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# ePlanning and open data: transforming insights into the Sydney housing market

authored by

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**DISCLAIMER**

The Henry Halloran Trust is an independent body which has supported this project as part of its programme of research. The opinions in this publication reflect the views of the author and do not necessarily reflect those of the Henry Halloran Trust, its Advisory Board, the Urban Housing Lab@Sydney or the University of Sydney.

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## ACRONYMS

→ ABS	Australian Bureau of Statistics
→ ATDIS	Application Tracking Data Interchange Specification
→ BASIX	Building Sustainability Index (State Environment Planning Policy)
→ CDC	Complying Development Certificate
→ CP	Contribution Plan
→ DA	Development Application
→ DCP	Development Control Plan
→ JSON	JavaScript Object Notation (a data-interchange format)
→ LDPM	Local Development Performance Monitor
→ SI LEP	Standard Instrument Local Environment Plan
→ SEPP	State Environment Planning Policy
→ UHL	Urban Housing Lab

## EXECUTIVE SUMMARY

The improvement of land use planning systems through the use of technology, commonly referred to as ePlanning, has been a focus of governments nationally and internationally over the past decade as the internet and digital technologies have transformed almost every aspect of society, including government service delivery and engagement with its citizens. Greater uptake of technology in planning is now seen as essential to its modernisation and integration into twenty-first century digital economies.

This report set out to address three questions: the rationale for government investments in ePlanning and benefits being delivered (with particular reference to New South Wales); the feasibility of near real time open access to local government planning and development data, including the benefits and opportunity for expanding the approach to more councils; and, implications for planning professionals and the community in the greater uptake of information technology in the NSW planning system.

A review of the international and national literature shows that major investments by governments in ePlanning are commonly justified in terms of the benefits of transparency, efficiency and speed of application processing when digitising planning systems. The narrative for investment in ePlanning in NSW mirrors this, technology is seen as one way to relieve the burden of a complex and inefficient planning system which frustrates strategic planning and unnecessarily delays development. The evidence for these benefits is limited, either because published accounts of quantified improvements against defined benchmarks are absent in the peer-reviewed literature, examples deal only with jurisdiction-specific non-integrated components of planning systems, or the definition of benefit is narrowly framed and reported in relation to application processing times and do not address broader planning outcomes. There is remarkably little published on how technology can or is actually transforming foundational components of statutory planning systems, the very changes which are likely to produce long term benefits in areas of digital legislation drafting, plan making, development assessment, reporting and policy review. Information in this regard is seen in ePlanning amendments to NSW planning legislation. Drawn from international best practice, the amendments establish a central repository of legal digital planning instruments (NSW Planning Database) accessible via web services published online (NSW Planning Portal) and provide regulatory mechanisms for the implementation of technical standards for matters like digital planmaking, online lodgement of development applications and standardization of development categories.

Since 2014 the NSW government has committed around \$64M to digital planning systems through its ePlanning Program to build the foundations of an integrated digital planning system for the state. By mid 2017, the legal framework for the ePlanning was in place, the foundational elements of a Planning Portal and Planning Database established and operating and the scope of services required to be built on this platform clearly identified and underway. A solid start on what will take a number of years to deliver the full scope of the state's vision for ePlanning.

One area that is yet to be effectively addressed and continues to frustrate planning practitioners, researchers and the community alike is better access to historic and contemporary and planning information. ePlanning was expected to facilitate a more efficient path to the data held by state and local governments essential to research into city planning, particularly in the area of residential housing. The overarching objective is for data to be freely available online and at a spatial resolution (to property level), frequency (daily), standard (mandated quality and completeness), reliability (authoritative source) and format (machine readable) to maximise its most flexible use.

The potential for ePlanning to facilitate better access to planning information, primarily development application determination data, is explored in a feasibility study using the NSW

State Government's Application Tracking Data Interchange Specification (ATDIS) in a pilot with Liverpool City and Maitland City Councils.

ATDIS was developed to help every council in NSW implement an electronic development application tracking tool to extract application information from their property management systems in a machine-readable format for publication online as open data. The information to be published was not limited to DAs, and also included data on a range of other applications and related certification (eg. Subdivisions, Section 96 and review determinations, Complying Development Certificates, Construction Certificates, Occupation Certificates). The pilot included the development of the Urban Housing Lab Development Monitor website (UHL Monitor) and its technical linkage to pilot council property information systems for regular (monthly) update of development data using ATDIS. These data are overlaid on open planning spatial layers (eg. Sydney District Boundaries, LEP zones) incorporated into the UHL Monitor from government web feature services. The pilot has demonstrated the feasibility of automated access to property level data from disparate council property systems to provide council staff and researchers a unique insight into development trends for Liverpool City Council and Maitland City Councils from 2005 up to the present day (December 2017) based on over 50,000 individual records. The report contains examples of how the UHL Monitor can be used to visualise development trends temporally and spatially and to drill down into the data to look at particular issues like dwelling yields related to state policies, including affordable housing. The UHL Monitor provides basic tools for data visualisation and exploration, leaving it to the user to download the data for further analysis in their business intelligence or GIS software of choice. Issues of non-standard description of application types between councils and inconsistent and over generalised development type categories are highlighted and point to areas of improvement readily addressed by state government standards, potentially introduced with online development application lodgement reforms. An exciting prospect is scaling the pilot to include more council and state government statutory planning information, giving greater coverage of the information available and an expanded view of planning activity at both levels of government.

Three areas of particular importance are identified in relation to the implications for planning practitioners, researchers and the community of increased use of technology in planning: the need for better appreciation of how legislative changes for ePlanning in NSW can and will shape planning practitioner work practices and community interaction with the planning system over time; the critical importance of standards and web services to guide policies on the collection and sharing of planning information; and, understanding what a commitment to open data principles looks like in practice and the opportunity it presents for improvements in community engagement on planning.

There are myriad ways technology can assist planning and these should be pursued where they have demonstrable benefit. One limited yet scalable example of how ePlanning can transform insights into development in Sydney has been explored in this report. The pilot highlights an immediate focus should be on how ePlanning can build a foundation of authoritative digital planning information, openly available and in a variety of formats for its equitable access and flexible use. As this information base becomes available, planning practitioners and the community alike can become more confident that strategic and operational planning matters requiring consultation and research will be informed by reliable and contemporary information.



# **1 INTRODUCTION**

## **1.1 Purpose of this Research Project**

By April 2017 the New South Wales economy had achieved five successive quarters as the best performing state in Australia, ranking top for business investment, retail trade and dwelling starts and second for unemployment, construction work and population growth. Despite the state's strong economic position, median house prices exceeded a million dollars in many areas of Sydney and there were calls for government action to address deteriorating housing affordability and the related social impacts of a buoyant housing market (Angus, 2017a; 2017b).

The planning minister called the situation in Sydney a 'crisis'<sup>1</sup>. In response, a \$4.3 billion housing affordability package was included in the 2017 State Budget to assist first home buyers enter the market, boost supply of new homes and build the infrastructure necessary to support growth (New South Wales Government, 2017a). Amendments to planning legislation were also being considered to increase housing supply through a more efficient development approval processes and improve strategic planning, infrastructure delivery and community consultation (New South Wales Government, 2017b). Amongst other things, the amendments sought to realise greater efficiencies and insights into the planning system by leveraging the government's multi-million dollar investment in digital planning through its ePlanning Program (Hudson, 2014; Holt et al., 2016).

The legal framework for an integrated digital planning system commenced with changes to state planning laws in 2015 (New South Wales Government, 2014a; 2015a). The changes were designed to move planning from a largely paper-based system to one where planning decisions were made online using legally recognised digital information. Amongst other things, the new planning laws provided for the automated capture and online publication of planning decisions and transactions, introducing the prospect of new insights into the functioning of the state's planning system and delivering the hoped-for transparency and certainty promised in over a decade of planning reforms (New South Wales Department Urban Affairs and Planning, 1999 and 2001; New South Wales Government, 2013). Moreover, the introduction of digital planning was in step with the NSW Government Digital Strategy and Open Data policies for online services and easy access to government information (New South Wales Government, 2017c).

The purpose of this research is to examine how a digital planning system can improve the transparency of statewide planning and transform insights into the Sydney housing market through improved access to planning, property and development data.

A practical demonstration of the potential benefits and insights possible is captured in a pilot for a major growth area in the city's southwest, Liverpool City Council. The research also explores the importance of incorporating digital information and tools into an evolving planning framework and the implications and challenges of digital technologies for planning professionals and the community.

## **1.2 Integrating digital technology and planning**

In a world of rapidly urbanising populations and globally networked cities, the prospect of a so-called "golden age" for cities in the twenty first century was anticipated at the turn of the century - the myriad issues confronting city planning and the well being of their inhabitants would be better addressed through technology and unprecedented access to information (Hall 1999). While technology and digital information systems clearly have made a difference

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<sup>1</sup> J Saulwick, [More density around rail stations and new schemes for renters: NSW housing plan, Sydney Morning Herald, 20 March 2017](#)

to how cities are planned and managed, unsurprisingly both have proven not to be the panacea for better designed urban environments and equitable outcomes for all citizens (Silva, 2010a, 2010b; Batty, 2013a, 2013b; Klosterman, 2012, 2013; Thakuria et al., 2017).

In any event, the past decade has seen books, special journal issues and numerous research articles written about the potential for improved planning through big data, open data, artificial intelligence, virtual reality, internet of things, and other hitherto unlabeled indicators of change resulting from technological, institutional, social, and business innovations (Silva 2010a; 2010b; Thakuria et al. 2017).

A useful starting point to understand the imagined scope and benefits of technology as applied to planning is found in Silva (2010b).

In his discussion of the relationship between planning theory, urban planning and information technology, Silva (2010b) defines digital planning, also referred to as e-Planning<sup>2</sup>, as a new urban paradigm demanding new concepts, methods and tools. He points to how the uptake of technology was fundamentally changing government processes and services and that it was inevitable the same scale of change would occur in planning. Digital planning was expected to transform paper-based urban planning to one conducted largely online and supported by networked information communications technologies.

The scope of ePlanning was imagined to be broad and not just restricted to the use of technology to improve the efficiency of planning services like the lodgement and processing of development applications. Rather, Silva (2010b) saw the scope for a fully developed ePlanning system as one that:

*“...provides on-line general information about the planning system, planning laws and regulations, and planning procedures, and contains basic and specialised information on all aspects of the planning system, in its several scales – local, regional and national – increasing the level of automation in the planning process and improving conditions for citizen participation. It comprises also the publication of local plans, including 3D-visualisation of built and natural environments, technical reports, public participation documents, monitoring and evaluation reports, and urban marketing....”*

Ultimately, the primary objective of ePlanning was seen to be the empowerment of communities in understanding planning and influencing planning outcomes.

In Australia, a similar enthusiastic scope for ePlanning was articulated in visioning documents at the national, state and territory and local government levels (Development Assessment Forum, 2005; PlanDev, 2011a; NSW Government 2013; Victoria State Government, 2017a; Government of South Australia, 2017). Planning reforms underway in a number of states recognised the potential and made changes to the planning laws to facilitate ePlanning, most notably in Tasmania, South Australia and New South Wales (Tasmanian Government, 2014; Government of South Australia 2016; NSW Government, 2013; 2014a).

Like the international experience, ePlanning implementations in Australia have generally been narrowly focused on improvements to the speed of planning administrative processes rather than delivering value in connecting communities to the decision making process and improving public governance generally (Alexander, 2014; Wallin et al., 2012; Williamson and Paroli, 2012; Williamson et al., 2013; Williamson and McFarland, 2015). A notable exception is the New South Wales Parliamentary Counsel Office which maintains the source data for the state's legislation, including state and local planning instruments, in machine readable format for its automated publication to the NSW Legislation website and integration into

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<sup>2</sup> For consistency with its reference in the *NSW Environmental Planning and Assessment Act 1979*, the term e-Planning is replaced by ePlanning for this report.

other online systems, including the NSW Planning Portal<sup>3</sup>. Notwithstanding advances in digital legislation drafting and publication, many of the legislative processes remain paper-based, relying on Ministers signing instruments and the Governor stamping and signing the same (Colagiuri and Rubacki, 2012). This situation will undoubtedly change as regulatory planning information (eg. text and maps) is increasingly prepared in digital formats, published online and available for public scrutiny. For now, legally recognised planning information and development activity data delivered as web services for free use by professional and non-professional planning stakeholders remains a work in progress, as yet unrealised outcome of ePlanning in Australia generally, and New South Wales specifically (Larsen et al., 2014; Pettit et al., 2015; 2017; Sinnot et al., 2015; Holt et al., 2016).

The practical outcome of a planning system still heavily reliant on manual systems and processes and with minimal technical integration of state and local government information systems is evident in recent Halloran Trust reports (Stone, 2014; Thomas, 2016). Both highlight that even for experienced planning practitioners there is considerable difficulty locating reliable information to assess the outcomes of planning policies – be that for a review of the efficacy of independent hearing and assessment panels or the impact of codification of assessments on housing supply (Stone, 2014; Thomas, 2016).

This report looks at how ePlanning can and must facilitate a more efficient path to the data held by state and local governments which is essential to research into city planning, particularly in the area of residential housing.

### **1.3 ePlanning in New South Wales – past, present and prospect**

For over a decade successive state governments have sought to overhaul the Environmental Planning and Assessment Act (1979) for improved speed, certainty and efficiency. The reform narrative has been that the NSW community and economy are burdened by a complex and inefficient planning system which frustrates strategic planning, investment in critical infrastructure, unnecessarily delays local development and is an important factor contributing to a decline in housing affordability (*PlanFirst* - NSW Dept. Urban Affairs and Planning, 2001; *Improving the Planning System* – NSW Dept. Planning, 2007; *A New Planning System for NSW – White Paper* NSW Government, 2013). In 2017 inefficient planning processes remain a concern and Premier's Priorities for making housing more affordable include streamlining the approval processes and online lodgement of applications as two of the four actions for faster housing approvals<sup>4</sup>.

While the evidence for these claims has been challenged as weak and driven more by an ideological critique of planning rather than an analysis of specific aspects of the planning system problems (Gurran and Phibbs 2013; 2014), each reform proposal in NSW has been a catalyst for renewed interest in an integrated digital planning system, generically referred to as ePlanning<sup>5</sup>, as a key component in the wholesale reform of the state's dated planning laws (Williamson and McFarland 2015).

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<sup>3</sup> New South Wales Legislation website <https://www.legislation.nsw.gov.au/#/>  
New South Wales Planning Portal <https://www.planningportal.nsw.gov.au/>

<sup>4</sup> Premier's Priorities for making housing more affordable. <https://www.nsw.gov.au/improving-nsw/premiers-priorities/making-housing-more-affordable/>

<sup>5</sup> ePlanning – the use of electronic processes in delivering planning and development services, such as online lodgement and processing of development applications, and the provision of web based

The benefits and challenges of implementing ePlanning solutions were understood from prior experience delivering NSW planning and property services online. Discrete (non-integrated) digital property and planning initiatives included: *iPlan*, online access to planning, natural resource and property data (NSW Department of Urban Affairs and Planning, 2001); *BASIX*, residential development sustainability State Environment Planning Policy (NSW Government, 2004); *SiX* and *NSW Globe*, online property and administrative spatial information (NSW Land and Property Management Authority, 2010; NSW Land and Property Information 2013); and, the *NSW Electronic Housing Code* and *Interactive Buildings* for online lodgement and assessment of code based developments (Huxley et al., 2014; New South Wales Government, 2017d).

