

LANDSCAPE PERFORMANCE SERIES

by the
Landscape Architecture Foundation

Ballast Point Park



BEFORE AFTER

Landscape Performance Benefits

ENVIRONMENTAL

- ▶ Diverted 22,200 tons of construction waste from landfills, about twice the weight of the Eiffel Tower, by repurposing it for use in gabion retaining walls
- ▶ Incorporated 582 tons of coal power plant waste into concrete used throughout the site. The concrete mix includes waste fly ash and slag, aggregate, and ground slag.
- ▶ Saved 30,620 linear ft of virgin timber by using recycled Australian Jarrah hardwood for all timber used in the project.

SOCIAL

- ▶ Provides waterfront access in a previously inaccessible area for local residents as well as non-local users, with 68% of 34 surveyed respondents reporting themselves as being from the area.

ECONOMIC

- ▶ Contributed to an over 50% increase in residential property values within a 500-yard radius.

View/Download a PDF showing how the landscape performance benefits were derived.

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At a Glance

DESIGNER

McGregor Coxall

LOCATION

4 Ballast Point Rd
Birchgrove, New South Wales 2041
Map it

SIZE

6.4 acres

PROJECT TYPE

Park/Open space
Waterfront redevelopment

BUDGET

\$6.6 million

FORMER LAND USE

Brownfield

CLIMATE ZONE

Humid subtropical

COMPLETION DATE

2009

OVERVIEW

Located on the Birchgrove Peninsula in Sydney's inner harbour, Ballast Point Park is a contemporary, award-winning waterfront park that deeply engages with the site's multilayered past. This history encompasses original indigenous habitation, colonial use as a ballast quarry for ships, serving as a home for early settlers, and finally service as an oil terminal from the 1920s until 2002. These combined historical narratives are acknowledged and referenced in the new park through 11 distinct interpretive locations where visitors may pause and consider the site's history through signage and material references to the site's industrial heritage. Ballast Point Park's design was driven by a desire to maximize sustainable design principles and innovative features and to faithfully recreate a complex native environment, which involved developing an endemic planting palette, prioritizing on-site material recycling, reducing transportation and waste, and managing stormwater runoff before discharge into the harbour. The result is a revitalised space that engages visitors through varied landscape zones and historical references while drawing them to the previously inaccessible water's edge in Sydney's inner harbour.

SUSTAINABLE FEATURES

- ▶ The footprints of former oil tanks were reinterpreted as raised and sunken lawn areas. The original concrete seawall of the former industrial facility was retained as a design feature, creating a sense of enclosure and semi-privacy within the sunken lawn spaces.
- ▶ Retaining walls were constructed from reinforced earth using soil sourced on site. The walls are faced with gabion baskets containing recycled building rubble and contrast with the site's quarried sandstone outcroppings and cast-in-place concrete walls.
- ▶ Recycled timber was sourced from garbage dump sites to create park furniture.
- ▶ Recycled seatbelt straps were dyed yellow and used to create shade structures for picnic areas.

- ▶ The recycled concrete elements of the site such as ramps, slabs, and sections of the viewing terraces incorporate recycled industrial waste, including fly ash and aggregate as well as ground slag drawn from coal power plant waste.
- ▶ Eight 1kW vertical axis wind turbines were integrated into panels within the largest storage tank, Tank 101, which was preserved from the site's previous use as an oil terminal. Integrating the wind turbines into the tank reduces the tank's perceived scale and helps to promote the idea of sustainable energy generation to park visitors. Tank 101 is also a work of art, with a poem by Australian poet Les Murray cut into it: "Stone statues of ancient waves, tongue like dingoes on shore."
- ▶ A 13-ft-high concrete sculpture called "Delicate Balance" by local artist Robyn Backen is another public art installation on the site.
- ▶ Stormwater previously discharged into the harbour is now redirected to water-sensitive cleansing basins.
- ▶ Endemic plants such as grey she-oak (*Casuarina glauca*), Sydney golden wattle (*Acacia longifolia*), and spiny-headed mat-rush (*Lomandra longifolia*) were grown from locally sourced seeds and planted extensively across the site. Due to their adaptation to the local climate, these species require less water and maintenance than exotic species while attracting native wildlife to the park. Grassed areas were minimised to reduce the need for irrigation.
During the site remediation process, the remains of the colonial-era "Menevia" house were discovered. These remains have been retained as a heritage feature.
- ▶ Park maintenance specifically contracts a company that hires employees with disabilities to perform maintenance tasks at the park.
- ▶

CHALLENGE / SOLUTION

Challenge

The designers faced the challenges presented by incorporating a strong sustainability agenda within a multilayered site with significant historical value. In addition, uncertainties about the shape and structural stability of the landform (composed of unpredictable zones of sandstone and topsoil) and industrial contamination provided both barriers and opportunities for the pursuit of sustainable and novel design outcomes.

