LANDSCAPE PERFORMANCE SERIES
presented by the Landscape Architecture Foundation

Vista Hermosa Natural Park, Los Angeles

Research Fellow: Kelly Shannon, PhD, International ASLA, Professor and Director—Graduate Program of Landscape Architecture + Urbanism, University of Southern California with Travis Longcore, PhD, Assistant Professor, University of Southern California

Research Assistant: Christina Hood, MLA Candidate, University of Southern California with Molly Fancler, ASLA, intern landscape architect, Mia Lehrer + Associates

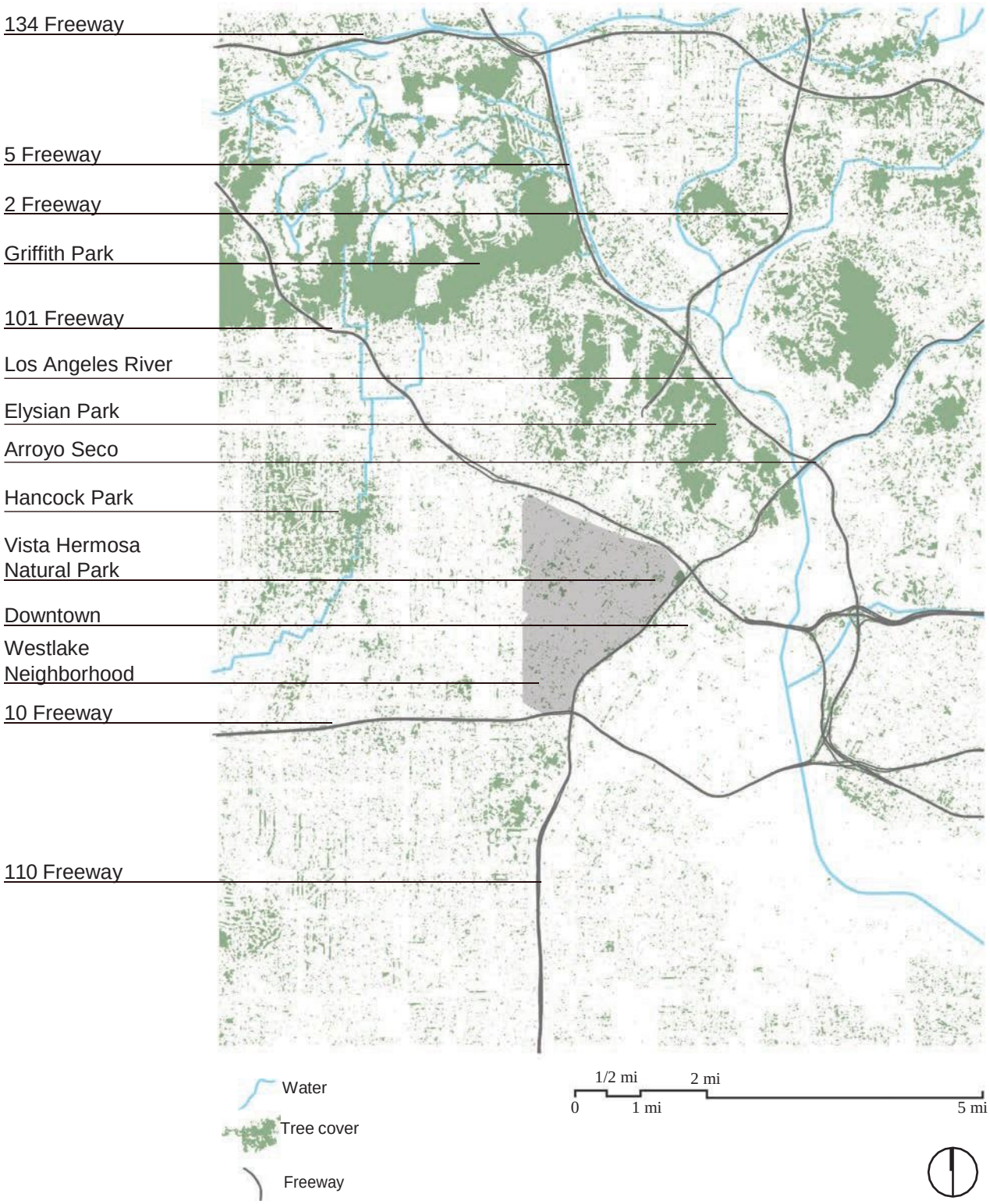
Firm Liaison: Claire Latané, ASLA, LEED AP, Senior Associate, Mia Lehrer + Associates

Client Liaison: Lisa Soghor, Santa Monica Mountains Conservancy / Mountains Recreation Conservation Authority (MRCA)

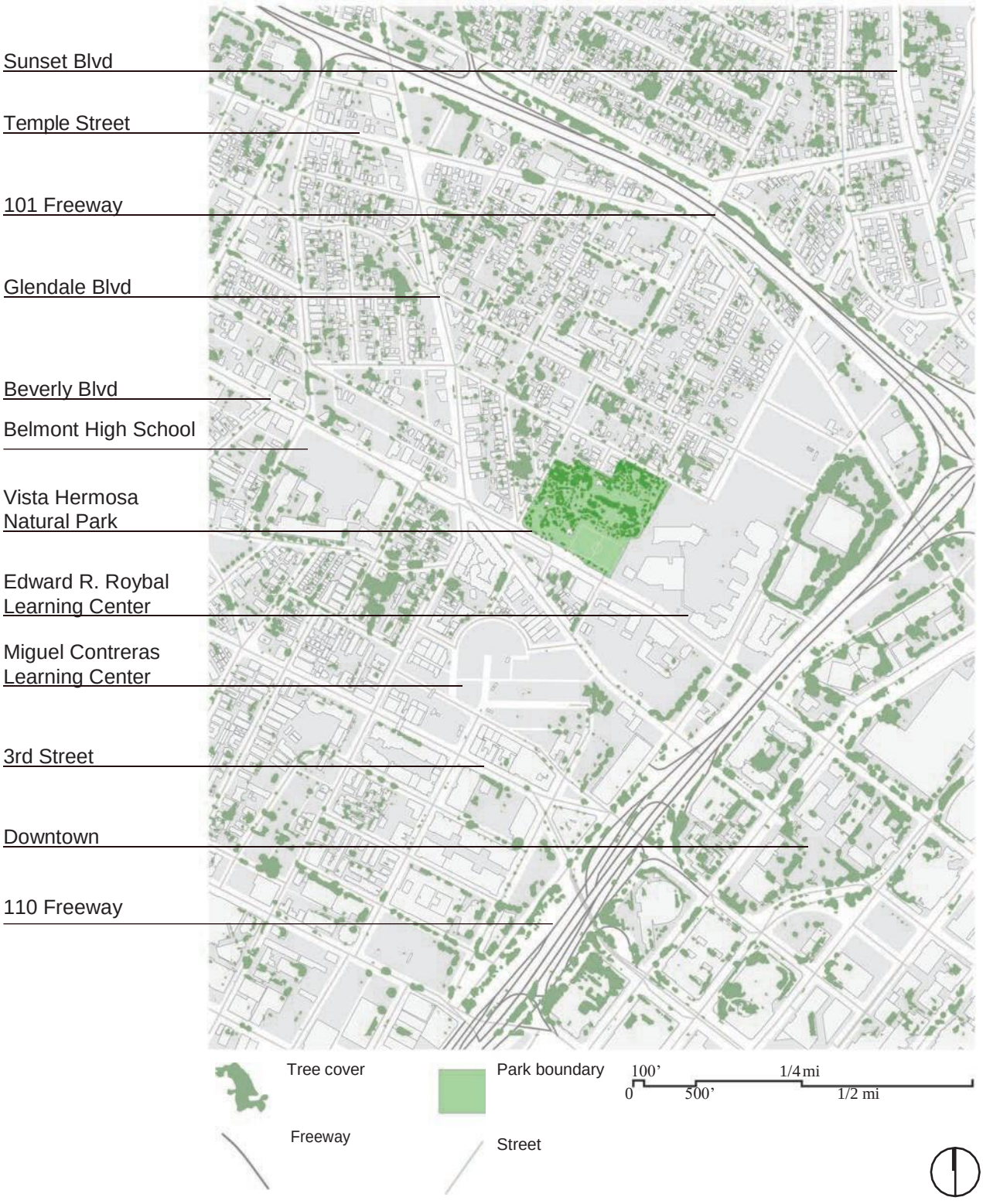
This Methods Document accompanies a *Landscape Performance Series* Case Study Brief. It was produced through the 2016 Landscape Architecture Foundation's *Case Study Investigation* (CSI) program, a unique research collaboration that matches LAF-funded faculty-student research teams with leading practitioners to document the benefits of exemplary high-performing landscape projects.

The full case study can be found at:
https://landscapeperformance.org/case-study-briefs/vista-hermosa

Regional context

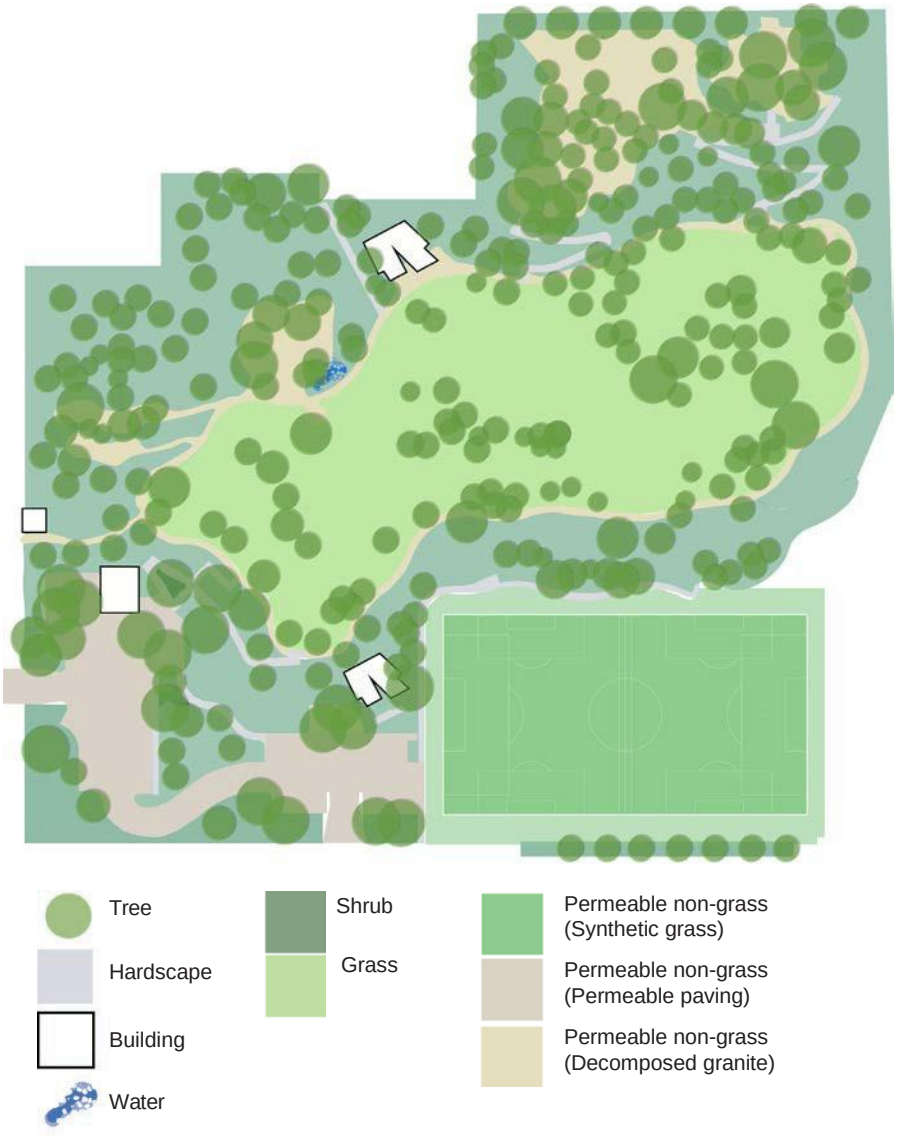


Westlake context



Neighborhood context

Environmental Benefit 1: Sequesters an estimated 22 tons of atmospheric carbon annually in the 800 trees on the site, equivalent to the carbon emissions from the annual energy use of 2 homes.