In each case, the approach was to use web-based technologies to provide simpler and quicker access to planning and property information and services. The uptake of the online services was however largely determined by whether they were mandated by legislation, few were. Of the examples listed above only *BASIX* was mandated, the other online services were a useful reference that still necessitated searching of authoritative property registers and planning legislation for reliable decision making.

The *BASIX* State Environment Planning Policy (Building Sustainability Index: *BASIX*) is arguably one of the best and longest standing examples of ePlanning in NSW – integrating service delivery with evidence-based policy monitoring and review. *BASIX* certificates are issued online after an automated assessment of the water and energy saving features of a residential development. With the completion of each *BASIX* certificate, individual development details and their sustainability commitments are stored in a comprehensive database of statewide residential developments. This database was used for independent assessments of the efficacy of the policy (Independent Pricing and Regulatory Tribunal, 2009) and subsequent policy review which saw an increase in *BASIX* water and energy savings targets (New South Wales Government, 2017e).

There remain limitations with the *BASIX* which largely reflects its development over a decade ago in 2004. *BASIX* certificates are issued in standard document format (PDF), underlining the ongoing reliance on essentially paper-based processes in the planning assessment and frustrating direct integration of the certification process with other digital planning systems (eg online application lodgement).

A national review of ePlanning in 2011 showed most states and territories had advanced the digitisation of their planning systems, if not their planning laws (PlanDev, 2011b). Many existing paper-based processes for plan making and development application had been moved online and improved through better information access and online services for lodgement and payment. Typical services and applications digitised included: DA lodgement and tracking, for applicants to lodge application documents online and view the status of their planning proposal; Smart Forms, for standardised online submission of development applications; Interactive Online Maps, for searching planning and property layers; Property Reports, generated online and showing site-specific planning and property information; Planning Controls, listings automatically drawn from digital documents and maps for specific development proposals and automated issue of Section 149 notices; and, collection and publication of development activity data for monitoring and performance reviews. All solid achievements but not integrated into an overarching digital planning framework.

The most recent attempt at holistic reform of the state planning laws, *A New Planning System for NSW White Paper* (NSW Government, 2013), set out an ambitious scope for a simpler, more efficient and transparent planning system where up front consultation with the

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information such as maps, regulations and state and local policies. ePlanning also provides the avenue for stakeholders to more effectively engage with planning (NSW Government, 2013).

community would ensure better coordination of strategic planning and infrastructure development and, as a consequence, better planning outcomes. As in previous proposals, an integrated electronic planning system was seen as central to reshaping planning services and community consultation. The reforms anticipated the establishment of a Planning Portal for centralised access to information and online services including a planning map viewer, application lodgement, application tracking, guidance and performance information, discussion threads and news and customer support. Critically, the new planning legislation would provide for the legal certainty of the electronic information and services so the community could use the portal with confidence.

In late 2013 the government's proposed reforms failed to pass the State Legislative Assembly, leading to a view that any change to the planning laws was likely to occur through evolution rather than a revolution<sup>6</sup> (Ruming and Davies, 2014). ePlanning was one component of the 2013 reform package that had broad support and was taken forward by the government. The 2014-15 State Budget included an initial allocation of \$30M for an ePlanning Program to deliver the range of integrated electronic services anticipated in the White Paper.

By early 2016, the first phase of the program was well advanced and the foundations for a digital planning system in place. Provisions relating to ePlanning in the Environmental Planning and Amendment Act 2014 had commenced, supporting the role and functions of the new NSW Planning Portal and NSW Planning Database as the authoritative source of state planning information (New South Wales Government, 2015a; 2015b). New standard technical requirements had also been published for spatial data and maps, opening the way for state government bodies and councils to submit spatial plans (eg District Plans, Local Environment Plans, Development Control Plans) in GIS format through the portal, moving away from the laborious and error-prone process of generating essentially paper maps, albeit in an electronic PDF format (New South Wales Government, 2015c). Open data initiatives were also improving access to planning performance data from the Local Development Performance Monitor, Housing Monitor and BASIX, albeit largely in conventional XLS and PDF formats<sup>7</sup>.

The NSW Planning Portal acted as the central point of access for a range of existing (non-integrated) online planning services: interactive mapping of planning instruments including LEPs and some SEPPs; property reports detailing the main planning controls; lodgement and tracking of state and local government development applications; BASIX certificates; local and metropolitan development monitoring data; alerts for planning proposals, major developments and policy proposals either lodged or on exhibition; and a range of planning guidance materials and documents (Hudson, 2014; Huxley et al., 2014; Holt et al., 2016).

Other jurisdictions also had planning portals of varying sophistication<sup>8</sup>. While the portals offered the prospect of a one-stop-shop for integrated planning information and services, in

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<sup>6</sup> NSW Planning Minister Stokes comment

<http://www.smh.com.au/nsw/nsw-planning-laws-overhauled-to-boost-housing-supply-20170108-gtnpmf.html>

<sup>7</sup> NSW online data reporting <http://www.datareporting.planning.nsw.gov.au/> and <http://www.planning.nsw.gov.au/Research-and-Demography/Research/Housing-Monitor-Reports/Metropolitan-Housing-Monitor-Sydney-Region>

<sup>8</sup> Planning Portals:

**QLD** <http://www.dilgp.qld.gov.au/planning/plan-making-tools/eplan-portal.html> ;

**NSW** <https://www.planningportal.nsw.gov.au/> ; **VIC** <https://www.planning.vic.gov.au/>

**SA** <http://www.saplanningportal.sa.gov.au/> ; **WA** <https://www.planning.wa.gov.au/>

**TAS** <http://iplan.tas.gov.au/Pages/XC.Home/Home.aspx>;

**ACT** <http://www.environment.act.gov.au/> ;

fact many simply provided a website which linked to existing non-integrated digital information and services. Consistent with the NSW ePlanning experience, integrating existing planning functions digitally was challenging and demanded changed business processes and improved information governance before integration could be considered.

The early success of the NSW ePlanning Program attracted further funding of \$21.7M (ePlanning Stage 2) and \$11.7M (ePlanning Stage 3) in the 2016-17 and 2017-18 State Budgets respectively (New South Wales Government, 2017f). The additional funding was focused on extending the content of the NSW Planning Database (eg. inclusion of standardised spatial data for State Environment Planning Policies, Sydney District Plans, Development Control Plans and Development Contribution Plans), adding new services to the NSW Planning Portal (eg centralised lodgement of all development applications) and better integration of existing ePlanning services (eg BASIX; Local Development Performance Monitoring; automated alerts for matters like state and local development applications) while retiring those services already integrated, or planned to be integrated, into the Portal (eg Electronic Housing Code, Interactive Buildings, Local Insights) (New South Wales Government, 2017f)

Since 2014 the NSW government has invested around \$64M in ePlanning to build an integrated digital planning system for the state. By mid 2017, the legal framework for the ePlanning was in place, the foundational elements of a Planning Portal and Planning Database established and operating and the scope of services required to be built on this platform clearly identified. The prospect of actually achieving a vision for ePlanning consistent with that set out in planning reform white papers of the past decades looks hopeful. Significant business process reform and technical challenges remain, particularly in the areas of standardising and integrating state and local government ePlanning systems, implementing whole-of-government information management practices to ensure the quality and currency of online planning and property information, and the development of reliable web services to facilitate open access and exchange of planning information between government, industry and the community.

ePlanning in NSW, and many other jurisdictions for that matter, is yet to facilitate its primary objective - empowering communities in understanding planning and influencing planning decisions and outcomes. Clearly ePlanning is just one of many factors influencing a transparent and equitable planning system. Currently, ePlanning remains stubbornly biased to improving the efficiency of planning services and not to assessing the substantive outcomes of planning policies. The possibility that better access to the planning information captured by these services will address this bias is discussed in the following section in relation to government open data policies.

#### **1.4 The promise of open data and realities in the planning domain**

One way ePlanning can facilitate better insight into planning and development decisions, and perhaps provide some level of empowerment of community participation in planning, is to fulfill the promise of government open data initiatives for free access to development information. While most levels of government have open data strategies for the proactive release of data, the Productivity Commission's 2017 report on national data availability highlights the significant shortfall between the policy and the implementation. The benefits of open data in transforming the everyday lives of citizens and businesses by driving efficiency, safety, productivity gains and better decision making are evident yet Australia is

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NT <https://nt.gov.au/property/building-and-development/northern-territory-planning-scheme>



significantly underperforming relative to its international counterparts in the release and use of government information (Productivity Commission, 2017).

Planning and development information (eg. the number type value and location of applications, determination times, dwelling yields etc.) are routinely published by government. The Australian Bureau of Statistics publishes monthly dwelling completions based mainly on aggregated local government returns in PDF and XLS formats. Government departments episodically publish planning and development data sourced from local government and state agencies, again in PDF and XLS formats (PlanDev, 2011b; Productivity Commission, 2011; Gurran et al., 2012; Australian Bureau of Statistics, 2017; NSW Department Planning and Environment, 2017). The data is used to assess the ongoing performance of planning systems and in some jurisdictions (eg. New South Wales and Victoria) long standing development performance monitoring programs (NSW Local Development Performance Monitor and Housing Monitor, NSW Department Planning and Environment, 2017; Victoria Planning Permit and Reporting Scheme, Victoria State Government, 2017b) provide a relatively rich set of data for tracking statewide development.

Notwithstanding that data is available, common complaints are that the indicators used in monitoring programs are not standardised across jurisdictions, infrequently reviewed for their value, too focused on outputs and do not effectively address planning outcomes like housing affordability or evidence-based engagements with the community on planning policy (Productivity Commission 2011; Gurran et al., 2012; Gurran and Phibbs, 2014;). These issues can be compounded by expensive licensing arrangements that restrict the use of data (eg. property sales, rental agreements, property cadastral information etc.) sourced from administrative and commercial databases (Pettit et al., 2017).

Open access to government and private sector data was a central objective of the Commonwealth funded Australian Urban Research Infrastructure Network (AURIN) program (Sinnot et al., 2012; 2015). AURIN was intended to address the difficulties of data access for researchers so as to usher in more evidence based urban research. While the AURIN Portal does demonstrate the value of centralised access to a rich set of health, census, demographic, planning and property information (Pettit et al., 2015), it's sustainable operation is predicated on the support and ongoing supply of data from a range of government and commercial suppliers which cannot be guaranteed for data licensing and administrative reasons (Pettit et al., 2017).

In New South Wales, an Open Data Policy (New South Wales Government, 2017c) has greatly improved the access to government datasets. Planning and development information are available via Data NSW<sup>9</sup>, the state government's one-stop-shop for data in a range of "traditional" formats (eg PDF and XLS), however best practice would indicate the same data should also be available in machine readable formats to facilitate their efficient and flexible use in platforms like AURIN, Greater Sydney Commission Dashboard, and NSW Government People & Places website<sup>10</sup>.

The currency of the development data available online is also variable, again largely because of the administrative overheads of maintaining and routinely publishing the information. Housing Monitor reports published by the Department of Planning and Environment track monthly development approvals and completions for the Greater Sydney Metropolitan, Central Coast and Wollongong Regions using a variety of sources (Australian

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<sup>9</sup> Data NSW <https://data.nsw.gov.au/>

<sup>10</sup> AURIN: Australian Urban Research Infrastructure Network <https://aurin.org.au/>  
GSC Dashboard <https://www.greater.sydney/dashboard#sustainability>  
NSW Government: People and Places <http://www.peopleandplaces.nsw.gov.au/>

Bureau Statistics; Sydney Water, selected councils). Datasets are consolidated and processed by the Department and typically lag the present by two to three months. Comprehensive reporting of statewide residential development activity based on annual council returns are published by the Department in the Local Development Performance Monitor<sup>11</sup> between 6 to 12 months or more later.

There is potential for issues of data quality, access and currency to be addressed through ePlanning such that standardised planning and development data are collected automatically from the authoritative source and published more frequently online as part of government open data policies. The objective must be for data to be freely available and at a spatial resolution (to property level), frequency (published daily), standard (mandated quality and completeness), reliability (from authoritative source) and format (conventional PDF, XLS and recognised machine readable formats) to maximise its use.

It was largely for this reason that the Application Tracking Data Interchange Specification (ATDIS) was developed and released by the NSW Department of Planning and Environment in 2014 (New South Wales Government, 2014b). ATDIS was designed to assist the state and local governments in NSW to develop, or extend, development application tracking tools to publish information in a machine readable format, making the information universally available online to a common standard.

ATDIS was a mechanism to leverage state and local government investments in ePlanning and open data policies to break away from the inefficient, time consuming and expensive practices used for collection of planning and property data in programs like the NSW Local Development Performance Monitor. The new approach would provide for automated extraction and online publication of standardised development activity data direct from councils' databases.

The potential for ATDIS to transform access and use of planning and property information from local government databases is explored further in this report and with reference to Liverpool City Council and Maitland City Council.

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<sup>11</sup> Local Development Performance Monitoring (LDPM) is produced by the NSW Department of Planning and Environment and provides an annual overview of the performance of the NSW planning system and information on local and regional development determined by councils, private certifiers and regional planning panels. By December 2017, the latest data available is from the 2015-2016 financial year.

See <http://www.datareporting.planning.nsw.gov.au/ldpm-executive-summary> and <http://data.environment.nsw.gov.au/dataset/local-development-performance-monitoring-2015-16>



## **2 RESEARCH QUESTIONS, METHODS AND REPORT STRUCTURE**

### **2.1 Research Questions**

It is against a background of the uptake of technology in planning generally, and the investment by government in ePlanning in New South Wales, that the following questions are addressed.

*1.3.1 What is the rationale for state and local government investment in digital planning systems and is it providing research, business and the community better access to planning information for improved understanding of planning outcomes in the Sydney's housing market?*

The multi million dollar investment by NSW and other jurisdictions in ePlanning is commonly justified in terms of the transparency, efficiency and speed demanded of modern planning systems. A related benefit is the improved access to administrative data in formats suited to direct technical integration into business and research systems. Within this context the metrics of success are typically the number and speed of development applications determined annually and the number of datasets available online. Whether these outcomes are what researchers and the community would view as success is uncertain, particularly given critiques of planning system performance often cite lack of information on planning outcomes and difficulty accessing relevant data.

Reviewing the information that is available frames the core of this research project which is addressed in the next question.

