

MAY 2016

PROPOSITION O

SOUTH LOS ANGELES WETLAND PARK

54th and Avalon, Los Angeles, CA

Envision® Platinum Award



ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE

Graduate School of Design
Harvard University

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Evgenia Chatzistavrou prepared this case study under the supervision of Prof. Spiro N. Pollalis as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation or a project. It is part of a series of case studies on projects having received Envision® certifications.

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1. BACKGROUND– OVERVIEW

1.1 History and Context

South Los Angeles is in a historically underserved area of Los Angeles County, formerly known as South Central Los Angeles.¹ The site of the South Los Angeles Wetland Park was historically the location of transportation facilities, originally for maintenance and storage of a fleet of trolley cars. In 1922, heavy streetcar work for the Los Angeles Railway was centralized at South Park. The facility was refurbished by the Los Angeles Metropolitan Transit Authority (1958–1964) to accommodate buses,² and at the time the project started it was used for maintenance of vehicles and storage. Various activities were conducted on the site over the years related to manufacturing, fabrication, and assembly of motors and other mechanical equipment. Due to these activities the site has been classified as a brownfield site with the potential for reuse.³

Figure 3-2 Historical Photo of Project Site c.1930s



Fig.1: Historical photo of the project site, c.1930s (source: Final Pre-Design Report)

Context

South Los Angeles is a 51-square-mile region within Los Angeles County. The 9th District where the project is located, approximately 7 miles south of Downtown Los Angeles, is deemed the second most “park poor” of the city’s 15 council districts. It occupies 14 square miles and is home to more than 250,000 people. As Councilwoman Jan Perry repeatedly stated, “the need for green, recreational space is present and immediate.”

¹Sean P. Vargas, PE, ENV SP, LEED AP, “South Los Angeles Wetland Park Sets the Standard for Achievement in Sustainability,” *Civil + Structural Engineer*, September 2014.

² Final Pre-Design Report for Proposition O, South Los Angeles Wetland Park, February 2008.

³Ibid.

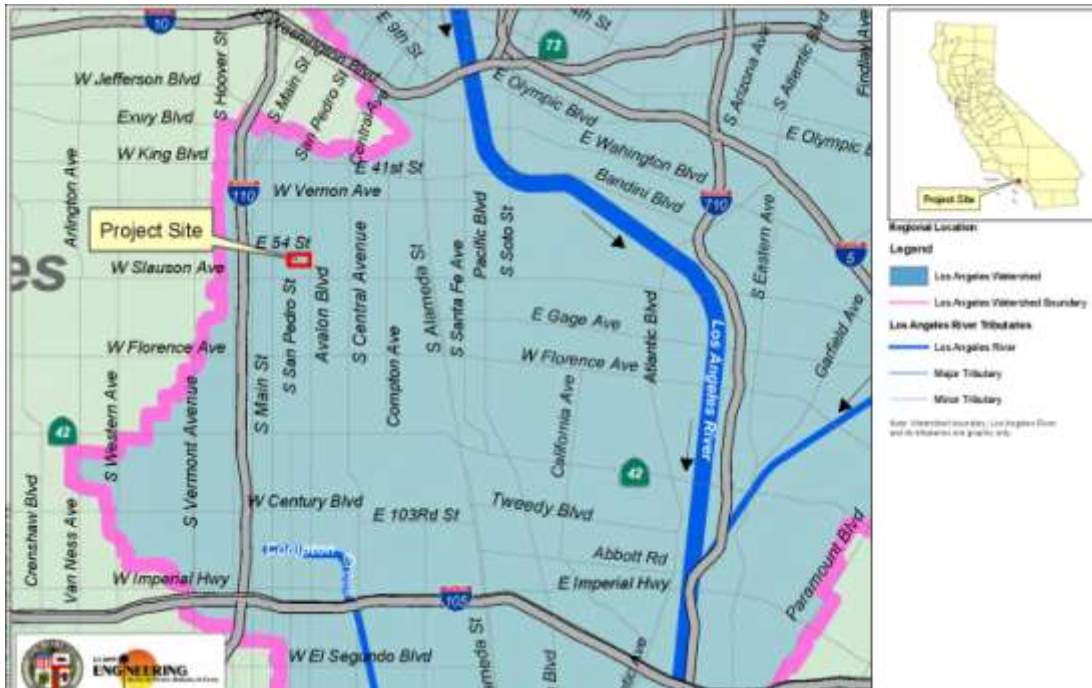


Fig.2: Location

The South LA region is located within the Los Angeles River Watershed. This highly urbanized area drains into the Los Angeles River, a predominantly concrete-paved channel that discharges to the Pacific Ocean. The river is categorized as a Clean Water Act Section 303(d) water body and is subject to total maximum daily load (TMDL) requirements for several listed pollutants.

The location of the site within this context, urban and hydrological, makes the project strategic at both the local and regional scales. “Parcels of land of sufficient size are rare and expensive to acquire, and this is a unique opportunity to bring a one-of-a-kind center of nature to the heart of the 9th District,” according to Perry.⁴



Fig.3: Site's location within the Los Angeles River watershed

⁴ Ibid.

1.2 Framework of the Project

Perry shepherded the South Los Angeles Wetland Park project through four years of negotiations with the Metropolitan Transit Authority (MTA) for the acquisition of the land, with community stakeholders, with a billboard company about the removal and/or repositioning of billboards in other parts of the city, and with city officials on the \$17.9 million to fund the park.

In November 2004, the City of Los Angeles voters passed Proposition O, the Clean Storm Water Bond, authorizing the City to issue a series of obligation bonds for up to \$500 million to fund storm water management projects. These projects would protect public health by cleaning up pollution of watercourses, beaches, and the ocean and should align with Clean Water Act requirements. To ensure transparency, the City established an Administrative Oversight Committee (AOC) and a Citizens Oversight Advisory Committee (COAC). In Fall 2005, the Proposition O program began conducting public workshops to educate the public about the program, as well as to encourage submission of candidate projects for funding. The City began accepting actual project applications in October of 2005.⁵

The Proposition O program established a framework within which environmentally, socially, and economically sustainable projects would be evaluated for funding based on the extent to which they satisfied the following criteria:

- Water quality improvements,
- Multiple objectives/benefits,
- Project feasibility/readiness/financial viability.

More than four years of hard work and bare-knuckle negotiations resulted in South Los Angeles taking a major step toward becoming the home of a green haven in an urban community full of broken cement, when the Los Angeles City Council overwhelmingly approved construction of a natural oasis there on April 6, 2008.⁶ It is one of 38 projects constructed as part of Proposition O. Kendrick Okuda explains: “There were about 50 projects that were conceptualized and had formal written concept reports, and this one in particular had a concept report with arguments both for water quality and for recreational benefits. After the project was approved, the pre-design phase started, in which several variations of the project were developed, providing the possibility for the City to select the best alternative.”⁷

The success of Proposition O was due in large part to the city’s decade-long public education effort on water quality issues. City officials had involved stakeholders at every level, from project selection to implementation; the Citizens Oversight Advisory Committee was appointed by the Mayor and City Council, with members chosen based on their expertise and experience.⁸

⁵ Draft Project Concept Report, South Los Angeles Wetland Park Proposition O Project, July 28, 2006, prepared by CDM.

⁶Vargas, “South Los Angeles Wetland Park Sets the Standard for Achievement in Sustainability.”

⁷Interview by Professor S.N.Pollalis with representatives of both the project’s consultants and the Bureau of Engineering.

⁸Sean P. Vargas, PE, ENV SP, LEED AP, “Transforming Urban Blight into Wetlands Oasis,” *Land and Water*, February 1, 2011.



Fig.4: Proposition O projects approved for implementation (source: Proposition O Monthly Progress Report, February 2009)

1.3 Project Scope

The South LA Park project was perceived as a multi-benefit constructed wetland to meet the Clean Water Act’s water quality standards as set by the Regional Water Quality Control Board for the LA River Watershed, and provide a beneficial use to the community.

“Inter-agency efforts, community input, coordination and negotiations over a five-year period have resulted in this sustainable green space. This park has not only changed this community’s landscape, but it will also benefit the Los Angeles River and create a wildlife habitat,” said Perry during the ribbon-cutting ceremony.⁹



Fig.5: Aerial view of the wetland as envisioned by the design team (source: Final Pre-Design Report)

⁹ Newsletter distributed by Bureau of Engineering (March 7, 2012).