Cover class	Points	Land-cover (acres)
Tree	274	3.50 ± 0.17
Hardscape	43	0.55 ± .08
Building	12	0.15 ± 0.04
Water	2	0.03 ± 0.02
Shrub	83	1.06 ± 0.11
Grass	91	1.16 ±0.11
Permeable non-grass	247	3.16 ± 0.16

- Calculations:
  - Tree species include oaks, alders and sycamores.
  - Calculations have been performed using i-Tree Canopy.
  - First, a project area is set in Google Earth through the i-Tree Canopy web application. In this case, the project area was set to be the boundaries of Vista Hermosa.
  - Second, in order to create an accurate date set, a number of "classes" were added to the analysis. The program creates automatically two classes, tree and non-tree. Non-tree was replaced with a number categories to more accurately represent the content of the park. The following classes were added to the data set: hardscape (impervious surfaces), building, water, shrub, grass, and permeable non-grass (which included decomposed granite and permeable paving).
  - Third, the project location was selected as Los Angeles County, California, USA and the project location and denoted as "urban."
  - Points were added on the satellite imagery until all classes present in the park were represented with an error margin of 1.75% or less.
  - At this point, the following report was created:

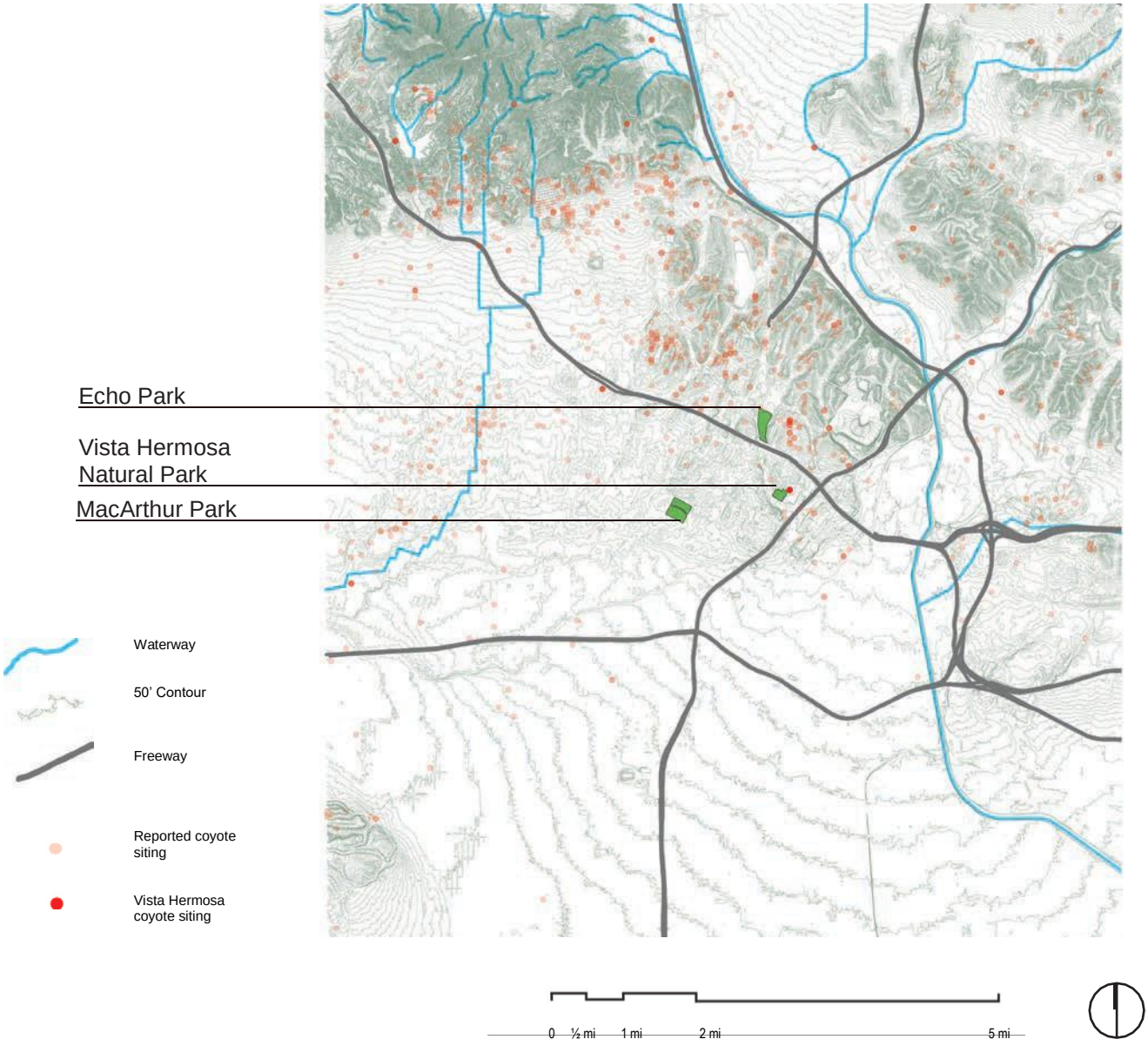
Benefit	**Amount**	**±SE**
Carbon monoxide removed annually	8.26 lb	± 0.40
Nitrogen dioxide removed annually	52.84 lb	±2.55
Ozone removed annually	293.67 lb	±14.14
Particulate Matter less than 2.5 microns removed annually	4.44 lb	±0.21
Sulfur Dioxide removed annually	10.65 lb	±0.51
Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	74.43 lb	±3.59
Carbon dioxide sequestered annually in trees	22.23 tons	±1.08
Carbon dioxide stored in trees (not an annual rate)	441.49 tons	±21.26

- Limitations:
  - Since the data is based on users assigning classes to randomly placed points using aerial satellite photography, the classification of points is subject to human error. Certain classes are particularly difficult to distinguish from one another in satellite photography, such as trees and shrubs. However, by placing a considerable number of points, until the standard of error for the data was below 1% for all classes.
  - Although this is a scientifically developed tool, it is still an approximation for the site conditions.

- Sources:
  - iTree Canopy: http://www.itreetools.org/canopy/
  - US Environmental Protection Agency, 'Greenhouse Gas Equivalences Calculator'

Environmental Benefit 2: **Provides habitat within the Pacific Flyway corridor with 60 bird species observed on site, and breeding grounds for at least one tagged coyote.**

Provides habitat for 60 bird species recorded on the site, which is in the Pacific Flyway connecting Mexico to Canada. The park is also within an area that is home to urban coyotes, and at least one tagged coyote, C-144, has the park in her home range. Wildlife cameras in the park have captured at least one litter of coyote puppies.



- Calculations:
  - 60 bird species have been recorded in the park on eBird.com.
  - C-144, a formerly tagged urban coyote, includes Vista Hermosa in her home range. Additionally, a joint urban wildlife study between the National Park Service and the Santa Monica Mountain Conservancy, which placed wildlife cameras in the park captured at least one image of coyote puppies.
  - Users on iNaturalist have submitted 36 different wildlife citings, 22 of which have been identified by the iNaturalist community. Identified species include the coyote (*Canis latrans*), Anise Swallowtail (*Pepilio zelicaon*), Allen's hummingbird (*Selasphorus sasin*) and Anna's hummingbird (*Calypte anna*).

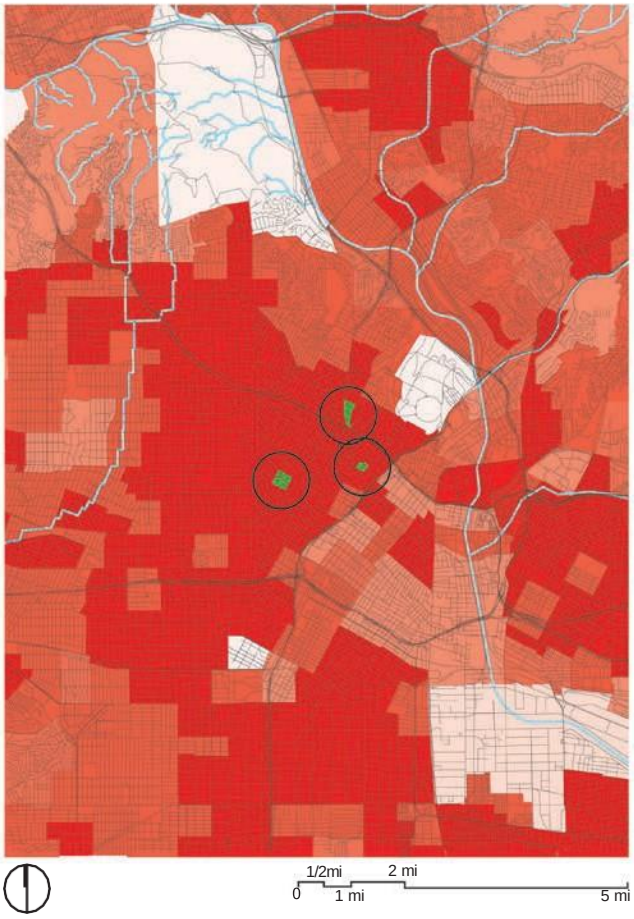
- Limitations:
  - All data is based on observations and by definition is incomplete.
  - Some eBird and iNaturalist data is submitted by enthusiasts and novices; there is no way to objectively ascertain the correctness of the data.

