ORVal Short Case Study: Millennium & Doorstep Greens: worth the investment? (Version 2.0)

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Introduction

The ORVal Tool is a web application (accessed at https://www.leep.exeter.ac.uk/orval) developed by the Land, Environment, Economics and Policy (LEEP) Institute at the University of Exeter with support from DEFRA (Day and Smith 2018).

ORVal's primary purpose is to help quantify the benefits that are derived from accessible outdoor recreation areas in England. Those outdoor recreation areas, or *greenspaces*, include an array of features such as beaches, parks, nature reserves and country paths

This short case study uses ORVal to explore the visits and welfare values generated by the array of Doorstep Greens and Millennium Greens developed across England since 1996.

The Case Study

Millennium and Doorstep Greens are the result of government initiatives that have supported local communities in creating, improving and restoring greenspaces.

According to Natural England[1,2] these new parks were to be "public open space close to people's homes … breathing spaces - places for relaxation, play and enjoyment of nature". Moreover the initiative aimed to target "communities who experience disadvantage and where regeneration of the local environment and outdoor recreation provision is sorely needed".

Some 245 Millennium Greens received funding up until 2000 and since then a further 192 Doorstep Greens have been created. While figures are not readily available, the average public investment in each green was around £60,000 with a matching amount donated by other funders Countryside Agency (2006). Accordingly, a rough estimate of the cost of developing the 437 Millennium and Doorstep Greens in England might be £55mill. The question we seek to answer in this brief case study is whether that investment is justified by the welfare benefits derived by the population from the new greenspaces it created.

ORVal's Value Estimates

The visits and welfare values reported by ORVal are estimates derived from a sophisticated *Recreation Demand Model* (See technical report: https://www.leep.exeter.ac.uk/orval/documents) (Day and Smith 2017). The model is estimated from a very large national dataset and establishes how visits and values tend to vary according to; (1) the size of a greenspace, (2) its land covers, (3) the proximity and socio-economic composition of nearby populations and (4) the availability of alternative sites. Note that the model does not capture the idiosyncrasies of individual greenspaces. Its predictions should be interpreted as indicating the visits and values that might be expected from an 'average' greenspace of that description in that location.

To be clear, ORVal reports 'welfare values' conforming to the standard economic definition; value is a figure describing the monetary equivalent of the welfare enjoyed by individuals as a result of having access to a greenspace.[3] More specifically, welfare values for a particular greenspace are calculated for each adult (over 16) by using the model to predict how the welfare that they enjoy from outdoor recreation would change if they could no longer access that particular site. Importantly the model accounts for the fact that individuals will mitigate that welfare loss by choosing to visit other greenspaces instead. ORVal's welfare values specifically account for this substitution behaviour.

In ORVal the predicted visits and welfare values (in 2016 prices) are reported as aggregates across the population of adults over the period of one year.

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[1] https://data.gov.uk/dataset/millennium-greens
[2] https://data.gov.uk/dataset/doorstep-greens

[3] In economics this welfare value is often called an 'economic value' or a 'willingness to pay'.

ORVal: Finding the Greens

The ORVal interface is a navigable map which illustrates the location of existing greenspaces in England. By default those greenspaces appear on the map, each one shaded using a colour-coding that roughly classifies the nature of the different recreation areas. In Figure 1 we have zoomed in the ORVal map to centre on an area to the northeast of the City of Liverpool.

To view Millennium & Doorstep Greens in ORVal selected the *Map Layers* tab, then expanded the *Designations* list and finally select the *Millennium & Doorstep Green* map layer. Millennium &

Doorstep Greens are now outlined on the map with a dark grey border. As is evident from the top panel, however, given everything else on the map, it is still not obvious where those greens are located.

