Talbot Park

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Context

Scale: block

Type of development: brownfield & retrofit

Status: constructed (2006-07)

Start time: October 2002

Finish time: March 2007

Area: .3 ha

Land Use: medium density residential

Soil: Anthropic Soil derived from mixed, weathered volcanic deposits

Receiving environment: Omaru Stream, Tamaki Estuary, Waitemata Harbour.

Identifiers

Location:
Talbot Park, bounded by Pilkington Road, Apirana Ave, and Pt England Road, Glen Innes, Auckland

Contact:
Stuart Bracey

Owner:
HNZC

Stormwater modelling:
Maunsell

Designer:
CKL Engineers & Surveyors (rain gardens), Boffa Miskell (landscaping), Pepper Dixon Architects (permeable paving, solar panels, rain tanks, stormwater detention tanks Accessible Units & Atrium)

Contractors:
Rain gardens: HEB Contractors (construction), Eco Maintenance Ltd (landscaping), GJ Gardner (permeable paving, solar panels, rain tanks Accessible Units), Federal Construction (SW detention tanks, SW treatment, solar panels

Introduction

What is this case study about? What were the drivers? (several short paragraphs)

Talbot Park is a Housing New Zealand Corporation (HNZC) development in Glen Innes, Auckland which has undergone a $48 million community renewal project. This project was launched in October 2002 and completed in March 2007, and was aimed at creating an improved living environment for tenants. The number of homes in Talbot Park has increased from 167 to 219, 111 of which are new homes (increased from 550 to 750 residents). The existing nine Starblocks (3 storey apartment blocks) have been internally refitted. Site areas have been redeveloped based on Crime Prevention Through Environmental Design (CPTED) principles, including visibility fences, a new car park, landscaping and security lighting.

Low impact urban design and development (LIUDD) features have been integrated into the development, including on-site stormwater management devices, and solar panels. On-site stormwater management devices, including rain gardens, rain tanks first flush devices and porous paving, are aimed at mitigating the effects of increased stormwater flows and contamination loads created by the development. Narrow carriageways and traffic calming devices have also been used to improve walkability.

LIUDD devices at Talbot Park were made possible by a grant from Infrastructure Auckland (IA). HNZC aim to use the site to demonstrate and monitor LIUDD devices to increase public acceptance and reduce costs of incorporating similar devices into future development. The site therefore provides a good opportunity to evaluate social, economic, technical, and environmental performance of the devices. The rain gardens (n.14) are of particular interest as they are the first to be installed on public roads in Auckland city. Lessons learned in planning and implementation of the rain gardens to achieve optimal performance are documented in this case study, together with learnings related to other devices.

Stormwater Objective(s) *to be selected (alternatively Y or N)*

Water quantity control	Y
Water quality control	Y
Aquatic ecosystem protection	Y

Low Impact Stormwater Management Approaches

Prevention	[REDUCED LEVEL OF IMPERVIOUSNESS] [SOURCE CONTROL] [PROTECTION] Planning Zoning

	Clustering Lot configuration etc. Goal of hydrological neutrality post-redevelopment.
Mitigation	[TREATMENT OF FLOW / CONTAMINANTS] Structures / Devices Whether: Close to the point of origin Minimised collection and conveyance Reliance on natural processes Treatment train approach Rain gardens, rain tanks, first flush devices, solar panels
Restoration	[GEOPHYSICAL/ HYDROLOGICAL/ BIODIVERSITY]
Integration (3 waters)	[REDUCE REUSE RECYCLE] Integration: drinking water, storm water, grey water and waste water Stormwater management and water conservation through use of rain tanks. Additionally, rain gardens and porous paving to reduce the impacts of stormwater.

Processes *Telling the story – Who participated? What happened?*

Planning (Design)

Initiation, contracts, stakeholders, consultation

A funding application was submitted to IA in 2004 for the Tamaki Inlet (Auckland City) Regional Project to fund on-site stormwater treatment at Talbot Park, Landcare Research (Tamaki Campus), and Auckland Netball Centre. The application was facilitated by Landcare Research, in collaboration with HNZC and University of Auckland, and with support from Auckland City Council (ACC). The project was aimed at managing growth in the catchment while protecting the estuarine receiving environment. Community consultation was undertaken as part of the initiative. Ngati Whatua O Orakei Maori Trust Board strongly supported the on-site features. Letters of support were also provided by the Tamaki Estuary Protection Society, Tamaki Catchment Wai Care groups, the Auckland Rowing Association and the Ohui-A-Rangi Young Mariners.

IA agreed to fund a percentage of the project, and concluded that the projects provided models of on-site stormwater collection and treatment that could reach higher treatment efficiency than is currently required. The potential for public education based on the high level of community ownership and links between the three sites was also observed.

HNZC was allocated $550,229 to install rain gardens, rain tanks, first-flush devices, and porous paving. Stormwater run-off from Talbot Park was discharged directly to closed drains prior to the redevelopment, and IA recognised the on-site devices as positive in terms of 'effects' and 'values' in their assessment of the project.