- Sources:
  - Pacific Flyway Council http://pacificflyway.gov/
  - Kuykendall, Kate (2015) 'What We Learned Before C-144's Collar Died', National Park Service, 21 October 2015 https://www.nps.gov/samo/blogs/What-We-Learned-Before-C-144-s-Collar-Died.htm
  - Vista Hermosa Natural Park, eBird http://ebird.org/ebird/hotspot/L63186(Accessed June 27, 2016).
  - Vista Hermosa Natural Park, iNaturalist http://www.inaturalist.org/places/vistahermosa-natural-park (Accessed July 1, 2016).
  - Santa Monica Mountains National Park Service (2015) Coyote observation (observation on iNaturalist with photo) 6 August 2015 (Accessed 1 July 2016) http://www.inaturalist.org/observations/1839333
  - KCET, University of Southern California, and the Urban Wildlands Group (2016) 'Coyote Calls to L.A. Animal Services 2001-2015 (L.A. City Only)' (Database of coyote sightings reported to LA Animal Services with geographic coordinates)

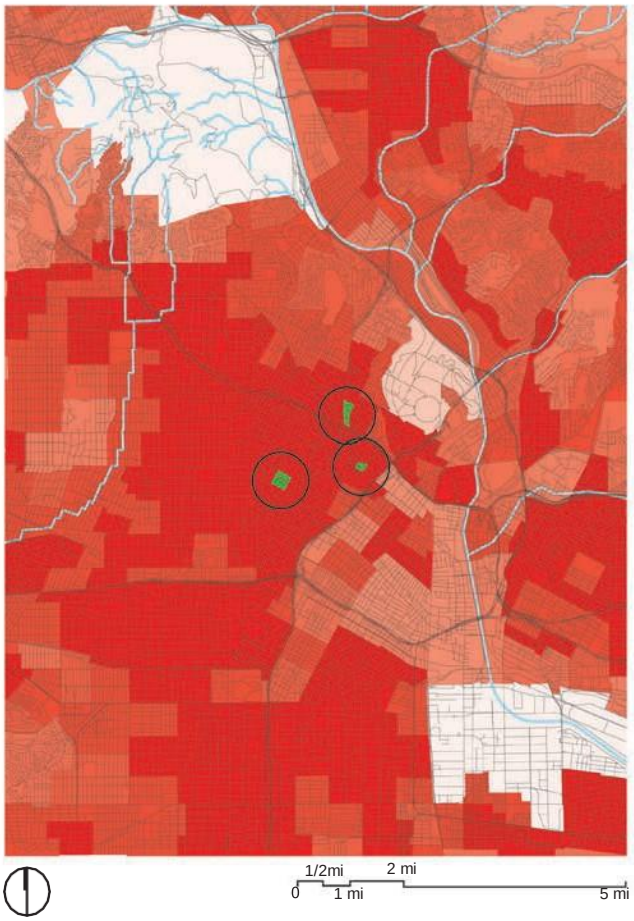
Social Benefit 1: **Increased the average park acreage per 1,000 residents by 13% for 111,803 Westlake neighborhood residents.**

Increased the average park acreage per 1000 residents in the Westlake area (which includes three parks) from 0.6 to 0.68 acres and serves a high density area of Los Angeles, where based on the 2010 census, population numbered 21,272 residents (with a median household income of $25,184) live within a half-mile radius of the park; in comparison to nearby McArthur Park (36,610 resident) and Echo Park (15,559 residents). This helps to counterbalance racial and ethnic disparities in access to green space and expand recreational opportunities for economically disadvantaged residents.

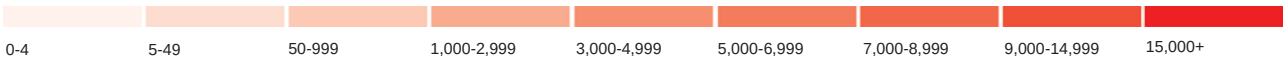
Population Density, 2000



Population Density, 2010

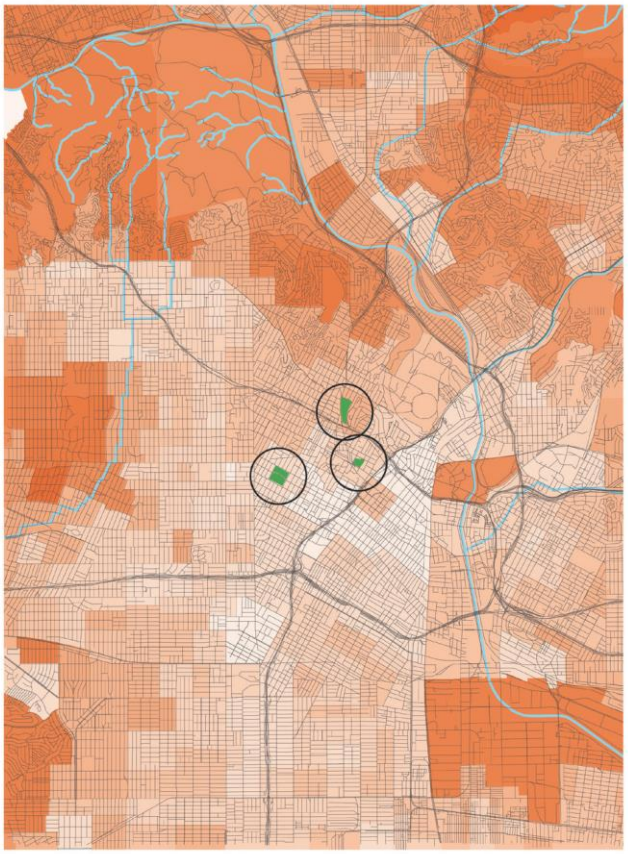


Population per square mile

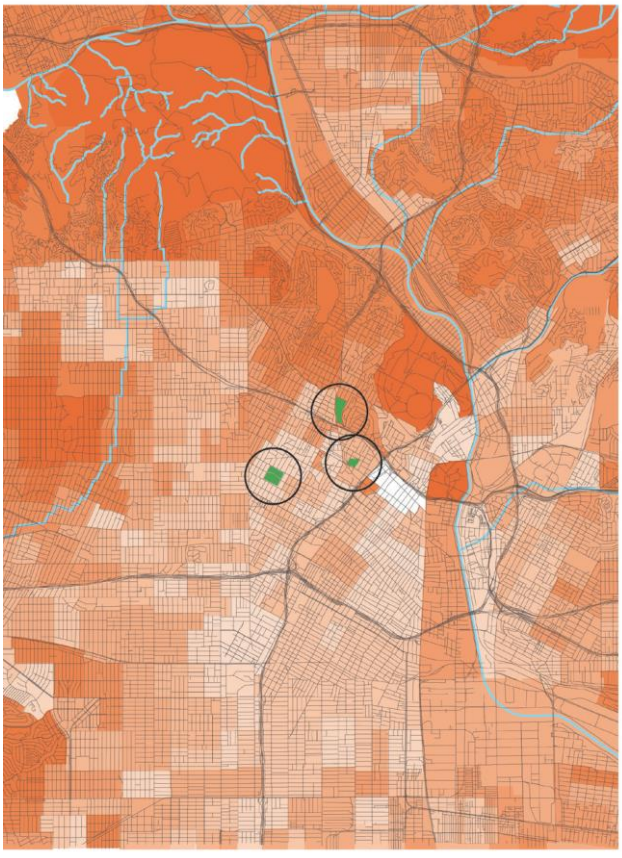


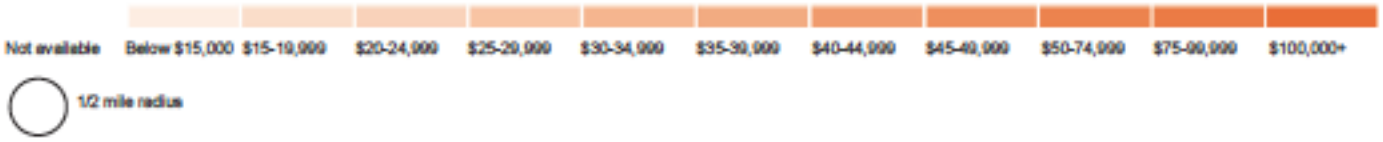
	Echo Park	MacArthur Park	Vista Hermosa
2010 Population (1/2 mi radius):	15,559	36,610	21,272
Park acreage:	26.71 acres	31.72 acres	9.5 acres
Park acres/1000 people:	1.72	.87	.45
	Westlake area	Los Angeles (city)	Los Angeles (county)
2010 Population:	111,803	3,792,621	9,818,605
Park acreage:	76.6	23,938	33,971
Park acres/1000 people	.68	6.31	3.46

Median Income, 2000



Median Income, 2010





	Echo Park (1/2 mi radius)	**MacArthur Park** (1/2 mi radius)	**Vista Hermosa** (1/2 mi radius)
Median Income (2010 US Census)	$41,212	$24,288	$25,184
	Westlake	Los Angeles County	City of Los Angeles

- Calculations:
  - Population numbers residents within 0.5 miles of Echo Park, MacArthur Park, and Vista Hermosa were derived from 2010 US Census data through ArcGIS Online's Community Analyst tool. Population for Los Angeles County, the City of Los Angeles and the Westlake neighborhood was derived through Social Explorer's interface using 2010 US Census Data. Working at census tract level, the population reflects the combined areas of the following Census Tracts in Los Angeles County, California: 2080, 2083.01, 2083.02, 2084.01, 2084.02, 2085.01, 2085.02, 2086.10, 2086.20, 2087.10, 2087.20, 2088.01, 2088.02, 2089.02, 2089.03, 2089.04, 2091.02, 2091.03, 2091.04, 2092, 2093, 2904.01, 2094.02, 2094.03, 2095.10, 2095.20, 2098.10, 2098.20, 2100.10, 2242, 2243.10, and 2243.20.
  - Park acreage for Echo Park and MacArthur Park and total parkland in Westland were sourced from the 2016 Los Angeles County Parks Needs Assessment. All parks listed in the Needs Assessment as contributing to the acreage of parkland in Westlake were constructed before 2010, so acreage is consistent with the 2010 park acreage numbers. Park acreage for Vista Hermosa is sourced from Mia Lehrer + Associates.

  - Park acreage per 1000 residents was calculated with the following equation, and rounded to two decimal points:

$$\frac{\text{Total park acreage}}{\text{Total population}} = \frac{X \text{ park acres}}{1000 \text{ residents}}$$

The formula rewritten to isolate Vista Hermosa park's impact would look like:

$$\frac{(\text{Total park acreage} - X \text{ park acres})}{(\text{Total population}/1000 \text{ residents})}$$

- The presence of Vista Hermosa impacts the park acreage per 1000 residents, the acreage of Vista Hermosa was subtracted from total acreage of the Westlake area (76.6 - 9.5 = 67.1 acres) and the remaining total was used in the equation above. It was assumed that the 2010 population of Westlake would be the same had the park not been constructed.

  76.6 / 111,803 = x / 1000
  x = .68 acres per 1000 residents (with Vista Hermosa)

  67.1 / 111,803 = x / 1000
  x = .60 acres per 1000 residents (without Vista Hermosa)

  To calculate percent change: ((y – x)/x * 100
  x = .60 y = .68 .08/.60 = .15 x 100 = 13%

- Although MacArthur Park and Echo Park have higher acreage, both feature substantial lakes, making the acreage of generally accessible areas of the park more similar.

MacArthur Park	8.4 acre lake	31.72 acre park total
Echo Park	14.14 acre lake	26.71 acre park total

- All income figures are taken from the 2010 US Census. Figures for the Westlake area, the city of Los Angeles, and Los Angeles County were calculated using the web application Social Explorer. Median incomes calculated within the 1/2 mile radius of the three parks were calculated using the Community Analyst tool of ArcGIS Online.