*1.3.2 Can the benefits of near real time access to local government planning and development data be demonstrated through the online Urban Housing Lab Housing Monitor Tool?*

Rather than addressing this question through literature review, the approach has been to actually propose a means of accessing planning and development data and then demonstrate its value through its integration into the Urban Housing Lab Housing Monitor website. The scope includes securing ongoing access to data directly from council databases at a spatial resolution (to property level), frequency (updated daily), standard (mandated quality and completeness), reliability (authoritative source) and format (machine readable) to address general questions of development activity over time and specific research questions of housing types, supply and affordability.

The pilot uses Liverpool City Council and Maitland City Council to demonstrate how data can be accessed and used, and seeks to demonstrate the portability and scalability of the approach despite councils using different property information systems.

*1.3.3 What are the implications for planning professionals and the community of a greater uptake of information technology in the NSW planning system?*

The research concludes with a short review of the potential for ePlanning to change the practices of planning professionals and improve community access to information in the short term (1 to 2 years). The short time frame is deliberate so as to negate the appeal of discussing more “blue sky” ePlanning opportunities at the expense of immediate priorities for improvements in the planning system of NSW.

### **2.2 Limitations**

This project occurs at a time when the NSW State Government is seeking to further improve the processing of development applications to meet statewide housing approval targets of

less than 40 days (NSW Premier Priority<sup>12</sup>) through the issue of best practice guidance material and (proposed) lodgement of all development applications through the NSW Planning Portal (NSW Dept. Planning and Environment, 2017; NSW Government 2017b). Albeit the focus remains firmly fixed on business process efficiency, if implemented, the changes will greatly improve the quality of digital information recorded and provide for better access to standardised development activity data statewide through initiatives like ATDIS.

The need for standardisation is evident in the data recorded for the purposes of assessing development applications at Liverpool and Maitland City Councils. While both councils collect the same data, there are, for example, differences in the types of development categories recorded and whether an approval relates to a particular state planning policy. Statewide standardisation of the requirements for development application represents an obvious area for the State Government's ePlanning effort.

The pilot is about working with what's available in councils' databases. The aim is to capture core data on the location, type and status of a development proposal, and where important development data is held but not easily accessible, identify the steps (changed business process and/or new technical tools) necessary to improve access to these data for online reporting, regardless of the proprietary ICT systems in use. In time, the state government's adoption of standardised processing of development applications online will greatly benefit the approach promoted in this research (NSW Dept. Planning and Environment, 2017; NSW Government 2017b).

Finally, it would be a mistake to view this research as more "technology than psychology". Ultimately, its success relies on making the case to organisations that improved business processes with standardised capture and publication of development data will meet their needs for efficient resource utilisation, regulatory reporting requirements, improved customer satisfaction, better community engagement. Most importantly, a central aim must be for organisations to better understand where, how and why locations are changing and if the hoped for policy outcomes are being realised. It should simply make good sense to regularly review existing practices, technology is just one means to facilitate this. To this end, engagement with the business owners and technical staff within an organisation, supported by their senior management, sits at the centre of this research, all the while referenced to the needs of their customers, citizens and communities.

## **2.3 Research Methods**

The research questions, data sources and limitations are summarised in the following table. The technical approach for extracting development data from councils' databases and visualising it in the Urban Housing Lab Monitor website is summarised in Section 3.

The research method details an approach using ATDIS and standard web-based technologies for automated viewing and analysis of contemporary and historic development data held in council property databases. Two councils, one metropolitan and one regional and both with different ICT systems, have been selected for the pilot to highlight the benefits of the approach as well as its applicability and portability to other councils in New South Wales.

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<sup>12</sup> A NSW Premier Priority targets housing approvals within 40 days - <https://www.nsw.gov.au/improving-nsw/premiers-priorities/making-housing-more-affordable/>

Research Question	Data Source	Limitations
<i>What is the rationale for state and local government investment in digital planning systems and is it providing research, business and the community better access to planning information for improved understanding of planning outcomes in the Sydney's housing market?</i>	Literature review (Sections 1.2 to 1.4)	The rationale, scope, implementation and benefits of ePlanning are primarily set out in Government reports and non-peer reviewed literature. Information on the benefits of ePlanning are largely qualitative, and where quantitative data on benefits are available they typically have a narrow focus on business efficiency (ie. application processing times, time saved for applicants) rather than planning outcomes (ie. community access to affordable housing)
<i>Can the benefits of near real time access to local government planning and development data be demonstrated through the online Urban Housing Lab Housing Monitor website?</i>	Standard development activity data extracted routinely in machine readable formats from Liverpool City Council (and as a comparison with a different ICT system and council - Maitland City Council) (Section 3)	There are differences in council business rules for data capture for the purposes of development application determinations.  Notwithstanding the adoption of the ATDIS template, non-standard terms are used by councils which constrains the analyses possible, underlining a need for clear State Government guidance on standards to be used.
<i>What are the implications for planning professionals and the community of a greater uptake of information technology in the NSW planning system?</i>	Review of pilot outcomes in context of proposed changes to NSW planning laws and regulations to facilitate ePlanning. (Section 4)	Limited sample of two councils in pilot and (in late 2017) uncertain scope, pace and resourcing of the NSW state government ePlanning Program.

## 2.4 Report Structure

The opening section of this report (Section 1) sets out the international and national context for the increased integration of technology into traditional planning systems. Business efficiency and improved service delivery, rather than demonstrated outcomes in planning

policy, are identified as the key benefits. These benefits in turn rely on standardisation of the planning nomenclature and communication protocols between the disparate computer systems managed by state and local governments. The overarching objective is for data to be freely available online and at a spatial resolution (to property level), frequency (daily), standard (mandated quality and completeness), reliability (authoritative source) and format (machine readable) to maximise its most flexible use.

Section 2 examines how the NSW government-sponsored Application Tracking Data Interchange Specification (ATDIS) attempts to bridge nomenclature and technical interoperability gaps to realise online access to development activity data for metropolitan and regional councils in NSW. Implementation of the ATDIS with two councils, Liverpool City Council and Maitland City Council, is described in Section 3 and demonstrated through the interactive data viewer developed for this research and accessed via the Urban Housing Lab Monitor website. The pilot shows how data which would otherwise only be available at an aggregate level on an annual basis through the Department Planning and Environment Local Development Performance Monitor, or individual council development tracking systems, can be visualised, analysed and downloaded at the property level from a single website.

The final section of the report (Section 4) discusses the benefits of detailed property level development data for researchers and others interested in examining the dynamics of a property market and assessing the efficacy of planning policies, particularly those related to residential development. Improvements to council business processes and data management are suggested to extend the range of data returned from council databases and to facilitate expansion of the pilot to more councils. The implications of the pilot for those seeking to take full advantage of ePlanning amendments made to the state's planning laws are discussed in the context of benefits to the community through greater transparency of planning decisions and the convenience for researchers and others in transformed access to property level historic and contemporary development data.

Unlike other reports from the Practitioner in Residence program, the main output of this research is online at the Urban Housing Lab website<sup>13</sup>. The Development Monitor continues to be an online resource providing access to development data sustained through a partnership between the University of Sydney and the councils involved in the pilot.

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<sup>13</sup> Urban Housing Lab Development Monitor

### 3 PILOTING OPEN ACCESS TO COUNCIL DEVELOPMENT DATA

#### 3.1 An Application Tracking Data Interchange Specification (ATDIS)

The Application Tracking Data Interchange Specification (ATDIS) was developed to help every council in NSW implement an electronic development application tracking tool to extract application information from their property management systems in a machine-readable format for publication online (NSW Government 2014b). The information was not limited to DAs, ATDIS also provided for the collection of information on a range of determinations and related certification (eg. Section 96 and review determinations, Complying Development Certificates, Construction Certificates, Occupation Certificates, Subdivisions, etc).

Specific objectives of ATDIS included:

- Implementation of a common machine-readable standard for data produced by application tracking tools;
- Adoption of a minimum set of fields that a council software vendor's product must be able to produce;
- Adoption of a best-practice set of fields that a Council should be aiming for; and
- Make it easy for other parties to consume the data produced by the tools deployed under the previous points.

Further details of the specification and compliance testing are available online at <https://www.planningalerts.org.au/atdis/specification> A summary of the data to be captured from council databases using the ATDIS approach is shown below.

Record Type	Mandatory /Optional	Fields		
Information (Unique identifying information about the development application)	Mandatory	Data id		
	Mandatory	Development type		
	Mandatory	Application type		
	Mandatory	Last modified date		
	Mandatory	Description		
	Mandatory	Authority	Reference Name	
	Mandatory	Lodgement date		
	Mandatory	Determination date		
	Mandatory	Determination type		
	Mandatory	Status		
	Optional	Notification start date		
	Optional	Notification end date		
	Optional	Officer		
	Optional	Estimated cost		
	Optional	Related apps		
Reference (Links to the source material for the application)	Mandatory	More information URL		
	Optional	Comments URL		
Locations (The geographical locations of the development)	Mandatory	Address	Street	
			Suburb	
			Postcode	
			State	
	Mandatory	Land title reference	Type of land title reference	Lot number Section number DP/SP identifier
	Optional	Geometry	Latitude Longitude	
Events (List of events that have occurred against the application since the lodgement)	Mandatory	Event id		
	Mandatory	Timestamp		
	Mandatory	Description		
	Optional	Event type		
	Optional	Status		
People (List of people that relate to the application)	Mandatory	Name		
	Mandatory	Role		
	Optional	Contact information		
Extended (filed to include any additional information relevant to the application)	Not specified			

**Table 1** A summary of ATDIS record types and data fields

This pilot has attempted to record both mandatory and optional fields in the “Location” and “Events” data types so as to accurately locate a property and to determine what certification has been issued for developments for individual properties over time.

The following technical information elaborates on how property-level development data is captured and published (NSW Government, 2014b):

ATDIS has four main components

- **Feed:** defines a publicly available source of application tracking data. For example, each complying Council would provide a single feed for application tracking data.

Any compliant source of application tracking data is referred to as a “feed” defined by a standard web address of the form

[http://www.council.nsw.gov.au/atdis/1.0/feed\[.format\]](http://www.council.nsw.gov.au/atdis/1.0/feed[.format])

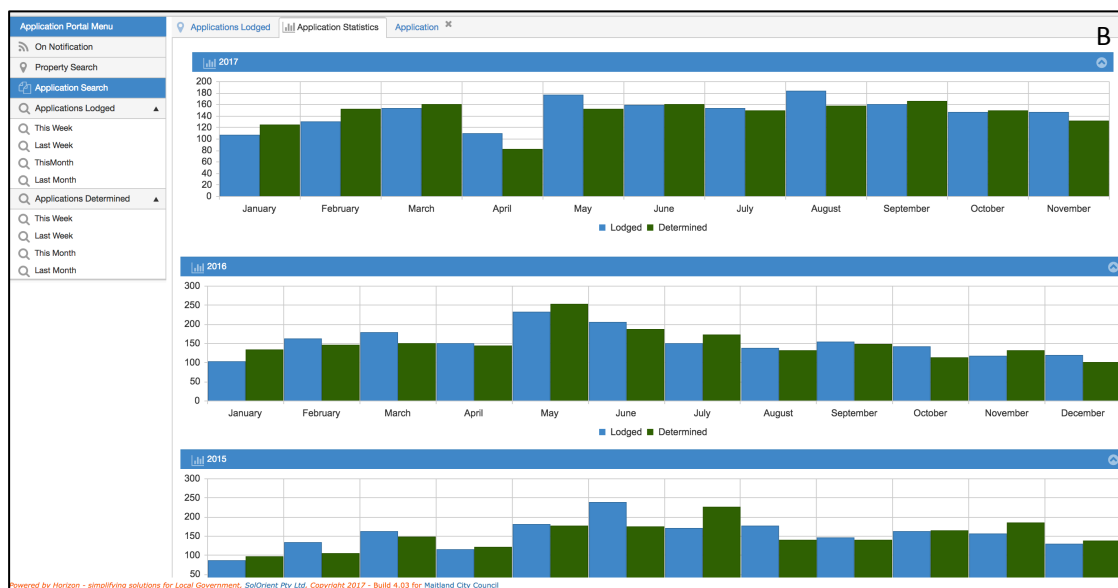
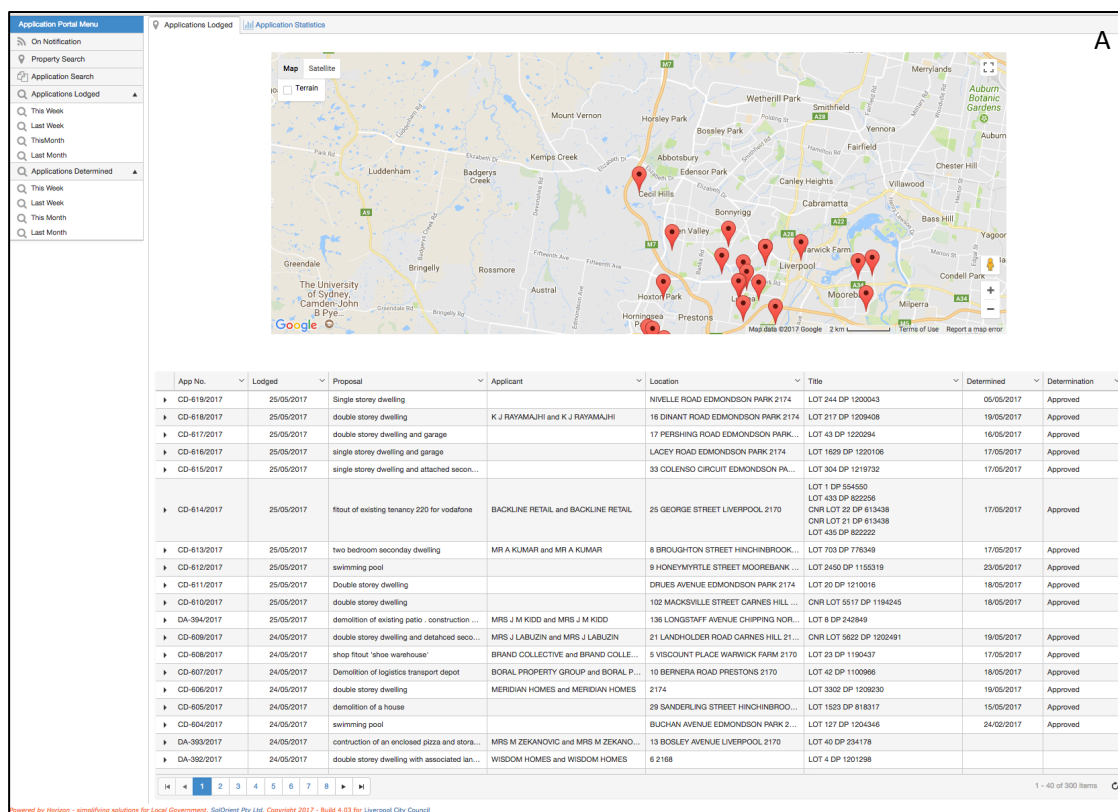
- **Schema:** defines the data elements that make up individual application tracking records. Examples include “date”, “location” and “reference”.