HNZC considered that the resource consent process for the rain gardens was aided by ACC planners' support for the inclusions of low impact devices in the concept plan. ACC asset managers were less supportive of rain gardens being installed on public roads but in the end approved the plans. From a developer's perspective, there was no development incentive to include low impact devices. Standard development contributions were required as well as the cost and time taken to get resource consents for the devices.

During planning, HNZC decided not to install rain gardens on individual properties because of the requirement for ongoing maintenance, for which HNZC would be responsible. Additionally, HNZC anticipated difficulties in ensuring that tenants stay off the rain gardens to avoid compaction.

Implementation (Construction)

Contracts, sub-contracts, project management, milestones (stages) etc.

Rain gardens were constructed around the roads at Talbot Park prior to housing construction and were completed with landscaping in January 2006. ACC required the rain gardens to be built prior to building construction as they were part of roading construction required prior to building consents being allocated. Permeability rates were measured by ARC upon completion and determined that they were performing according to specifications. However, curb and channel edging of the rain gardens which was installed to keep cars off, prevented sheet flow of water to the rain gardens, instead concentrating water at a few entry points. This flow concentration was exacerbated by having slightly raised parking areas, which meant water generally flowed into rain gardens through only one or two points. Curbing was modified to allow improved water flow from the roads into the rain garden.

Constructing buildings after rain gardens led to many rain gardens becoming clogged with sediment runoff from the building sites (up to 20 cm of deposition) and compaction of the substrate by contractors parking or dumping waste construction materials on the rain gardens. Sediment from building sites also blocked some entry points, preventing stormwater from flowing into some rain gardens (see photo below). Nevertheless, the rain gardens performed a useful function of reducing sediment discharges into the piped stormwater system during the construction phase of the development. Signs and contractor induction may be useful to inform people of the purpose and requirements of rain gardens.

Landcare Research scientists examined the rain gardens several times in 2006 and found that some of the gardens were working reasonably well. Infiltration testing of two rain gardens in September 2006 confirmed they exceeded ARC (2003) permeability guidelines of 300 mm per day. However, because they were overfilled with mulch and soil, they were unlikely to meet ARC (2003) live storage guidelines of 220 mm. It was also observed that the accumulation layer of silt, sand and debris did not appear to slow down infiltration. Recommendations were made for improving landscaping aspects of the rain gardens, including lowering the rain garden surface to meet the 220 mm live storage guidelines (or the height of the SW grates raised using a concrete collar) and replacing mulch with a thinner (c.50 mm depth), non-floating organic mulch. *Phormuim* (mountain flax) and *Carex* (sedge) cultivars have generally performed well, with high survival rates and acceptable growth rates (photo). *Muelenbeckia and Libertia* have died in nearly all rain gardens, showing a lower tolerance to sediment accumulation, compaction/treading damage and anaerobic conditions that developed within the rooting zone (under the mulch and accumulated sediment) in parts of many gardens.

HNZC expressed keen interest in refitting the rain gardens that were not performing well. ARC also required this before IA funding could be released to HNZC. However, HNZC wanted agreement on what should be done to the rain gardens by all interested parties. Stakeholders (HNZC, ARC, ACC, Boffa Miskell and Landcare Research) then met in September 2006 to discuss the best course of action. Boffa Miskell was engaged to draw up plans for the redevelopments required, and these plans are now awaiting approval by ARC (June 2007).

Permeable paving: HNZC planned to use permeable paving extensively in Talbot Park on driveways, patio area and pathways. However, they had problems finding a suitable permeable paving product, some having very hard sharp surfaces and therefore unsuitable for areas where children play. The need for ongoing maintenance was also a deterrent, and the lack of a contractor specialised in this maintenance.

A small amount of permeable paving has been installed around 4 x 1-bedroom accessible units. A new permeable paving product (PermaPave) and a stormwater treatment tank have also been installed at the Atrium apartments to assist in filtering sheet water from the large carparking area.

Rain tanks have been installed in 4 terrace homes, 4 x 1-bedroom accessible units and in 1 large apartment block. The tanks installed for the terrace homes and units are small (3500 litres), half of what was originally planned, because it was decided that space in the small backyards (>50m2) needed to be retained for tenant use. The system is a dual water supply system, with rain tank water used for toilets and outdoor taps, reticulated water for the rest of the house. A larger 50,000 litre tank has been installed underground at the Atrium apartment block to service 24 units. Signs have been erected next to outdoor taps to warn that the water is not drinkable.

Solar Panels have been installed in 4 x 1-bedroom accessible units.

Starblock refits included the replacement of all services (electrical and plumbing), installation of passive ventilation around existing windows and mechanical ventilation in bathrooms and kitchens in all but one block (the first block they renovated they did not install these and learnt from that the need for these devices). Balconies have also been added.

Operation & Maintenance

In-house, subcontracted etc.

