholders. The childcare facility adjacent to Hub is frequently at capacity and more support is required. The standard childcare model of daily attendance on a term-by-term basis does not suit the needs and schedule of many workers and is limited for school age and teenaged children. Provision of childcare that is available on a more flexible basis and for a wider range of ages would be beneficial.

6.4 Policy and Governance

Greater Planning Alignment to Bentley Technology Park Uses

The Industry and Technology Development (ITD) Act (1998) (the Act) was identified as a major constraint to development and expansion of current uses. The current planning framework is onerous and restrictive, rather than enabling, with inappropriate elements such as large setbacks and height limits. Stakeholders unanimously identified need for a planning framework for the Bentley Technology Park that was flexible and more aligned with key uses allowing for a more urbanised footprint and intensification of uses (i.e. upward development).

Governance Framework

Stakeholders identified the need for a clear governance framework with a central coordinating body to support growth of Bentley Technology Park. This was seen as critical to improving the network connections between key stakeholders and attracting strategic uses including partners and supply chain stakeholders to located in Bentley Technology Park.

7 SPATIAL IMPLICATIONS

The PSP must be designed with adaptability in mind to support the dynamic nature of a technology and innovation precinct. Rigid regulations can stifle innovation, hindering the ability of businesses to respond to rapidly evolving technological landscapes. Key stakeholders have provided direct feedback regarding the current planning restrictions affecting their activities within the Precinct. By incorporating flexibility into the planning framework, precincts can accommodate emerging trends, unexpected growth spurts, and the unique needs of innovative enterprises. This adaptability allows for the seamless integration of new technologies, fostering a culture of experimentation and risk-taking that drives progress.

Flexibility in the PSP also enables businesses to scale and evolve within the precinct. As startups mature and expand, they may require additional space, specialised infrastructure, and / or alternative zoning arrangements. Providing businesses that develop in the precinct, the opportunity to expand in the precinct improves long-term stability and encourages investment, both crucial factors in the development of technology innovation precincts. The PSP can create an environment that not only attracts and retains talent but also propels technological advancement and economic growth by prioritising flexibility.

This section provides an understanding of the type and scale of uses that the PSP should and may need to allow for. Two approaches have been used to develop infrastructure opportunities:

- Stakeholder engagement has provided an understanding of short to medium-term infrastructure opportunities
- Benchmarking was used to understand potential long term floorspace opportunities

7.1 Stakeholder Identified Infrastructure (Short – Medium Term)

Stakeholders have provided an understanding of their floorspace requirements in the short to medium term. Potential floorspace (m^2), built form and locational considerations are summarised to support the PSP. A set of categories provides an overview of the broader theme's stakeholders shared:

- Amenity elements increase the attractiveness and functionality of Bentley Technology Park as a place to work and visit
- Existing Stakeholder elements reflect the future planning of a tenant already within Bentley Technology Park
- Productive elements reflect floorspace uses that would expand and promote economic and research activity
- Precinct elements concern things that would require precinct-wide coordination and governance