Solution

The landscape architects wove ideas of history and sustainability through the landscape in a variety of innovative ways. The site's past use as a quarry for mining ballast inspired the creation of gabion walls with the "modern ballast" of construction rubble, which reduced the need to import material to create retaining walls. Recycled timber was used for site furnishings, and industrial waste from the former coal power plants was used in the production of recycled concrete. Industrial relics such as the existing fuel tanks were reinterpreted and reconfigured in novel ways to create a commentary on the post-industrial age. As former storage facilities for fossil fuels, the fuel tanks represent past, unsustainable use of resources. The design concept integrated technology and sustainable energy production into these antiquated structures in the form of wind turbines in an effort to illustrate the move forward to a more sustainable future. The uncertainties about the

shape and structural stability of the landform required a design and construction process that allowed flexibility throughout, leading to novel solutions such as the integration of sandstone and incorporating rubble elements throughout the site.

LESSONS LEARNED

- ▶ As the former largest storage facility for fuel on the site, the repurposing of “Tank 101” as a site for renewable energy generation was a clear statement of the transition from the consumption of fossil fuels to the production of renewable energy. Initial modelling was conducted with early calculations from the wind turbine suppliers suggesting that they would perform to supply the full energy requirements of the site. Unfortunately, the wind turbines could not deliver the projected energy output due to a combination of the landforms funnelling wind over and around the wind turbines, exacerbated by the rusting of some moving parts due to the salt spray from the harbour. The constructed landforms proved detrimental to the effectiveness of the wind turbines, which would have required an inverter to work under these conditions. An inverter was not installed due to limitations of the project budget. Utilizing new technologies was recognized as a risk of the project.
- ▶ The designers anticipated no need for irrigation because only endemic plant species and drought-tolerant grasses were planted on-site, so no irrigation systems were initially installed. However, several years after construction, irrigation had to be installed for the main grass terraces due to higher-than-expected levels of use.
- ▶ A truly sustainable cradle-to-cradle approach was in practice more expensive to implement than certain conventional processes. For example, the on-site processing of waste was more expensive, so site demolition materials that were to be reused were sent off-site to a processor, with other recycled materials being sent back to the site.
- ▶ The client, the Sydney Harbour Foreshore Authority (SHFA), was a state government body with a mission to provide a park of regional significance. In an effort to involve the local community, participatory engagement was incorporated into the design process. This engagement, however, may have been conducted too early in the process, resulting in the master plan for the park being overly shaped by input that considers the park to be a mostly local amenity rather than a regional draw. If a range of scenarios had been developed for wider exhibition and a broader range of stakeholders engaged, a more regionally-significant park may have been the outcome, and the park would have more visitors from outside of the neighbouring area. Still, in addition to attracting many local users, the use of the park as a backdrop for magazine photo shoots and weddings is indicative that it does hold some broader appeal as a cultural contribution to the city as a whole.

PROJECT TEAM

Project Team

McGregor Coxall

CHROFI

Landscape Solutions

Northrop Engineers

Deuce Design
WT Partnership
HydroPlan
Lighting Art+Science
Robyn Backen

Role of the Landscape Architect

The landscape architect inherited the previous master plan developed by a collective of design and consulting firms. The ideals and vision were retained by the landscape architect, although significant design changes were made partly due to the physical uncertainties on the site. While leading and collaborating with the rest of the project team, the landscape architect undertook project management, design development, construction documentation, and administration of the construction contract.