One way round that problem is to do what we have done in the bottom panel of Figure 1 and simplify the map. Still in the *Map Layers* dialogue we expanded the *Background* list and then used the slider to fade out the background map layer. Then we expanded the *Recreation Sites* list and turned off the map layers showing the locations of the greenspaces. Now the locations of the greens are very clear.
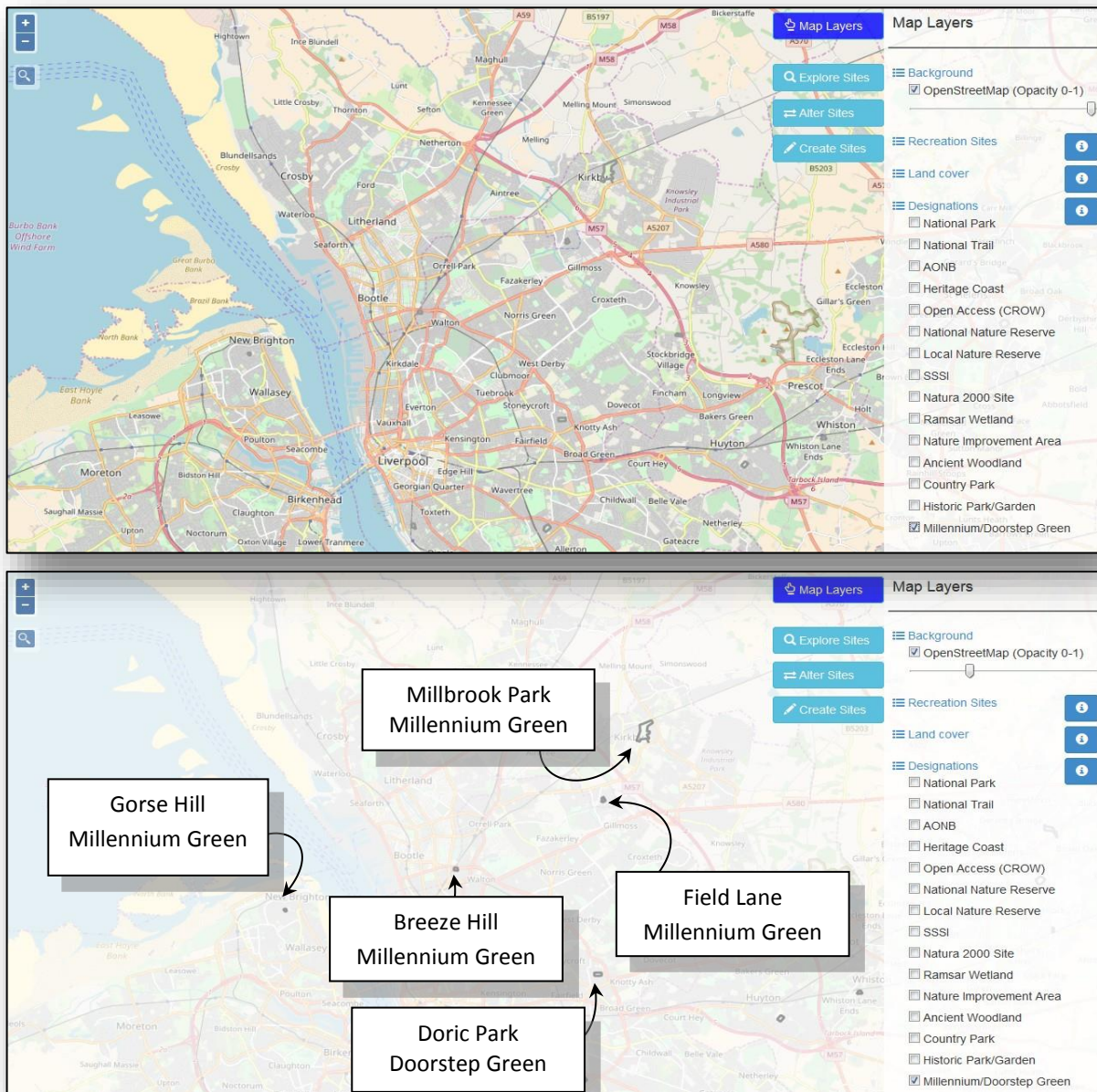

Figure 1: The Millenium and Doorstep Greens of Liverpool

Valuing a Single Green

In Figure 2, we have zoomed in on one of those Millennium Greens, that at Millbrook Park. Estimates of values and visits to that Green can be accessed in ORVal by clicking on the *Explore Sites* tab, selecting the *Sites* button, then clicking on that Green. The *Current Site Information* Panel appears to the left of the screen populated with information on Millbrook Park Millennium Green, including details of estimated levels of annual visitation, annual welfare values, landcovers, designations and points of interest.

The ORVal model estimates the welfare value of Millbrook Park Millennium Green to be approximately £586,000 per year. Recall that an individual's welfare value is the monetary equivalent of the welfare loss that they would experience if that Green were no longer accessible. The £586,000 figure is the sum of those welfare values across everyone in the population and will be made up of some large values, probably for those who live close by, and some relatively smaller values, probably for those that live further away.