The *schema* defines the specific data elements that are published in a compliant *feed*. The schema has a defined structure, broken down into one or more *application* records, which are further decomposed into *blocks* and *fields*. Record types can be mandatory or optional however a feed must include all mandatory record types.

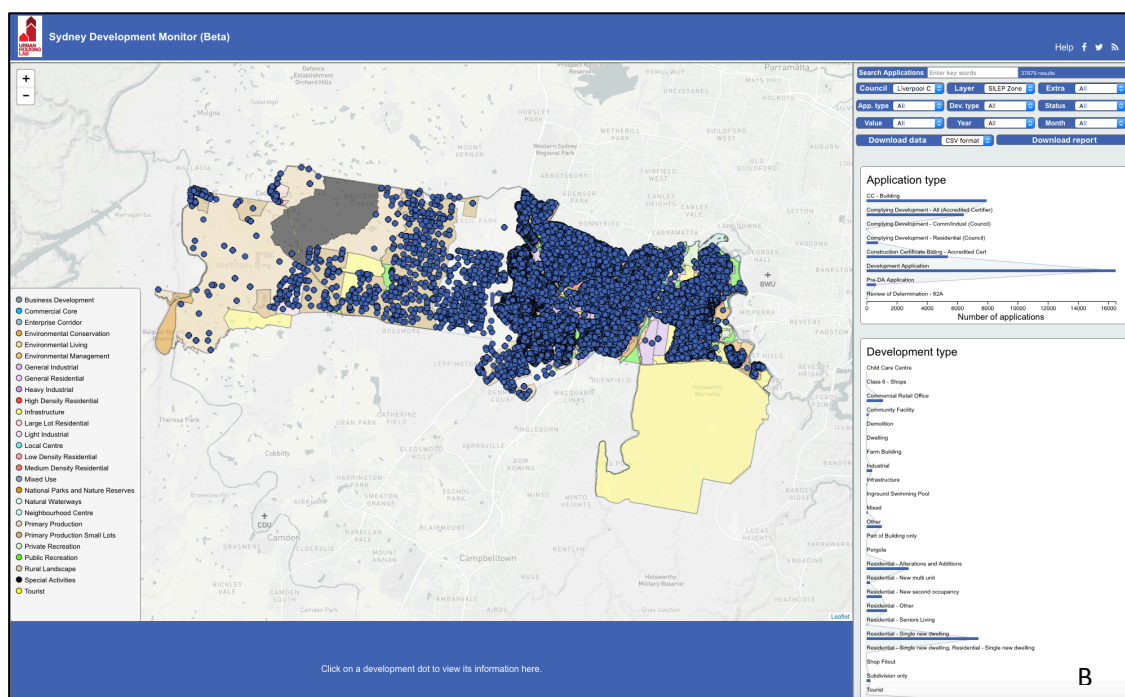
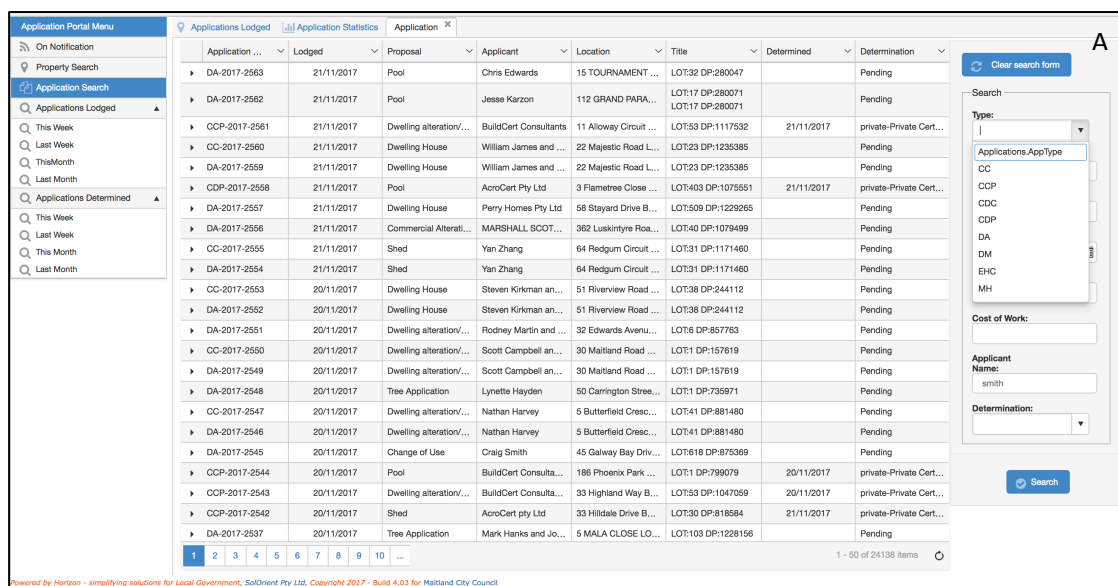
For each application, the blocks of data to be provided include:

- Information [Mandatory]: unique identifying information about a single development application;
  - Reference [Mandatory]: links to the original source material for the application at the relevant Authority;
  - Locations [Mandatory]: information about the geographic location of a development application;
  - Events [Mandatory]: list of events that have occurred against the application since lodgement;
  - Documents [Mandatory]: list of reference links to documents that relate to the application;
  - People [Optional]: list of people that relate to the application; and
  - Extended [Optional]: provision for inclusion of any additional information that may be relevant to an application.
- **Use cases:** defines the agreed use cases for which ATDIS data can participate. Examples include queries like “list all development applications for a Council”, “list all development application for a Council in a period”, “list all development applications for a Council in specific location” etc.
  - **Channels:** defines the channels over which ATDIS data can be delivered. Examples include RSS, REST/[JSON, XML] and Browser. It is mandatory for compliance to produce a REST/JSON style feed of application tracking data.

An example of how the ATDIS data can be rendered in a web browser is shown below in a proprietary web-based viewer developed for Maitland City Council by Sol Orient P/L (Figure 1a; 1b) and the Urban Housing Lab’s Sydney Development monitor built with open source JavaScript and Python code (Figure 2a; 2b).



**Figure 1** Rendering of development application data from an ATDIS feed in a web browser (A) and annual summary statistics for development determinations (B). Source Maitland City Council and Sol Orient P/L



**Figure 2** Summary data and search options for ATDIS-formatted data for Maitland City Council (A) and Liverpool City Council (B)

Using either a proprietary (2a) or the University of Sydney Urban Housing Lab monitor (2b) web viewer, the user can quickly view all development application data and drill down to development and property-specific information using a range of search fields beyond the usual location and development type. The UHL viewer offers the additional function of downloading data in JSON or CSV formats. Source Maitland City Council, Liverpool City Council, Sol Orient P/L and UHL.

### 3.2 Realising near real time access to local government development information

The value of ATDIS is that it provides a flexible means of viewing and analysing standard development data published by councils from their application tracking services, irrespective of the proprietary software they are using. ATDIS compliant data feeds contain public



information on all developments considered by an authority as far back as their digital records permit, for many Sydney metropolitan councils this is at least ten years at the individual property level. These features address recurring issues for those undertaking research of planning and development in urban environments, namely, data timeliness, consistency and scale. For NSW, and many other Australian jurisdictions, there remains a chronic lack of open, property-level, contemporary and historic development data and its availability in machine-readable formats suited to the most flexible use (Gurran et al., 2012; Pettit et al., 2017; Sarkar and Gurran, 2017).

An approach to data access based on published standards for content (data fields) and communication (industry recognised machine-readable formats), of which ATDIS is an example, is in line with best practice principles for open data (Productivity Commission, 2017) and holds the best promise for timely access to authoritative development data.

While the NSW government released ATDIS in 2014 and funded councils to take up the specification, it was not mandated and there are no published accounts of council uptake or benefits. A review of the Planning Alerts<sup>14</sup> website undertaken in October 2017 for this research indicates that around 10 councils are maintaining an up to date ATDIS data feed and those listed are all in regional NSW (Ballina, Bathurst, Cowra, Gilgandra, Lake Macquarie, Maitland, Nambucca, Walcha, Weddin, Yass). The majority of development data sourced by PlanningAlerts from state and local governments uses less reliable “screen scraping” techniques to return a limited set of information on each development (ie. development description, a URL with more information, council reference, address and date).

The remainder of this report will demonstrate through a pilot implementation of ATDIS for major metropolitan, Liverpool City Council, and regional, Maitland City Council, the benefits, limitations and opportunities to be realised for council, researchers and community alike through a new way to access and use authoritative planning and development data.

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<sup>14</sup> PlanningAlerts is a free service which searches as many planning authority websites as it can to find details of development applications. PlanningAlerts is produced by the OpenAustralia Foundation and was adapted for Australia by OpenAustralia and is based on the UK site PlanningAlerts.com

## 4 THE LIVERPOOL CITY COUNCIL DATA ACCESS PILOT

The pilot focussed on Liverpool City Council owing to its location in the Urban Housing Lab's primary area of interest, residential development in the urban areas of Australia's major cities. The inclusion of Maitland City Council in the pilot is to demonstrate how ATDIS can be used to retrieve comparable data from different proprietary property management systems – *Horizon* in the case of Maitland and *Infor Pathway* for Liverpool<sup>15</sup> - identifying the approach as portable and scalable to other local and state government organisations in NSW, and potentially interstate. A related objective has been to compare two councils to highlight how non-standardised capture of development data using over-generalised development type categories and local terms can frustrate research into statewide planning outcomes for residential housing.

The pilot does not include analysis of the Maitland City Council development data, although results similar to that shown for Liverpool can be produced for Maitland as its data are included in the Urban Housing Lab Sydney Development Monitor website (UHL Monitor).

This report uses development data incorporated in the UHL Monitor up to late December 2017 – specifically January 2005 to December 2017 for Liverpool City Council (c.38,000 records) and January 2010 to December 2017 for Maitland City Council (c.15,000 records). Development data includes determined and in-process property-level Development Applications, Section 96 and 82a Development Application modifications and reviews, Complying Development Certificates, Subdivisions, Construction Certificates, Occupation Certificates. Data used in the analysis have been filtered to only include those applications which have been determined. All data can be regularly updated (eg. daily, weekly monthly) as new and updated development data are published by councils and incorporated into the UHL Monitor.

### 4.1 The Urban Housing Lab Sydney Development Monitor

The UHL Monitor is designed to provide rapid access to contemporary and historic council development data for visualisation, analysis, filtering and download. It has been built using open source JavaScript libraries including D3.js (Data-Driven Documents), Leaflet (open-source library for interactive maps) and Mapbox API, an open source mapping platform for custom designed maps.

Figure 3 identifies the main components and functions of the UHL Monitor. Overall, the intent is for users to explore a council's data, do some simple filtering based on a selected set of ATDIS data fields of interest before downloading the results for further analysis in database and spatial analysis tools of their choice.

UHL Monitor website is designed to provide rapid access to contemporary and historic council development data for visualisation, analysis, filtering and download<sup>16</sup>. It has been built using open source JavaScript libraries including D3.js (Data-Driven Documents), Leaflet (open-source library for interactive maps) and Mapbox API, an open source mapping platform for custom designed maps.

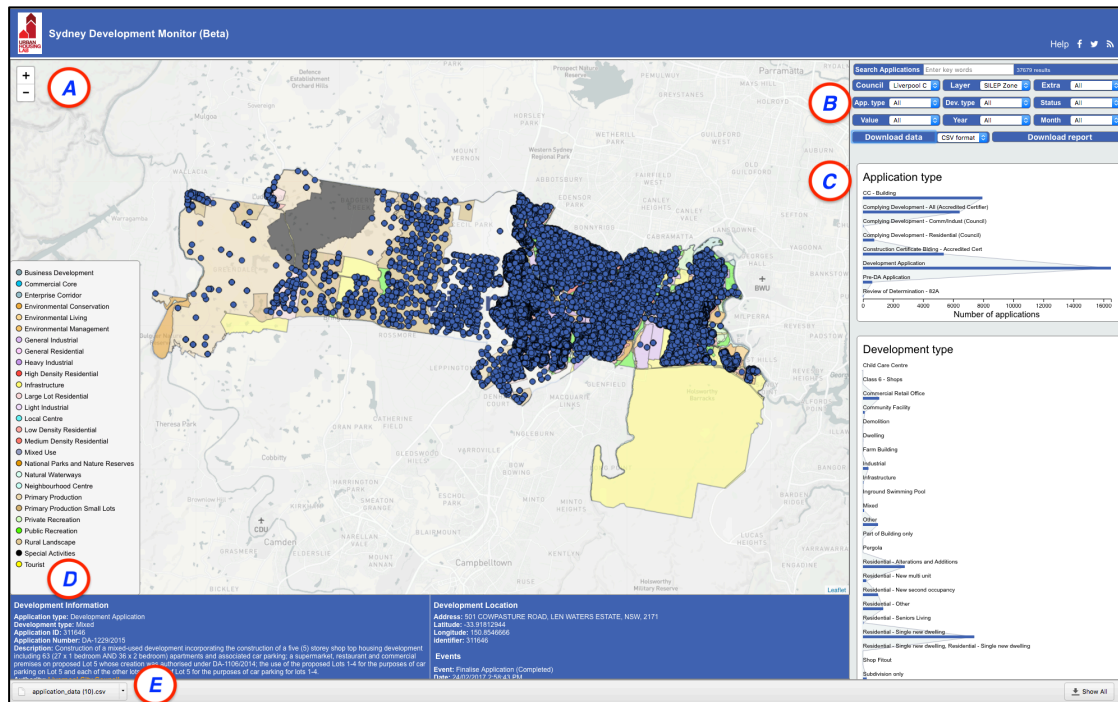
Figure 3 identifies the main components and functions of the UHL Monitor. Overall, the intent is for users to explore a council's data, do some simple filtering based on a selected set of

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<sup>15</sup> Horizon <http://www.solorient.com.au/horizon.html>

Infor Pathway <https://www.infor.com/product-summary/public-sector/pathway/>

ATDIS data fields of interest before downloading the results for further analysis in business intelligence and spatial analysis tools of their choice.



**Figure 3** Urban Housing Lab Sydney Development Monitor website (UHL Monitor)

**A:** Map view of selected data incorporating government Web Feature Services; **B:** Data search and filters using ATDIS fields (eg. Council, Application Type, Development Type, Status, Estimated Value, Date etc.); **C:** Summary plots (eg Application Type, Development Type, Status and Value); **D:** Individual development details including links to related Council; and, **E:** Data download in either CSV or JSON formats.

The UHL Monitor also incorporates publicly available spatial administrative and planning layers (eg. Sydney Districts, SI Local Environment Plan, State Environment Planning Policy Major Development and Growth Centre Zones) as context for the development data. The spatial layers are sourced from NSW government Web Mapping and Feature Services<sup>17</sup> and underlines how open source planning data can and should be routinely incorporated into online decision support tools.

The opening default view of the UHL Monitor is of the Sydney metropolitan area and its administrative districts. Selection of a specific council in the data search frame (Figure 3 – B) will zoom the view to the council area of interest and populate the map and summary graphs with all available development data.