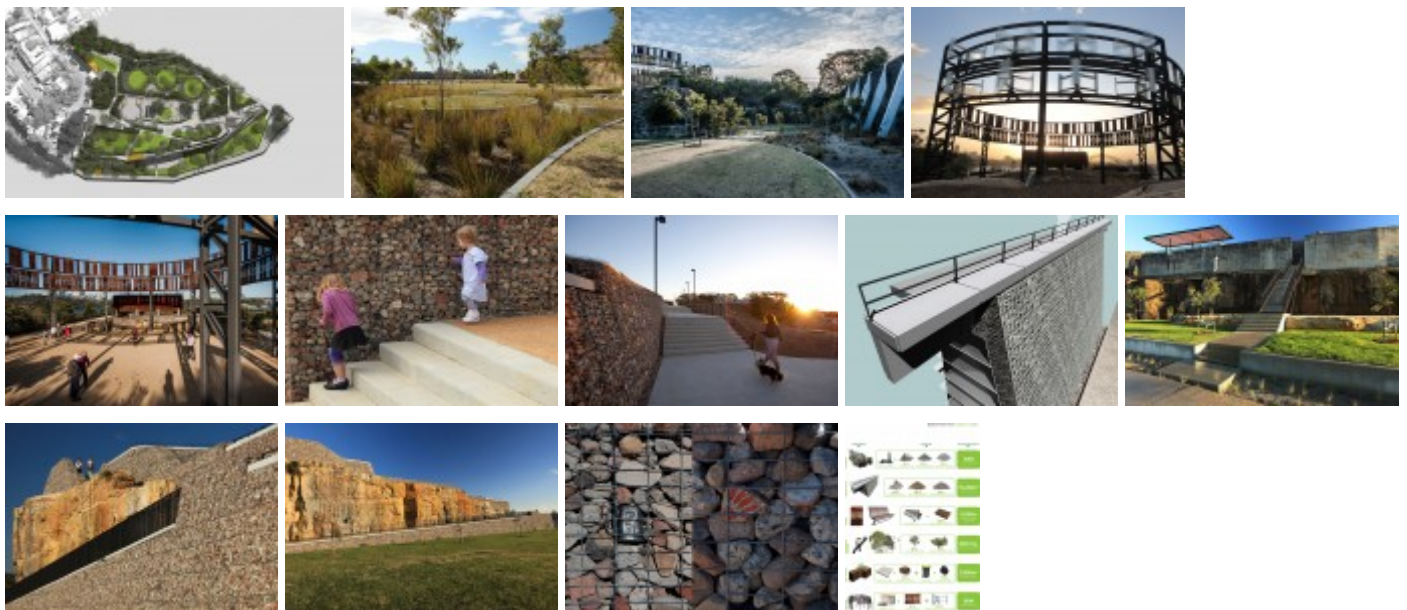
Case Study Prepared By

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. Landscape Architecture Foundation,
2017. <https://doi.org/10.31353/cs1220>

Additional Images



References and Resources

McGregor Coxall: Ballast Point Park

Landzine: Ballast Point Park

YouTube Video: Ballast Point Park Tour

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laf:casestudy=1074

Need Help?

TOPICS

REUSED/RECYCLED MATERIALS, ACCESS & EQUITY, PROPERTY VALUES,
LOCAL MATERIALS, NATIVE PLANTS, ONSITE ENERGY GENERATION,
REUSED/RECYCLED MATERIALS, SHADE STRUCTURE, REVITALIZATION

The LPS Case Study Briefs are produced by the Landscape Architecture Foundation (LAF), working in conjunction with designers and/or academic research teams to assess performance and document each project. LAF has no involvement in the design, construction, operation, or maintenance of the projects. See the Project Team tab for details. If you have questions or comments on the case study itself, contact us at ips@lafoundation.org.

Methods Document: Ballast Point Park University of Technology Sydney

Prepared by:

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August 2017

Overview of CSI: This investigation was conducted as part of the Landscape Architecture Foundation's 2017 *Case Study Investigation* (CSI) program. CSI matches faculty-student research teams with design practitioners to document the benefits of exemplary high-performing landscape projects. Teams develop methods to quantify environmental, economic and social benefits and produce Case Study Briefs for LAF's *Landscape Performance Series*.