Fig.6:View of the wetland as constructed(source: material submitted for Envision rating)

“The South LA Wetland Park demonstrates a bold, integrated, and sustainably engineered project approach that captures and treats urban runoff, while at the same time creating a new neighborhood-rejuvenating amenity. The project is helping to transform a community by turning a former brownfield site into a rare public park space in a highly urbanized setting. By revitalizing a neighborhood while treating urban runoff, the 10-acre park earned the Envision® Platinum award – the highest level attainable in the Institute for Sustainable Infrastructure (ISI) rating system.”¹⁰ This is how it is presented by Sean Vargas, senior project manager with Psomas which served as the prime consultant and designer on the project.

The transformation of the former industrial site to a sustainable park, according to City Engineer Gary Lee Moore, “exemplifies Public Works and the Bureau of Engineering’s commitment to transform LA into a most livable city by replacing 9 acres of asphalt and buildings with 9,500 native plants and trees providing open space and water quality benefits.”¹¹

1.4 Acquisition of the Land by the City of Los Angeles

The process of land acquisition by the City of Los Angeles to accommodate the wetlands project was complex. After the identification of the site and the verification of its potential, negotiations started with the owner of the site.

The lot was “a barren, underutilized concrete pad,” Perry said in an interview with the *Los Angeles Times*. Surrounded by homes and schools, the site would make an ideal locale for an urban park.¹² Perry established a task force to explore the site’s potential as a park, and she was able to convince MTA itself to join the effort as a partner in support of the project.¹³

¹⁰Vargas, “South Los Angeles Wetland Park Sets the Standard for Achievement in Sustainability.”

¹¹ Newsletter distributed by Bureau of Engineering (March 7, 2012).

¹² Vargas, “Transforming Urban Blight into Wetlands Oasis.”

¹³<http://foresternetwork.com/daily/water/restoring-a-link-to-nature/>



Fig.7: Site before intervention(source: material submitted for Envision rating)

The city's Bureau of Sanitation joined Perry in her vision. The site had the acreage, the location, and the availability to house a major storm water best management practice (BMP).¹⁴ When the project was conceived, MTA was in the process of building a more centrally located facility and no longer foresaw an ongoing need for the site. The park property was finally purchased from MTA in February 2009¹⁵ through a multi-agency partnership to create a major storm water BMP and a parkland in the heart of the city.¹⁶

2. PROJECT DESCRIPTION

2.1 Project Team Structure

The structure of the project team was:

Owner: City of Los Angeles, Bureau of Engineering

Lead Designer: Psomas, <http://www.psomas.com> – Prime Consultant and Designer

Environmental Documentation: CDM – Preparation of the Environmental Impact Report (EIR)

Geotechnical Engineer: Ninyo & Moore – Soils investigation, reporting, and construction-phase field observation

Landscape Architect: Mia Lehrer and Associates – Upland planting and irrigation plans

Archaeologist: Greenwood and Associates – Observation and cataloguing of historic items

Mechanical, Electrical, and Plumbing Engineer: Lee & Ro – Mechanical and electrical engineering support including SCADA controls and reporting

Structural Engineer: JCE Structural Engineers – Design of special structures including both bridges

Traffic Engineer: KOA Corporation – Preparation and processing of traffic control plans for work in adjacent public right-of-way

Public Outreach: Consensus Planning Group – Supporting public outreach efforts and foreign language translation

¹⁴<http://foresternetwork.com/daily/water/restoring-a-link-to-nature/>

¹⁵ Proposition O – Clean Water Bond Program Monthly Progress Report, February 2009, by Bureau of Engineering Prop O – Clean Water Bond Team.

¹⁶Vargas, "Transforming Urban Blight into Wetlands Oasis."

Construction Cost Controls: Jacobus and Yuang, Inc., The Moote Group – Construction cost estimates
Environmental Consulting: Edith Read, PhD – Riparian planting and maintenance consulting
Mothballing Consultant: SWCA Environmental Consultants – Mothballing of existing historic structure
Environmental Site Investigation: Ultrasystems Environmental – Preliminary Endangerment Assessment (PEA)

2.2 Project Components

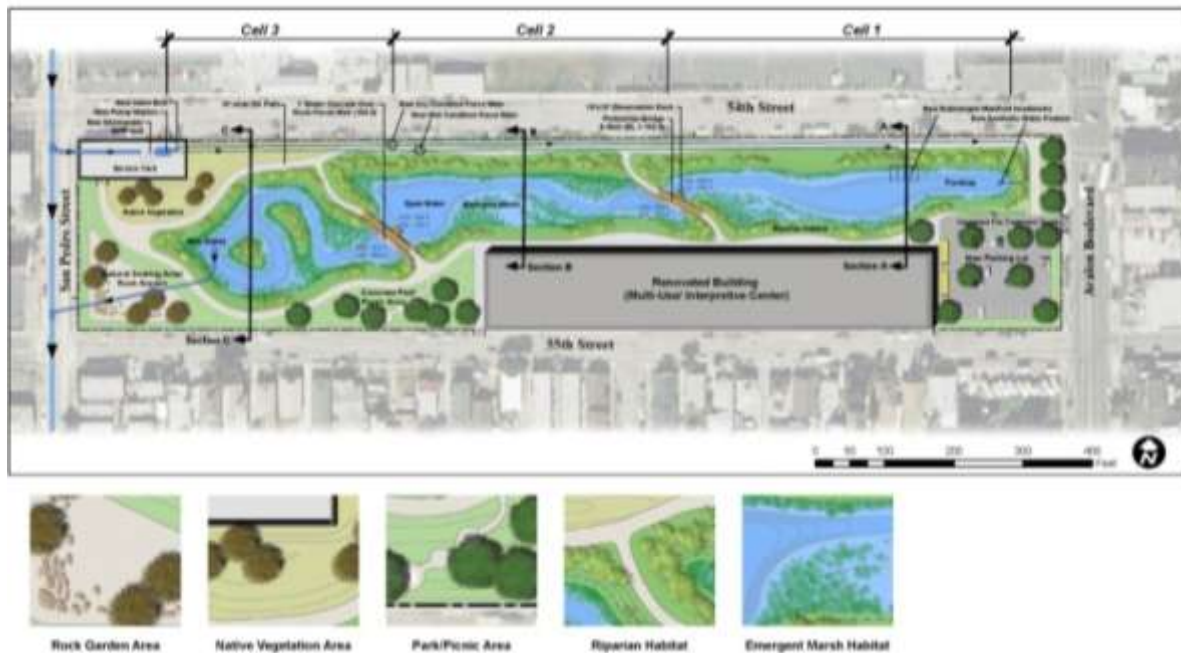


Fig.8: Site plan (source: Final Pre-Design Report)

The project consists of a 9-acre park at Avalon Boulevard and 54th Street, containing a 4.5-acre treatment wetland, riparian habitat, open park space, trails, bridges, and educational signage. The treatment wetlands are supplied by storm water runoff from a 525-acre watershed upstream of this site. Treated storm water flows via the Compton Creek and the Los Angeles River to the Pacific Ocean.

Park amenities include trails, boardwalks, observation decks, picnic areas, a natural rockgarden seating area, educational signage, and renovation of an 81,760-square-foot on-site building that was conserved for mixed public use.¹⁷ The project also includes over half a mile of walkways, 2 pedestrian bridges, 88 native California trees, 82 native California shrubs, over 9,500 native California wetland plants, and 40 solar-powered park lights.

The wetland has the capacity to treat up to 6,700 gallons per minute of storm water diverted from a 63-inch storm drain in San Pedro Street. Storm water is pre-treated through a trash rack and hydrodynamic separator, which removes trash, and then pumped through a 120-hp station (three 40-hp HOMA pumps) into the wetlands. The wetlands provide further treatment including settling of suspended solids and nutrient uptake. When full, the three wetland cells hold a total of 2.4 million gallons of storm water. After treatment by the wetlands, the storm water is returned to the storm drain in San Pedro Street, and eventually into the LA River.¹⁸

¹⁷ The South Los Angeles Wetland Park preliminary design report, City of Los Angeles, February 2008.

