Project – The attributes of Wellington’s Green Star rated buildings – Phase 1

Final report – 5 September 2013

Summer Scholar: Hendrik Prins BBSc
VUW Supervisor: Prof. George Baird
WCC Supervisors: Zach Rissel & Catherine Leining
Sponsors: Wellington City Council and Victoria University of Wellington
# Contents

1. Project Summary ........................................................................................................................................ 3
2. Market Share ............................................................................................................................................... 4
3. Green Star Trends ...................................................................................................................................... 6
   3.1 Introduction ........................................................................................................................................ 6
   3.2 Office Design: .................................................................................................................................... 6
      3.2.1 Management: ............................................................................................................................... 6
      3.2.2 Indoor Environmental Quality: .................................................................................................... 7
      3.2.3 Energy: ......................................................................................................................................... 8
      3.2.4 Transport: .................................................................................................................................... 9
      3.2.5 Water: .......................................................................................................................................... 9
      3.2.6 Materials: .................................................................................................................................... 10
      3.2.7 Ecology and Land Use: ................................................................................................................ 11
      3.2.8 Emissions: ................................................................................................................................... 11
      3.2.9 Summary: ..................................................................................................................................... 12
   3.3 Office Interiors: .................................................................................................................................... 13
4. Presentation slides – 25 February 2013 ..................................................................................................... 14
Appendix A – 28 January Interim Report – not for general distribution ...................................................... 16
Appendix B – Dossiers and Summaries – building owners and research team only .................................... 16
   B1 Dossiers of available information on each project ............................................................................. 16
   B2 Summary of attributes of each project ............................................................................................... 16
1. Project Summary

The project is the first phase in growing knowledge and awareness of the sustainable, Green Star rated offices in Wellington, currently consisting of nine office buildings and three office interior fit-outs. These twelve projects in Wellington include New Zealand’s first Green Star rated building (Meridian Building), its first Green Star rated refurbishment (Aorangi House), its first 6 star rated interior fit out (BNZ Harbour Quays) and the first 6 star rated interior refurbishment of an historical building (Stephenson & Turner Design Studios).

The project itself has involved the collection of information available on each of the twelve buildings and then summarising it, outlining key details about the project and its sustainable features.

Also involved has been the analysis of trends in Wellington’s green building scene, focusing on the market share of quality office space which is Green Star rated and the sustainable trends. Since 2007 when the Green Star rating tool came into effect, 95% of Wellington’s newly constructed high grade office space has been sustainably developed, with trends revolving around recycling large amounts construction waste, using healthy and sustainable materials, providing cyclist facilities and using both water and electricity efficient technologies in an attempt to reduce operational costs.
Currently there is a total of 330,054 m² net leasable area (NLA) of A grade and above office space within Wellington, split between 23 different buildings. 137,581 m² (41.7%) of this 330,054 m² is split between seven Green Star rated office buildings.

Of the newly constructed office buildings since Green Star came into effect in 2007, seven of the eight buildings have been rated under the Green Star office design tool, six of them gaining a 5 star rating and one gaining a 4 star rating. Two of these buildings also gained an office interiors rating which was also introduced, one gaining 4 stars and the other gaining 6 stars. This amounts to 94.7% of newly constructed A grade and above office buildings since 2007 by NLA being Green Star rated.

The building which was not rated was the Chews Lane development which began prior to the introduction of the rating tool in 2007 with work completed afterwards. The Vogel Integrated Campus was also a project that was started before 2007, but once the office design rating tool was released it was decided that the design was to be altered to achieve a 4 star office design rating, which it did.

With the exception of the Vogel Integrated Campus, which began prior to the introduction of the green star rating tool, and the Meridian building, which was completed in 2007 as the pilot, all of the projects were developed after the introduction of the office design tool to achieve a 5 star rating.

There are various reasons for this drive for developing Green Star rated buildings. Several of the developers, such as The Wellington Company (Willis Central) and Centreport (BNZ Harbour Quays, Customhouse), had the initial target of achieving a 5 star rating at the start of the design. Several of the companies which are now the anchor tenants for these buildings, including BNZ (BNZ Harbour Quays), Telecom (Willis Central) and Meridian (Meridian Building), were actively looking into having a sustainable building and were established early in the project as the tenants, having their requirements integrated into the building’s design.
Beca (Aorangi Hose) and Stephenson & Turner (S&T Design Studio) are both companies involved in building design and engineering, and both were interested in developing their own sustainable buildings to showcase their dedication to sustainable practice, much like the above companies. Some of the tenants (BNZ, Telecom) also have multiple Green Star rated buildings, the others being in Auckland, indicating that some of the larger companies have an on-going commitment to sustainability.