The full case study can be found at: <https://landscapeperformance.org/case-study-briefs/ballast-point>

ENVIRONMENTAL BENEFITS

- **Diverted 22,200 tons of construction waste from landfills, about twice the weight of the Eiffel Tower, by repurposing it for use in gabion retaining walls**

Method

The following recycled materials were used in the construction of the rubble-faced (gabion-style) walls:

- 3,196,703 lbs of recycled construction waste rubble. The original design intention was to have construction waste rubble produced by the demolition work on site processed for reuse on site. However, it was significantly less expensive for the demolition rubble to be shipped off-site for processing, with an equivalent amount of processed and graded construction waste rubble then returned to site from the recycling facility (this may not therefore have been the original material). Processing on site would have reduced the CO₂ emissions incurred during transportation, but ultimately a decision based upon economic cost and time efficiency was made.
- 39,683,207 lbs of site soils. Because much of the original soil on site had to be removed due to contamination from the former use, new fill had to be obtained for the backfill. Uncontaminated waste site-soil from other construction excavations was obtained from the construction waste material recycling facility to serve this purpose.
- 1,543,236 lbs of additional recycled rubble sourced from the construction waste recycling facility was also used for filling the gabion walls.

Adding together the weights of all recycled materials obtained from the construction waste recycling facility for the rubble-faced retaining walls gives an aggregate amount of recycled materials used in this aspect of the design (McGregor Coxall nd.).

$$3,196,703 + 39,683,207 + 1,543,236 = 44,423,146 \text{ lbs}$$

$$44,423,146 \text{ lbs} = 22,211.573 \text{ tons}$$

Calculation for the Eiffel Tower:

$$16,093,745 \text{ (puddled iron)} + 6,172,943 \text{ (non-metal components)} = 22,266,688 \text{ lbs}$$

$$44,423,146 \text{ (diverted landfill)} / 22,266,688 \text{ (Eiffel Tower)} = 1.995$$