¹⁸ Newsletter distributed by Bureau of Engineering (March 7, 2012).

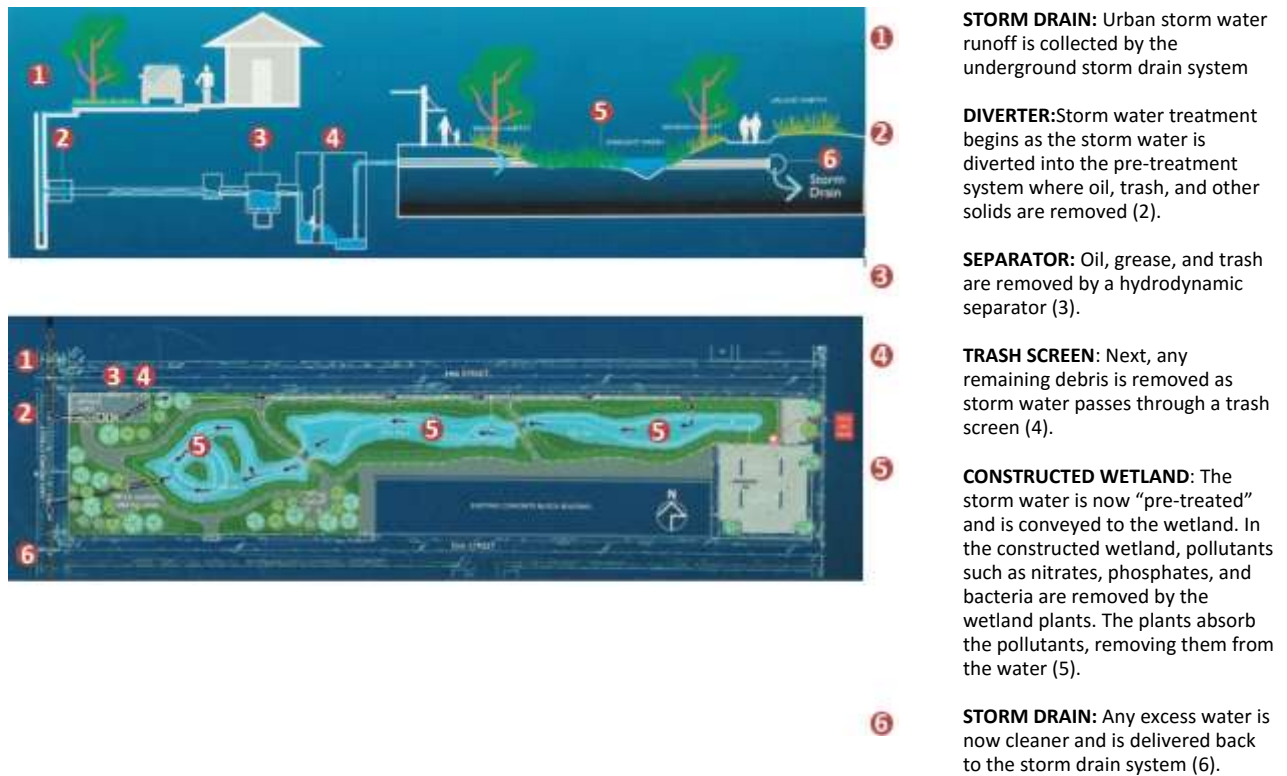


Fig.9: Diagram explaining the storm water runoff (source: signage on-site)

The treatment wetland itself is unique, located in Los Angeles’s subtropical climate, which receives little to no precipitation for seven months a year. The project team considered ways to extend the durability and resilience of the project early in the planning stage by designing flexible operation features. These features are built into the project such that the wetland may be operated differently in extreme flood or drought conditions.¹⁹

During a storm event, the high-flow pump section rapidly fills the wetland to its more than two acre-foot treatment volume capacity, then the monitoring and control system shuts down the pumps to prevent washout and allow treatment and slow discharge.

2.3 Planning Process

The survey of the site “was a pretty involved effort,” says Sean Vargas, which included geotechnical exploration, environmental analysis, topographic surveys, boundary surveys, and title report research—“just so we could know everything that we could know about the site.” The utility mapping effort was a critical early piece, to provide “as built” documentation, given that there was little information available because of the age of the installation.²⁰

Intense pre-design and planning efforts were made through a matrix of meetings and design charrettes from 2006 to 2008. Collaboration and teamwork were evident at all stages of the project.²¹ Stakeholders include the local community, Council Office, Mayor, Department of Recreation and Parks, Bureau of Engineering, and Bureau of Sanitation. The project team solicited and assessed

¹⁹ Excerpts from the Detailed Credit Information document of the Envision® Final Results for South LA Wetland Park provided by the consultants’ team.

²⁰ <http://foresternetwork.com/daily/water/restoring-a-link-to-nature/>

²¹ Excerpts from the Detailed Credit Information document of the Envision® Final Results for South LA Wetland park provided by the consultants’ team

stakeholder issues and concerns through stakeholder meetings in 2008 and 2009. The project team provided public outreach to engage the community, and the feedback was documented in the EIR.²²



Fig.10: Groundbreaking ceremony with representatives from the city and the local community (source: material submitted for Envision rating)

2.4 Project Funding Sources

“It was incredibly complex the way that this has come together, with different funding sources and different milestones that the project had to hit in order to retain that funding,” says Vargas, member of the consultants’ team.²³ Proposition O was the funding catalyst; without it, getting this project off the ground would have been impossible. In addition to \$9.8 million in Proposition O funds, the project received \$900,000 from MTA for site remediation, as well as funding from other initiatives for park improvements, drinking water supplies, and natural resource protection.

The total cost for the Wetland Park Project was \$17,901,224, of which \$8,071,850 was non-Proposition O funding that came from other grant sources. However, not all funding sources had been confirmed during the pre-design phase and there was an identified funding shortfall of nearly \$4.5 million, so part of the first step of the design phase was to identify additional funds.

The overall project cost includes land acquisition, site cleanup, project delivery, and construction, as follows:

Land acquisition:	\$3,011,937
Pre-design, design, bid and award:	\$3,330,560
Site Readiness & Construction:	\$8,167,294
Construction management, post construction:	\$3,391,433
Total cost:	\$17,901,224

The funding sources included Prop O, Prop K, Prop 12, Prop 50, Prop 40, and SCM(SEP).

2.5 Project Challenges

A project of this complexity and magnitude is not without challenges. In addition to the complex funding, challenges ranged from managing the brownfield cleanup and excavation of a historical site to coordination with multiple agencies.

²² Ibid.

²³ <http://foresternetwork.com/daily/water/restoring-a-link-to-nature/>

Brownfield cleanup: historic site conditions stemming from its use as a maintenance yard for buses and trolleys dating back to 1901 proved a great challenge, precipitating a number of requirements.

Unforeseen conditions: An archaeologist was needed on site to photograph and document buried rail spurs due to their historical significance.

Partnership and interagency coordination: Numerous agencies were involved in this effort, as well as public stakeholders.

No major issues have surfaced during construction due to the rigorous vetting process prior to groundbreaking – concept reports, pre-design reports, and highly detailed design documents.²⁴

2.6 Recognition

The City of Los Angeles's commitment to sustainability, along with the Proposition O criteria that favored multi-benefit projects, encouraged the study and development of project features that exemplify the triple bottom line that Envision® promotes, of social, environmental, and economic sustainability.²⁵

The exposure that the project has received as a result of the Envision® Platinum award has allowed the merits of sustainably engineered infrastructure to be understood and appreciated by a broader audience. The park has been honored with the Superior Achievement Award by the American Academy of Environmental Engineers & Scientists and a National Recognition Award from the American Council of Engineering Companies.²⁶

3. APPLICATION OF ENVISION®

3.1 Envision® Process

The ISI Envision® rating system provides a holistic framework for evaluating the community, environmental, and economic benefits of infrastructure projects. It recognizes projects that use this transformational, collaborative approach to assess project sustainability factors.