A comparison of the available application and development types for Liverpool City Council and Maitland City Council captured by ATDIS is instructive. While ATDIS will extract standard data fields and locational information for every development, council business practices, especially in relation to the use of a standard terminology for application and development types largely determine the categories available. See table 2.

<sup>17</sup> NSW Government Web Mapping Services and Web Feature Services  
<http://data.environment.nsw.gov.au/>

Maitland City Council		Liverpool City Council	
Application Type	Development Type	Application Type	Development Type
DA	commercial	Pre-DA Application	Unknown
CDC	industrial	Development Application	Residential - Single new dwelling
CDP	residential	Complying Development - All (Accredited Certifier)	Residential - Other
	rural	Construction Certificate Bldg - Accredited Cert	Residential - Alterations and Additions
	Shop	CC - Building	Residential - New second occupancy
	Subdivision - New Road	Complying Development - Residential (Council)	Commercial Retail Office
	other	Review of Determination - 82A	Mixed
	unknown	Complying Development - Comm/Indust (Council)	Industrial
			Subdivision only
			Inground Swimming Pool
			Residential - New multi unit
			Infrastructure
			Residential - Seniors Living
			Demolition
			Community Facility
			Usage
			Dwelling
			Tourist
			Part of Building only
			Child Care Centre
			Vehicle Repair Station
			Class 6 - Shops
			Pergola
			Farm Building
			Shop Fitout
			Other

**Table 2** A comparison of the application and development types used by Maitland and Liverpool City Councils

The application and development types reflect, in part, the evolution of data capture practices within a council over the past ten to twenty years, the influence of (changing) reporting requirements of the state government through the Local Development Performance Monitor (LDPM), introduction of standard development type terminology in the Standard Instrument Local Environment Plans (SI LEP) and a council's own priorities for tracking development in its area.

It is anticipated that the introduction of centralised development application lodgement through the NSW Planning Portal will enforce greater standardisation of development categories in line with the SI LEP<sup>18</sup>, greatly assisting in a shift to a more "evidence-based" approach to monitoring planning outcomes and the quality of information available through ATDIS. In any event, the transition to the adoption of a standard nomenclature will take time, will not address historical records in council databases and relies on the as yet untested integration of local and state government ePlanning systems.

The UHL Monitor addresses most of these issues by providing an effective means of navigating councils' current and historic records using a simple set of tools to query data based on high level categories (eg Application and Development Type), irrespective of what terms are used or adopted over time, to extract valuable information on information including the numbers of dwellings and bedrooms or applications determined under various State Environment Planning Policies (eg. Affordable Rental Housing; Housing for Seniors or People with a Disability).

The summary graphs and maps in the following section have been prepared using the UHL Monitor to explore, filter, map and download Liverpool City Council data and basic MS Excel tools for data manipulation and graphing. A richer set of data visualisation and analysis functions could easily be integrated into the UHL Monitor using standard Business Intelligence tools however this technical development is outside the scope of the pilot and not central to the research objectives.

<sup>18</sup> See Appendix 1 for the list of development categories used for the most recently published LDPM 2015-16 reporting period and a more detailed list based on the SI LEP.

## 4.2 Liverpool City Council housing market insights – Outputs and Outcomes

The following graphs set out the basic outputs of a planning system for Liverpool City Council area over the past twelve calendar years – the numbers of applications determined, the types of development, their value, location, certificates issued etc. These graphs provide an important temporal context for more detailed and location-specific research on matters less easily quantified or determined, like the impact of state government affordable housing and complying development policies on housing choice or the level of secondary dwelling (granny flat) development respectively.

As the graphs are based on a direct extract of the council's development database using the ATDIS, they contain insights into the evolving business and data capture practices within council influenced by state government policy as well as council's own initiatives to improve development processing times. This is valuable information in itself as it is a valuable pointer to potential areas for improved data collection and reporting. For example, council introduced new practices in 2008 to record categories of development for development applications, prior to this date these data were not specifically recorded, resulting in a large "unknown" category for development types. While this is clearly a limitation for longitudinal analyses, detailed information for each "unknown" development is available through an application's unique URL captured by ATDIS.

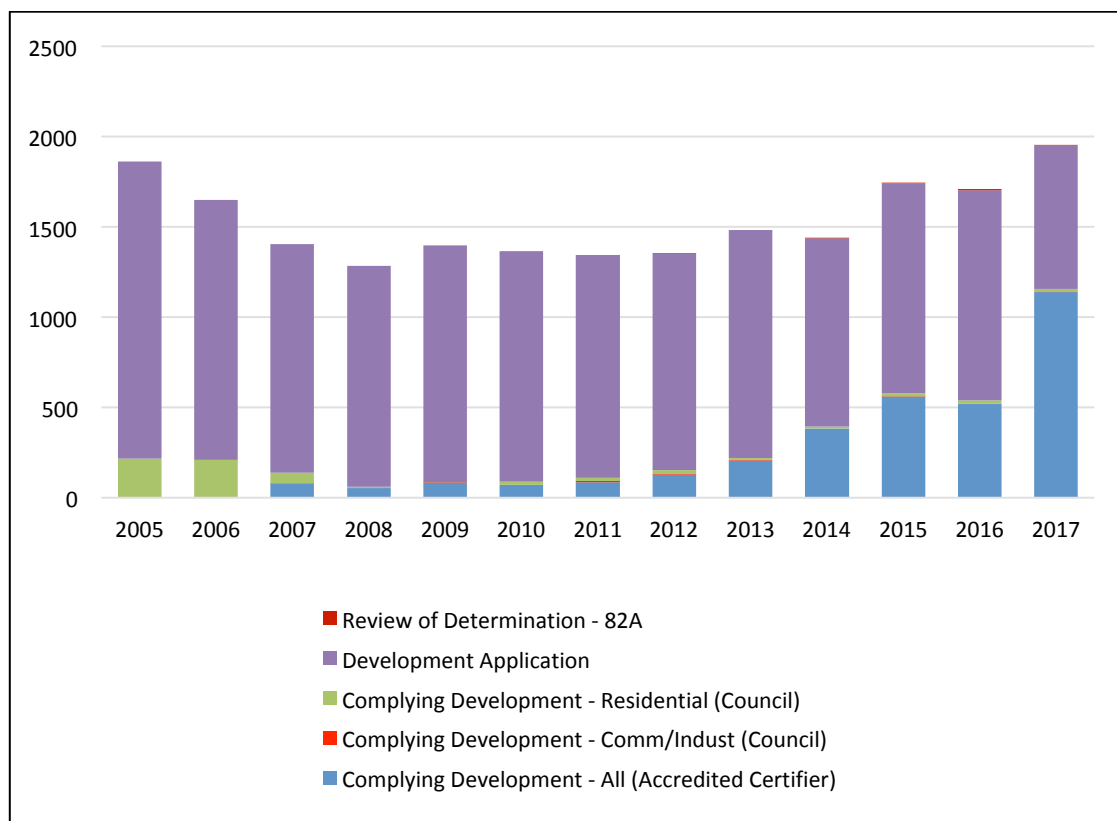
Working with the pilot data has assisted council to identify where application information is either incomplete or contains minor data entry errors, in view of this the observations made below must be seen as a general account of the development activity within the council area. The intent is to show how data automatically and regularly extracted from council's property system can be used to give both a high level account of development activity across the entire LGA and the opportunity to look in more detail at specific planning outcomes in particular geographic areas of interest and areas for improved data capture.

Several observations are common to all graphs – the Global Financial Crisis (GFC) of 2007-2008 clearly had a negative impact on development for a number of years plus the introduction of the Exempt and Complying Development state planning policy in 2008 had a significant impact on the role of accredited private certifiers and uptake of complying development as a development approval pathway, despite the implementation of the private certification framework years previous. Similar trends are tracked by financial year in the NSW Local Development Performance Monitor (LDPM) (NSW Dept. Planning and Environment 2017). The LDPM reported depressed development activity statewide for 5 years following the GFC, with the 2011-12 financial year recording the lowest activity since reporting began in 2006-07. It wasn't until 2013-14 that the first increase in development activity since the GFC was recorded. From 2006-07 to 2014-15<sup>19</sup> complying development rose from 10% to 32% of statewide development approvals (NSW Department Planning and Environment, 2017). Similar trends are seen in the Liverpool City Council data, depressed development activity persisted until 2011 and complying development had risen significantly from 2006 to 2017. Note that the data presented here for Liverpool City Council are by calendar year, the UHL Monitor provides for data to be extracted at a number of temporal scales (annual, quarterly, monthly) depending on the user's preference.

Figure 4 shows the volume of applications determined between January 2005 and December 2017 for the Liverpool local government area.

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<sup>19</sup> The latest published information for the NSW LDPM is 2014-15  
<http://data.environment.nsw.gov.au/dataset/local-development-performance-monitoring-2014-15>

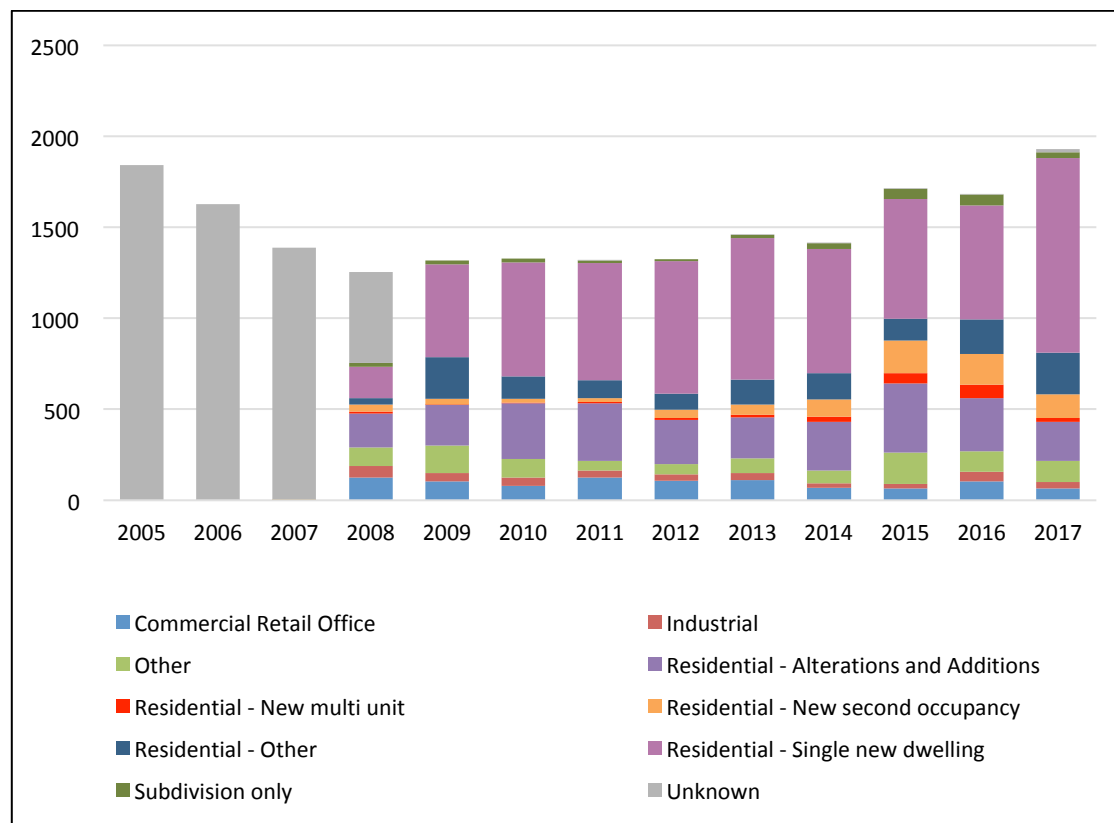


**Figure 4** Application types determined by calendar year for Liverpool City Council. Source UHL Monitor

The graph shows depressed development activity post GFC up until 2011 and a dramatic shift in the volume and type of development application from 2011 onwards. The proportion of complying development certificates issued by private certifiers has increased significantly since 2011 to c.60% of all applications. The shift to complying development is consistent with the increase in low density residential development occurring within the suburbs like Austral and Edmondson Park, both located in a Sydney Region Growth Centre area, and is expected to continue. The increased role of the private certifier and decreased role of council in complying development approvals has seen a shift in council's activity away from approvals and more towards compliance activities.

A breakdown of the development types determined over the same period is summarised in Figure 5. The plot shows a shift in the level of detail recorded by council for development types post 2008, possibly as a result of the introduction of the Council's new SI LEP and in response to the state government requirements for reporting in the Local Development Performance Monitor (LDPM) which was first published in 2007. As discussed previously, the LDPM development categories are widely recognised as too general for tracking the types of development of interest to researchers and policy practitioners - it is expected that LDPM development categories will be replaced by those used in the Standard Instrument Local Environment Plan when standardised requirements for online lodgement of development applications are introduced by the state government. Despite this limitation, the data is still sufficiently detailed to highlight the overall dominance of low density residential development (Residential – Single new dwelling) and more high density unit developments (Residential – New multi unit) since 2014 along with notable growth in dual occupancies and granny flats (Residential – New second occupancy). Council staff involved in the pilot note

the expansion of the Council's Fast Track DA<sup>20</sup> system (10 day approval for residential single dwellings) supporting residential development in the Growth Centre suburbs Austral and Edmondson Park has contributed to the dominance of low density residential development in 2017. Alterations and additions approvals range between 185 to 380 approvals annually and appear to have been remarkably resilient from the GFC and right up to 2017.



**Figure 5** Development types determined by calendar year for Liverpool City Council. Source UHL Monitor

Note that the development types generally follow the categories for the NSW LDPM: "residential other" refers to development types other than the listed residential development types (eg. ancillary development, secondary dwelling); secondary dwellings are included in two categories (residential other and residential - new second occupancy); and, "Unknown" means that development type information has not been recorded.

Figures 6 and 7 look at the value of approvals by application and development type respectively. The value of applications has increased steadily since the GFC, exceeding a billion dollars in 2015 and 2016. According to council staff, the drop to around \$800M in 2017 shown in the graph is likely due to a backlog of number of large DAs yet to be determined by late 2017. How the value of developments determined trend into 2018 could be analysed as new development data are incorporated into the UHL Monitor. A trend consistent with previous graphs is the increase in value of complying development certificates issued by private certifiers (to around \$300M) up to 2017, a tripling of the amount from the previous two years.