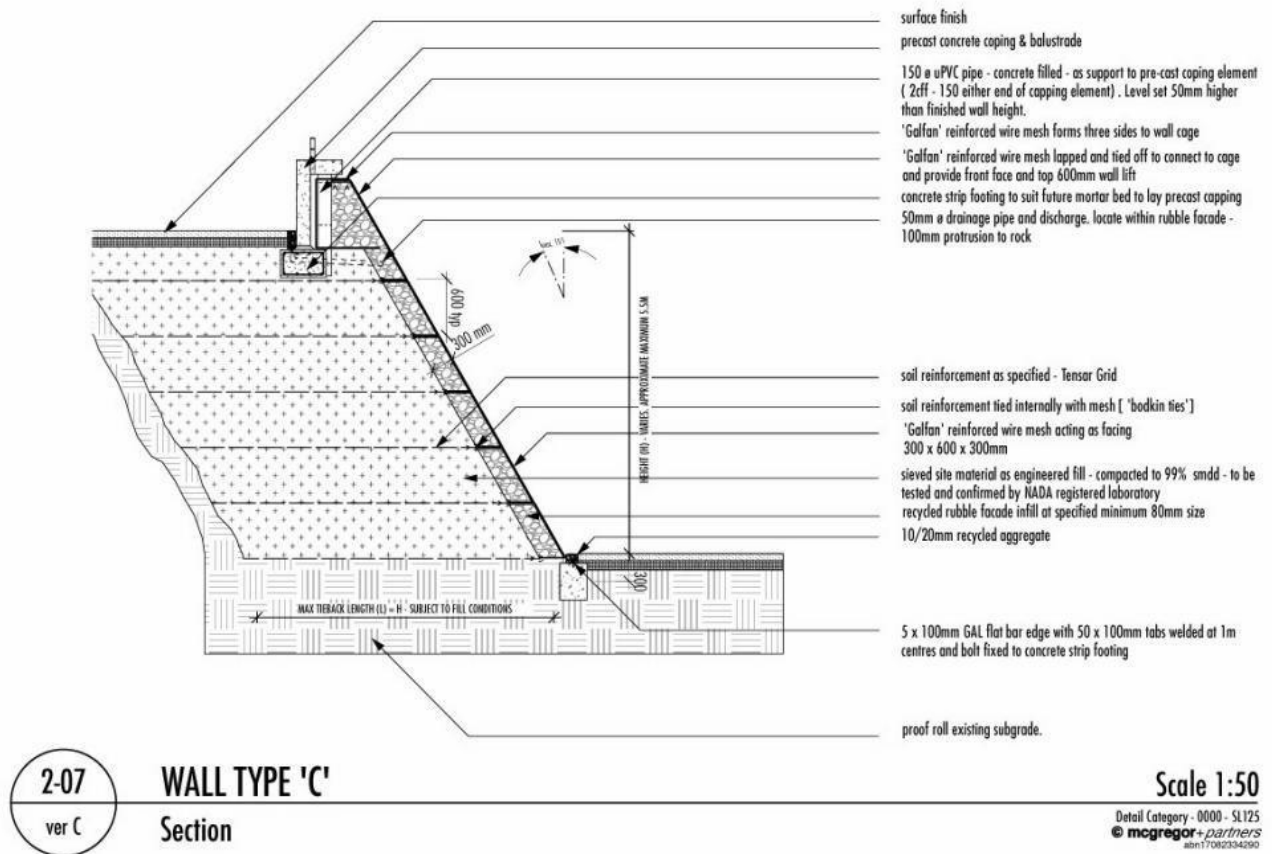


FIGURE 1: Section detail of the gabion walls at Ballast Point Park (Landezine 2010).

It was the advocacy of the design team (in keeping with the community-driven masterplan) in proposing to “create a sustainable design that incorporates best practice and ESD” (McGregor Coxall, Sustainability Book 3.7 nd.) that enabled the project to argue for the re-use of rubble “ballast” (from which the site takes its name). The designers considered this a poetic, yet pragmatic solution to add to the sustainable credentials of the park.

Sources

Landezine 2010. Ballast Point Park. Accessed 04/07/2017 from <http://www.landezine.com/index.php/2010/11/ballast-point-park-by-mcgregorcoxall-landscape-architecture/>

McGregor Coxall nd. *Ballast Point Park*.

McGregor Coxall nd. *Sustainability Book 3.7*.

Société d'exploitation de la Tour Eiffel, Paris nd. *The Tower in Figures*. Accessed 27/07/2017 from http://www.toureiffel.paris/images/PDF/supports-pedagogiques/EN/en_10_la_tour_en_chiffres.pdf

Limitations

It was not possible to calculate the exact savings of virgin materials that resulted if a different design solution had been applied (ie, one that did not specify recycled rubble gabions from the outset), as this exercise would require too many assumptions about differences in configuration that would have resulted from a different design solution.

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- **Incorporated 582 tons of coal power plant waste into concrete used throughout the site. The concrete mix includes waste fly ash and slag, aggregate, and ground slag.**

In the attempt to increase the sustainable components of the park, the designers found that upcycling coal power plant waste in the mix of concrete pours also introduced a desirable aesthetic component in the resulting blue hue of the concrete. This altered mix contained:

- 40% of the sand was replaced with fly ash and slag - 339,512 lbs
- 20% of the aggregate was replaced with recycled aggregate - 485,017 lbs
- 20% of the cement was replaced with recycled ground slag - 339,512 lbs

Adding together the weights of the various elements of the components of the concrete mix coming from recycled coal plant waste results in:

$$33,912 + 485,017 + 339,512 = 1,164,041 \text{ lbs}$$

$$1,164,041 \text{ lbs} = 582.0205 \text{ tons}$$

Sources

McGregor Coxall nd. *Ballast Point Park*.

Limitations

There are few precise metrics surrounding the re-use of fly-ash into concrete in an Australian context in landscape architecture projects, however the percentages indicated give some indication of the magnitudes of savings in the concrete.

- **Saved 30,620 linear ft of virgin timber by using recycled Australian Jarrah hardwood for all timber used in the project.**

Method

The use of recycled Jarrah hardwood timber purchased from rubbish dumps saved a large volume of virgin timber. Furthermore, due to substantial variations of the recycled timber, ripping the timber successfully exposed the attractive grain, provided a more even surface quality, and ultimately saved 30,620 linear feet of wood.

Sources

Coxall, P. 2017. *Personal Communication*.

McGregor Coxall nd. *Ballast Point Park*.

Limitations

The quantity of recycled timber used was affected by numerous factors throughout the design and construction process: the availability of relatively consistent and obtainable recycled material shaped a number design and specification decisions. Reliable and consistent supplies of recycled timber could not necessarily have been relied upon, and if circumstances had been different, a different approach to design and specification could have resulted that still sought to meet the environmental objectives of the project.