■ Limitations:

- Calculations are performed in GIS using Census Data. Census Data may not be entirely complete and is more likely to omit people of lower economic status and may not accurately reflect the incomes of those who participate in informal economies, and those whose wages are not reported.
- Park acreage for the Westlake area and Los Angeles County is taken from the 2016 Los Angeles Parks Needs Assessment report and so reflects the park acreage present in 2015. However, all parks listed in the report as contributing to the park acreage in Westlake were established by 2010, so this number should still be correct, unless parks were closed and not referred to in the report. However, it is likely that Los Angeles County parkland did change in the years between 2010 and 2016, so the calculated number has a margin of error.

- Sources:
  - Esri, ArcGIS Online Community Analyst report,'2010 Census Profile: Echo Park' 1/2 mile radius of Echo Park, report created 2016.
  - Esri, ArcGIS Online Community Analyst report '2010 Census Profile: MacArthur Park' 1/2 mile radius of MacArthur Park, report created 2016.
  - Esri, '2010 Census Profile: Vista Hermosa Natural Park' 1/2 mile radius of Vista Hermosa Natural Park report created 2016.
  - 'City of LA Westlake: Study Area Profile' (2016) Los Angeles Countywide Parks Needs Assessment Report http://lacountyparkneeds.org/FinalReportAppendixA/StudyArea_147.pdf
  - 'Los Angeles Countywide Comprehensive Parks and Recreation Needs Assessment (2016) http://lacountyparkneeds.org/wp-content/uploads/2016/06/FinalReport.pdf
  - Trust for Public Land (2011) '2011 City Park Facts' https://www.tpl.org/sites/default files/cloud.tpl.org/pubs/ccpe-city-park-facts-2011.pdf
  - US Census Bureau. Population, 2010. Prepared by Social Explorer (3 July 2016).

Social Benefit 3: Supports 4 major and numerous additional recreational and social activities, as documented on social media platforms: 58% sightseeing, 14% social entertainment, 6% nature, 2% sports, and 20% other diverse activities.

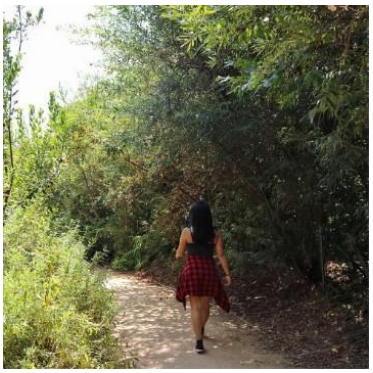
Accommodates a wide array of experiences by incorporating contrasting atmospheres and activities in a relatively small area. Of 369 images publicly posted to Instagram in June 2016 and geotagged as being taken in Vista Hermosa, 59% focus on views of the downtown Los Angeles skyline, while 7% show focus on showing nature, and 8% focus on cultural events or social milestones, such as organized meet-ups, prom photos, and engagement photos. Of 512 photos submitted to Yelp over the park's lifetime, 57% focus on views of the skyline, 21% focus on natural elements, and 4% show cultural events or social milestones. The park currently has 4.5/5 star rating on Yelp, based on 190 reviews.

- Calculations:
  - Photographs posted on social media site Instagram and on Yelp, a business, service, and location rating website, were collated and organized. For Yelp, the lifetime collection of photo (512) was analyzed. For Instagram, due to the volume of photographs posted, only the photographs posted in June 2016, which totaled 369 images, were analyzed.
  - Photographs were organized by their content into the categories below. Photographs containing multiple elements were categorized based on the main focus or motivation for the framing of the photograph.

- Limitations:
  - Not all photo posts are made public.
  - Park users of lower economic levels may not have the same access to internet and internet capable cell phones, and their park usage patterns and priorities may be under- or unrepresented in the data.

- Since only data for one month was used for Instagram photos, the data may not reflect any larger shifts in people's value of the park or their relationship with the park as it evolved over Vista Hermosa's lifetime.
- Since categorizing the images is a subjective process despite attempts at objectivity, categorization of the photos is subject to implicit bias and/ or human error.
- People are more likely to take and post sightseeing photos than they are of regular activities happening in the park, like soccer practice/games, walking, children playing, etc.

Skyline
https://www.instagram.com/p/BHQYH7-gukt/



Nature
https://www.instagram.com/p/BHGaov9jDIr/

Sports
https://www.instagram.com/p/BG_LrTHDXw8/

Other
https://www.instagram.com/p/BGvF3NuK8Mr/

Event/Social
https://www.instagram.com/p/BGk6yR5hJgg/

Sample classifications of images

	Skyline	Nature	Event/social	Sports	Other
Yelp photo counts	292	21	105	6	88
Percent	57.0%	4.1%	20.5%	1.2%	17.2%
Instagram photo counts	221	29	28	6	85
Percent	59.9%	7.9%	7.6%	1.6%	23.0%
Percent averages	58.4%	6.0%	14.1%	1.4%	20.1%

- Sources:
  - Vista Hermosa, Instagram https://www.instagram.com/explore/locations/119388/
  - Vista Hermosa Natural Park, Yelp, http://www.yelp.com/biz/vista-hermosa-natural-park-los-angeles (Accessed 3 July 2016)

Social Benefit 4: Educated an average of 1,487 visitors per year through an average of 67 programs in English and Spanish between 2008 and 2012.

Hosts 67 programs on average annually throughout the park, including educational lectures and tours, provided in both Spanish and English by the Santa Monica Mountains Conservancy, averaging 161 hours a year and serving on average 1,487 attendees.

One program in particular, the “Transit to Trails” program, facilitates transport to, and exploration of, the extensive natural areas surrounding the city for members of the public from throughout Los Angeles, free of cost and accompanied by a naturalist guide. 90% of Transit to Trails trips are bilingual in English and Spanish, and the program averaged 7 trips a year between July 2012 and July 2016.

- Calculations:
  - Quantitative data provided by Mountains Recreation and Conservation Authority for the years 2008-2009, 2009-2010, 2010-2011, and 2011-2012.

	Number of programs	Hours of programming	Attendees
2008-2009	76	200	1834
2009-2010	102	165	1527
2010-2011	55	183.25	1525
2011-2012	36	95.5	1061
Totals:	269	643.75	5947
Average per year:	67.25	160.94	1486.75

- Data quantities provided by the Mountains Recreation and Conservation Authority.

	2012-13	2013-14	2014-15	2015-16	Total	Average
Trips	5	11	8	3	27	6.75

- Limitations:
  - Data is only available for the first four years of the park.
  - As of July 1, 2016, these programs have been placed on hiatus due to the elimination of state funding.
  - The Transit to Trails program depends on outside funding and its frequency and availability vary depending on the financial support. Indeed, as of July 1, 2016, these programs have been placed on hiatus due to the elimination of state funding

- Sources:
  - Sally Garcia, Project Assistant, Mountains Recreation and Conservation Authority (personal communication July 6, 2016)

Social Benefit 5: Serves approximately 1,500 to 2,000 athletes a week. The park added only the third publicly-accessible soccer field to the neighborhood, bringing the ratio up to 2.6 soccer fields per 100,000 residents compared to a country-wide ratio of 4 per 100,000 residents.

Increases the number of publicly available soccer fields in the Westlake area (the neighborhood of the park) by 50%, (from two to three fields), resulting in a ratio of 2.6 soccer fields per 100,000 residents, as compared to a county-wide ratio of 4 soccer fields per 100,000 residents, and a national average of 16 soccer fields per 100,000 residents. The field serves Edward R. Roybal Learning Center during weekdays. It is open to the public after 6:00 PM on weekdays, and on weekends the fields hosts soccer matches every two hours between 8:00 AM and 10:00 PM, serving approximately 1,500 to 2,000 athletes a week. The field is rarely vacant during hours when it is available for the public.

- Calculations:
  - Soccer field averages for Los Angeles County and the United States are taken directly from the Los Angeles Countywide Parks and Recreation Needs Assessment. Data used for the Westlake area comes specifically from the City of LA: Westlake report, which provides the soccer field count as being 3 and the population of the area as being 114,579.
  - Data regarding field usage numbers was provided by the Mountains Recreation and Conservation Authority.
  - Data regarding field vacancy is provided by the Municipal Sports Office.

- Limitations:
  - Field usage numbers are an estimate.

- Sources:
  - City of LA Westlake: Study Area Profile' (2016) Los Angeles Countywide Parks Needs Assessment Report http://lacountyparkneeds.org/FinalReportAppendixA/ StudyArea_147.pdf
  - Lisa Soghor, Deputy Executive Officer and Chief of Developed Resources, Mountains Recreation and Conservation Authority (personal communication July 5, 2016),
  - Tina Guerrero, Administrator, Los Angeles Municipal Sports Office (personal communication)

Economic Benefit 1: Avoids an estimated $70,000 in irrigation and maintenance costs annually by using artificial turf instead of live turf for the soccer field.

Maintenance costs for a comparable turf soccer field, including reseeding, irrigating, and re-striping the soccer field are reported at an estimated $70,000 annually. In Environmental Benefit 2 irrigation was estimated at $31.870.

- Calculations:
  - The $70,000 figure is published by the LA Times.

- Limitations:
  - This is a general estimate for the Los Angeles area and may not reflect the exact information regarding Vista Hermosa's synthetic field.

- Sources:
  - Sondheimer, Eric (2004) "Sunny California Buys into Splendor in the Turf." LA Times, 29 March 2004, http://articles.latimes.com/2004/mar/29/sports/sp-turf29

Economic Benefit 2: Creates 2.5 full time equivalent jobs, and provided more than 6,000 hours of employment during construction.

Employs two full-time staff and one part-time staff member who splits time across multiple parks. Additionally, the construction phase of the park provided more than 6,000 hours of employment through several contractors and consultants.

- Calculations: Figures provided by Mountains Recreation and Conservation Authority.

- Limitations:
  - This does not include any growth in economic opportunities in the surrounding areas, nor does it account for any informal economy opportunities which have arisen in the park.
  - The numbers of park staff have fluctuated through the years due to inconsistent funding for maintenance and programming.
  - Salary information was not available for those employed in the park's construction or ongoing maintenance.

- Sources:

- Mario Sandoval, Project Analyst I, Mountains Recreation and Conservation Authority (personal communication July 7, 2016)

Economic Benefit 3: Generates a projected $87,000 in annual revenue for park operating expenses from fees associated with professional filming activities.

By arranging location space for filming, MRCA collects fees that are allocated toward park operating expenses. By July 7, 2016 the yearly total was $45,195 ($2,511 per filming day). The following calculations project the estimated total revenue for 35 days of filming over the year 2016.

- Calculations:
  - As of July 7, 2016, the park had hosted 18 filming days during 2016.
  - July 7, 2016, is in the 27th week of 2016 and can be used to estimate an average number of days per week in which filming takes place in the park:
    18 filming days / 27 weeks = 2/3 filming days per week.
  - By multiplying this times 52, the number of weeks per year, we get an annual estimate of filming days:
    2/3 filming days per week x 52 weeks per year = 34.7 filming days per year.
  - A similar method can be applied to estimate the annual revenue from filming, which totaled $45,195 through July 7, 2016:

    $45,195 / 18 days = $2,510.83 per filming day
    $2,510.83 x 34.7 filming days per year = $87,126 estimated annual revenue

- Limitations:
  - Since annual numbers were not available, this is an estimation of total production annually. If there are times of increased or decreased filming during the year, those trends are represented in these calculations.