In February of 2013, a year after the project's completion, Psomas, serving as the prime consultant and designer on the project, met informally with the City's Bureau of Engineering (BOE) to formally initiate the Envision® process for the South LA Wetland Park. As Blake Murillo²⁷ from Psomas consultants explains, "Tim Psomas²⁸ from our firm was participating in the formulation of Envision® and encouraged us to become familiar with the program; the specific project seemed very worthy of ISI consideration."

Then the idea was presented to the project's owner and the reaction was positive. In Gary Lee Moore's²⁹ words, "I was excited because of the experience of the benefits of LEED to our department and how it helped train everybody; and that's what I see with Envision. It is helping train our practical senses." So that was also the entry of Envision® in the City of Los Angeles. According to Blake Murillo, "One of the reasons that the City was comfortable proceeding with this and considered it would be a good candidate, is because it is a sustainability project by definition."

²⁴ Vargas, "Transforming Urban Blight into Wetlands Oasis."

²⁵ Vargas, "South Los Angeles Wetland Park Sets the Standard for Achievement in Sustainability."

²⁶ Ibid.

²⁷ Blake Murillo, PE, ENV SP, LEED AP, Chief Executive Officer, Psomas Consulting Engineering Firm.

²⁸ At the initial ISI board meeting held February 8, 2011, Tim Psomas, P.E., FACEC, ExecEng, former chairman of the Board of Psomas and former chairman of ACEC, was named ISI chairman.

²⁹ Gary Lee Moore, City Engineer, Executive Division, Bureau of Engineering, Department of Public Works, City of Los Angeles.

The project was registered with the Institute for Sustainable Infrastructure in March 2013. At the time of registration no projects had yet been verified under Envision. The decision to “green-light” the registration and submittal was based on the client’s and consultants’ mutual commitment to sustainability and their desire to partner to learn about the benefits of Envision. During the planning of the project, Envision® was not yet available as a sustainability tool. Both the client and the consultant pointed out this lack of sustainable practice guides for a project of these features; the then-current rating systems for infrastructure in the U.S. are sector-specific (US Green Building Council’s LEED, Greenroads, the Sustainable Sites Initiative) and a means to document good design decisions. After the registration, a joint effort was required to assemble and review all the data needed for the assessment process. The team finally submitted at the end of October 2013.

They enthusiastically applauded the development of Envision® as an unprecedented means of documenting good design decisions and uniquely qualified to address America’s infrastructure. It is a tool that addresses design, planning, construction, and maintenance and therefore is applicable at any point in an infrastructure project’s life cycle; it speaks to the triple bottom line of social, economic, and environmental goals, and is designed to keep pace with a changing concept of sustainability.³⁰

The park opened in February 2012. Psomas started the Envision® process in early 2013. This made the process a forensic exercise, in that many decision points during project development and design had already been passed.³¹ The project was formally recognized in December of 2013 and attained an Envision® Platinum Award.³²

For information regarding the credits, the representatives used the web-based Envision® platform, which can track and tabulate the score. It was used to upload the required documentation in support of the scores entered.

3.2 Meeting the Criteria

The Envision® system measures the sustainability of infrastructure projects through 60 criteria organized into the five categories of Quality of Life (QL), Leadership (LD), Natural World (NW), Resource Allocation (RA), and Climate and Risk (CR). The overall credits measure the positive social, economic, and environmental impacts of an infrastructure project in the community. Envision® provides a solid framework for comprehensive sustainability analysis of projects, and guidance for achieving either an Improved, Enhanced, Superior, Conserving, or Restorative rating for each of the 60 credits.

As the project was constructed in California, it was subject to the California Environmental Quality Act (CEQA), and a number of the studies included in the Environmental Impact Report (EIR) were already satisfying the requirements for elevated Levels of Achievement.³³

The City of Los Angeles’s commitment to sustainability paired with the Proposition O Clean Storm Water Bond’s ranking criteria (which favored multi-benefit projects) created an atmosphere that allowed for progressive solutions. An extensive pre-design process promoted study and development of project features that exemplify the triple bottom line. The Park not only targeted satisfying the Proposition O mandate for improving storm water quality, but it also:

- Cleaned up a brownfield site,
- Created new natural habitat,
- Protected historic resources,

³⁰SLA Envision® presentation, April 2015.

³¹Vargas, “South Los Angeles Wetland Park Sets the Standard for Achievement in Sustainability.”

³²Ibid.

³³ Ibid.

- Created a new public park in a neighborhood that was sorely deficient,
- Helped transform a community.³⁴

The city’s BOE established a Strategic Plan in accordance with their mission to be recognized as a national leader in the delivery of sustainable capital projects by fiscal year 2016/2017, whose primary goal was to design and build all projects in an ecologically advanced and cost-effective manner. BOE also formed a Sustainable Design Implementation Program in July 2000.³⁵

Features of the project that helped the project score highly within the Envision® framework included remediation of the former brownfield site, creation of new urban green space, and the engineers’ design of the park to use urban runoff as a treatment-wetland sustaining resource, as well as the successful collaboration of multiple stakeholders that demonstrated mutual commitment and aligned their goals, thus enabling a shared understanding of the project’s sustainability potential and necessity. The South LA Wetland Park ranked very highly in many Envision® credit areas.

This section presents the basic strategies incorporated in the project for each Envision® credit, together with examples of the documentation and justification of Envision® score.

3.2.1 Quality of Life (Purpose – Well-being – Community)

The Quality of Life category evaluates infrastructure projects in terms of purpose, well-being, and community. The Purpose subcategory addresses the project’s impact on functional aspects of the community such as growth, development, and general improvement of quality of life, as well as the project’s contribution to community knowledge creation on specific sustainable features and processes. Well-being addresses individual comfort and health in terms of safety, minimization of nuisances, and mobility (alternative modes of transportation, equal access, availability and quality). Finally, the Community subcategory seeks to ensure that the project respects and improves its surroundings through context-sensitive design. While infrastructure is driven primarily by engineering parameters, its visual and functional impacts should be considered together during design.



Fig.11: A special informative label is placed at the entrance of the park informing the public about Prop O and the park’s contribution to storm water treatment (source: Prof. Pollalis)



Fig.12: Visitors can learn about wetland ecosystems, native California habitat and species, as well as physical and biological processes that are unique to wetlands (source: Prof. Pollalis)

³⁴SLA Envision® presentation, April 2015.

³⁵ Excerpts from the Detailed Credit Information document of the Envision® Final Results for South LA Wetland park provided by the consultants’ team.

The project was restorative in the sense that it created a much-needed open space in a site previously inaccessible to the public.³⁶

In terms of Purpose, the project was expected to reflect and amplify Prop O's multi-benefit mandate. The park needed to act as a local neighborhood-serving amenity, provide a profound environmental benefit, and represent a catalytic "node" in the revitalization of South LA. The project team engaged the community through public hearings where the proposal was presented along with the findings of the Environmental Impact Report. Public participation was encouraged, and meaningful input was received and was incorporated into planning.

In terms of Well-being, the project enhanced public space and restored site accessibility. Being surrounded by homes and schools, the site made an ideal locale for an urban park with restored natural features and green space. The site had been previously inaccessible to the public and surrounded by an eight-foot chain link fence. The project team developed informative way-finding signage located near the entrance of the park, and addressed safety and accessibility in and around the park by providing multiple access and egress points, as well as installing security cameras at the site.³⁷

For the Community subcategory a key metric with respect to social sustainability is the degree to which a project restores important community assets. The project's Concept Report refers to the Southeast Los Angeles Community Plan, which is a document specifying the goals and objectives for the neighborhood in the future. According to the Community Plan, the area has seen some inconsistent land use developments over the years that have created issues for the local community. The project helps to resolve these issues by meeting the goals and objectives summarized in the Plan and responds to the identified lack of open space within the area.

The project has helped to energize the host and nearby communities. Genuine collaboration with the community has elevated awareness and pride. A markedly improved quality of life has resulted as community members enjoy nature while strolling, jogging, and walking their dogs in a nature park right in their midst. Community-engaging park features include:

- an outdoor classroom amphitheater;
- an educational kiosk and signage describing the park's function, flora, and fauna;
- a recreational walking trail around the treatment wetland;
- picnic areas with benches; and
- observation bridges and platforms overlooking the wetland.