SOCIAL BENEFITS

- **Provides waterfront access in a previously inaccessible area for local residents as well as non-local users, with 68% of 34 surveyed respondents reporting themselves as being from the area.**

Method

In January 2014, researchers from the Queensland University of Technology conducted random surveys of users during a two week period on weekdays, weekends and a public holiday, between 7:30am and 7pm. Thirty-four survey responses were collected to questions including “Do you live in the area?” (Ozgun et al., 2015).

68% (23 respondents) reported living in the area; 32% (11 respondents) reported that they did not live in the area.

After initial test observations, we decided to rely on this earlier survey data rather than conduct our own survey because the seasonal period of the survey (winter) meant that park usage was

reduced compared to other seasons. The 2014 survey was conducted in the middle of summer during a period when daylight savings time applies.

The earlier researchers conclude that the park is “inaccessible to a large number of regional users”. Although this may be true, in our view, one-third of users describing themselves as not living in the area is still a significant number of non-local users for a park located away from easily accessible public transport routes.

We also analysed 73 reviews posted on Google. Of the 73 reviews, 48 contained written comments beyond a mere star-rating. We coded the 48 written comments according to subject matter to determine repeated themes that emerged among users – responses were categorised according to whether they included implicit or explicit references to design/aesthetics; harbor front/view; amenities/activities; and heritage/history. Comments often contained statements addressed several of the coding categories; the percentage totals thus indicate the proportion of the total written comments that raised that particular coded theme.

Analysis of 48 written comments provided in Google Reviews of Ballast Point Park between 2010 and July 2017		
Coded response	No. of responses (frequency)	Percent of total written comments
Aesthetics/design	34	71%
Harbor front/view	32	67%
Amenities/activities	26	54%
Heritage/history	10	21%

TABLE 1 (Data derived from Google Reviews of Ballast Point Park)