HNZC is responsible for maintaining the rain gardens for the first two years. ACC formally took over ownership as an asset on public roads as of April 2006, and will take over management of the rain gardens as of April-2008.

Operation of rain tanks requires some tenant involvement and so education has been required. If rain tanks run dry, tenants can switch over to mains for toilet flushing and outdoor water use, but need to switch back to tank water once it rains. Maintenance of water pumps and permeable paving will be HNZC’s responsibility.

Progress to Date

Environmental

Change in Effective Imperviousness (pre- and post-development)

Peak flow

Storm volume (2, 10, 100 year storm events)

Annual volume

Contaminant loads

Vegetation cover and amenity

Biodiversity

Estimated 30% reduction in water demand in households with rain tanks (n.31).
Anticipated that increased housing density has not led to increased stormwater runoff from the site nor decreased stormwater quality.

Economic

Costs: Life Cycle Costs (Acquisition Costs, Routine Maintenance Costs, Corrective Maintenance Costs, Decommissioning Costs), Costs associated with risks, Land costs

Benefits

Cost efficiency

Cost effectiveness

Cost sharing (funding mechanisms, distributional effects)

IA funding allowed LIUDD devices to be installed.
Anticipated water and power savings.
Cost sharing between HNZC and ACC for installation and maintenance of rain gardens.

Social

Governance

Equity

Tangata Whenua

Public safety

Landscape aesthetics

Changes in stakeholder knowledge

Changes in stakeholder practices

Provision of affordable housing which is attractive and generates a community feel. Overall redevelopment has led to greatly reduced tenancy turnover (from 50% to 4% p.a.), reduced antisocial behaviour, and now a waiting list of people wanting to live in Talbot Park. Narrow carriageways have slowed traffic, making streets safer and more user-friendly to pedestrians.

A broader range of stakeholders was engaged in the preparation stage of the IA funding proposal than would normally be engaged in infrastructural supply issues, including tangata whenua and community groups. The installation of LIUDD devices in rental properties has required an education process to inform tenants about the purpose and requirements of the devices.

A considerable amount of learning has taken place related to rain gardens on public roads, including collaboration between stakeholders. The rain gardens are an attractive landscaping feature that also function as traffic- calming devices on public roads.

What worked well?

Positive experiences / Opportunities
Comments by stakeholders, reviewers, etc

- Accessing funding from IA as part of a collaborative proposal.
- Stable and committed leadership in HNZC project management team (project manager and project co-ordinator) over the term of the project.
- Engaging residents in decisions related to designing and implementation of community renewal.
- The use of rain gardens for stormwater treatment, traffic calming and amenity on public roads.
- Using 8 different architectural firms to design the new homes, and 1 for an overall masterplan, leading to a range of housing styles.

What were the challenges?

Geotechnical barriers

Legal barriers

Social barriers etc.

Comments by stakeholders, reviewers, etc.

- Gaining consent from council roading engineers for rain gardens in public roads.
- Requirement to construct rain gardens on public roads prior to redevelopment of housing sites, leading to rain gardens becoming clogged with sediment from building sites and damaged by compaction and squashing – leading to death of most groundcover plants.
- Ensuring that rain gardens are constructed to design specifications, particularly ensuring overflows are high enough to allow 220 mm ponding depth and perform efficiently.
- Sourcing a suitable permeable paving product.
- Tenants are required to take responsibility in the operation of the dual water supply system but are not required to pay water bills.
- Requirement for dual water supply system reduced economic viability of the water system.
- Council requirement to provide one park per home, but this level of parking space is under-utilised and unnecessary.

Recommendations

For this project / other similar projects

Comments by stakeholders, reviewers, etc.

- Rain gardens: Allow live storage of 220 mm. Sheet flow is required for rain gardens to function well; barriers can be pinned above the ground as an alternative to curb and channelling. Rain gardens should be completed after buildings. If raingarden underdrains and gravel/sand layers are completed before buildings are started, they can be covered with filter cloth, and used to trap sediment during construction. After houses are finished, this filter cloth and overlying sediment should be removed and raingarden tilled, planted, and mulched. Rain gardens should be mulched with a non-floating organic mulch (e.g., long-fibre chip). Signs can be useful to inform people about the purpose and requirements of the rain gardens (photo).

Pictures

Rain gardens were designed to help slow traffic and provide visual amenity to Talbot Park, as well as detain and treat road runoff. Evergreen magnolias and native groundcovers of sedge, mountain flax and NZ iris were planted. Photo: May 2006, soon after construction.


During construction of houses, sediment eroded from the building sites was captured in some rain gardens until it prevented water flowing into the rain gardens (left photo, July 2006). Most rain gardens were constructed with less than the specified 220 mm ponding depth, generally due to a combination of overfilling of the raingarden with soil and mulch, and the overflow grates being set too low. This means in places stormwater can short-circuit the raingarden, reducing treatment efficiency and volume detained (photo July 2007)