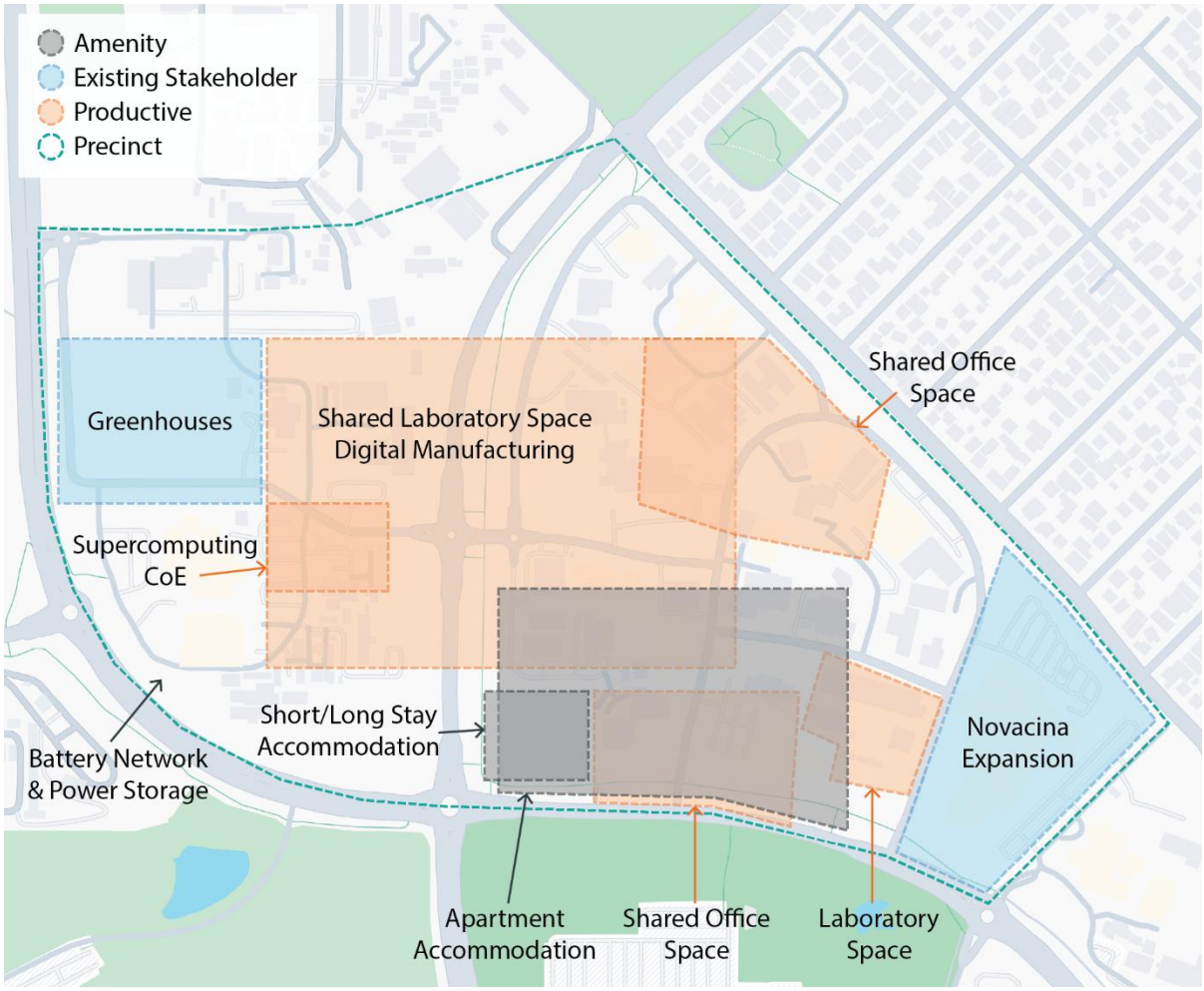
Figure 18: Spaces for Bentley Technology Park

Facility	Category / Description	Size/Built Form	Potential Location
Apartment Style Accommodation	**Amenity** Accommodation to support visiting professionals and researchers that may need to stay a number of months	6 to 10 storeys, indicative. To be market led.	Adjacent to The Hub
Medical Manufacturing	**Existing Stakeholder** Support expansion of current pharmaceutical manufacturing capabilities	Up to 3 storeys	Proponent current site
Laboratory space	**Productive** Flexible medical / pharmaceutical laboratories that allow for both commercially confident and shared use applications.	High ceilings, 200m^2	East of The Hub Centrally located, either side of Kent St
Shared office space	**Productive** Provide opportunity for support services related to pharmaceutical activities. Provide workspace for stakeholders working on temporary projects. Provide space for start-ups	Not defined	Near the Hub Northeast of the Precinct
Childcare	**Amenity** Expansion of current services and additional services including after school care for younger and older children	Not defined	Expansion of current site
Greenhouses	**Existing Stakeholder** Potential transfer of use for key stakeholder	Similar scale to uses at stakeholder's current site	Western section of the Precinct
Shared laboratory space	**Productive** Shared use laboratories that include some larger spaces to support flexible application across multiple uses	700m^2	Centrally located, either side of Kent St
Digital Manufacturing	**Productive** Opportunity to support the Square Kilometre Array with components design and manufacturing	Not defined	Centrally located, either side of Kent St
Supercomputing Centre of Excellence	**Productive** Opportunity to support the Square Kilometre Array and related researchers from around the world; opportunity to support growing diversity of applications for Pawsey super computer	500 – 1,000m^2 +	West of Kent St
Battery network and power storage	**Precinct** Opportunity to create a local renewable power network	Not defined	Precinct wide

Facility	Category / Description	Size/Built Form	Potential Location
Pedestrian / transport link to Curtin	**Amenity** Improve connection between Bentley Technology Park and Curtin to support greater knowledge sharing and spillover opportunities between key stakeholders.	Not defined	Connection from the Hub through to Curtin across Hayman Rd

Source: Pracsys 2024

Figure 19: Stakeholder Input



Source: Pracsys 2024

These uses are all linked to key opportunities identified by stakeholders. Some improve the attractiveness of the Precinct as a place to work; others will enable expansion of current stakeholder activities and increase opportunities for new business start-ups. Employment estimates for most of these uses are not available and likely to fluctuate according to research need, however pharmaceutical manufacturing can be expected to support up to 1,000 employees following expansion, and radioastronomy through the SKA is expected to house 100 employees. The PSP should ensure these types of uses, at their identified scales, can be accommodated in the planning framework within the lifetime of the PSP document.