- Sources:
  - Mario Sandoval, Project Analyst I, Mountains Recreation and Conservation Authority (personal communication July 7, 2016)

Cost Comparison

Saved $365,732.26 in annual maintenance costs when compared to a more traditional Los Angeles park.

- Echo Park is one of the oldest parks in Los Angeles and exemplifies a traditional Los Angeles park and has a lake. Its maintenance regime includes stormwater conveyance systems and associated treatments systems, a lotus bed, in-lake vegetation on terraces, and wetland islands, plant pruning and harvesting, periodic inspections on a “smart irrigation system”, and permeable paving maintenance.

Vista Hermosa has an annual operating cost of $199,000, costing $20,947.37 per acre to maintain. Echo Park’s annual maintenance cost is estimated at $1.2 million, costing $44,926.99

per acre, which is $23,980 or 114% more per acre than Vista Hermosa.

- Calculations:

	Vista Hermosa	Echo Park
Acreage	9.5	26.71
Parkland acreage	9.5	12.57 (14.14 is a lake)
Annual maintenance cost	$199,000	$1.2 million
Maintenance/acre	$20,947.37	$44,926.99
Maintenance cost difference per acre	----	$23,979.60
Percent difference per acre	----	114%

Maintenance costs for parkland only	$199,000	$564,732.26

- Limitations:
  - The calculations are based on Vista Hermosa's maintenance data for one year, which may not be indicative of the larger picture.
  - Echo Park's maintenance projection comes from the Final Concept Report, since actual figures were not available.
  - No itemized costs were obtained for upfront costs or maintenance regimes of the various land cover types, native or nonnative plants, or lake.

- Sources:
  - Ryan Villaincourt (2011) 'City Pays Premium for Maguire Gardens' 24 August 2011, http://www.ladowntownnews.com/news/city-pays-premium-for-maguire-gardens/article_9bbf9694-ce82-11e0-aa75-001cc4c03286.html
  - CDM for the City of Los Angeles, Bureau of Sanitation (2006) 'Final Concept Report: Echo Park Lake Rehabilitation Proposition O Project' (December 13, 2006) http://www.lapropo.org/sitefiles/docs/concept_reports/echoparklakerehab.pdf
  - Anita Bennett (2013) 'Echo Park Lake Reopens After $45m Renovation' (June 16, 2013) http://ktla.com/2013/06/15/echo-park-lake-reopens-after-massive-renovation-project/
  - City of LA Westlake: Study Area Profile' (2016) Los Angeles Countywide Parks Needs Assessment Report http://lacountyparkneeds.org/FinalReportAppendixA/StudyArea_147.pdf

APPENDIX A - Temperature Data

PARK GRID:

Numbering & site accessibility (white dots represent points that could be measured, while the open dots are those that were inaccessible for measurement due to difficult terrain or private property, etc.).

Point name	TEMP_AM	TEMP_1	TEMP_PM	NOTES
1A	69.9	86.7	71.6	
1B	69.6	80.9	71.2	
1C	69.8	81.3	71.6	
1D	69.9	85.4	70.7	
1E	69.9	81.3	71.0	
1F	69.9	84.5	70.8	
1G	69.6	84.3	71.0	
1H	69.0	85.2	69.8	
1J	68.5	81.1	69.4	
1K	67.6	79.3	69.8	
1L	68.3	79.8	69.4	
2A	69.9	80.6	71.9	
2E	69.2	82.2	70.5	
2G	68.9	82.2	68.5	
2H	68.7	82.2	68.7	
2J	68.7	81.8	69.9	
3A	69.9	81.1	71.6	
3E	69.6	84.7	71.0	
3G	69.2	83.1	68.0	
3H	68.9	89.7	68.5	
3J	68.9	79.5	68.1	
4A	67.8	82.4	71.4	
4E	69.6	81.8	68.3	
4G	68.9	86.0	68.0	
4H	66.5	84.5	68.1	
4J	67.2	83.4	68.3	
4K	66.3	83.6	68.1	
5A	67.7	81.8	71.2	
5D	68.0	82.2	68.3	
5E	67.6	79.8	68.1	
5F	68.1	78.0	67.8	
5G	67.8	79.8	68.0	
5K	67.2	85.4	67.8	
6A	69.9	77.0	71.6	
6B	68.0	81.9	70.8	
6C	68.0	82.5	72.6	
6D	66.9	78.8	68.1	

6E	68.0	87.2	68.1	
6F	67.8	80.0	68.3	
6G	67.8	88.8	68.5	
6H	68.1	85.2	69.0	
6J	68.3	82.7	69.0	
7A	69.8	80.7	71.2	
7B	68.5	80.9	70.5	
7C	68.5	80.7	69.8	
7D	67.6	84.0	68.1	
7E	67.1	82.5	68.0	
8A	69.2	80.4	70.8	
8B	67.8	82.7	71.2	
8C	67.2	82.0	70.7	
8D	66.3	83.3	70.5	
8E	66.7	84.3	70.8	
8F	67.4		68.3	AFTERNOON - FIELD WAS CLOSED TO PUBLIC
8G	67.4		68.3	AFTERNOON - FIELD WAS CLOSED TO PUBLIC
8H	67.2		68.5	AFTERNOON - FIELD WAS CLOSED TO PUBLIC
8J	67.2		68.7	AFTERNOON - FIELD WAS CLOSED TO PUBLIC
9A	69.8	78.2	70.8	
9B	67.6	85.1	70.8	
9C	68.1	80.2	70.5	
9D	67.6	80.6	70.5	
9E	68.5	82.2	70.1	
9F	67.1		68.0	AFTERNOON - FIELD WAS CLOSED TO PUBLIC
9G	66.7		68.0	AFTERNOON - FIELD WAS CLOSED TO PUBLIC
9H	67.1		68.0	AFTERNOON - FIELD WAS CLOSED TO PUBLIC
9J	67.2		68.1	AFTERNOON - FIELD WAS CLOSED TO PUBLIC
10A	70.1	82.0	71.2	
10B	70.1	82.0	71.6	
10C	70.7	81.1	71.4	
10D	71.0	80.0	71.2	

10E	71.4	79.5	70.3	
10F	71.9	82.2	69.8	
10G	72.1	82.9	69.8	
10H	71.9	81.6	69.2	
10J	71.6	80.9	68.9	
10K	71.4	81.1	69.0	
10L	71.0	80.9	69.0	
11A	71.6	81.8	71.6	
11B	71.9	81.3	70.5	
11C	72.3	84.0	70.1	
11D	71.9	84.2	70.5	
11E	71.4	83.6	70.5	
11F	70.8	82.5	69.9	
11G	70.7	79.5	70.5	
11H	69.4	82.9	70.8	
11J	69.9	81.6	70.8	
11K	70.5	81.1	70.8	
11L	70.1	80.0	70.5	
average non-park	70.2	81.7	70.4	average: 74.1
average park	67.8	82.8	69.0	average: 73.2

Study on localized heat island effect

Reduces localized heat island effect: temperatures taken on-site declined 13.7º F from afternoon to evening, while the corresponding decline in the larger area declined only 7.25º F.

- Calculations:
  - A 100’ grid was placed over the site. The resulting points were categorized between points where are accessible and those which are inaccessible. Accessible points were labeled by number, and inaccessible points were lettered.
  - Temperatures were recorded at each of the accessible points during three different periods of a single day, July 5, 2016: 7-8:00 AM, 1:45-3:15 PM, and 7:00-8:00 PM.
  - Temperatures were taken using a digital thermometer, Protech MS6508.
  - Temperatures were taken while holding the thermometer approximately 5 feet above ground, with the thermometer shaded to prevent readings being influenced by radiant heat. When a temperature location was not located in the shade, the thermometer was covered with an opaque shield.
  - Temperature readings corresponding to the times of day were taken from the two closes Weather Monitoring Stations operated by the National Weather Service, which are the Los Angeles - North Main Street, CA CQ070 and Los Angeles / USC Campus Downtown, CA KCQ weather stations. Since fieldwork temperature

readings spanned an hour, temperature readings from the weather stations from the approximate start and end times of fieldwork readings were averaged, and then the two stations' readings were averaged together to approximate the larger city context.
    - Averaged evening temperatures were then subtracted from the averaged afternoon temperatures to see how quickly temperatures decreased.
    - See Appendix A for fieldwork temperature data and grid mapping.

	Afternoon reading 1	Afternoon reading 2	Average
CQ070	78 (2:00 PM)	77 (3:00 PM)	77.5
KCQT	77 (1:47 PM)	75 (2:47 PM)	76
		Average:	76.75
	Evening reading 1	Evening reading 2:	
CQ070	71 (7:00 PM)	69 (8:00 PM)	70
KCQT	70 (6:47 PM)	68 (7:47 PM)	69
		Average:	69.5

	Average afternoon	Average evening	Difference
Park	82.8	69.0	13.8
Weather stations	76.75	69.5	7.25

- Limitations:
    - Since it is not possible to take all measurements at an exact identical time, there is some time different between the data points.
    - Zip code data may be influenced by an area which is particularly hot or cold, and thus may not be an accurate representation of the general temperature of the area.
- Sources:
    - Independent measurements.
    - National Weather Service, 'Weather Conditions for: Los Angeles / USC Campus Downtown, CA. KCQT' http://www.wrh.noaa.gov/mesowest/getobext.php?wfo=wrh&sid=KCQT&num=168&raw=0&dbn=m
    - National Weather Service, 'Weather Conditions for: Weather Conditions for: Los Angeles-North Main Street, CA. CQ070.' http://www.wrh.noaa.gov/mesowest/getobext.php?wfo=wrh&sid=CQ070&num=168&raw=0&dbn=m

Study of microclimate

Creates a cooler microclimate for the neighborhood, lowering the average temperature by 0.9º F as compared to adjacent parcels, given the green infrastructure within the park.

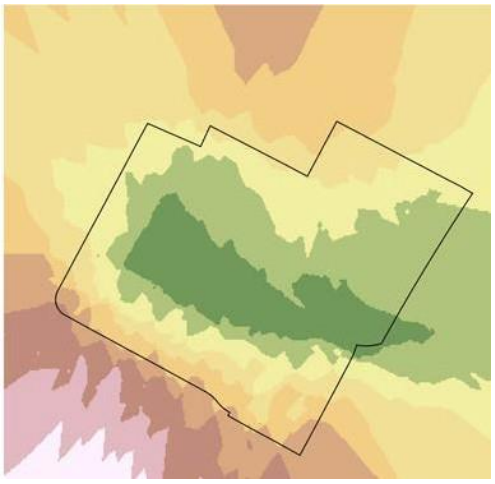
- Calculations:
    - Temperatures are recorded on-site and on surrounding plots using the methodology described in Environmental Benefit 7.

Average of temperatures outside park	74.1
Average of temperatures inside park	73.2
Difference	0.9

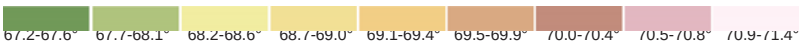
- The resulting data is then mapped in ArcMap 10.3.1 GIS software using the Kriging process to create a temperature map.
- See Appendix A for temperature data and grid mapping.