Fig.13: Improved quality of life has resulted from the project as community members enjoy nature while strolling, jogging, and walking their dogs in a nature park(source: material submitted for Envision rating)

³⁶SLA Envision® presentation, April 2015.

³⁷ http://www.sustainableinfrastructure.org/news/wetland_award_013014.cfm

In the Envision® Quality of Life category, the project scored 57% (94 earned points out of 165 applicable). It is worth mentioning that 8 of the earned points were given to reward exceptional performance beyond the expectations of the system for enhancing public space. According to the Envision® Verifier’s and Authenticator’s respective feedback on innovation credits for the Quality of Life category: “The project team applied the foundational principles of the Envision® system: enlarging opportunities, systems thinking, and prioritizing sustainability from the conceptual phase on. They were tough enough to defend a great concept from the deflating influences of the real world.” “The project team overcame significant barriers to create an innovative storm water solution with significant quality of life improvements for the community.”

The following tables show an example of credit justification in Quality of life.

Table 1: Envision® evaluation criteria and documentation for Quality of Life

ENVISION®				
QL1.1 IMPROVE COMMUNITY QUALITY OF LIFE				
LEVELS OF ACHIEVEMENT				
IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
<p>(2) Internal focus. The project team has located and reviewed the most recent and relevant community planning information. Some, but not systematic outreach to stakeholders and decision makers has taken place. Some relatively easy, but not particularly important or meaningful changes made to the project. No significant adverse community effects are caused by the project (A, B, C)</p>	<p>(5) Community linkages. More substantive efforts to locate, review, assess and incorporate the needs, goals and plans of the host community into the project. Most potential negative adverse impacts of the project on the host community are reduced or eliminated. Key stakeholders are involved in the project decision-making process. (A, B, C)</p>	<p>(10) Broad community alignment. All relevant community plans are reviewed and verified through stakeholder input. The project team works to achieve good project alignment with community plans, recognizing that the scope of the project is a limiting factor. Potential negative impacts on nearby affected communities are reduced or eliminated. (A, B, C)</p>	<p>(20) Holistic assessment and collaboration. The project makes a net positive contribution to the quality of life of the host and nearby affected communities. The project team makes a holistic assessment of community needs, goals and plans, incorporating meaningful stakeholder input. Project meets or exceeds important identified community needs and long-term requirements for sustainability. Remaining adverse impacts are minimal, mostly accepted as reasonable tradeoffs for benefits achieved. The project has broad community endorsement. (A, B, C)</p>	<p>(25) Community renaissance. Through rehabilitation of important community assets, upgraded and extended access, increased safety, improved environmental quality and additional infrastructure capacity, the project substantially reinvigorates the host and nearby communities. Working in genuine collaboration with stakeholders and community decision-makers, the project owner and the project team scope the project in a way that elevates community awareness and pride. Overall quality of life in these communities is markedly elevated. (A, B, C, D)</p>
EVALUATION CRITERIA AND DOCUMENTATION				
<p>A. Has the project team identified and taken into account community needs, goals, plans, and issues?</p> <ol style="list-style-type: none"> Lists and examples of documents obtained and reviewed, minutes of meetings with key stakeholders, community leaders and decision-makers, letters and memoranda. 				
<p>B. Has the project team sought to align the project vision and goals to the needs and goals of the host and affected communities as well as address potential adverse impacts?</p> <ol style="list-style-type: none"> Comprehensive impact assessments conducted, identifying and evaluating the positive and negative impacts of the project on affected communities. Planned actions for mitigating adverse impacts. Minutes of meetings, letters and memoranda with key stakeholders, community leaders and decision-makers for obtaining input and agreement regarding the impact assessment and planned actions. 				
<p>C. To what extent have the affected communities been meaningfully engaged in the project design process?</p> <ol style="list-style-type: none"> Reports and documented results of meetings, design charrettes and other activities conducted with representatives of affected communities. Evidence of project processes for collecting, evaluating and incorporating community input into the project designs. Demonstration of the thoroughness of the evaluation and incorporation into the designs. Evidence showing the extent to which options were identified, and needed and reasonable changes to the project were made in accordance with community needs, plans. Acknowledgments and endorsements by the community that the design participation process was helpful and that their input was appropriately assessed and incorporated into the project design. 				
<p>D. Have the project owner and the project team designed the project in a way that improves existing community conditions and rehabilitates infrastructure assets?</p> <ol style="list-style-type: none"> Plans, designs, meeting minutes with community stakeholders and decision-makers demonstrating an understanding of community conditions and assets, and substantive efforts to rehabilitate. Evidence of community satisfaction and endorsement of plans. 				

<i>Table 2: South Los Angeles Wetland Park credit justification in Quality of Life</i>			
Quality of Life	Evaluation Criteria and Documentation Available	Current Score	Max. Points Possible
QL1.1 Improve Community Quality of Life	<p>A.1 The goal of this innovative project was to construct a true multi-benefit project to minimize the discharge of pollutants from urban run-off to receiving waters; while at the same time providing a critically important open green space, public-use facilities, and recreational and educational amenities to a community that was in desperate need.</p> <p>The project team prepared an Environmental Impact Report (EIR) in accordance with the California Environmental Quality Act (CEQA). The EIR presented a summary of environmental impacts and mitigation measures to reduce potential significant impacts of the proposed project.</p> <p>The project team engaged the community through public hearings in September 2007 and October 2008. At these hearings, the project team took the following measures to assess the community's needs:</p> <ul style="list-style-type: none"> Presented proposed project Presented a summary of the findings of EIR process Identified potential significant environmental impacts of proposed project Identified mitigation measures to reduce impacts Provided opportunities for public participation Received public comments <p>In addition to providing open green space, the project improved existing community conditions by remediation of a Brownfield site. The project team provided public outreach by working with the City Council Office and Targeted Neighborhood Initiative groups. A public notice was posted on October 9, 2008 informing the public of the City's intention and a public hearing was held before the Los Angeles City Council on October 31, 2008.</p> <p>Sound and meaningful input regarding the impact assessment and planned actions was provided through stakeholder meetings in 2008 and 2009.</p> <p>C. The community was given an opportunity to provide additional input on the project at the Community Open House in April 2009.</p> <p><u>Supporting documentation:</u></p> <ul style="list-style-type: none"> Sample stakeholder meeting notes Sample comment card and transcript from public hearing for the Draft EIR on September 12, 2007 Brownfields grant public hearing on October 31, 2008 Notice letter and agenda for public hearing on April 28, 2009 Section 1.4 – Summary of Environmental Impacts from EIR 	20	25

Level of Achievement: CONSERVING

3.2.2 Leadership (Collaboration – Management – Planning)

The Leadership category addresses sustainability through its three subcategories of Collaboration, Management, and Planning. The Leadership category encourages teamwork and communication among multiple stakeholders, who can contribute to a project's sustainable performance through the different perspectives they can provide to planning. This type of collaboration requires a new kind of leadership and commitment from the team, and new ways of managing the process. Sustainable management requires identifying and pursuing synergies between systems, either within a project or among larger infrastructure systems, understanding the project as a whole and planning for the long term.

The project showcased effective leadership and commitment of all involved parties in all its stages. The project team recognized the importance of working together as a team to achieve high quality, and encouraged multiple meetings and design charrettes from 2006 to 2008. The collaborative process involved input from the project team and stakeholders, which included the Bureau of Sanitation (BOS), Bureau of Engineering (BOE), the City Council Office, and the Department of Recreation and Parks (RAP).

A partnering document was signed in order to achieve commitment and align common goals. The concept was developed during an extensive pre-design phase under the oversight of assigned committees (the Citizen’s Oversight Advisory Committee and the Administrative Oversight Committee). A work plan was implemented to develop a comprehensive policy to advance sustainable infrastructure; and a working group, with representatives from each infrastructure stakeholder group, was established to formulate an initial set of policy recommendations.

In terms of Management, the project is an integrated infrastructure component that treats urban runoff while adding beneficial park space in the community.³⁸It improves the integration of the regional storm drain system by using water from the storm drain network to sustain the wetland.³⁹The project was designed to take into account the operational relationships among other elements of community infrastructure, which results in an overall improvement in infrastructure efficiency and effectiveness.⁴⁰

In terms of Planning, the project team considered ways to extend the durability and resilience of the project, designing flexible operation features. The three cells that make up the wetland are designed to operate independently. In the long term, this flexibility provides opportunity to reconfigure the wetland in the event that source water is reduced (i.e., consider converting one of the cells to park space), thus extending its useful life.