In Figure 2, you can also see that the model predicts that approximately 212,000 adults will visit Leighton View Millennium Green over the course of a year. Again it is worth understanding exactly how ORVal comes to this figure. The model works out the probability that each individual in England will take a trip to Millbrook Park Millennium Green on each day of the year (as you might expect, visits are more common on weekends and during the summer months). The visitation figures reported in ORVal are the sums of those probabilities over all individuals over all days of the year.

In the bottom panel of Figure 2 we have used the visit origin function which is located under the current site information to add a visualisation of where the model predicts that people come from to visit Millbrook Park Millennium Green. Hovering the mouse over the orange dots reveals the number of visitors from that particular area.
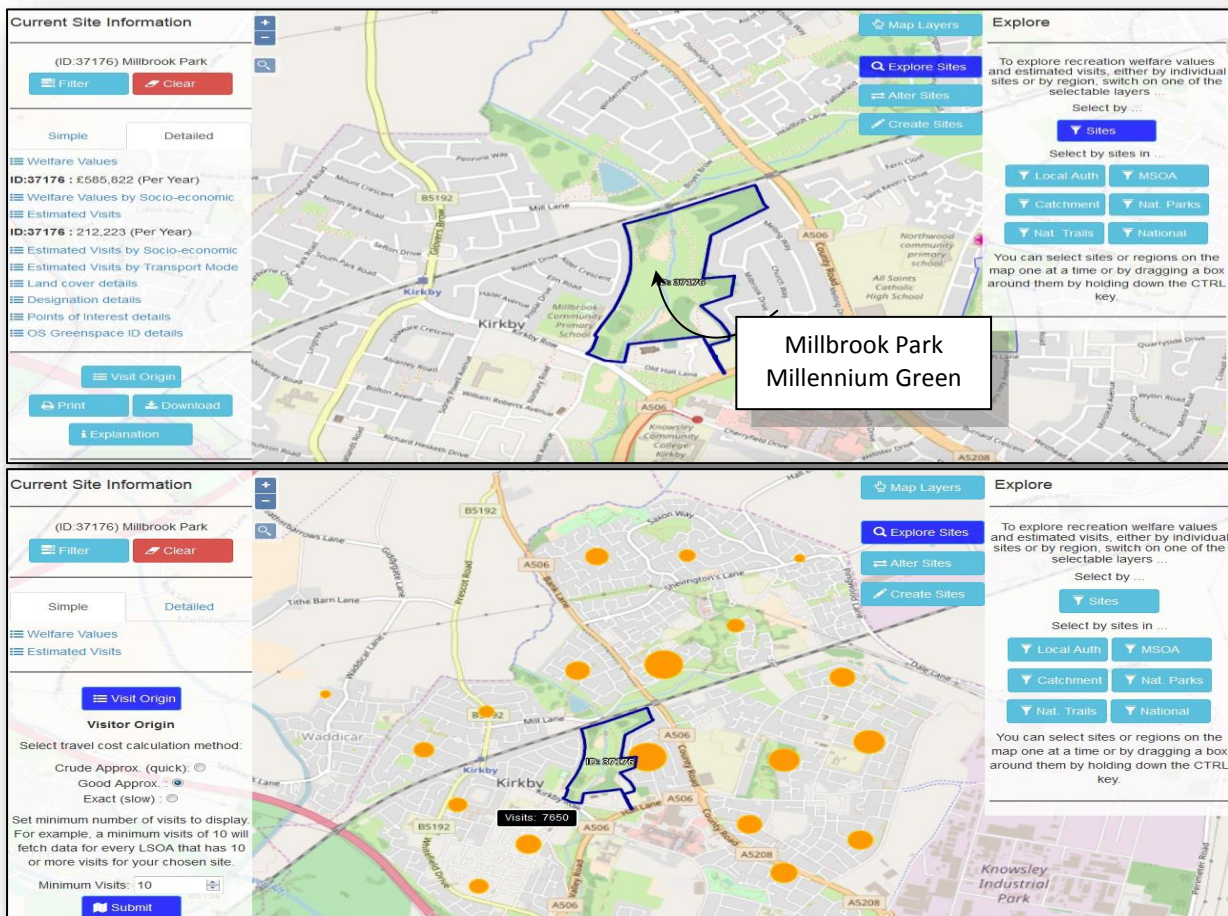

Figure 2: Welfare, Visit and visit origin Predictions for Millbrook Park Millennium Green

Valuing Multiple Greens

To answer our motivating question (was the money spent on creating the Doorstep and Millennium Greens a good investment?), we need welfare values not just for one but for all the Doorstep and Millennium Greens across England. One simple, but time-consuming, way to proceed would be to move around the map clicking on each in turn and recording the value reported in the *Current Site Information* Panel.