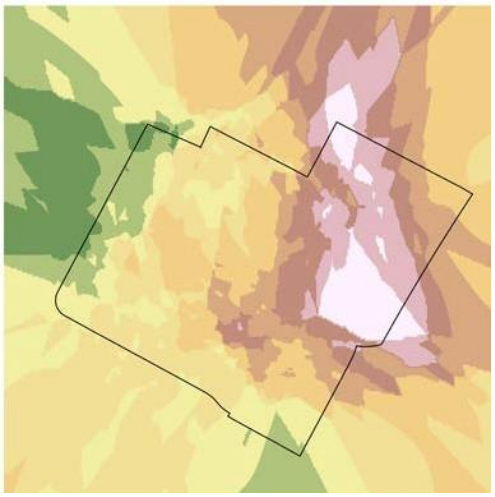
- Limitations:
  - Thermometers may unknowingly be placed in slightly differing conditions leading to small differences in data.
  - Due to inherent human limitations, it is not possible to be in two locations at exactly the same time. This allows for the possibility of subtle shifts in site conditions to impact fieldwork datasets.

- Sources:
  - Fieldwork measurements.
  - ArcMap 10.3.1 GIS Software.

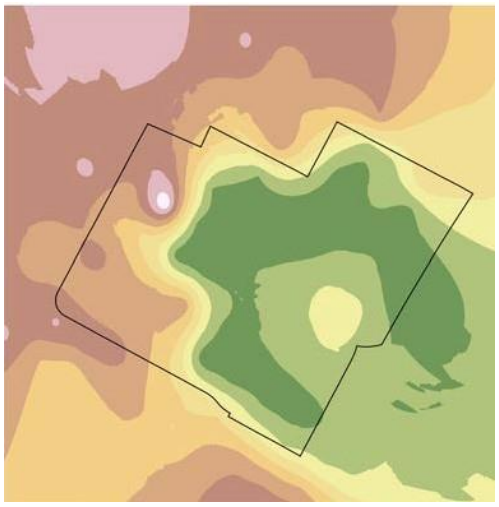


Relative temperature
7:00-8:00 AM

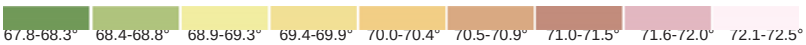




Relative temperature
1:40-3:10 PM



Relative temperature
7:00-8:00 PM



APPENDIX B – Study on public safety

Provides a safe environment for the neighborhood in what was once a dangerous and gang-threatened vacant lot in downtown.

- Calculations:

Year	Total crimes mapped near park (LASD)	Total crimes recorded (LASD)
2005	7	211,733
2006	18	213,866
2007	10	227,470
Total:	**35**	**653,071**
Average crimes/year	**11.67**	**217,690.33**
2013	17	169,983
2014	60	164,886
2015	20	167,075
Total:	**97**	**501944**
Average crimes/year	**32.33**	**167,314.67**
% Change from 2005-2007 to 2013-2015	36% increase	23% decrease
	Park's surround census tracts	**Los Angeles County**
Population 2006	26,266	9,948,081
Rate of crimes per 100,000 residents (2006)	44.43	2188
Population 2014 (PUMA)	27,970	9,974,203
Rate of crimes per population area (2014)	115.59	1677.47

- Lisa Soghor, Deputy Executive Officer of the Mountains Recreation Conservation
- and Authority (MRCA) stated that the park has been very safe and a refuge for the neighborhood and that once it was constructed gang activity noticeably reduced.
- Vista Hermosa was opened in July of 2008. Since this fell in the center of a year, we did not use that year in our data, instead choosing the three years preceding the park's construction. These years were then compared with the three most complete years, 2012-2014.
- Population in this area was calculated using PUMAs for the American Community Surveys in 2006 and 2014, which is the finest degree of specificity provided by the ACS reports. These years were chosen because they were the middle year in each range of data. The PUMA used, Los Angeles County--LA City (East Central/Silver Lake), has an area of 11.67 miles, which was used to calculate the population density in the PUMA. This density was then multiplied by the area of the map, which equals 1.65 miles squared, as calculated by ArcMap 10.3.1, to calculate an approximate population for the area represented.
- Crime rate was calculated by dividing the number of crimes by the population and then multiplying it by 100,000 to provide crimes per 100,000 residents.

- Limitations:
  - LAPD data was not available for time periods beyond an immediately preceding 6 month period. As such, Los Angeles Sheriff's Department data was used, which had a lower quantity of responses within Los Angeles city limits and thus a smaller sample size. Additionally, since the Sheriff's Department responds more often to areas outside of LAPD's jurisdiction than inside them, it is expected that there would be a higher incidence of response county-wide than locally.
  - The method that was required to acquire population for the map area provides only an estimation.

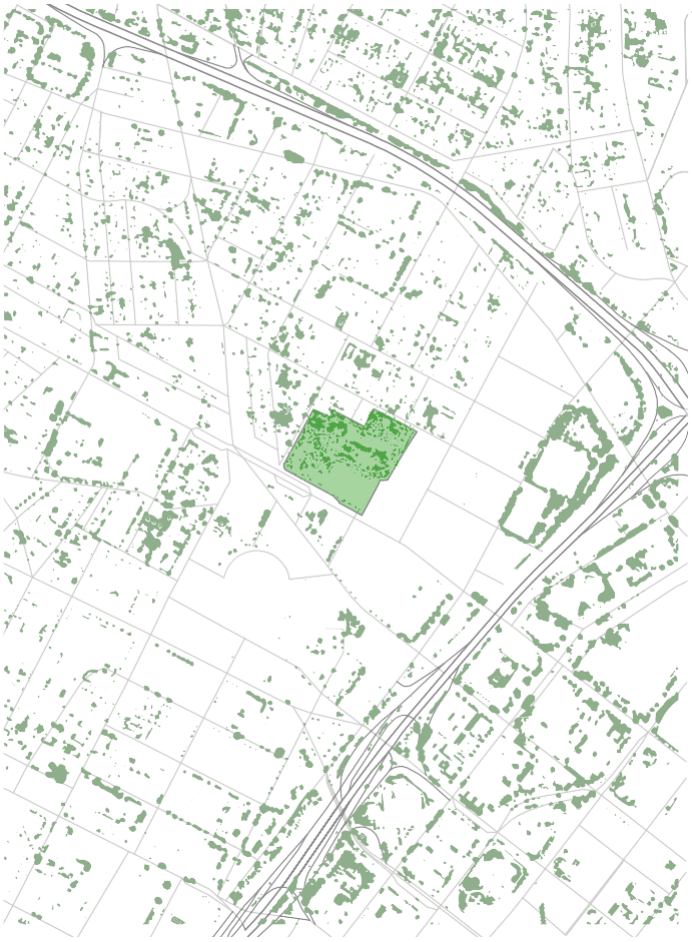
- Sources:
  - Lisa Soghor, Deputy Executive Officer and Chief of Developed Resources, Mountains Recreation and Conservation Authority (personal communication June 14, 2016).
  - Los Angeles Sheriff's Department, Historical Crime Data. http://shq.lasdnews.net CrimeStats/CAASS/desc.html
  - American Community Survey 2014 through Social Explorer
  - American Community Survey 2006 through Social Explorer
  - ArcMap 10.3.1, GIS Software

APPENDIX C – Tree canopy / shade

Provides ample shade for the Los Angeles, which has 284 sunny days and connects to a larger tree canopy matrix connecting the Santa Monica Mountains in the north to the urban system in the south.

Regional Context

Neighborhood Context



Park Context

- Methodology:
  - Imagery of the regional tree canopy coverage was created using LARIAC's raster GIS data layer. Tree coverage in Vista Hermosa Natural Park was traced from Google Maps Satellite imagery in order to reflect the most accurate and up-to-date status of the park's tree canopy layer.
- Sources:
  - Los Angeles Region Imagery Acquisition Consortium. Trees (LARIAC). GIS raster dataset of tree canopy in Los Angeles County. 2006. Available: USC Geoportal, Spatial Sciences Institute, University of Southern California (June 16, 2016).
  - Google Maps. 2016. *Vista Hermosa Natural Park 34°03'42.1"N 118°15'29.1"W.* Satellite i imagery. <http://maps.google.com> (Accessed June 20, 2016).

APPENDIX D - Carbon emissions avoided as compared to a hypothetical all-turf land coverage condition

Avoids emissions from gas-powered maintenance equipment by 84%, reducing the carbon footprint of the park by 1831.1 pounds, the equivalence of driving 2,641 miles, due to balancing the park's lawns with areas of naturalized Los Angeles plantings, which do not require maintenance with gas-powered equipment.

- Calculations:
  - Maintenance regime and calculations:
    Lawns are mowed every two weeks during the summer, and once a month in the winter using a gas-powered mower. Native areas are weeded by hand three times a year and do not require maintenance with gas-powered equipment.
    In summer: Lawns mowed = 2 mows per month x 6 months = 12 mows
    In winter: Lawns mowed =1 mow per month x 6 months = 6 mows Total = 18 mows per year
  - Time spent mowing:
    It takes an estimated .5 hours to mow 1 acre of grass
    .5 hours x 1.16 acres of grass = .58 hours to mow the lawn
    .58 hours per mow x 18 mows per year = 10.4 hours
  - Alternate mowing calculations:
    Assuming the 7.35-acre potential planting area (calculated in Environmental Benefit 4) was planted with turf grass, mowing would take:
    7.35 acres x .5 hours to mow one acre = 3.68 hours to mow the park
    3.68 hours per mow x 18 mows per year = 66.2 hours of mowing annually
  - Comparison: (66.2 hours - 10.4 hours) / 66.2 hours = .84
    Thus an 84% reduction in carbon emissions
  - Equivalency:
    One hour of mowing was calculated as equivalent to driving a car 100 miles in 2005
    New EPA regulations increased emissions standards by 55% in 2007, a theoretical decrease of 55% in emissions.
    100 miles per hour of mowing x (1 - . 45) = 55 mile car trip per hour of mowing 55 miles car driving per hour mowing x 55.8 hours not mowed = 3,069 miles car driving
    3,069 miles / 25.5 average miles driven per gallon = 120.4 gallons of gas
    120.4 gallons of gas x 17.68 average pounds of CO^2 = 2128.7 pounds of carbon

- Limitations:
  - Emissions are a best estimate, which vary according to equipment used and efficiency of the maintenance personnel.
  - Mowing time per acre is an estimate.

- Sources:
  - Mario Sandoval, Project Analyst I, Mountains Recreation and Conservation Authority (personal communication July 7, 2016),
  - American Forests 'A Carbon Conundrum' https://www.americanforests.org/a-carbon-conundrum/

- Brian T. Horowitz (2009) 'How Green is Your Lawnmower?' (April 3, 2009) http://www.foxnews.com/story/2009/04/03/how-green-is-your-lawn-mower.html
- Encore Power Equipment (2012) 'Calculating Mowing Times and Productivity' (June 2012) http://www.encoreequipment.com/wordpress/wp-content/uploads/2012/06/Mowing-Times-and-Productivity.pdf
- Willow Larson 'Study: Lawn mowing equals car trip' http://abcnews.go.com Technology/story?id=98532&page=1

APPENDIX E - Ranger station energy savings (with green roof)

Saves an estimated $15 annually in energy costs due the use of green roofs when compared to a traditional, dark-colored roof.