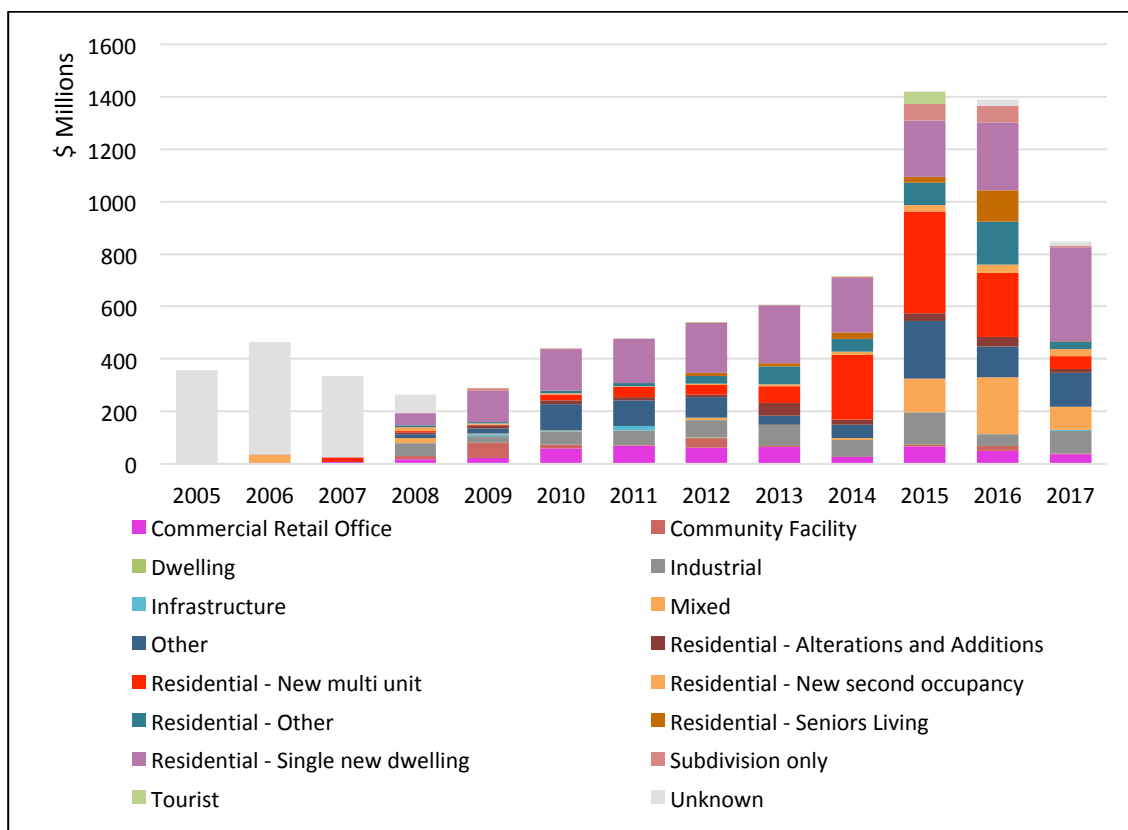
<sup>20</sup> Liverpool City Council ePlanning Portal and Fast Track DA system  
<https://eplanning.liverpool.nsw.gov.au/Pages/XC.Home/Home.aspx>



**Figure 6** Application types determined by value by calendar year for Liverpool City Council. Source UHL Monitor

The types of development by value shown in Figure 7 highlight approvals totalling over \$100M in 2016 for residential development under the State Environmental Planning Policy (Senior Living) 2004; a strong base of commercial retail and industrial development approvals since 2010; a marked increase in the value of related mixed development (residential, commercial, retail) approvals from 2015 to 2017; and, three strong years of new multi unit residential developments from 2014 to 2016.





**Figure 7** Development types determined by value by calendar year for Liverpool City Council. Source UHL Monitor.

At an aggregate level the picture of development for Liverpool City Council is consistent with the general trend of a high level of development activity over the past three to four years across metropolitan Sydney with a focus on both new high and low density residential development in western Sydney.

The UHL Monitor quickly brings historic and current development data together for the user and allows for further searching and analysis of specific development details and trends. How factors like change in government planning policy and new priority growth areas may interact with (say) shifts in financial lending criteria to influence the balance of applications for residential and commercial projects in an LGA could be explored. Moreover, some of the data fields captured by ATDIS provide further opportunity to drill down into detailed development activity not readily possible.

The short form development description recorded by council for each application is one of the ATDIS fields searchable in the monitor. The development description is a free text entry field (ie non standard) difficult to search systematically yet contains important data on numbers of dwellings, proposed building heights, number of bedrooms, parking spaces and relationship to specific State Environment Planning Policies. When this information is extracted, categorised using more sophisticated business intelligence tools, checked against the documentation provided by the applicant (ATDIS records the URL to the specific development application), mapped (ATDIS records the latitude/longitude for each development) and combined with other information the user is better placed to understand the detail and assess the planning outcomes.

The following figures illustrate how further analysis of council's data can track and compare the types of residential development occurring in specific areas, leading more to insights

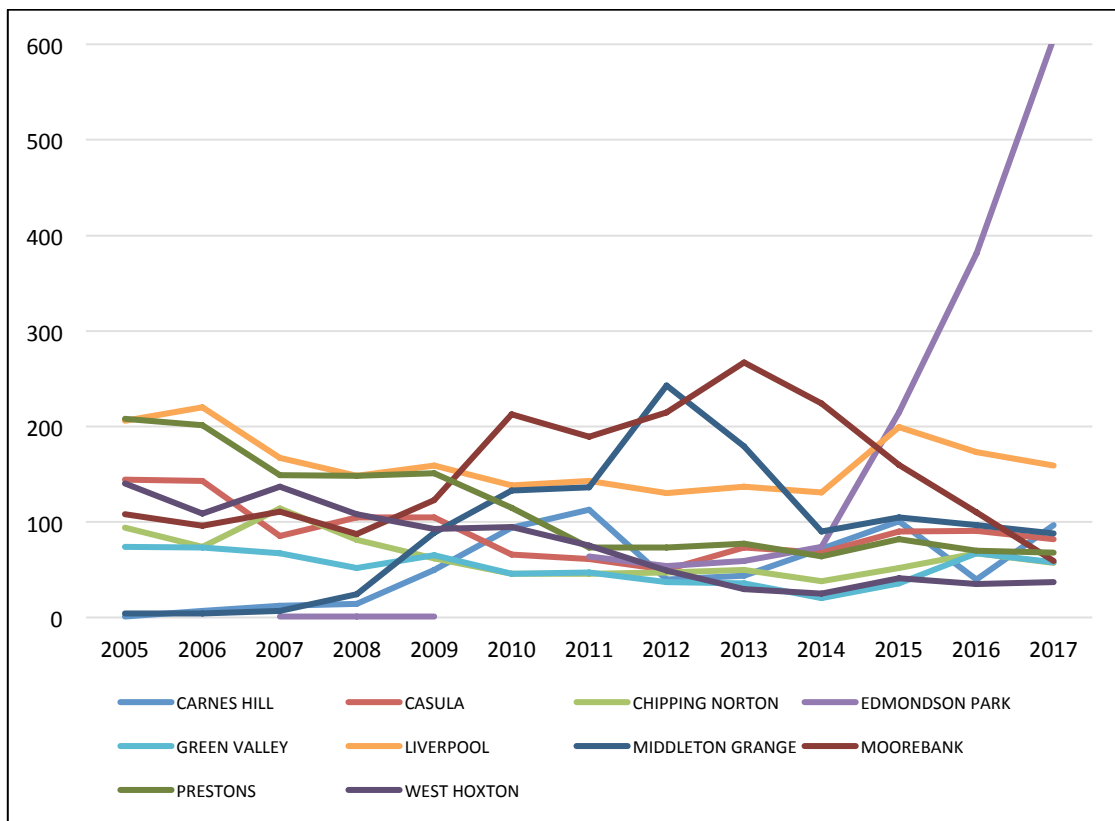
about planning outcomes rather than simple outputs. While council staff will likely know this information, to the researcher or policy professional unfamiliar with the area it can be used to quickly build a view of the planning activity and its implications using the UHL Monitor.

Figures 8, 9 and 10 examine time series development data for two suburbs in Liverpool City LGA – Liverpool and Edmondson Park. Liverpool is an established suburb containing the city centre and has a mix of commercial, retail and residential development types. Edmondson Park is a new suburb in a Growth Centre with mostly low density residential single dwellings.

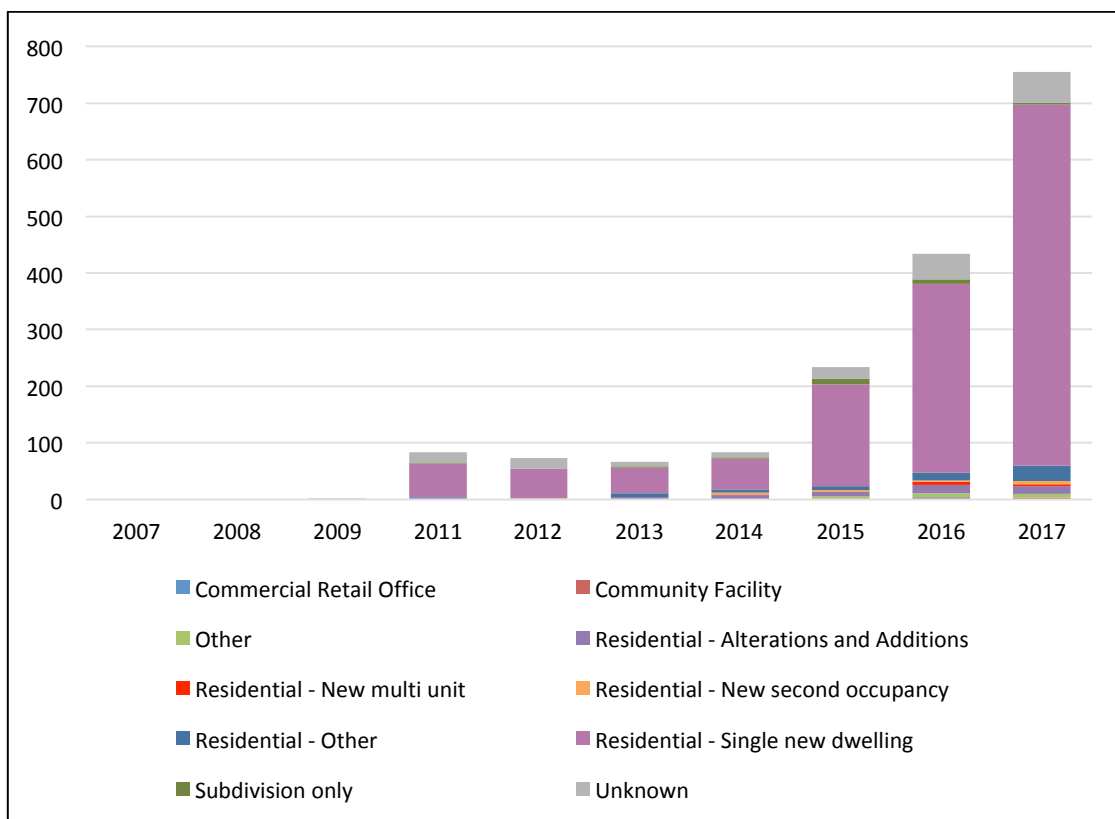
Figure 8 tracks the development activity from 2005 to December 2017 in Liverpool City Council's top ten suburbs by volume of determined applications. In the past three years the volume of development in Edmondson Park has eclipsed all other suburbs, prior to that urban release areas Moorebank and Middleton Grange held the position of most applications. Council staff noted these trends reflect both changes in state-based planning controls (Edmondson Park) and amendments to the Liverpool LEP (Moorebank and Middleton Grange). Over the same period Liverpool has achieved a mix of commercial and residential development, marking the city centre as a resilient and steady performer in terms of development approvals, albeit not to the level of the suburbs mentioned.

Figures 9 and 10 look at the development types making up the bulk of approvals in Edmondson Park and Liverpool respectively. It is clear developments in Edmondson Park are overwhelmingly low density single residential and Liverpool has a mix of residential types and commercial. The differences are explained by the objectives of state planning frameworks for new housing in designated growth areas (Edmondson Park) versus a range of commercial, retail and residential applications in the city centre facilitated by rezonings and infill development. This pattern will shift again in 2018 with the commencement of the council's new local environment plan which will support accelerated development in the city centre.

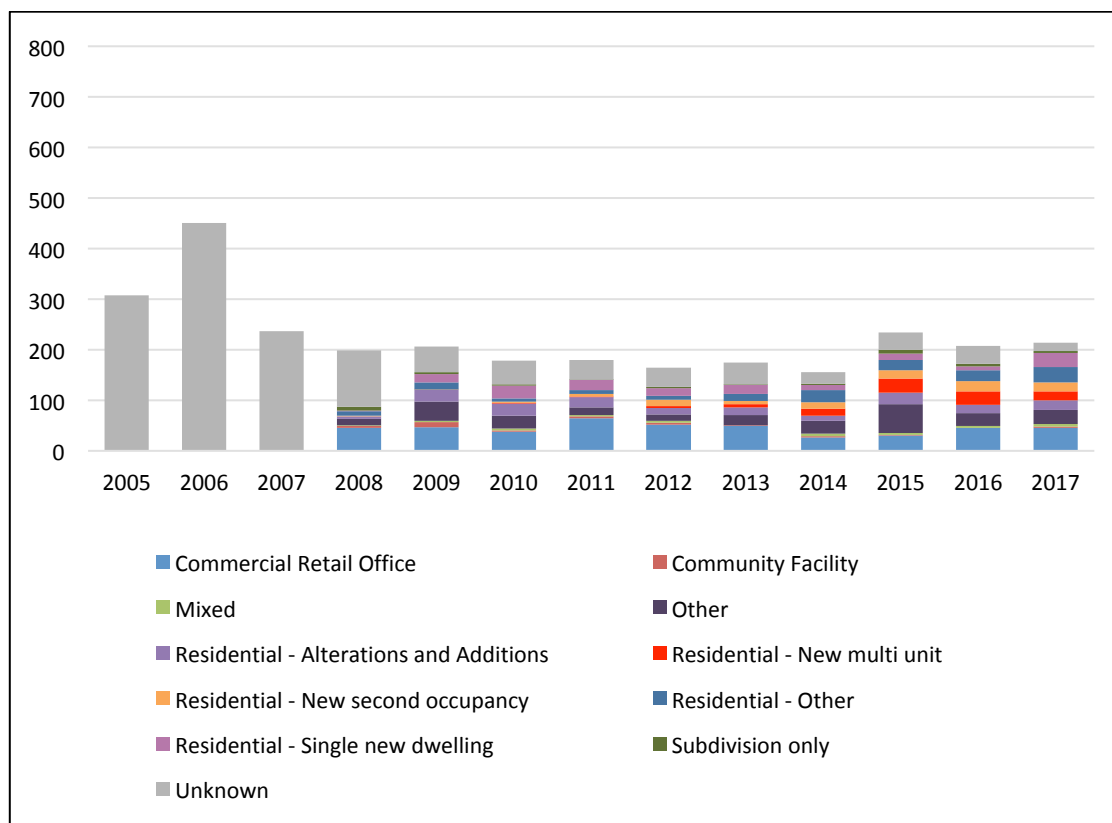
The final figures in this section (Figures 11 and 12) are maps taken directly from the UHL Monitor demonstrating how otherwise difficult information to source on affordable housing and secondary dwellings (granny flats) can be extracted from council's data. Council staff have commented that they will begin to use the UHL Monitor to research these types of elements of the planning system.