7.2 Benchmarking (Long Term)

Benchmarking of national, high intensity innovation precincts has been used to provide a long-term understanding of the potential development that may occur at the Precinct. Some of this development is likely to occur outside the lifetime of the PSP; it provides an understanding of the level of flexibility the PSP should provide to ensure future opportunities can be realised.

A set of technology-focused business parks and precincts[15] was assessed to find relevant locations with greater employment and floorspace ratios than Bentley Technology Park based on the ABS statistical geography for Destination Zones, which provide detailed place of work data broken down by industry of employment[16].To account for the relative intensity of floorspace and employment across different cities and locations, benchmarks were adjusted by employment density[17] to avoid over-stating the expected floorspace growth.

The scaled employment within benchmark technology parks was distributed across relevant Planning Land Use Categories to provide a high-medium-low estimate of potential floorspace growth in Bentley Technology Park, Figure 20**.**

Figure 20: Additional Floorspace Growth Scenarios

Floorspace Type	Lower (m^2)	Middle (m^2)	Upper (m^2)
ENT – Entertainment/Recreation/Culture	-	318	1,096
HEL – Health/Welfare/Community Services	8,517	89,329	96,356
MAN – Manufacturing/Processing/Fabrication	395	783	4,065
OFF – Office/Business	6,576	34,060	44,398
PRI – Primary/Rural	-	-	92
SER – Service Industry	1,012	4,646	4,742
SHP – Shop/Retail	767	1,307	2,945
STO – Storage/Distribution	2,385	3,584	11,724
UTE – Utilities/Communications	-	-	10,103
Total Floorspace	**19,652**	**134,028**	**175,429**

Source: Pracsys 2024, ABS 2021, DPLH 2017

Accommodation is separated from this due to accommodation floorspace varying in the level of employment that is provided between short stay and residential accommodation uses.

[15] Lot 14 in South Australia, Melbourne Connect in Victoria and South Eveleigh in New South Wales
[16] ABS 2021: INDP Employment by Industry
[17] SGS Economics and Planning, Effective Job Density: comparing our regions and cities

Employment (Long Term)

The employment supported in each floorspace scenario has been estimated using floorspace-to-employee ratios derived from LUES, Figure 21.

Figure 21: Employment projections by scenario

Employment Type	Lower	Middle	Upper
ENT – Entertainment/Recreation/Culture	-	5	18
HEL – Health/Welfare/Community Services	177	1,856	2,002
MAN – Manufacturing/Processing/Fabrication	7	14	74
OFF – Office/Business	319	1,652	2,153
PRI – Primary/Rural	-	-	2
SER – Service Industry	15	69	70
SHP – Shop/Retail	30	51	114
STO – Storage/Distribution	13	19	64
UTE – Utilities/Communications	-	-	66
Total Employment	**561**	**3,666**	**4,564**

Source: Pracsys 2024, ABS 2021, DPLH 2017

Bentley Technology Park could support between 561 and 4,564 additional employment opportunities in the long term based on benchmarks. Based on stakeholder feedback for employment in the short – medium term, the Middle and Upper estimates seem feasible.

8 CONCLUSION

The Bentley Technology Park Precinct Structure Plan should aim to support and grow industry clusters within the park by allowing the types and scale of infrastructure and amenity uses that will support a successful innovation precinct and technology park.

To do this, the following land uses and elements are recommended based on stakeholder consultation and desktop research:

- Shared-use laboratory and office space that is flexible to changing research and business needs, with tenancy opportunities for collaborative and private uses. These laboratory and research facilities need attached office space for both permanent and temporary use by research teams, consultants and supporting professional service businesses to support growing and established businesses
- A facility that enhances and showcases the capabilities of and opportunities arising from the Pawsey Supercomputing centre and Square Kilometre Array for supercomputing, data science and radio-astronomy. These uses are likely to attract research partners from government, academia and industry from across Australia and internationally
- Increasing the density of uses within Bentley Technology Park, both in floor-plates and building heights.
- Accommodation and amenity that supports medium- and longer-term occupancy.
- Amenity that makes Bentley Technology Park a more attractive and functional location to work, including flexible childcare options, cafes and restaurants, walkable spaces and mid-tier transport options
- Providing utilities, environmental management and waste management solutions for the precinct as a whole.
- A centrally coordinated governance framework

Estimates of the potential floorspace have been provided based on high performing benchmark locations elsewhere in Australia, finding that Bentley Technology Park may grow by 20,000 to 175,000 square metres of floorspace in the medium to long term, reflecting a significant increase in density and employment.