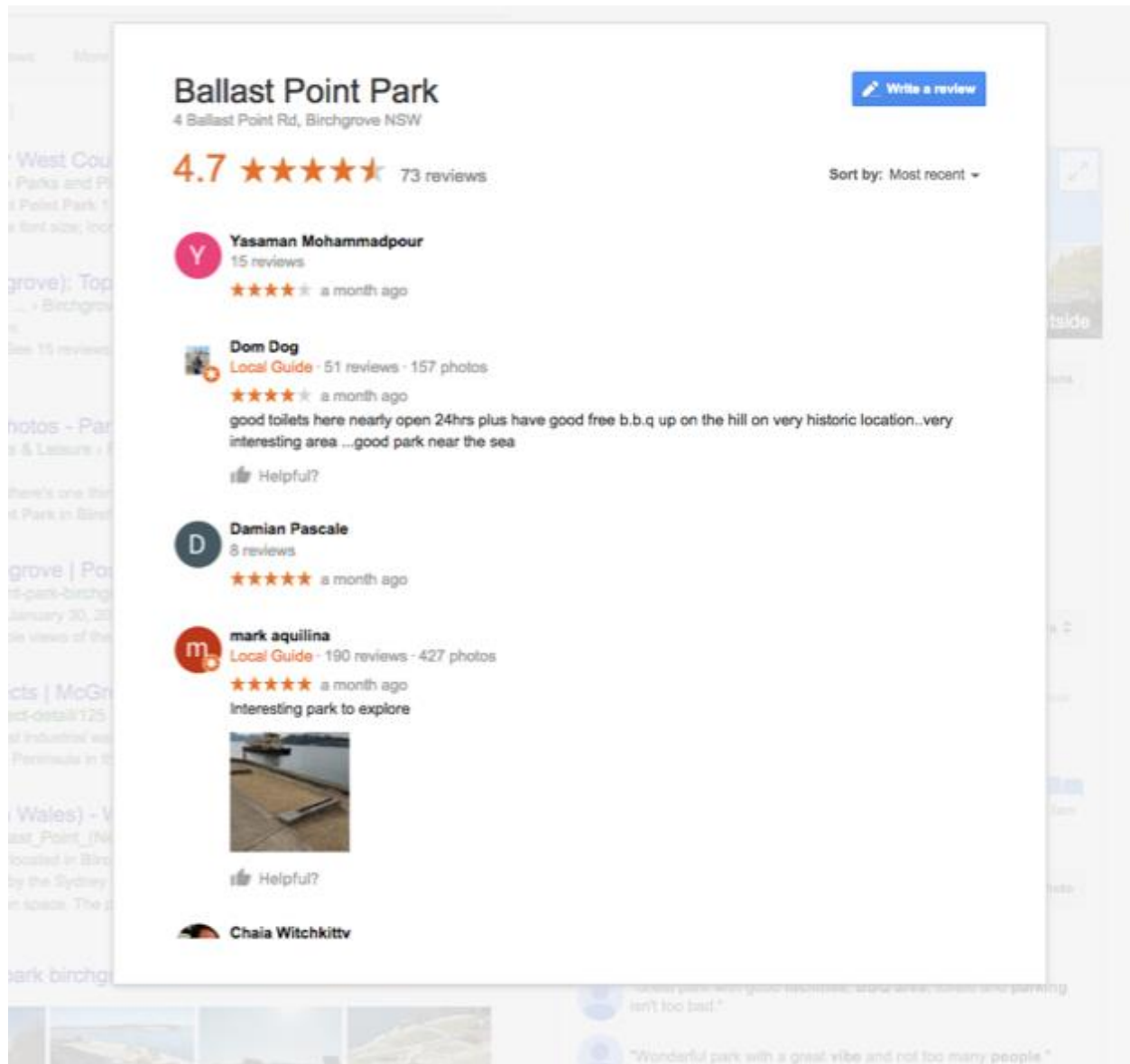


FIGURE 2: Screen capture of part of the 73 Google Reviews posted by users for Ballast Point Park.

Sources

google.com.au. Accessed July 8, 2017.

Ozgun, K., Flanders Cushing, D., & Buys, L. 2015. Renewable energy distribution in public spaces: Analyzing the case of Ballast Point Park in Sydney, using a triple bottom line approach. *Journal of Landscape Architecture*, 10(2), 18-31.

Limitations

The survey in Ozgun et al (2015) was conducted in early January in the middle of summer, and the timing and seasonal context may have affected the types of users in the park. Early January

is the height of the summer holiday season in Australia, and it is likely that the park attracts a higher number of regional visitors at this time.

The Google Review data is not a representative sample of park users but only reflects those with the inclination to write a review on Google. In addition, the categorisation of written comments within our four categories involved the exercise of judgment as to whether a statement implicitly or explicitly invoked subject matter falling into that category. Some comments like “Nice park!” could have been motivated by reasons that could have fallen within a number of the categories, but there was not sufficient evidence to make a judgment, so they were not counted, even though the commenter was likely to have been motivated by reasons falling into one of the categories.

ECONOMIC

- Contributed to an over 50% increase in residential property values within a 500-yard radius.

Method

Annual land valuations made by the New South Wales Valuer General were obtained for each of the 49 freehold residential properties on the two streets adjacent to Ballast Point Park (Ballast Point Road and Wharf Road) between 2002 and 2016. These were then compared to land valuations for a random sample of other properties within the surrounding district.

In general, the rate of increase in land values for all properties across all years was roughly within the range of 2%–15%. However, between 2005 and 2006, the year in which the plans to redevelop the former industrial site into a park were confirmed, the valuations for those properties within an immediately surrounding area (there were 30 affected properties) increased between 30%–100%. The average increase across these 30 properties was 63.3%.



FIGURE 3: The 30 residential properties in the immediate vicinity of Ballast Point Park which witnessed increases in land valuations of between 30%–100%.

Sources

NSW Government nd. *Valuer General*. Accessed 26/07/2017 from <http://www.valuergeneral.nsw.gov.au/services/lvs.htm?execution=e2s1>

Limitations

Although the dominant change in the suburb and its surroundings was the construction of Ballast Point Park, there will inevitably be other impacts, both micro- and macroeconomic that will have an effect on residential property values. Our sample largely concentrated on properties in close proximity Ballast Point Park to verify the impact of the park, but also selected a range of properties of varying distance from the park to draw comparison. It should also be noted that no comparisons were made with increases in land values in other locations outside the district or across Sydney as a whole.

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