- Calculations:
  - Calculations were performed using the Green Building Research Laboratory's Impact of Green Roof calculator. The following information was input:
    State/province: California
    City: Los Angeles
    Area of roof: 784 square feet
    Building type: New office
    Growing depth: 8"
    Leaf Area Index: .51 (closest allowable value to the LAI estimated in "Green roofs in the sustainable design of agri-food buildings: a case-study in Calabria (Italy)")
    Roof irrigated: Yes
    Percentage of roof covered: 100%

	Electrical Savings	Gas Savings	Total energy cost savings
As compared to a dark roof (albedo=.15)	55.0 kWh	0.0 Therms	$15.48

  - 784 SQ FT Ranger Station – Compare energy expenditures to average Los Angeles expenditures

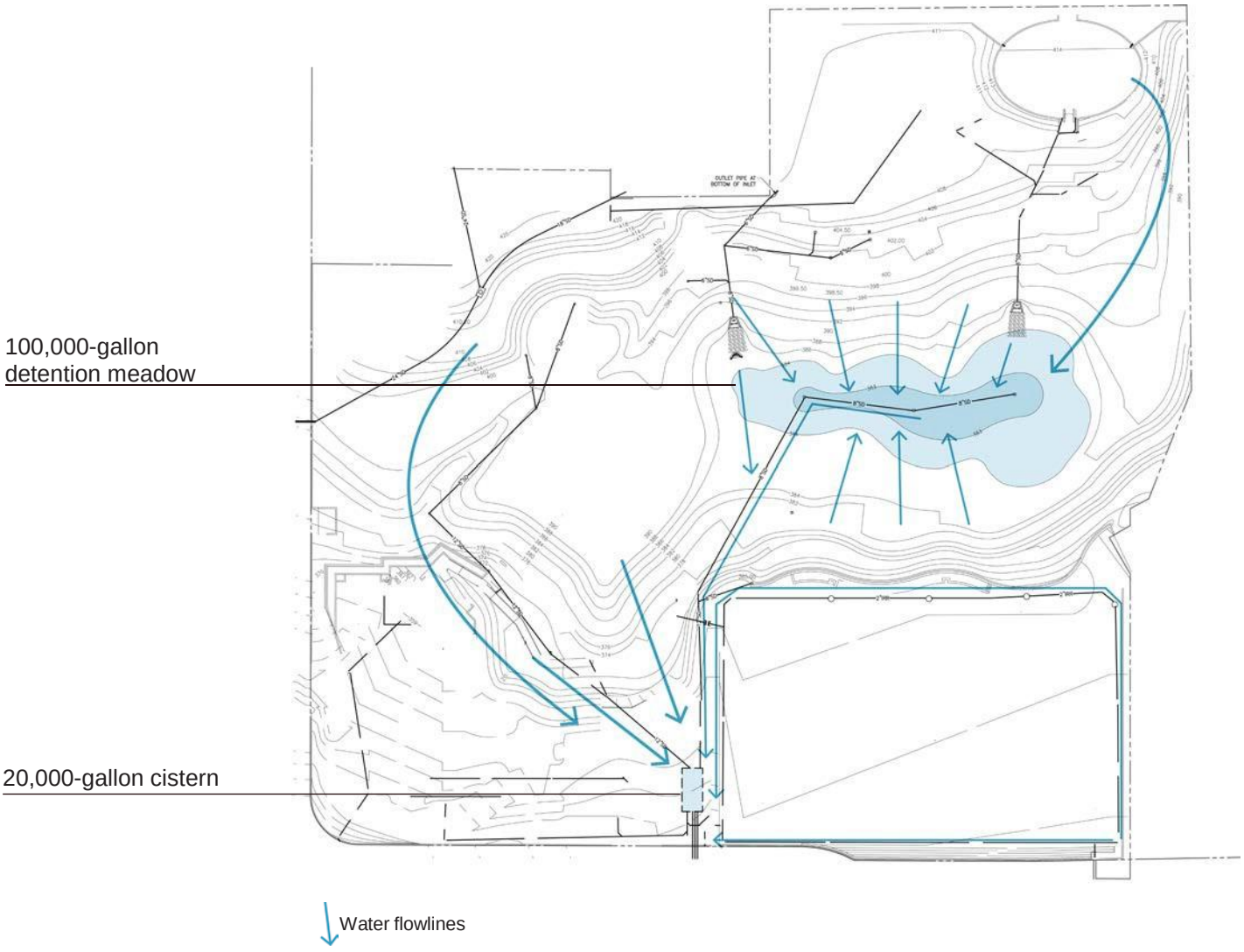
- Limitations:
  - The calculation is based on general energy costs in Los Angeles, resulting in a general estimate of cost savings rather than a precise calculation.

- Sources:
  - Green Roof Energy Calculator, Green Building Research Laboratory at Portland State University http://greenbuilding.pdx.edu/GR_CALC_v2/grcalc_v2.php
  - Marrara Concetta Valeria, Barreca Francesco, Di Fazio Salvatore (2014) 'Green roofs in the sustainable design of agri-food buildings: a case-study in Calabria (Italy)' 2014 http://www.geyseco.es/geystiona/adjs/comunicaciones/304/C06780001. pdf

APPENDIX F - Stormwater

Prevents 54% of annual runoff or approximately 1.9 million gallons of stormwater from entering the Los Angeles stormwater system.

The park itself is designed to retain approximately 120,000 gallons of water in a storm event, with approximately 100,000 gallons held in the retention meadow and approximately 20,000 gallons stored in the cistern. This is approximately one-fifth of an Olympic-sized swimming pool.



- Calculations:
  - iTree calculations produce the following estimate of impermeable hardscape.

Cover Class	Points	Land cover (acres) ± SE
Hardscape	43	.55 ± .08

  - iTree calculated the total land coverage area of Vista Hermosa as 9.61 acres; 0.55 acres or 5.7% of land cover is impermeable.

- Using the Green Values National Stormwater calculator, the estimated decrease in site impermeability over a traditionally developed site is 59%. This is calculated by inputting square footage values equal to the proportions derived from the iTree analysis.
- Calculating annual gallons prevented from entering stormwater system:
  The EPA Stormwater Calculator was used with the following parameters:

Area	9.6 acres
Hydrologic Soil Group	C
Hydraulic Conductivity	.001 inches
Surface Slope	10%
Precipitation Source	Los Angeles Downtown/USC Weather Station
Evaporation Source	Los Angeles Downtown/USC Weather Station
Climate Change Scenario	Hot/Dry/Near Term
% Forest	36.4
% Meadow	11
% Lawn	12
% Desert	0
% Impervious	40.6
Years Analyzed:	20
Ignore consecutive wet days:	No
Wet Day threshold:	.10 inches

Hydrologic soil group C (moderately high runoff potential) and hydraulic conductivity are taken from the Remedial Action Completion Report: Vista Hermosa Park by SCS Engineers. Average surface slope down the site is approximately 10%. Precipitation and evaporation sources are set at the closest local weather station, Los Angeles Downtown/USC. The Southern California area is expected to become hotter and drier as a result of climate change. The Stormwater Calculator defines forest as stands of trees, meadow as non-forested natural areas such as scrub and shrub areas, and lawn as sod or grass. The percentages from iTree were used for each category.

Cover class	**Points**	**Land-cover (percent)**
Tree	274	36.4 ± 1.75
Hardscape	43	5.72 ± 0.85
Building	12	1.60 ± 0.46
Water	2	0.27 ± 0.19
Shrub	83	11.0 ± 1.14
Grass	91	12.1 ± 1.19
Permeable non-grass	247	32.8 ± 1.71

Impervious is used to cover all hardscape and all the contents of the ‘permeable non-grass’ category from iTree. The permeable elements are considered within this category in the ‘low impact development (LID) controls’ below. Years analyzed, ignore consecutive wet days, and the wet day threshold was set automatically by the stormwater calculator.

The low impact development control settings used are as follows:

Rain harvesting	1%
Green roofs	4%
Infiltration basins	8%
Porous pavement	73%

Rain harvesting refers to the water captured in the 20,000 gallon cistern
7.48 gallons per cubic foot
20,000 gallons / 7.48 = 2,673.8 cubic feet

Assuming a depth of one foot for the sake of calculation, the cistern covers a theoretical area of 2,673.8 square feet
2,673.8 square feet = .06 acres (1 acre = 43,560 sf, so 2,673.8 / 43,560)

The impervious category includes 5.7% of land cover as hardscape and 32.8% as permeable non-grass, for a total 38.5% for the category: 38.5% / 9.6 total land cover area = 3.7 acres categorized as impervious land cover.
The cistern covers a theoretical 1.6% of this area: .06 / 3.7 = .016

Green roofs are calculated simply by percentage: 1.6% / 40.6% = 3.9% of the impervious area is attributed to green roofs.
(40.6% is indicated as percent of impervious area in the EPA stormwater chart, above)

The infiltration basin, although it is located in a lawn area of the park, was required to be included in the impervious section due to the restraints of the software. The infiltration basin holds 100,000 gallons, and the theoretical retention is calculated in the same manner as the cistern.
100,000 gallons = 13,369 cubic feet, thus covering 13,369 square feet when the depth is one foot, or 0.3 acres
0.3 acres / 3.7 acres = 0.081 or 8%

Due to limitations of the program, both decomposed gravel and the synthetic soccer field had to be included as porous pavement since it is the only designation which calculates to allow infiltration. We know the percentage of impermeable hardscape is 5.72% of the whole site. 5.72 % / 40.6 % = .14 or 14%
Subtracting all percentages above results in 73% porous pavement for the site.
100% - (1% + 4% + 8% + 14%) = 73%

These inputs provide the following results:

Average annual rainfall (inches)	13.47
Average annual runoff (inches)	6.19
Days per year with rainfall	21.14
Days per year with runoff	10.69
Percent of Wet Days retrained	49.41
Largest rainfall without runoff	0.50
Max rainfall retained (inches)	1.81

13.47 inches rainfall - 6.19 inches run off = 7.28 inches remaining on site
7.28 / 13.47 = 54%
7.28 inches = 0.607 feet
9.6 acres of land cover = 418,176 square feet
418,176 square feet of land cover area x 0.607 feet precipitation = 253,832.83 cubic feet of prevented runoff
253,832.83 cubic feet x 7.48 gallons per cf = 1,898,669.58 gallons prevented runoff

- Limitations:
  - iTree only provides an estimation of surface cover. There is clearly a small discrepancy between estimations and reality, which is made apparent in the 9.6 acre figure, which is greater than the park's 9.5-acre area. However, iTree uses the 9.61 acre figure in its calculations, so it has been used throughout this methodology for consistency or has resultant percentages have been used to calculate areas based on the 9.5 acre area when required. These figures were not accurately available in construction drawings since there were changes made during the construction phase of the project, particularly the decision to include a larger turf area.
  - The Green Values National Stormwater calculator does not offer a permeable, synthetic option, so it was marked as a natural lawn since it is designed to be permeable and to directly absorb water into the cistern.
  - Gallon figures retained on site are best estimates, since as actual figures were not available.
  - The cistern must contain a minimum level of water at all times or there is a risk of damage to the system. This requires that water be added to the cistern when it is low, so the actual available capacity during a storm event would be slightly lower than 20,000 gallons, which is its capacity.