**Figure 8** Applications determined by calendar year for the top ten suburbs by volume of applications for Liverpool City Council. Source UHL Monitor.

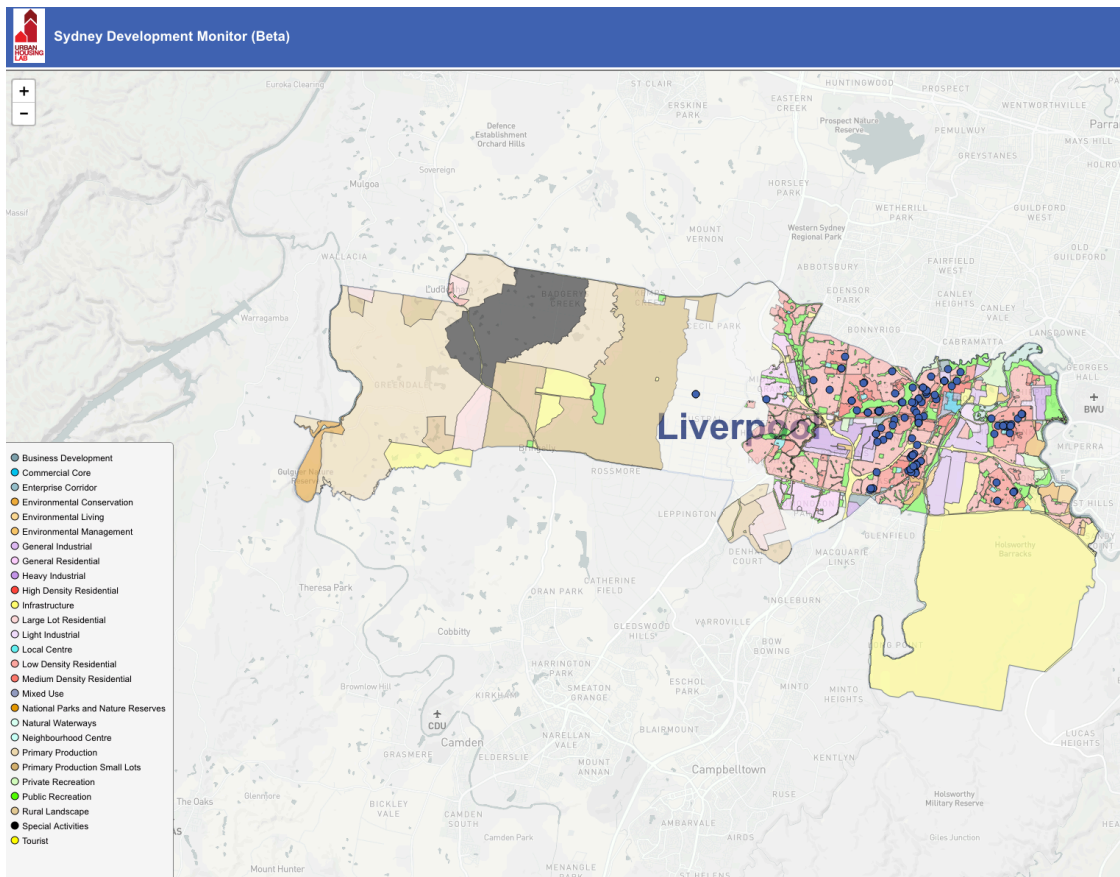


**Figure 9** Breakdown of development types by calendar year for Edmondson Park. Source UHL Monitor.



**Figure 10** Breakdown of development types by calendar year for Liverpool CBD. Source UHL Monitor.

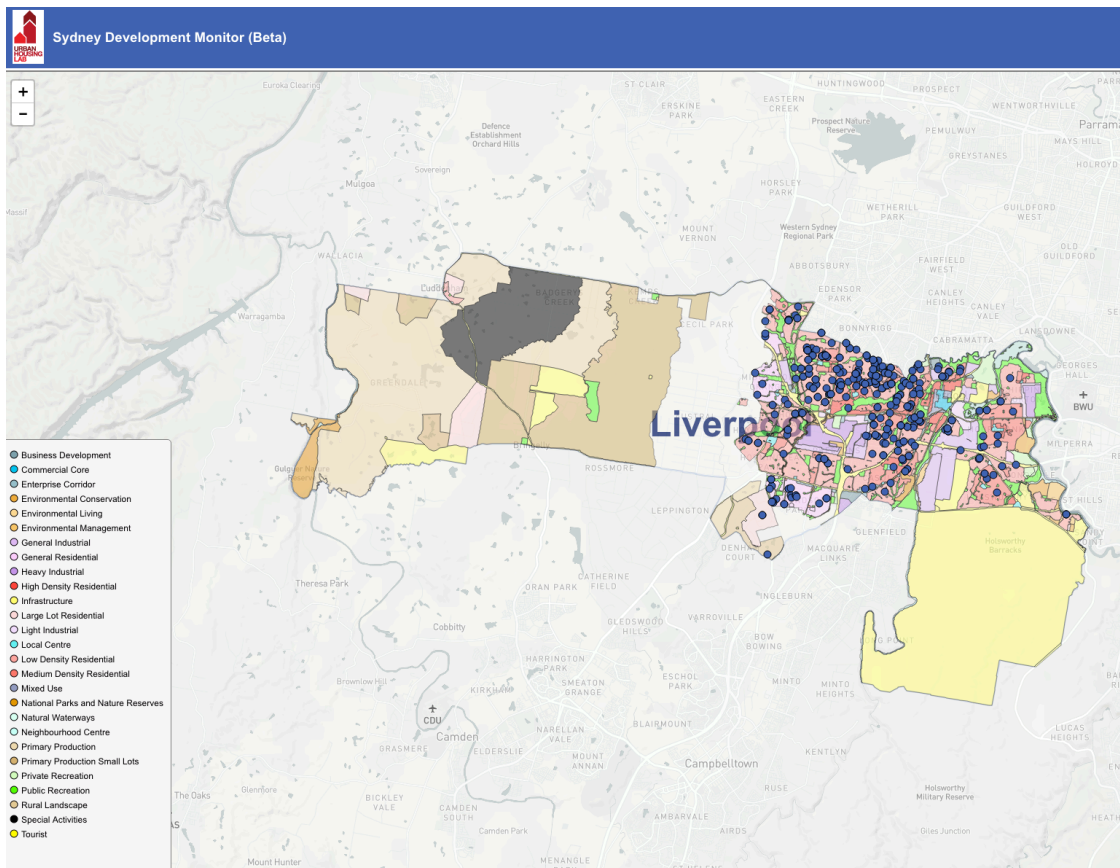
Figure 11 shows the distribution and number of development applications recorded by council as being approved under the State Environmental Planning Policy (Affordable Rental Housing) 2009, Figure 12 plots the number of residential development applications for “granny flat” (Residential – new second occupancy). For both maps, all categories of application status are shown (ie determined and non-determined) as the only search criterion used to filter the data was the term “affordable” or “granny”. The Liverpool Local Environment Plan 2008 land use zones provide a backdrop for the data.



**Figure 11** Location and number of development applications that reference the State Environmental Planning Policy (Affordable Rental Housing) 2009. Source UHL Monitor.

Data current as of December 2017. The apparent gap in the local environment plan landuse zones is where the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 applies. Source Urban Housing Lab Monitor.

Figure 11 shows 116 data points which contain “affordable” in any of the ATDIS data fields. Closer inspection of these data and filtering for determined applications (DAs and CDCs) only results in a total of 49 (48 approved, 1 refused) developments between 2013 and 2017. The majority (70%) are residential multi unit developments approved under the Affordable Rental Housing SEPP generating around 580 new dwellings. The three top suburbs are Liverpool, Casula and Cartwright which either include or are adjacent to the city centre and proximate to major transport (road and rail) corridors.



**Figure 12** Location and number of applications which reference the term "granny" in any ATDIS field. Source UHL Monitor. Gap in the local environment plan landuse zones is where the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 applies.

Development applications which contain the term "granny" in any of the ATDIS fields are shown in Figure 12. These applications, properly identified as secondary dwellings (self-contained accommodation within, attached or separate to an individual home), are tagged in the council database as "granny flats" in the ATDIS development description field. A total of around 360 records are returned, filtering for determined applications results in 192 (186 approved, 6 refused) between 2005 and 2017. The majority (c.80%) have been determined as DAs. While many low density residential areas are represented in the list of granny flat approvals, the three top suburbs in terms of numbers of "granny flats" determined in the time period are Liverpool, Hinchinbrook, Edmondson Park.

The feasibility of near real time open access to local government planning and development data, and the demonstrated benefits of this, has been a central objective of the research. This section demonstrates that online access to council development data is feasible and opens the opportunity for researchers and planning professionals to analyse statutory planning data and integrate it with other related information in ways that have either not been possible or simply too difficult or time consuming to warrant the effort. A legacy of this project will be the ongoing access to regularly updated development data for Liverpool City Council and Maitland City Council through the UHL Monitor. An exciting prospect is scaling the approach to include more council and state government statutory planning information, giving greater geographic reach of the information available and an expanded view of planning activity at both levels of government.

The research and pilot have highlighted preconditions for the success of digital planning and these conditions, and their implications for existing work practices of professional planning practitioners, are examined in the final section of this report.

## **5 IMPLICATIONS OF DIGITAL PLANNING SYSTEMS FOR PLANNING PROFESSIONALS AND THE COMMUNITY**

### **5.1 The Urban Housing Lab Sydney Development Monitor and preconditions for digital planning to meet stakeholder expectations**

It is perhaps ironic yet instructive that the broader benefits of a digital planning system can be demonstrated in a pilot to open up access to what is otherwise perceived as an important but relatively unglamorous component of planning – statutory planning and the processing of development applications.

Earlier sections of this report identified facilitating the empowerment of communities in understanding planning and influencing planning outcomes as a central objective of digital planning. While this objective is far from being realised, it is unchallenged that stakeholder understanding and influence need a reliable evidence-base, what better base than the official record of planning decisions made over time by individuals, companies and the government. This record of planning decisions, framed by strategic planning objectives and state planning policies of the day, give a unique view of the interplay of public and private interests in the decisions shaping our cities and urban environments. A challenge is to provide the most complete view of planning decisions – historic and contemporary.

The preconditions for realising the best outcomes for ePlanning include an understanding of community expectations for planning, good governance, legislation fit for a digital economy, standards for data capture and exchange, a commitment to open data principles and perhaps of most importance, collaboration.

Effectively addressing each of these opens new opportunities for improved evidence-based strategic planning, regular policy and plan reviews and informed community engagement. These types of considerations guided the development of the digital planning framework for New South Wales as part of proposed planning system reforms in 2013 (NSW Government, 2013; Larsen et al, 2014) and remain relevant to the challenges faced in this research. Each one of these considerations has been explored in the research and delivery of the UHL Monitor website pilot, as summarized below.

An understanding of how users want to access planning information and services was the starting point for the development of the UHL Monitor. It was apparent from the literature, and public commentary on planning systems generally, that a majority of stakeholders including planning professionals, researchers and the community want greater transparency of planning decision and confidence in the planning frameworks supporting these decisions. Moreover, stakeholders want most interactions with the planning system to be online and where the relevant data is available in real time so that decision can be made in the confidence that the available information accurately reflects the law.

The pilot started from the basic premise of transparency and information reliability. The UHL Monitor website has been developed in consultation with council staff and university researchers to deliver simple online tools for open access to authoritative development data directly from councils' property information systems, without any filtering by third parties. Based on user feedback, only the minimum functions necessary for data viewing and analysis are provided, most importance being placed on the currency and reliability of the data accessible through the UHL Monitor and the number of council and state government datasets available. The opportunity for users to integrate the data as a machine-readable feed in a standard format directly into their software of choice without using the UHL Monitor website was viewed positively. These requirements have been successfully delivered in the pilot through the support of Liverpool City and Maitland City Councils. A key area for development post-pilot is the establishment of more ATDIS-formatted data feeds from metropolitan councils and their incorporation into the UHL Monitor website.



Good governance, particularly in relation to the responsibilities of both state and local government for planning information management and access, has been critical to the pilot's success. The State Government has set out the role of a digital planning system in ePlanning amendments to the Environmental Planning and Assessment Act (NSW Government 2014a; 2017b) including the respective responsibilities of state and local government. Both Liverpool City and Maitland City Councils maintain a digital database of development determinations and related certifications confident it is consistent with the new legislative requirements while also meeting the particular needs of their business operations and community. This understanding of government roles and responsibilities for managing planning information has underpinned the collaboration with councils and given them the confidence to try new ways of access to, and publication of, statutory planning and development data online. Further, the governance framework has enabled discussions with councils on what additional data could be made available which is of general benefit to their operations and the community. For example, as part of the pilot Liverpool City Council has commenced collecting specific information on numbers of bedrooms and parking spaces for developments as well as gross floor area for commercial and industrial developments. These additional data have been added as an extension to ATDIS, extending the specification for a common standard for recording and extracting application tracking information from council electronic management systems.

The future reliance on a digital planning system in NSW has been established in ePlanning amendments to the Environmental Planning and Assessment Act (NSW Government 2014a) and the Environmental Planning and Assessment (ePlanning) Regulation (New South Wales Government, 2017b). Taken together, the reforms provide the objects and means to guide the design, management and uptake of digital planning practices sought by users of the current planning system. Importantly the changes represent a long overdue modernisation of the planning system away from a reliance on paper-based systems and processes towards digital information and web services, and of specific relevance to this research, standardisation of the development application process and related matters like the terms used to describe development types. A major issue encountered in the pilot frustrating the analysis of council information has been the overgeneralised and inconsistent terminology used to describe development types. Today the New South Wales has the necessary legislation to change this by introducing standardised development application forms and nomenclature for development types – simple technical changes that will make a significant difference to how development data can be combined and analysed at any spatial scale. Pilot programs like the UHL Monitor demonstrate how technology can realise novel ways to access and use planning information - planning legislation suited to a digital age and economy can facilitate these types of initiatives.

Common standards to facilitate the capture and exchange of information and the adoption of the principles for open data and web services are essential for digital planning. Both of these considerations led to the adoption of the existing state government ATDIS for the pilot. ATDIS has been successfully used in the pilot to structure the extraction and routine publication of standard development information as an open data web service from two different proprietary council property information systems. The result of the technical work is evident in the UHL Monitor and the value of the technical solution to researchers and council staff has been demonstrated in the visualisation of application and development type trends for the entire Liverpool City Council area and for specific areas within the Local Government Area. The inconsistency with which councils record application information, most particularly development types, has been highlighted in the pilot as an area for improvement. While this presents some initial difficulties for the comparison of development information from different councils, the use of other ATDIS fields such as the development description and URL link to the application documents held by council provide the researcher with options for resolving inconsistencies. The problem should be addressed for future development applications with



the introduction of a standard development application form and nomenclature for terms like development type flagged in the Environmental Planning and Assessment (ePlanning) Regulation (New South Wales Government, 2017b).