In the Envision®Leadership category, the project scored 56% (68 earned points out of 121 applicable).The following tables show an example of credit justification in Leadership.

Table 3: Envision® evaluation criteria and documentation for Leadership

ENVISION®				
LD1.1 PROVIDE EFFECTIVE LEADERSHIP AND COMMITMENT				
LEVELS OF ACHIEVEMENT				
IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
<p>(2) Limited commitment. General sustainability policy statements can be found in organizational literature, but are not extensive. Existence of public statements by the organization’s leadership about their commitment to sustainability, but not related to the specific project. A few substantive examples of how that commitment to sustainability principles translates into actual practice. (A)</p>	<p>(4) Better clarity and commitment. Commitment to sustainability has moved beyond general statements to more specific statements. Organizational demonstration of commitment is backed up by several, but not extensive, examples of activities undertaken and performance achieved. (A)</p>	<p>(9) Walking the talk. Significant commitment across the organization with a few exceptions. Programs to improve are underway. Organizational demonstration of commitment includes various examples of activities undertaken or performance achieved focused on this project. Commitment is backed up by numerous and wide-ranging examples of activities undertaken and performance achieved. Sustainability performance of the organization is reported regularly through annual reports. (A)</p>	<p>(17) Sustainability is a core value. Sustainability is a core value of the organization and the project team as demonstrated by their policies, activities and performance. Apparent full commitment by all parties to address all aspects of the triple bottom line as they apply to the project. Understanding of the issues and problems associated with sustainability. Explicit recognition of the need for action to address the consequences of operating in a non-sustainable environment. (A)</p>	
EVALUATION CRITERIA AND DOCUMENTATION				
<p>A. To what level and extent have the project owner and the project team made public commitments, both organizational and project-specific, to improving sustainable performance?</p> <p>1. Public statements by the leadership in the project owner’s organization and the leadership of the project team regarding their commitment to the principles of sustainability.</p>				

³⁸SLA Envision® presentation, April 2015.

³⁹Vargas, “South Los Angeles Wetland Park Sets the Standard for Achievement in Sustainability.”

⁴⁰ http://www.sustainableinfrastructure.org/news/wetland_award_013014.cfm

- 2. Written commitment by the project owner and the project team to address the economic, environmental, and social aspects of the project at each project stage. For large projects, evidence that a chartering session was conducted that included the project owner, designer, contractor, and operator, with a charter document agreed to and signed by all parties.
- 3. Examples of published sustainability reports, and organizational principles and policies regarding sustainability.
- 4. Examples of past or ongoing significant actions taken to improve sustainable performance.

Table 4: South Los Angeles Wetland park credit justification in Leadership

Leadership	Evaluation Criteria and Documentation Available	Current Score	Max. Points Possible
<p>LD1.1 Provide Effective Leadership and Commitment</p>	<p>The project owner, City of Los Angeles, established the Proposition O program to achieve the sustainability goal of water quality improvement. The primary purpose of selected projects is to improve water quality by reducing pollutant loads to the impaired waters of Los Angeles. The South Los Angeles Wetland Park is one of many projects funded by the Proposition O bond measure.</p> <p>The concept was developed during an extensive pre-design phase under the oversight of a Citizen’s Oversight Advisory Committee (COAC) and Administrative Oversight Committee (AOC), and in partnership with the Bureau of Engineering (BOE), Bureau of Sanitation (BOS), and the Department of Recreation and Parks (RAP).</p> <p>BOE’s mission statement is to be recognized as a national leader in the delivery of sustainable capital projects by the fiscal year 2016/2017. BOE currently has a Strategic Plan for sustainable infrastructure and a Sustainable Design Implementation Program (reference LD1.2).</p> <p>For the project, a partnering document was signed by all partners in order to achieve commitment and align common goals. BOE is also working closely with the two agencies responsible for long-term project maintenance, BOS and RAP, during the ongoing monitoring and optimization period.</p> <p><u>Supporting documentation:</u> Proposition O program information from website Sample COAC and AOC meeting minutes BOE mission statement BOE Strategic Plan for sustainable infrastructure BOE Sustainable Design Implementation Program Signed partnering document Evidence of monitoring and optimization efforts Contractor’s submittal for pumps Contractor’s submittal for solar lighting</p>	<p>17</p>	<p>17</p>

Level of Achievement: CONSERVING

3.2.3 Resource Allocation (Materials – Energy – Water)

Resource Allocation is the category that addresses the issue of sustainable use of resources both for the construction and operation of infrastructure projects. Materials, Energy, and Water comprise its three subcategories, all referring directly or indirectly to natural resources use.

In this project, 88% of materials used were locally sourced within the distances specified in the criteria. A Waste Management Plan was prepared to decrease project waste and divert waste from landfills

and incinerators. The project exceeded requirements as the Waste Management Plan indicated a plan to recycle 82.6% of significant waste streams, while the contractor was required to divert a minimum of 75% of all inert debris and 50% of all other demolition and construction debris per project specifications.

In the Energy subcategory, the project promoted renewable sources of energy by installing solar lighting. It is estimated that 66% of the project's anticipated annual operational energy consumption will be provided through solar energy. At the same time these solar panels, by being entirely disconnected from the electrical grid, are estimated to reduce energy consumption by 77%. The pump systems are also considered to avoid unnecessary energy use. Since the storm water discharge rates vary between dry and wet seasons by an order of magnitude, the project designed separate pump systems for each flow regime. An extensive initial commissioning of the pump stations was conducted to ensure that the SCADA system controlling the wetland's low-flow and high-flow pump systems operated efficiently.⁴¹



Fig.14: Security lighting zones along the pedestrian walkways were established, with a total of 41 lights equipped with solar panels (source: Prof. Pollalis)

In terms of Water, the project is designed to use storm water (dry and wet weather runoff) as the source to sustain the wetland habitat. In order to reduce the need for potable water, the project team conducted a comprehensive water balance study. Actual flow monitoring was conducted to better understand the runoff availability (the average daily baseflow) in order to optimize the wetland size, configuration, and layout, so as to sustain wetland habitat and maximize runoff treatment potential. All on-site surface water is directed to the wetland. The wetland cells are lined to form an impermeable layer that prevents water loss via infiltration. Potable water requirements for the wetland (in inches per week) are less than the irrigation requirements for an equivalent area of turf (using existing irrigation rate benchmark). The reduction of annual water consumption over industry norms is estimated at 91%, according to water consumption calculations carried out.

In the Envision®Resource Allocation category, the project scored 43% (79 earned points out of 182 applicable). In this category, apart from the sustainable actions mentioned, there was a series of credits for which a level of achievement was not documented. The requested documentation should include:

Inventory of materials used in the project, specifying that they have been acquired by a validated source or undergone a lifecycle net embodied energy assessment;

⁴¹ http://www.sustainableinfrastructure.org/news/wetland_award_013014.cfm

Defined program for sustainable procurement, to support that the sourcing of materials and equipment considered suppliers and manufacturers that implement sustainable practices;

Inventory for all materials being tracked for sustainable procurement practices, including a description of the material and the manufacturer or supplier of the material and specifications on materials with recycled content.

The following tables show an example of credit justification in Resource Allocation.