Four of the Green Star rated buildings in Wellington are occupied by government departments which includes the Vogel Integrated Campus (Ministry of Justice), the Customhouse (NZ Customs Service), One Featherston St. (IRD) and Pipitea Plaza (GCSB), as well as a fifth in Upper Hutt, the MPI Multipurpose Building (MPI). One of the main reasons for government departments occupying around 50% of Wellington’s Green Star rated office buildings was the introduction of the Govt³ scheme which ran from 2003 until 2009. The Govt³ scheme was initiated and led by the Ministry of the Environment to reduce the environmental impact of government agencies. One aspect of this required new government buildings to be sustainably designed and developed, therefore leading to government agencies consolidating their offices and employees into a single, Green Star rated office building which is fitted out for their security and operational requirements.

In terms of user satisfaction, Green Star rated buildings, with their focus on healthy and sustainable design, achieve quite well in this regard. A case study of Aorangi House by Baird et al. shows that at the time it was one of the best performing buildings in New Zealand in terms of user experience, with people reporting that the building was a comfortable and healthy place to work, and that it positively increased their productivity. BNZ had a simpler staff satisfaction survey which yielded similar results, with the users rating it highly for its open plan layout, good views and, encouraging collaboration and constructive habits of the staff in comparison to previous buildings.
3. Green Star Trends

3.1 Introduction
Wellington is currently home to nine buildings rated under the Office Design v1 rating tool and three interior fit-outs rated under the Office Interiors 2009 rating tool. This section analyses, anonymously, the score sheets of the twelve projects involved, outlines the trends found, and the potential reasons for some of this.

This section is structured relative to the Green Star rating system for Office Design. Some familiarity with the Office Design v1 and Office Interiors 2009 rating tools is assumed.

3.2 Office Design:
All of Wellington’s Office Design rated buildings are as follows:

- Willis Central
- Aorangi House
- One Featherston Street
- D4 the Customhouse
- MPI Multipurpose Building
- Pipitea Plaza
- Vogel Integrated Campus
- BNZ Harbour Quays
- Meridian Building

3.2.1 Management:
All of the projects involved Green Star accredited professionals in providing sustainability advice. Likewise, all of the projects made use of commissioning clauses and a tuning period for the systems of the buildings to ensure that they were optimised, although only five of the nine projects made use of an independent commissioning agent for the systems prior to handover. Building user guides were supplied to all but one of the buildings to help with the sustainable operations of the building by its users.

Seven of the nine projects included an environmental management plan, with five of the projects achieving full points for the enhancement of the IEQ of the building. Varying numbers of points were gained for the recycling of building waste during construction, with seven of the nine buildings diverting over 50% of the waste by weight from the landfill or recycling them. Two of these seven
buildings recycled over 70% of the waste while only one of the nine failed to reach the minimum 30% to gain a point.

The scores ranged from 7 to 12 points with an average score of 10 from the available 13 points.

This indicates that it is standard practice in sustainable design for collaboration with Green Star accredited professionals as well as for the use of commissioning clauses and a tuning period to optimise the building. Independent commissioning agents were used on occasion, most likely depending on the companies involved and the type of project itself. Waste management, environmental management plans and building user guides are also indicated to be standard practice.

3.2.2 Indoor Environmental Quality:

The scores for the ventilation rates of the buildings varied due to the different types of ventilation options used, with points being awarded for natural ventilation, mixed mode ventilation or mechanical ventilation, as well as sourcing mechanical ventilation supply air from a clean, external source. No buildings scored points for the air change effectiveness, most likely due to wanting to use a system other than floor diffusers, such as chilled beams. There were varying numbers of points gained for the monitoring and control of CO2 levels in the building, with three being marked as N/A and four of the remaining buildings having sufficient levels of monitoring and control over CO2 levels, while only two buildings didn’t have a system put in place.

Likewise varying numbers of points were awarded for daylight access between the buildings. All but one of the buildings had sufficient daylight to score at least 1 point, while two of the buildings with over 90% of their NLA having sufficient daylight to meet the required daylight factor scored 3. Only one building scored the point available for having sufficient glare control.