Fortunately, ORVal provides a simpler way to find out the values generated by a set of greenspaces. Observe Figure 3, where rather than choosing to retrieve the value and visit estimates by individual *Sites* we have instead chosen to select by *Local Authority.* In response, ORVal has loaded up a new selectable map layer showing the outlines of the Local Authority Regions in England. By clicking on a region, as we have done with the Liverpool Local Authority in Figure 3, the *Current Site Information* panel is populated with details of the total values and visits generated by all the greenspaces falling within the boundaries of that region.

Of course, there are very many types of greenspace within the boundaries of the Liverpool Local Authority region. To isolate the values generated by Millennium and Doorstep Greens we need to use ORVal's filter feature which allows us to pick out data just for those sites in the selected region that meet some user-defined criteria.

In Figure 3 we have invoked the *Filter Dialogue Panel* by pressing the *Filter* button in the *Current Site Information* panel. We then expanded the *Type* list to restrict our search to sites that are Parks, Nature or Woods (for our analysis we are going to ignore paths and beaches and other recreations sites that border or pass through Millennium and Doorstep Greens), then expanded the *Designation* list to select just the *Greens* designation. Pressing on the *Filter* button at the bottom of the dialogue panel brings up another window that summarises the restrictions we are applying to the data.

The values and visits for those greenspaces within the selected region summed up for all sites meeting the filtering criteria are sent to the *Current Site Information* panel by pressing the *Show Results* button. Here, we get the output:

Figure 3: Filtering out the Values for Millennium & Doorstep Greens in a Local Authority Regon

Accordingly, ORVal estimates that the welfare value of the three Millennium and Doorstep Greens in the Liverpool Local Authority Region (see Figure 1) amounts to £512,894 each year. Observe also, that by expanding the *Values by Socio-economic Group* list we can view ORVal's estimates as to how that total welfare value disaggregates across socioeconomic groups. In the Liverpool Local Authority Region, the C1 group enjoy the most benefits (£180,058 per year), while the C2 group enjoy the least (£89,995 per year).

Within ORVal it is possible to use the same procedure to select out values over multiple sets of regions (by selecting multiple local authorities) or by other aggregation regions, for example, by catchment or the Census Middle Supper Output Area (MSOA).

As explained in detail in *ORVal Brief Case Study 1*, the welfare values reported in ORVal for groups of greenspaces simply sum up a measure of the welfare loss that individuals would experience if each site in turn were made inaccessible while all other sites could still be visited. An alternative way to calculate aggregate values would be to consider how much welfare would be lost if all the greenspaces were made inaccessible at the same time. Since the possibilities of limiting welfare loss by switching visits to another site are more limited when we remove all the sites together, the welfare loss using the latter calculation would tend to be larger. In this case, the simpler calculation used in ORVal should be a very good approximation since Millennium and Doorstep Greens tend to be quite widely dispersed across space such that individuals are unlikely to consider switching visits from one Green to another.

A Good Investment?

A rough estimate puts the public and private investment in England's 437 Millennium and Doorstep Greens since 1996 at £55mill. How does that figure compare to the welfare benefits which that investment has created?

To do that we selected 'national' as the aggregation region and repeated the filtering procedure described in the last section. ORVal's estimate of that total welfare value turned out to be £45.8mill per year. In other words, the return on investment is almost being recouped in just one year of operation.

If we were to assume that each park incurs annual maintenance costs of £25,000 and adopt a 5% discount rate over a 30 year project horizon then the investment in Millennium and Doorstep Greens returns a 3.4 benefit to cost ratio. It appears that the programme of creation of Millennium and Doorstep Greens has been a very valuable social investment.

Using ORVal we also explored how the welfare values generated by Millennium and Doorstep Greens disaggregated across socio economic groups. That analysis indicated that a larger share of the welfare value from the Greens accrued to those in groups A&B (25% of the total) and C1 (31%), with relatively smaller amounts flowing to groups C2 (21%) and DE (22%). While a much more detailed study would be needed to fully understand the implications of those results, there is some indication that the intention of targeting "communities who experience disadvantage" has been less successful.

References

Countryside Agency (2006). Opening Green Doors: Doorstep Greens and Community Green Space, A Report for Natural England, Birmingham, UK.

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