## **5.2 Equipping planning professionals for digital planning systems**

The preconditions for implementing an integrated digital planning system also provides a convenient reference for planning professionals and researchers to think about how the introduction of more and new technologies will impact their day to day activities and provide opportunities for better community engagement in planning our cities and regions.

Understanding community expectations for planning, good governance, planning legislation that facilitates integration with the digital economy, adoption of standards for data capture and exchange and a commitment to open data principles all have implications for how planning professionals will work into the future, irrespective of the jurisdiction they are in. For professionals and researchers in New South Wales four areas are of particular importance for equipping them for the future are flagged: an appreciation of how legislative changes will shape their work practices and interaction with the planning system, why standards for data are important, what a commitment to open data principles looks like and the opportunity for improvements in community engagement.

Firstly, planning professionals, researchers and educators need to be aware of the purpose and implications of legislative changes for ePlanning in their jurisdiction. While the review of international and national approaches to ePlanning summarised earlier in this report highlight a focus for technology on planning process efficiencies, the intent of legislative changes for ePlanning in New South Wales reach well beyond this narrow scope. It's not business as usual - the legislative changes seek to give greater transparency and certainty for people interacting with the planning system and will fundamentally change existing planning practices. For example, the expectation is that strategic plans, state and local planning instruments (text and spatial data) will all be prepared digitally and in a way that they can ultimately be published, maintained and monitored as legal digital data in the NSW Planning Database. Current practices where plans in the hierarchy from state to region to local are prepared manually (albeit using technology to digitise paper-based steps) and with insufficient regard to the consistency between plans in terms of purpose or even spatial extent, are not fit for a digital planning environment and contradictory to community expectations. Moreover, the community expectation is that the planning information they source online will be reliable, current and suited to their particular needs. The legislation will increasingly move the planning system online with attendant challenges and opportunities for planning professionals, researchers and the community.

Second, the adoption of standards for planning information is critical for its management, efficient exchange and use online by all stakeholders in the system. In New South Wales the preparation of Local Environment Plans and reporting of development activity are two examples where broad benefits in terms of more efficient business processes and resource use and improved community engagement and planning services will be realised. Up until relatively recently, Local Environment Plans prepared using GIS software had to be converted to a digital paper-based format (ie PDF) before they could be published as legal plans. With the commencement of the NSW Planning Portal and Planning Database in 2015, the legal requirement is shifting to plans referenced by planning instruments to be prepared in digital formats suited for incorporation in the NSW Planning Database and accessed via the NSW Planning Portal, or web services publishing data directly from the NSW Planning Database (NSW Government, 2015a; 2015b; 2015c). A move away for PDF formatted maps to GIS formatted spatial data for local plans represents a significant benefit in terms of the efficiency and reliability of drafting and publishing plans by local and state

governments, and reduction in housekeeping amendments to legislation to correct cartographic errors in PDF maps; improved access to current planning spatial data online for stakeholders to undertake integrated property and planning searches or investigate the applicability of planning rules and for automated issuing of advice like a Section 149 certificate<sup>21</sup>; and incorporation of the planning spatial data as web services directly into systems like the UHL Development Monitor. The same requirement applies to newly created plans like the boundaries of the Greater Sydney Region Districts published in 2017 which guide the operations of the Greater Sydney Commission.

The UHL Development Monitor pilot has shown how standards for data capture and exchange can significantly improve access to development activity information. Apart from the obvious benefits to the researchers and planning professionals of online access to these data, the pilot has provided councils with an efficient automated and cost-effective approach for providing their development information online. The pilot has highlighted where standardisation of development type categories, anticipated in 2018 with the introduction of online lodgement of development applications in the NSW Planning Portal, will make a significant contribution to the value and comparability of councils' data.

While the development and adoption of standards for spatial plans and development application data are provided for in legislation, it will be the planning professionals who will have the opportunity to act and implement standardised solutions for the publication of authoritative planning data. Central to their thinking must be the adoption of open data principles to ensure the greatest equity of access to information and flexibility in its use. The UHL Monitor pilot would not have been possible without a commitment to open data principles by the Liverpool City and Maitland City Councils. Similarly, the incorporation of government spatial planning layers (ie. Greater Sydney Districts; Liverpool and Maitland SI LEP) as web feature services underlines a commitment to open data. What has emerged in New South Wales by late 2017, and most other jurisdictions in Australia and overseas, is a maturing in the governance arrangements supporting the management of public information and its open publication via a range of technologies and formats suited to user needs. The daily actions and decisions of planning practitioners must be informed by a clear appreciation of the potential benefit of the public information they manage and seek to realise these benefits through the adoption of open data solutions.

Finally, facilitating improved community engagement via ePlanning must be informed by the enduring concern for transparency and consistency in planning. Much can be done with technology but the question really is what must be done now. Actions which immediately suggest themselves as opportunities for improved engagement through the appropriate use of technology are the full integration of interactive spatial plans and the text of planning instruments on the NSW Legislation website; state and local plan making in digital formats such that gazetted plans of varying scale can be overlaid to demonstrate policy and spatial consistency; and, automated publication of standardised property-level development activity data by state and local government for the purposes of sharing information on planning system outputs and facilitating policy review. Taken together, these four initiatives alone would provide planning professionals, researchers and the community with far greater access to current and legal plans and up to date development activity data online in a way suited to a range of engagement purposes. There are of course myriad other ways technology can assist engagement and these should be pursued where they have demonstrable benefit, the immediate focus should be on how technology can facilitate a foundation of authoritative digital planning information, openly available as web services for

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<sup>21</sup> A Section 149 Planning Certificate is a certificate issued by a council under the provisions of Section 149 of the Environmental Planning and Assessment Act 1979. The certificate provides information on how the land may be used and restrictions on its development

equitable access and flexible use. Once this platform is available, planning practitioners and the community alike can be confident strategic and operational planning matters requiring consultation will be informed by the same reliable and contemporary information.

## 6 CONCLUSIONS

This report set out to address three questions: the rationale for government investments in digital planning and benefits being delivered; the feasibility and benefits of near real time open access to local government planning and development data; and, implications for planning professionals and the community in the greater uptake of information technology in the NSW planning system.

A review of the international and national literature on ePlanning has shown that major investments by governments are commonly justified in terms of the benefits of transparency, efficiency and speed of application processing when digitising planning systems. The evidence for these benefits is limited, either because published accounts of quantified improvements against defined benchmarks are absent in the peer-reviewed literature, or the definition of benefit is narrowly framed and reported in relation to application processing times. The literature does have many case studies of technology and networked information systems making a difference in evidence-based planning and community engagement, however there is remarkably little published on how technology is actually transforming foundational components of statutory planning systems such as legislation drafting, plan making, development assessments, reporting and policy review. This may simply be due to the difficulty of locating and extracting this information from government publications or the non-peer reviewed literature. Another possibility is that digital transformation of planning is challenging and the examples that are available deal only with jurisdiction-specific non-integrated components of planning systems. Despite this, information is available as the research which informed the foundations of ePlanning in NSW shows. Amendments to the NSW planning legislation draws on research into international examples of best practice, most notably Denmark, leading to the establishment of a central repository for digital planning instruments in the NSW Planning Database accessible via a range of web services published to the NSW Planning Portal (Larsen et al., 2014).

The potential for ePlanning to do more than simply speed up application processing but provide new insights into planning outcomes through better access to development data is explored in a feasibility study using the ATDIS specification for open access to local government property-level development information. Two councils with different proprietary property management systems, one metropolitan (Liverpool City Council) and one regional (Maitland City Council), have participated in a pilot. The pilot has demonstrated automated and regular (monthly) publication of historic and contemporary development data from each council in a standard machine readable format. The Urban Housing Lab Development Monitor website (UHL Monitor) developed by the University of Sydney for the pilot enables visualisation and basic exploration of these data and their download for further analysis using business intelligence or GIS software of choice. The UHL Monitor provides council staff and researchers with a unique insight into development trends for the Liverpool City Council area from 2005 up to the present day (December 2017) using up-to-date data. Temporal trends and spatial patterns of applications and residential development types, numbers of dwellings approved, affordable housing development locations and type are all explored to illustrate basic functions of the UHL Monitor website and richness of the council development data. The pilot has demonstrated the feasibility of access to council data and the benefits of expanding the pilot to other metropolitan and regional councils in NSW, and potentially interstate.

The research concludes with a brief examination of the implications of ePlanning for planning practitioners, researchers and educators. Implications are discussed with reference to important precursors for a successful ePlanning implementation, three of which are singled out: developing planning legislation fit for a digital economy; the use of technical standards and web services to facilitate open exchange of planning information and services; and, adoption of open data principles for equitable and flexible access to planning

data. The provision for each is already incorporated in NSW planning legislation and government policy, it is now a matter for planning practitioners to imagine how ePlanning can be leveraged by them and multi-disciplinary teams to help deliver the transparency and consistency in planning decisions and outcomes expected by the community.

The Practitioner in Residence program has been a unique opportunity for this “practitioner” to work closely with university researchers to understand their research priorities and to bring my experience from state government to address these priorities. It has been particularly satisfying to establish the Urban Housing Lab Development Monitor website as a resource for the ongoing use of university researchers and students. Expansion of this work to more councils will add to this legacy and lead to further valuable research into the Sydney residential property market.

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## 8 APPENDIX

### Appendix 1: NSW Development Categories.

Development type categories **(A)** used by the most recently published Local Development Performance Monitor (2015-16) and **(B)** more detailed list based on the Standard Instrument Local Environment Plan template.

#### A

Development category definition for NSW Local Development Performance Monitoring 2015 -2016	
Development Type	
1: Residential - Alterations & additions	Alteration or addition to existing residential development 1. Includes additional ancillary development to dwelling houses e.g. a. swimming pools, b. fences c. garages, carports etc. 2. Also include alterations and additions to other types of housing (multi unit etc) that does not involve the creation of additional dwellings.
2: Residential - Single new dwelling	A new single attached or detached house on a single Torrens lot. (Note: Attached would have dividing wall with adjoining dwelling along a lot boundary.)
3: Residential - New second occupancy	Includes attached or detached: 1. granny flats, or 2. dual occupancies.
4: Residential - New multi unit	Includes 1. residential flat buildings, and 2. multi dwelling housing i.e. townhouses and villa developments, manor houses. Not seniors housing
5: Residential - Seniors Living	Any development approved under the Seniors Living SEPP or previous versions of this SEPP.
6: Residential - Other	Includes: 1. boarding houses, 2. group homes, 3. rural workers' dwellings, and 4. caravan parks and manufactured home estates if accommodation is of a permanent nature.
7: Tourist Includes:	Includes: 1. tourist and visitor accommodation, and 2. other development primarily related to tourism.
8: Commercial / retail / office	Office, business or retail premises.
9: Mixed	Any mix or all of: 1. residential; 2. commercial; 3. tourism, or 4. retail.
10: Infrastructure	Includes: 1. transport; 2. utilities, and 3. telecommunications proposals.
11: Industrial	Includes: 1. rural industry; 2. warehouse and storage facilities, and 3. extractive industry.
12: Community facility	Includes: 1. educational establishments; 2. libraries; 3. hospitals; and 4. public recreation facilities etc.
13: Subdivision only ,	Includes applications for subdivision only (Torrens Strata or Community title) and does not involve the construction of: 1. new residential, and 2. commercial development etc.
14: Other	Development not covered by categories above (eg. agriculture, signage, events.)

<b>Development Types based on SI Local Environment Plan</b>	
Example of the types of development and their categorisation based on the Standard Instrument Local Environment Pla.	
Note - current official categories are at <a href="http://www.planning.nsw.gov.au/Plans-for-your-area/Local-Planning-and-Zoning/~/_media/59DD6FDC284043E6A7856232F21D50C2.ashx">http://www.planning.nsw.gov.au/Plans-for-your-area/Local-Planning-and-Zoning/~/_media/59DD6FDC284043E6A7856232F21D50C2.ashx</a>	
<b>Development Type</b>	<b>Description of Development</b>
1: Residential	Ancillary Development Attached Dwelling Dwelling House Rural Workers' Dwelling Semi-Detached Dwelling Secondary Dwelling Dual Occupancy (Attached) Dual Occupancy (Detached) Residential Flat Building (SEPP65) Villa Homes Townhouse Non-SEPP65 Flat Building Boarding House Group Homes (Permanent) Group Homes (Transitional) Hostel Seniors Housing (Including Residential Care Facility) Home-Based Child Care Home Business Home Industry Home Occupation Home Occupation (Sex Services)
2: Commercial	Ancillary Development Business Premises (Including Funeral Home) Office Premises Amusement Centre Entertainment Facility Function Centre Highway Service Centre Registered Club Restricted Premises Service Station Sex Services Premises Veterinary Hospital Wholesale Supplies Animal Boarding or Training Establishment Parking Facility
3: Retail	Ancillary Development Cellar Door Premises Industrial Retail Outlet Bulky Goods Premises Food and Drink Premises (Includes Restaurant, Cafe, Small Bar, Pub, or Takeaway Food and Drink Premises) Garden Centre Hardware and Building Supplies Kiosks Landscaping Material Supplies Markets Plant Nursery Roadside Stall Rural Supplies Shop (Including Neighbourhood Shop) Timber Yard Vehicle Sales or Hire Premises
4: Industrial	Ancillary Development Heavy Industry (Including Hazardous Industry and Offensive Industry) Heavy Industrial Storage Establishment (Including Hazardous Storage Establishment, Liquid Fuel Depot and Offensive Storage Establishments) Light Industry (Including High Technology Industry) General Industry Boat Building and Repair Facility Vehicle Body Repair Workshop Vehicle Repair Station Storage Premises (Including Self-Storage Units) Depot Warehouse or Distribution Centre Extractive Industry Mining Underground Mining Open Cut Mining Agricultural Produce Industry Composting Facilities and Works Livestock Processing Industry Sawmill or Log Processing Industry Stock and Sale Yard
5: Agricultural	Ancillary Development Aquaculture Extensive Agriculture (Including Pasture-Based Dairy, Bee Keeping) Intensive Livestock Agriculture (Restricted Dairy, Feedlot, Piggery, Poultry Farm) Intensive Plant Agriculture (Cultivation of Irrigated Crops for Commercial Purposes, Horticulture, Turf Farming, or Viticulture) Farm Building Forestry
6: Tourist and Visitor Accommodation	Ancillary Development Backpackers' Accommodation Bed and Breakfast Accommodation Farm Stay Accommodation Hotel or Motel Accommodation Serviced Apartments Camping Ground Caravan Park Eco-Tourist Facility
7: Community Facilities	Ancillary Development Place of Public Worship Educational Establishment (School or Tertiary Institution) Child Care Centre Health Services Facility (Including Hospital, Medical Centre, Health Consulting Rooms, Community Health Service Facility and Patient Treatment Centre) Community Facility Correctional Centre Emergency Services Facility Industrial Training Facility Information and Education Facility Public Administration Building (Including Courthouse and Police Station) Research Station Swimming Pool Respite Day Care Centre