All of the buildings made use of high frequency ballasts for the electric lighting in over 95% of the NLA – these reduce the flicker given off by some lights which impacts on the users’ comfort. Six of the nine buildings scored the point for having a designed average illuminance of 400 lux at desk level, and several of the buildings had systems in place which adjust the artificial lighting based on daylight levels to maintain this average.

Seven of the nine buildings scored 1 point for providing good views to the outdoors to over 60% of the NLA, while one building scored the full 2 points, indicating over 90% of the NLA has an external view.

All of the buildings scored at least 2 points for thermal comfort, indicating that all of the spaces are kept at comfortable and healthy temperature ranges for the users. Only five of the buildings scored a point for individual comfort control, indicating that thermal comfort is most likely dictated by the system in the four buildings that didn’t score, while the ones that did score have either small control zones, control over the operable windows in naturally ventilated buildings, or a combination of the two. Five of the buildings scored full points for their acoustic design, indicating quiet service operations and low sound levels.
The reduction of interior pollutants given off by VOCs, formaldehyde, printing and photocopying scored an average of 66% of the available 5 points, with 2 buildings achieving full points, and all of the buildings achieving at least one point for the minimisation of VOCs, indicating that user health is an important part of the designs.

The scores ranged from 9 to 16 with an average score of 14 points of the available 26.

Scores for most aspects of this category vary, although some of the types of solutions would be dependent on the site, building form and location. There were some aspects however which indicate a standard practice, which includes the use of low frequency ballast lighting, external views, daylight and creating healthy environments through reducing pollutants in the materials and removing those produced in office operations.

3.2.3 Energy:

As a conditional requirement for being green star accredited, all the buildings have a base design with a predicted, modelled energy usage of 120 kWh/m².year.

The reduction in CO₂ emissions makes up 15 of the 24 available points (63%), with three of the buildings scoring nine points for predicted CO₂ emissions of <10 kg/m².year, and the remaining six buildings scoring 12 points for <7.5 kg/m².year, indicating a focus on reducing the climate change impact of Green Star buildings.

All buildings have sub-metering for the electricity consumption and the tenancy energy usage, which would be useful during the building tuning period to identify areas of concern and rectify them. Two of the buildings scored half the points available for having an office lighting power density of 2.5 W/m² per 100 lux and the other seven buildings scored 3 of the 4 points for having a power density of 2.0 W/m² per 100lux. All the buildings but one had lighting control zones which can be operated by the users of the space.

None of the buildings scored points for minimising loads during peak hours. This is apparent in that none of the buildings have energy storage systems to operate during peak loads, or their own electricity generating system, such as a photovoltaic array.

The scores ranged from 14 to 18 with an average score of 17 points of the available 24.

The energy category seems to be designed to encourage the creation of an energy efficient building with greatly reduced CO₂ emissions, with all the buildings having similar scores in this category. It also indicates that a BMS is common practice as a building technology, with it metering energy usage for the building and tenancy. This metering and reporting would be useful during the tuning period to find any areas of concern. Low lighting power densities and user controlled zones are also indicated to be common practice in Green Star building design to further reduce power consumption.
3.2.4 Transport:

All of the buildings have minimised the amount of car parking available to the users based on the district plan, and all of the eligible buildings have dedicated spaces for small cars and/or motor cycles. All but one building has dedicated facilities for cyclists and foot commuters, which includes showers, lockers and secure bike racks.

All but one of the buildings scored full points for proximity to public transport which is most likely due to most of the buildings being located relatively close to Wellington train station and bus depot.

The scores ranged from 7 to 11 with an average score of 10 points of the 11 available.

Six of the nine buildings scoring 10 points and one building scoring the full 11 points indicates that catering towards cyclists and public transport while cutting down on car parking is a common way to secure greens star credits.

3.2.5 Water:

All of the buildings have some features to reduce the consumption of the occupants’ potable water usage, including water efficient fittings and fixtures, waterless urinals, rain water harvesting and a grey water system. The average score for reducing occupant water consumption was 4 of the 5 available points, with four of the buildings achieving 5 points and the lowest score being 2 points.

All but one of the buildings had water meters for all major water uses, with seven of the eight buildings linking the meters to the BMS and providing leak detection systems. As with the energy metering, this would be useful during the building tuning period to find any areas of the water network which are not operating as efficiently as they could, or to provide information on how to adjust the system for further reductions in potable water consumption.