Table 5: Envision® evaluation criteria and documentation for Resource Allocation

ENVISION®				
RA2.1 REDUCE ENERGY CONSUMPTION				
LEVELS OF ACHIEVEMENT				
IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
<p>(3) 10% to 30%. During the planning and design phases of the project, the owner and the project team conduct one or more planning or design reviews to identify and analyze options for reducing energy consumption in the operation and maintenance of the constructed works. Operational energy reductions are estimated at 10% to 30% as compared to industry norms. (A, C)</p>	<p>(7) 31% to 50%. During the planning and design phases of the project, the owner and the project team conduct one or more planning or design reviews to identify and analyze options for reducing energy consumption in the operation and maintenance of the constructed works. Operational energy reductions are estimated at 31% to 50% as compared to industry norms. (A, B, C)</p>	<p>(12) 51% to 70%. During the planning and design phases of the project, the owner and the project team conduct one or more planning or design reviews to identify and analyze options for reducing energy consumption in the operation and maintenance of the constructed works. Operational energy reductions are estimated at 51% to 70% as compared to industry norms. (A, B, C)</p>	<p>(18) Greater than 70%. During the planning and design phases of the project, the owner and the project team conduct one or more planning or design reviews to identify and analyze options for reducing energy consumption in the operation and maintenance of the constructed works. Operational energy reductions are estimated at greater than 70% as compared to industry norms. (A, B, C)</p>	
EVALUATION CRITERIA AND DOCUMENTATION				
<p>A. To what extent have the owner and project team conducted planning or design reviews to identify and analyze options for reducing energy consumption in the operation and maintenance of the constructed works?</p> <ol style="list-style-type: none"> 1. Reports, memoranda, minutes of meetings with project teams and owner regarding energy reduction strategies. 				
<p>B. Have the owner and project team conducted feasibility and cost analysis to determine the most effective methods for energy reduction and incorporated them into the design?</p> <ol style="list-style-type: none"> 1. Inventory of energy-saving methods considered. 2. Results of feasibility studies. 3. Design documents demonstrating the incorporation of energy-saving strategies into the design. 				
<p>C. To what extent does the project reduce energy consumption over industry norms?</p> <ol style="list-style-type: none"> 1. Calculation of the industry norm to use as a benchmark. The appropriateness of the comparison will be assessed by the project verifier. All energy sources should be converted into BTU. 2. Submit calculations for the project's estimated annual energy consumption over the life of the project. Document the percentage reduction over the industry norm benchmark. All energy sources should be converted into BTU. 				

Table 6: South Los Angeles Wetland Park credit justification in Resource Allocation

Resource Allocation	Evaluation Criteria and Documentation Available	Current Score	Max. Points Possible
RA2.1 Reduce energy consumption	The project team decided during the planning stages to design pump systems that would reduce energy consumption in the operation of the constructed works. Since the storm water discharge rates vary between dry and wet seasons by an order of magnitude, the project designed separate pump systems for each flow regime. For a majority of any given year, the low-flow pump system that includes two small sump pumps would operate. During a rain event, the high-flow pump system that includes three large process	18	18

	<p>pumps would operate. The calculations assume that the City of Los Angeles has approximately 15 rainy days in one year based on historical data.</p> <p>The major energy consumption reduction is due to the project’s security lighting, which is entirely disconnected from the electrical grid. It is estimated that the use of solar lights reduces the annual energy consumption by 77%.</p> <p><u>Supporting documentation:</u> Energy consumption calculations Section 6.2 – Pump System from Pre-Design Report Contractor’s submittal for pumps Contractor’s submittal for solar lighting</p>			
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Level of Achievement: CONSERVING

3.2.4 Natural World (Siting – Land and Water–Biodiversity)

This Envision category offers guidance on how to understand and minimize the negative impact infrastructure projects may have on the natural world – the habitats, species, and non-living natural systems. The project’s siting within these systems as well as the new elements it may introduce interact with natural systems, negatively or positively. These types of interactions and impacts are divided into the three Envision subcategories of Siting, Land and Water, and Biodiversity to address sustainable performance.

The project by definition was expected to have an elevated sustainable performance in all subcategories, and it was recognized for achieving the restorative level in most of the credits.

The Siting of the project, apart from being well documented and selected in terms of social sustainability, does not interrupt a habitat of high ecosystem value or natural cycle, since the EPA deemed the site a brownfield site and it was 100% paved. Moreover, the project seeks to create new prime habitat in an area that previously had none. The result is native flora and fauna within an existing migratory bird flight path. This previously developed and disturbed land was ideal for siting, not only preventing further damage to that environment but remediating contaminated soils and improving land value.

Infrastructure projects should have minimal impact on existing hydrologic and nutrient cycles. In the Land and Water subcategory this storm water management project achieved the highest level of performance for preventing surface and groundwater contamination. It is designed to use a series of best management practices to enhance the quality of runoff, which is diverted through the project site prior to its release to the storm water conveyance system. In addition to treating 100% of on-site runoff, the project is designed to divert storm water from the adjacent 63-inch storm drain and treat 100% of dry weather runoff from a 525-acre contributing watershed. Therefore, the site actively shares responsibility for protecting the quality of the larger hydrological system of which it is a part.

The project transformed the previous brownfield facility into an urban park with amenities including trails, boardwalks, observation decks, picnic areas, and a natural rock garden seating area. A wetland with riparian and emergent marsh habitat was created at the center of a densely populated urban community, and the land use designation of the site was changed from light industrial to open space in order to ensure the continued use of the site as a wetland park. The project incorporates native California plant species, non-invasive species requiring no pesticides or fertilizer. These open-water, emergent marsh, riparian and upland plants contribute to wetland habitat restoration and help restore species biodiversity.⁴² The project’s Operation and Maintenance Plan provides procedures for ongoing maintenance, methods for weed removal, and recommendations on identifying and eliminating any invasive species from the site.

⁴² http://www.sustainableinfrastructure.org/news/wetland_award_013014.cfm

The characteristics of the South LA Wetland Park represent key sustainable strategies for the issues raised within the Natural World category, from the restoration of disturbed soils to its function as an ecological catalyst that enhances species biodiversity and storm water management.

In the Envision® Natural World category, the project reached its highest score, 93% (156 earned points out of 168 applicable). It is worth mentioning that 8 of the earned points were given in recognition of the project’s exceeding the credit requirements and for its innovative performance. The project is pioneering in that it has defined a new paradigm of using storm water runoff as a resource to sustain natural aquatic surface water systems in a Mediterranean/high-desert environment. Mediterranean environments are characterized by long, hot summer droughts and prolonged wet periods in winter. The unique technical challenge was to design a wetland system that would support the survival of soil, biota, flora, and fauna during both the wetter season as well as the completely dry season; and to simultaneously maximize urban runoff treatment year round – on a brownfield site. The Envision® verifier characterizes the project as a “unique storm water solution ... transferable to other projects and other project scales.”



Fig.15: Creating new habitats on a former brownfield(source: Prof. Pollalis)



(source: material submitted for Envision rating)



Fig.16: Enhancing biodiversity(source: material submitted for Envision rating)



The following tables show an example of credit justification in Natural World.

Table 7:Envision® evaluation criteria and documentation for Natural World

ENVISION®				
NW2.1MANAGE STORM WATER				
LEVELS OF ACHIEVEMENT				
IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
	<p>(4) Increased storage capacity. Project employs low impact development (LID) measures to reduce generation of storm runoff to pre-development conditions. The target water storage capacity for greyfields, 30% improvement in water storage capacity. For brownfields, 20% improvement. Greenfields site maintains 100%. (A)</p>	<p>(9) Extended storage capacity. Project employs low impact development (LID) measures to reduce generation of storm runoff to pre-development conditions. The target water storage capacity for greyfields, 60% improvement in water storage capacity. For brownfields, 40% improvement. Greenfields site maintains 100%. (A)</p>	<p>(17) Sustainable stormwater management. Project employs low impact development (LID) measures to reduce generation of storm runoff to pre-development conditions. The target water storage capacity for greenfields is the pre-development water storage capacity. For greyfields, 90% improvement in water storage capacity. For brownfields, 60% improvement. (A)</p>	<p>(21) Enhanced stormwater management. Project employs substantial low impact development (LID) measures to reduce generation of storm runoff. Runoff is maintained on site and/or exceeds undisturbed climate ecosystem. Stormwater management programs and storm water handling structures are designed to capture and repurpose more than 100% of storm water on-site as part of overall water management regime. (B)</p>
EVALUATION CRITERIA AND DOCUMENTATION				
<p>A. What percentage improvement for a grayfield or brownfield site does the site’s proposed water storage, infiltration, evapotranspiration, and/or water harvesting capacity achieve, or does the site maintain a greenfield site water storage capacity?</p> <p>1. Documentation of the initial, final post-development, and target water storage, infiltration, evaporation, water harvesting and/or cistern storage capacities using TR-55 CNs or other continuous simulation modeling methods to describe site conditions.</p> <p>B. Is 100% of the target water storage capacity achieved for grayfield and brownfield sites, or does the greenfield site exceed 100% target water capacity so as to mitigate the impact of adjacent developed sites?</p> <p>1. Documentation of the initial, final post-development, and target water storage, infiltration, evaporation, water harvesting and/or cistern storage capacities using TR-55 CNs or other continuous simulation modeling methods to describe site conditions.</p>				