- Sources:
  - iTree Canopy: http://www.itreetools.org/canopy/
  - Green Values National Stormwater Calculator, http://greenvalues.cnt.org/national/ calculator.php.
  - Mario Sandoval, Project Analyst I, Mountains Recreation and Conservation Authority (personal communication July 7, 2016)
  - United States Geological Survey 'Water Questions and Answers' http://water.usgs. gov/edu/qa-home-percapita.html
  - SCS Engineers 'Remedial Action Completion Report: Vista Hermosa Park' April 2, 2008, http://www.laschools.org/vista-hermosa/clahs-11/download/racr_ (park)%2Ftext%2FVH_Park_RACR_Text.pdf?version_id=17799070
  - United States Environmental Protection Agency, National Stormwater Calculator, https://www.epa.gov/water-research/national-stormwater-calculator

Saves an estimated 3.1 million gallons of potable water per year when compared to the irrigation needs of a turf soccer field, saving approximately $31,870 annually.

- Calculations:
  - The FIFA regulation soccer field is measured as 1.63 acres from construction drawings.
  - Traditional landscapes require 1,955,0350 gallons of water annually per acre in the Los Angeles region: According to the garden/garden report, a home with a traditional, 1,900-square foot yard, required 703,813 gallons of water for irrigation in a 9 year timeframe (2004-2013), or 78,201 gallons per year (703,813 / 9)
    1,900 square foot garden = 0.04 acre garden (1 acre = 43,560 sq ft)
    78,201 gallons / 0.04 acres = 1,955,025 gallons per acre

    FIFA regulation soccer field with artificial turf = 1.63 acres
    1,955,025 gallons per acre x 1.63 acres = 3,186,690.75 gallons avoided
  - Saved water cost is approximately $31,865 annually.

    Los Angeles Department of Water and Power Water Rate Calculator estimates the cost per gallon to be $0.01 on average with the following variable entered: Bi-monthly HCF usage: 2200 HCF (usage for Vista Hermosa from May 1, 2016 - June 30, 2016)
    Zip code: 90026
    Lot size: Greater than 43,559 square feet
    Date range: 5/01/2016 - 6/30/2016
    3,186,690.75 gallons x ($0.01 / gallon) = $31,866.91 savings

- Limitations:
  - Calculations using planting information and the LEED Calculator produces an estimate.
  - Actual irrigation requirements from comparable sports fields under similar conditions (location, use) were not calculated.

- Sources:
  - Los Angeles Department of Water and Power ‘Water Rate Calculator’ (accessed July 8, 2016) http://ezweb.ladwp.com/RateCalculator_4Tier.aspx
  - City of Santa Monica Office of Sustainability and the Environment (2013)‘garden\ garden’http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Landscape/garden-garden-2013.pdf
  - Water Education Foundation ‘California Water Basics’ http://www.watereducation.org/photo-gallery/california-water-basics

APPENDIX G – Park Access

Allows 6,762 residents, 6% of the neighborhood, to access this park in 10 minutes or less.

Improves park proximity for 6,762 residents, helping to counterbalance racial and ethnic disparities in access to green space. In comparison, MacArthur Park is the most proximate park with the equivalent of 30,209 residents and Echo Park with 15,176 residents.

- Calculations:
  - Calculations are based on the metric Park Pressure, which is included in the Los Angeles Countywide Comprehensive Parks and Recreation Needs Assessment. The Report describes this metric as "the potential demand if each resident of a parkshed were to use the park closest to them" (Appendix E). This figure is calculated by defining a polygon which encloses all the households for
    which the park in question is the closest park. The Park Pressure is then calculated per 1000 residents using the population within the polygon and the acreage of the park in question. The equation for this can be found below.
  - Since the Los Angeles Countywide Comprehensive Parks and Recreation Needs Assessment only provides the final figure for Park Pressure, which is given in park acres per 1000 residents, it is necessary to work backwards to arrive at actual number of residents within this polygon. The following equation can be re-written to solve for polygon population:

$$\frac{\text{Individual park acreage}}{\text{Polygon population}} = \frac{X \text{ park acres}}{1000 \text{ residents}}$$

$$\text{Polygon population} = \frac{(\text{Individual park acreage}) \times (1000 \text{ residents})}{X \text{ park acres}}$$

	Park pressure (acres per 1000)	Individual park acreage	Calculated polygon population
Vista Hermosa Park	1.54	6.84	4441.56
Vista Hermosa Soccer field	.81	1.88	2320.99
Total:			**6762.55**
MacArthur Park	1.05	31.72	30,209.52
Echo Park	1.76	26.71	15,176.14

Population 1 = (6.84 x 1,000) / 1.54
Population 1 = 6,840 / 1.54 = 4,441.56

Population 2 = (1.88 x 1,000) / .81
Population 2 = 2,320.99

Westlake population = 111,803 (Provided in Social Benefit 1)

6,763/111,803 = 6% of Westlake population served

Parkshed polygons used in the Los Angeles Countywide Parks and Recreation Needs Assessment for Vista Hermosa. The greatest distance from the park is a half-mile, commonly averaged as a 10-minute walk.

- Limitations:
  - For these calculations, we used the acreage numbers for Vista Hermosa as used in the Park Needs Assessment report in order to replicate the calculations correctly. In this report, the composite acreage of Vista Hermosa is 8.72 acres. It is uncertain why this acreage differs from the published acreage of Vista Hermosa of 9.5 acres.
  - The rationale for this figure is that, according to scientific studies cited in the Parks Needs Assessment, people are most likely to visit the park closest to their home, and that they visit these parks more frequently than other parks. However, this does not account for qualitative differences or differences in amenities between different parks.
  - It would be optimal to know the walking times for residents and how the opening of Vista Hermosa impacted them, but that information was not available.

- Sources:
  - 'Appendix E: Technical Appendix' (2016) Los Angeles County Department of Parks & Recreation Needs Assessment http://lacountyparkneeds.org/wp-content/ uploads/2016/05/Appendix_E 1.pdf
  - 'City of LA Westlake: Study Area Profile' (2016) Los Angeles Countywide Parks Needs Assessment Report http://lacountyparkneeds.org/FinalReportAppendixA/ StudyArea_147.pdf
  - 'Interactive Maps Website: Metric #3: Park Pressure,' Los Angeles Countywide Parks and Recreation Needs Assessment http://tpc.maps.arcgis.com/apps/MapJournal/indexhtml?appid=6f8962df9e9446babb35f28fa8d1c23a
  - American Community Survey 2006 through Social Explorer ArcMap 10.3.1, GIS Software

APPENDIX H – Housing

Contributed to a 35% increase in adjacent housing units as compared with a 5.7% increase citywide.

Contributed to a 35% increase in housing units according to the Census tracts surrounding the park from 2000 to 2010, as compared with an increase of 5.7% across the city.

- Calculations:

Housing units: Census 2000	7,372
Housing units: Census 2010	10,013

  - (10,013 - 7,372) / 7,372 = .3582 x 100 = 35.82%
  - City growth rate of 5.7% from the Los Angeles Department of City Planning's Housing Needs Assessment
  - Census 2000 numbers were calculated using Social Explorer and running a report on the following census tracts: 2091.02, 2092, 2091.01, 2083, 2080.
  - Census 2010 numbers were calculated using Social Explorer and running a report on the following census tracts: 2080, 2083.01, 2091.02, 2091.03, 2091.04, 2092.

- Limitations:
  - This does not explore the quality of housing available.
  - Los Angeles has very low vacancy rate and a growing population, meaning that there was a strong impetus to increase housing supply.
  - The tracts used in the 2000 Census and the 2010 differ slightly but cannot be avoided. The total area for the 2000 Census calculations is .88 square miles compared to .93 square miles for the 2010 Census. This 5% difference in area does not account for a 26% increase in housing units.

- Sources:
  - United States Census 2000 through Social Explorer
  - United States Census 2010 through Social Explorer
  - Los Angeles Department of City Planning (2013) 'Housing Needs Assessment' (December 3, 2013) http://planning.lacity.org/HousingInitiatives/HousingElement/Text/Ch1.pdf

WORKS CITED

References and Resources

- Boucher, Natalie (2012) ‘Going down to the Place of Three Shadows: Journey’s to and f from Downtown Los Angeles’ Public Spaces’ in Urbanities, November 2012, pp. 45-61.
- Dickinson, Elizabeth Evitts (2008) ‘LA’s Learning Curve: The AIA Journal’ in Architect, April 2008, pp. 70-75. http://www.architectmagazine.com/design/buildings/las-learning-curve_o
- Holland, Gale (2012) ‘Vista Hermosa is a Park Like No Other’ in Los Angeles Times, 28 August 2012, http://articles.latimes.com/2012/aug/28/local/la-me-adv-holland-vista-hermosa-20120828http://articles.latimes.com/2012/aug/28/local/la-me-adv-holland-vista-hermosa-20120828
- Jost, Daniel (2009) ‘Mitigating Past Inequities in Los Angeles, a new park on a former oil field brings nature into a park starved-neighborhood’ in Landscape Architecture Magazine, May 2009, pp. 83-89.
- Rigby, Allison (2014) ‘The Reclamation of Public Parks: An Analysis of Environmental Justice in Los Angeles’ (unpublished undergraduate thesis, Scripps College) http://scholarship.claremont.edu/cgi/viewcontent.cgi?article=1333&context=scripps_theses
- Villancourt, Ryan (2011) ‘City Pays Premium for Maguire Gardens’, Los Angeles Downtown News, 24 August 2011 http://www.ladowntownnews.com/news/city-pays-premium-for-maguire-gardens/article_9bbf9694-ce82-11e0-aa75-001cc4c03286.html

Websites and blogs:

- Vista Hermosa Natural Park, Santa Monica Mountains Conservancy http://www.lamountains.com/parks.asp?parkid=672
- Vista Hermosa Park, City of Los Angeles Department of Recreation and Parks http://www.laparks.org/dos/parks/facility/vistaHermosaPk.htm
- Vista Hermosa Natural Park, Mia Lehrer and Associates http://mlagreen.com/projects/vista-hermosanatural-park#
- Vista Hermosa Park, Mia Lehrer and Associations Blogspot https://mlagreen.wordpress.com/2011/04/29/vista-hermosa-natural-park-los-angeles/
- Vista Hermosa Natural Park, Santa Monica Mountains Conservancy brochure http://www.lamountains.com/pdf/Vista%20Hermosa%20Natural%20Park.pdf
- Grand Prize winner, Los Angeles Business Council 39th Annual LA Architectural Awards www.labusinesscouncil.org http://www.mrca.ca.gov/Urban/VH%20-%20Landscape%20Arch%20Article.pdf
- Vista Hermosa Park – Ranger Station and Facility Buildings http://www.greenroofs.com/projects/pview.php?id=747
- Conservancy Opens New Park Near Downtown Los Angeles, Santa Monica Mountains Conservancypress release, 19 July 2008 http://smmc.ca.gov/PressRelease/Microsoft%20Word%20%20Vista%20Hermosa%20Press%20Release%207.19.08.pdf
- Vista Hermosa Natural Park, Library of American Landscape History http://lalh.org/vista-hermosanatural-park-los-angeles-california/
- ‘Draft Environmental Report for Central LA Area New High School No. 11 and Vista Hermosa Park’ PCR Services Corporation for the Los Angeles Unified School District, January 2004, http://www.laschools.org/vista-hermosa/documents/