Three of the five buildings with landscaping gained the point available for reducing the potable water consumption in the maintenance and irrigation of the landscape and/or had drought resistant plants. Seven of the nine buildings scored full points for the reduction of water consumption by the cooling towers by either not having any cooling towers in the design or having them use over 90% non-potable water, while two of the buildings scored 2 points for the reduction in potable water consumption by the water based cooling systems.

The scores ranged from 8 to 11 points with an average score of 10 points.

Reducing the consumption of potable water was common practice amongst all the buildings as evidenced by the high scores and average. Grey water systems were used in several of the buildings to further reduce potable water usage and cut down on the run-off into the storm water network.
3.2.6 Materials:

Seven of the nine buildings have a dedicated area for the collection and sorting of recyclables to reduce waste to landfill that is easily used by the occupants.

Three of the projects involved existing buildings being on the site, and either demolished, reused or integrated into the new design. One project achieved the full 6 points for the reuse of both the façade and the structure, one achieved 4 of the 6 points for the reuse of the existing structure but not the façade, and the other achieved none of the 6 points.

All but one of the buildings achieved points for having either a ‘shell or core’ or an integrated fit out, seven of the eight achieving the full 3 points and the other achieving 2. An integrated fit out would be far more likely due to the majority of the buildings having established a tenant quite early in the development phase. Several of the tenants also had specific design requirements, in particular the government departments and their security requirements.

Only one building scored points for adding some recycled content to the concrete while no buildings scored points for the recycled content of the steel used. This indicates that factors such as the cost, availability, complexity and/or industry knowledge may be obstacles to attempting this.

Three of the nine buildings scored points for the substitution of PVC materials while only one of the buildings scored points for the inclusion of sustainable timbers. This indicates that factors such as cost, availability or other challenges may be obstacles to gaining the credits too.

Eight of the nine buildings scored the point available for the use of environmentally preferable carpets and five of the nine buildings scored the point for using environmentally preferable paints. However only two buildings scored points for the use of environmentally preferable insulation and no buildings scored the point available for using environmentally preferable non-carpet floor coverings. This again indicates that factors such as cost and availability may make it difficult to try and secure this single green star point.

The scores of the six buildings that didn’t include an existing building range from 5 to 9 out of 18, with an average score of 7 points. Of the 3 projects that involved the reuse of existing buildings, one scored a 7 and another scored a 9 out of the available 24 points. The remaining building scored 12 points of the 19 available.

Overall, the scoring for materials is relatively low, most scoring less than 50% of the available points, likely due to factors such as cost, lack of expertise or availability outweighing the benefits, which were usually only one or two points. The building which scored the highest shows that reusing existing buildings is an effective way of gaining green star points.
3.2.7 Ecology and Land Use:

All but one building got the point for the reuse of land which was previously used, while one building got full points for the development and fixing of reclaimed contaminated land which would otherwise have remained undeveloped. All the projects gained 1 point, and one gaining 2 points, for the improvement of the ecological value of the land (out of the 4 points available). Only two projects got a point for the balance of the cut and fill of topsoil and not removing any from the site.

The scores range from 2 to 4 points with an average score of 2 out of the 8 points available.

The scores for land use and ecology are all relatively low. This could be due to limitations within the site and what can be realistically achieved.

3.2.8 Emissions:

All buildings got the point for either using zero ODP (Ozone Depletion Potential) refrigerants or by not requiring any refrigerant to be used. None had low GWP (global warming potential) refrigerant or refrigerant recovery. Three of the nine buildings reduce the watercourse pollution for water leaving the site for storms of up to 1 in 20 year events. Seven of the nine buildings have been designed to reduce the flow to the sewer, although only two buildings score 2 of the 4 points, while none scored over that. The categories for reducing light pollution from the property, not having any cooling towers and using low ODP insulation all had seven of the nine buildings achieve a point.

The scores range from 4 to 6 points with an average score of 5 out of the 12 points available.

