



LOW CARBON LIVING
CRC

Precinct Information Modelling

Collaboration:

Empowering Broadway



Introduction

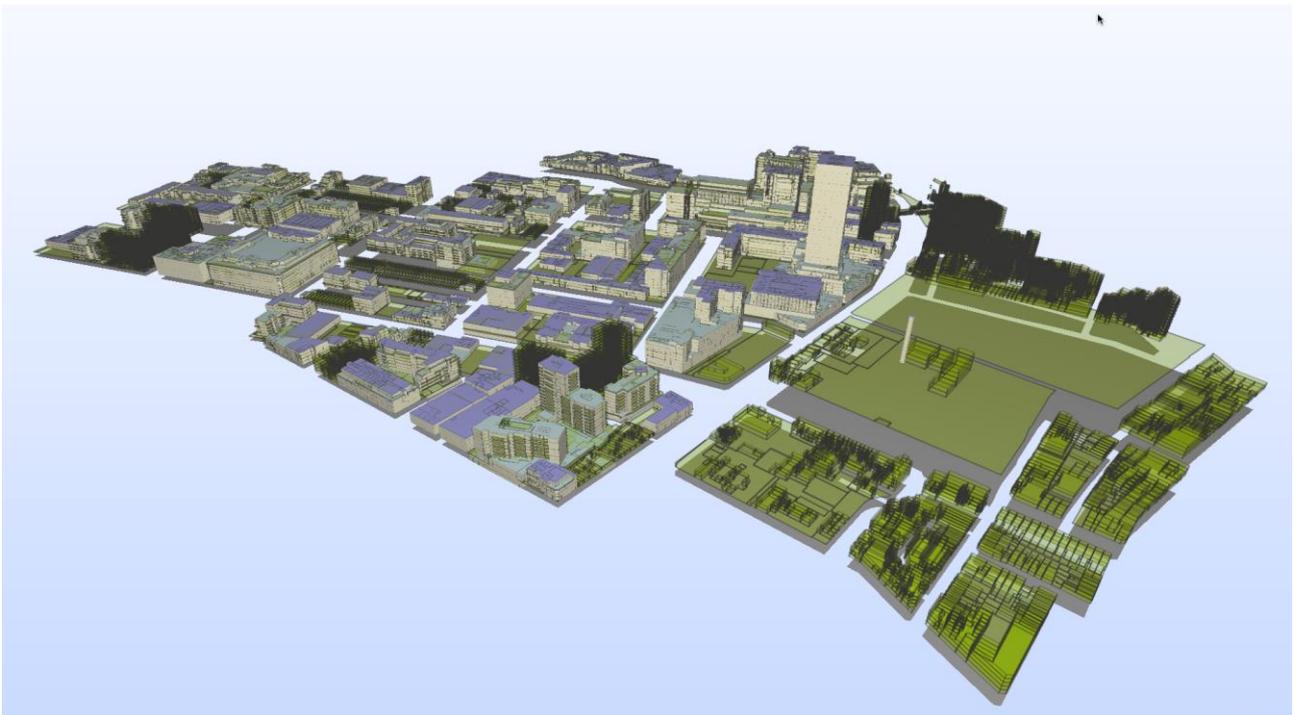
The Broadway Precinct – A testbed for Precinct Concepts

The Broadway Precinct has been the major starting point for the PIM Team, with the development of a large model derived from the City of Sydney's Floor Space Employment Survey (FSES). Hosted in a GIS format, the data was converted into BIM format (using the IFC open BIM standard).

To date this Precinct Model has supported a number of key investigations and findings:

- Creation of a large data set of building instances (over 400 in the immediate precinct of interest and a further 200 in the Ultimo extension)
- Understanding in detail how Development Planning works under the NSW Local Environment Planning legislation (LEP) using the concepts of Land Use Zones and Development Types (see *TI: Land Use and Development Types*)
- Understanding the role of cadastre – legal land ownership – in current surveying systems and the context for map-referencing and GPS in precinct scale developments
- Understanding how Local Governments (represented by the City of Sydney) classify building assets and the organisations that use these facilities to understand changes in development activity within a local government area (LGA)
- Identifying the properties of precinct objects (at their differing levels of typology or detail) to capture environmental impacts and embodied carbon for comprehensive sustainability performance recording (see *TI: Precinct Object Library Implementation*)
- A test bed for landscape planning and road modelling through contributions from two private organisations
- A platform for testing the requirements for an extended urban context to include built facility types other than buildings, such as roads, bridges utilities and civic space.

Figure 1: Broadway Precinct Model, (including Ultimo extension)



Whilst the development of this model has been very useful to explore, define and refine approaches to creation and management of precinct models, so far we have been very limited in extending this to a full simulation of a formal business problem. This is the stage of work we now need to move to.