The scores for this category were relatively low. Some areas show common practice, such as for the use of zero ODP refrigerants and insulation, reducing light pollution and not including cooling towers, while other areas could be limited by the site and the systems installed.
3.2.9 Summary:

All of these projects scored highly in the following categories:

- The use of Green Star accredited professionals
- Commissioning clauses
- A building tuning period
- Construction waste recycling
- Thermal comfort
- Reduction in CO₂ emissions
- Sub-metering of building and tenant energy use
- Sub-metering of water consumption
- Parking space minimisation
- Close proximity to public transport
- Low office lighting power densities with energy efficient lighting with a low frequency ballast

These appear to have become standard practice in green building projects and would most likely lead to long term savings in building operations.

There are also several categories in which no points were scored or in which only one or two buildings achieved some points, as follows:

- Air change effectiveness through floor diffusers
- Daylight glare control
- Reduction of energy use during peak times
- Environmentally friendly insulation and/or non-carpet floor coverings
- Use of recycled content in steel and concrete
- The balance of topsoil removed from and supplied to site
- Low GWP refrigerant or refrigerant recovery

There could be several reasons for this, such as the increase in cost, time or perhaps the practicality in getting these points within Wellington.

Some categories scored higher than others, with transport being a category in which over 90% of the available points were achieved by most of the buildings. Other categories had an average score of less than 50%, including the materials category which has one of the highest weightings in comparison to the other relatively low scoring categories.
3.3 Office Interiors:

There are three different office interior rated projects in Wellington currently, each of different scales. These include a large, fully fitted out office building, a partial fit-out of a large office building, and a fit-out of a single floor in an historical building.

As with office design, high scores in some categories were achieved by all three fit-outs, which indicates a standard practice. These categories include:

- The use of Green Star accredited professionals
- Commissioning clauses
- Waste management
- Building user guides
- Low VOC and formaldehyde emitting products
- Sub-metering
- User lighting control
- Close proximity to public transport
- Integrated fit-outs
- Environmentally friendly materials and furniture

The categories which scored the highest were those focussed on the users’ comfort and health, as well as the use of environmentally friendly materials and furniture. The use of environmentally friendly products under the materials category had a very high weighting, and each of the buildings scored well in it. This involves the reuse of furniture and appliances from the previous tenancy fit out and the use of recycled and/or environmentally preferable furniture, joinery and flooring.

There are some areas of the office interiors rating tool which were not scored as highly or as frequently. These categories include:

- The inclusion of exhaust risers in printing and photocopy rooms
- Substitution of PVC with other materials
- Sustainably sourced timbers
- Indoor plants

As for the office buildings, this could be down to matters of practicality and cost (with efforts going into achieving points elsewhere). However, it could also be that there was insufficient documentation or doing work for the category but not enough to gain any points. Many of the fit-outs made use of sustainable timbers and planting for example, while only one of the fit-outs had sufficient usage of the sustainable timbers and planting to gain credits for it under the rating tool.
4. Presentation slides – 25 February 2013

The attributes of Wellington’s Green Star buildings – Phase 1

Hendrik Prins
VUW supervisor: George Baird
WCC supervisor: Zach Rosen, Catherine Lanning

What was involved

- Compiling information available on each of the buildings
- Creating a summary of the buildings outlining their key features and innovations
- Assessing the market share held by Green Star rated buildings
- Create a research plan to further assess these buildings

The Buildings

- Willis Central
- Aorangi House
- One Featherston St. (including the IRD interior fit out)
- The Customhouse
- MPI Multipurpose Building
- Pipitea Plaza
- Vogel Integrated Campus
- BNZ Harbour Quays (including the interior fit out)
- Meridian Building
- Stephenson & Turner Design Studios (Interior fit out)

BNZ Harbour Quays

Developer: Centreport
Architect: Jasmax
Engineering: Beca
Green Star Rating: 5 Star Office; 6 Star Office Interiors

Key Features:
- 2 large naturally lit atria for daylight access and views
- Artificial lighting dims depending on daylight levels to maintain a maximum of 400 lux at desk height
- Ergonomic furniture which is 90% recycled and has an end of life stewardship
- Use of indoor plants and green walls
- Extensive use of low VOC and formaldehyde emitting products
- Blasterwater flushing system collects rainwater from roof and stores it in a 25,000L tank for use in toilet flushing
- Close proximity to public transportation (directly across the road from the train station)

MPI Multipurpose Building

Developer: Ministry of Agriculture and Forestry (MAF)
Architect: Stephenson & Turner
Engineering: Stephenson & Turner
Key Tenant: Ministry of Primary Industries
Green Star Rating: 5 Star Office