The Empowering Broadway Project (EBP)

The CRC LCL Empowering Broadway project aimed “to identify and understand the economic, stakeholder, regulatory and technical barriers to *transitioning existing communities to low carbon energy and water solutions...*”. (Swinbourne 2016). A key element of the project was “to empower stakeholders within communities to *drive transitions to low carbon energy and water use*, by providing them with the data and processes they need for change”.

The federal government’s recent decision to expand the National Carbon Offset Standard (NCOS) to buildings, precincts and cities gives added impetus to precinct modelling such as this one (although at this time no guidelines have been published).

The key question is: what information is needed for a *transition project*?

A challenge the research has found in establishing precinct models is the difficulty in obtaining consistent, up-to-date data. There is an absolute paucity of base data for both the urban context of precincts - roads, pavements, utilities, civic space etc - and the owner’s assets in terms of facilities, equipment, operations, maintenance, performance, energy consumption, patterns of usage, etc.

Broadway Precinct Data Project

The PIM Team’s ongoing contribution will be to continue the modelling of the data collected by the EBP team. It was noted at the outset, that the data necessary for the EBP analyses does not necessarily require 3D modelling, but might require some spatial “connection” data. We propose to extend the existing Broadway PIM model with the additional data collected by the EBP team which includes electricity and water usage data, as well as location and condition status of existing plant.

(**Note:** We presume that we would continue to work with UTS and Tafe NSW as partners in this work).

Storing and representing the data in a strategic, incrementable, accessible way is best undertaken using the structured data schema that the PIM team has developed (see *TI: Precinct Information Schema*), based on global work in the building and infrastructure domains.

This method ensures that the many data providers and users can access sub-sets of information through defined user interfaces and data exchange definitions.

We will use the EBP data survey material as a starting point for the uploading of data to the extended model and monitor its effectiveness to support analysis for transitioning to better energy sharing strategies.

The New Broadway Precinct Model

The new submodel will be a shared model of the two facility owners, UTS and TAFE NSW. It will focus on the simulation of shared services and understanding the existing performances of facilities and services.

Figure 2: New Precinct Model, UTS

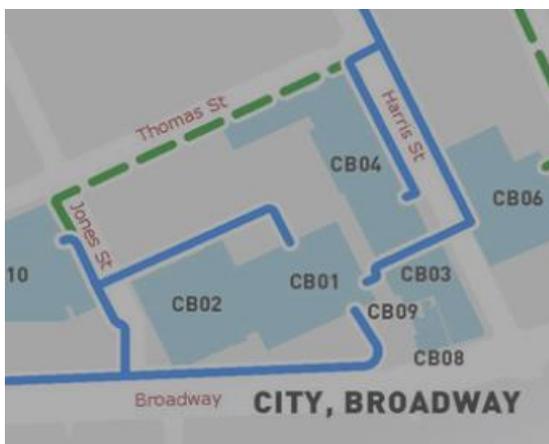
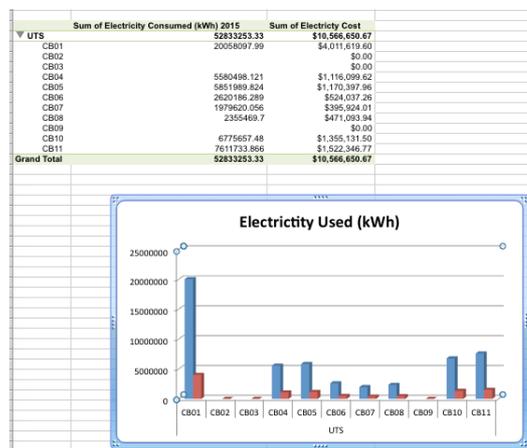


Figure 3: Raw Electrical Consumption data by building, UTS



Using the existing Broadway precinct model, we propose a range of implementations to extend functionality and serve as a robust demonstrator as follows:

- The Urban Heat Islands Project

The Broadway model can provide a useful exemplar for the UHI project, by adding the extra data required to support heat island behaviour (ground plane and façade elements, vegetation etc)

- Implementing a *detailed sub-model* (tentatively located on Thomas Street), modelling several adjacent buildings from both campuses, with the roads, pavements, civic spaces and utilities, assisted by our project partners and previous collaborators McGregor Coxall and 12D Solutions.
- Updating and extending data for occupancy, and usage, energy, and water utilisation based on the EBP data collected for 8 buildings
- Adding functionality for online monitoring from the current UTS metering system(s)
- Providing, in accordance with our precinct typologies, examples on two levels of detail (LOD) for the NBP
- Documenting a *Precinct Model Guide* explaining key concepts, applicable standards for environmental performance and sustainability, access to the model etc as a template for modelling in other precincts