Key Features:
- Low predicted energy use of 39kWh/m²/year
- Low predicted CO₂ emissions of less than 7.5kg/m²/year
- Natural ventilation reduces reliance on the HVAC system
- Extensive use of sustainably sourced, low formaldehyde timbers
- Designed around the 3 Tūī trees retained on the site
- Swale reduces flow to the stormwater network by 100% in most situations and protects the site and the building from 1 in 50 year storm events

S&T Design Studio

Developer: Stephenson & Turner
Architect: Stephenson & Turner
Engineering: Stephenson & Turner
Key Tenant: Stephenson & Turner
Green Star Rating: 6 Star Office Interior

Key Features:
- Renovated loft space of a historical building constructed in the early 1900s
- Over 90% of construction waste was recycled
- The entire office space is naturally ventilated
- Retention of the existing walls, floor and ceiling space, mostly left unaltered and exposed
- All of the furniture was brought over from their previous office
- Entire office area can be lit solely by daylight
- Daylight sensor dim the artificial lighting relative to daylight levels and occupancy sensors automatically turn off lights when area remains unoccupied
Aorangi House

Developer: Prime Property Group
Architecture: Studio Pacific
Engineering: Beca
Key Tenant: Beca

Green Star Rating: 5 Star Office

Key Features:
- First existing building to be completely refurbished and awarded a 5 star rating
- Tuning period resulted in a reduction of over 20% energy consumption
- Office space is naturally ventilated
- Solar shades attached to exterior to reduce interior heat gains
- Polystyrene insulation attached to exterior to reduce heat gains and loss
- Renovation of existing building cost around $9 million total compared to the estimated $24 million if it was demolished and rebuilt

Market Share

- 42% of the Grade A and above office space in Wellington is Green Star rated
- 95% of the newly constructed grade A and above office space is Green Star rated
- The only building which is not Green Star rated began before the introduction of the rating tool in 2007, but finished after
- The Vogel Integrated Campus had work begin well before the Green Star rating tool came into effect but was adapted to score a 4-star rating

Reasons for Green Buildings

- All of the Green Star buildings in Wellington were developed to achieve a rating of 5 stars or more (excluding the Vogel Integrated Campus)
- This was usually developer driven to secure tenants looking for sustainable office buildings
- 5 of the buildings are occupied by government departments which moved in under the Gov3 scheme
- Other buildings have tenants that occupy multiple Green Star buildings
- Many of the tenants looking for developing sustainable space to showcase their dedication towards sustainability

Green Building Trends

- Extensive recycling of construction waste and establishing areas for tenancy recycling
- Commissioning clauses and tuning periods for the systems allow them to be optimised to reduce energy use, both during construction and post occupancy
- Actively using healthy materials and good office design and layout to increase user health, comfort and productivity
- Buildings encourage use of public transport with the reduction of car parking, close proximity to public transport options and the inclusion of cyclist facilities
- Some Green Star categories were not actively pursued, such as the reduction of energy usage during peak hours and the use of recycled content in concrete and steel
- Could be due to several factors, including availability, cost, lack of industry knowledge, difficulty of use in Wellington and difficulty in fully documenting the changes

Questions?
Appendix A – 28 January Interim Report

Not for general distribution

OVERVIEW

There is a large variation on the information available for each building. Currently, 7 of the 15 listed projects (Aorangi House, Customhouse, MAF building, BNZ Harbour Quays office/interiors, Meridian Building, S&T studio) seem to have sufficient information for the dossier and summary.

The remaining 8 projects vary in the amount of information available. Some have good information on a couple of the environmentally sustainable design (ESD) features and innovations but lack information in others, and some of the projects have next to no information available. Of these 8 projects, 4 of them (Featherston street/IRD interior, Vogel Integrated Campus, Kimi Ora base School) have available contacts which may be able to help with gathering additional information and filling in the gaps, while the other 4 (Willis Central, Pipitea Plaza, Amesbury school, Kapi Mana Special Needs School) have no specific contacts available.

Attached is the current format being used for the dossier and the summary. The dossier lists the available information, potentially with a linked appendix for the PDF documents. The summary contains a list of details on the project as well as a synopsis of the building and a list of ESD features broken into their Green Star categories.

Appendix B – Dossiers and Summaries

Available to individual building owners and the research team only

B1 Dossiers of available information on each project

B2 Summary of attributes of each project