Table 8: South Los Angeles Wetland Park credit justification in Natural World

Natural World	Evaluation Criteria and Documentation Available	Current Score	Max. Points Possible
NW2.1Manage storm water	<p>Project is designed to use a series of storm water best management practices (BMPs) to enhance the quality of runoff diverted through the project site prior to release back to the storm water conveyance system. These BMPs include: a pre-treatment hydrodynamic separator unit designed to remove sediment, trash, oil and grease; and a three-cell treatment wetland containing wetland habitats and vegetation. As described in the Standard Urban Storm Water Mitigation Plan (SUSMP), runoff from precipitation and irrigation on the 9-acre project site is designed to flow into the treatment wetland.</p> <p>In addition to treating 100% of on-site runoff, the project is designed to divert storm water from the adjacent 63-inch storm drain and treat 100% of dry weather runoff from a 525-acre contributing watershed (as shown on the Local Drainage Area exhibit).In the winter, the wetland is designed to rapidly fill the transient storage volume with first-flush runoff from the same watershed.</p> <p>As documented in the Pre-Design Report, the constructed wetland is</p>	21	21

	<p>designed to maintain a permanent pool volume of approximately 5.4 acre-feet. During periods of increased runoff, the wetland is designed to treat a maximum treatment volume of 2.1 acre-feet.</p> <p><u>Supporting documentation:</u></p> <ul style="list-style-type: none"> • Standard Urban Storm Water Mitigation Plan (SUSMP) • Local Drainage Area exhibit • Section 6.0 – Storm Water Treatment, from Pre-Design Report 		
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Level of Achievement: RESTORATIVE

Table 9:Envision® evaluation criteria and documentation for Natural World

ENVISION®	
NW0.0 INNOVATE OR EXCEED CREDIT REQUIREMENTS	
LEVELS OF ACHIEVEMENT	
INNOVATION	
<p>(+8) Innovate or exceed credit requirements.</p> <p>Projects clearly document a performance that far exceeds both industry norms and the existing requirements within the system. Projects may also demonstrate the innovative application of methods, technologies, or processes, novel either in their use, their application, or within the local regulatory or cultural climate.</p>	
EVALUATION CRITERIA AND DOCUMENTATION	
<p>A. To what extent has the project exceeded highest levels of achievement for a given credit?</p> <p>1. Detailed documentation of how the project exceeds the existing requirements, currently within a given Resource Allocation credit.</p> <p>B. To what extent does the project implement innovative technologies or methods?</p> <p>1. Documentation of the application of innovative technologies or methods. Detailed description as to how this application will improve upon existing conventional practice either globally or within the unique context of the project. Provide justification as to why this application should be considered “innovative” either as a technology, a method, or its application within the project context (climate, political, cultural, etc.).</p> <p>C. To what extent does the project overcome significant problems, barriers, or limitations or create scalable and/or transferable solutions?</p> <p>1. Documentation that the project reduces or eliminates significant problems, barriers, or limitations that previously hampered the use or implementation of certain resources, technologies, processes or methodologies which improve the efficiency or sustainability of a project.</p> <p>2. Documentation that the improved performance achieved or the problems, barriers, or limitations overcome are scalable across a wide range of project sizes, and/or are applicable and transferable across multiple kinds of infrastructure projects in multiple sectors.</p>	

Table 10: South Los Angeles Wetland Park credit justification for Innovation in Natural World

Natural World	Evaluation Criteria and Documentation Available	Current Score	Max. Points Possible
<p>NW0.0 Innovate or exceed credit requirements</p>	<p>The project exceeds the highest levels of achievement for Credit NW2.1 for storm water management.</p> <p>The project is pioneering in that it has defined the new paradigm of using storm water runoff as a resource to sustain natural aquatic surface water systems in a Mediterranean/high-desert environment. Mediterranean environments are characterized by long, hot summer droughts and prolonged wet periods in winter. The unique technical challenge was to design a wetland system that would support the survival of soil, biota, flora, and fauna during both the “wet” season as well as the completely “dry” season; and to simultaneously maximize urban runoff treatment year round – on a brownfield site. The project team developed an approach to consider a water budget that sustains the wetland in the summer with “dry weather runoff” while treating 100% of this runoff from the contributing 525 acre subwatershed. In the winter the wetland is designed to rapidly fill the transient storage volume with “first-flush runoff” from the same subwatershed.</p> <p>To test the hypothesis that the proposed water budgeting approach would support the summer condition, the team quantified the available dry weather runoff in the existing 63-inch subsurface storm drain in the adjacent right-of-way using ultrasonic flow monitoring equipment; evaluated the existing soil properties through a robust soils investigation; and estimated the evapotranspirative potential of the wetland via local pan data. The wetland size, configuration, and layout were then optimized to provide maximized wet-weather runoff treatment potential.</p> <p>The result is an advanced SCADA-controlled, centrally monitored three-cell wetland treatment system that diverts and treats 100% of dry weather runoff from the existing adjacent 63-inch storm drain during the summer and winter while also providing first-flush treatment during rain events in the winter.</p>		

Level of Achievement: Innovation Points for NW2.1

3.2.5 Climate and Risk (Emissions – Resilience)

The Climate and Risk category evaluates infrastructure projects on issues related to greenhouse gas emissions reduction and preparedness for the consequences of long-term climate change through the Emissions and Resilience subcategories.

The project was designed to be resilient and adaptive to long-term climate change scenarios, such as extreme flood or drought. Flexible operation features were built in so that the wetland can be operated differently if conditions change in the future. Substantial efforts were made to restore and rehabilitate effects of future change by constructing a wetland environment with riparian habitat at the center of a densely populated urban community.⁴³

⁴³ http://www.sustainableinfrastructure.org/news/wetland_award_013014.cfm

According to the project’s Environmental Impact Report, greenhouse gas emissions would be reduced with the implementation of the Wetland Park. The project team identified and assessed possible changes in key engineering design variables, such as water balance, to avoid potential future vulnerabilities and ensure an adequate performance under altered climate conditions. The project team conducted a comprehensive water balance study during pre-design efforts, considering different evapotranspiration rates and wetland sizes.

In the Resilience subcategory, the project documented actions for managing heat island effects. It limited the amount of impervious hardscape areas on site. 104,259 square feet of buildings were demolished. The project added 24% more concrete pavement, but the total area of asphalt pavement was reduced by 86%. Overall, the project reduced 87.5% of heat-producing surfaces.



Fig.17: Site before intervention(source: material submitted for Envision rating)



Fig.18: Storage tanks and the poor condition of the site before intervention (source: Bureau of Engineering)



Fig.18: 100% of the site’s surface was covered with impervious material (source: material submitted for Envision rating)

In the Envision®Climate and Risk category, the project scored 21% (26 earned points out of 122 applicable). The documentation required to support levels of achievement in certain credits, such as reduction of greenhouse gas emissions or long-term adaptability to climate change, involved specific calculations such as lifecycle carbon analysis and future projections on climate change effects. Given that the Envision® assessment process was only made available for use after the project’s completion, it was not possible for the project team to align with all these specific documentation requirements.

The following tables show an example of credit justification in Climate and Risk

Table 11: Envision® evaluation criteria and documentation for Climate and Risk

ENVISION®				
CR1.2 REDUCE AIR POLLUTANT EMISSIONS				
LEVELS OF ACHIEVEMENT				
IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
<p>(2) Improved air quality standards. California's standards are more stringent than NAAQS, and address additional pollutants beyond the six common air pollutants. Meet CAAQS standards for all project activities. Create a maintenance program to ensure that these standards remain met throughout the life of the project. (A)</p>	<p>(8) Enhanced air quality standards. Meet SCAQM rules in section XI and XIV, as applicable, for Source Specific Standards and Toxics and Other Non-Criteria Pollutants. (B)</p>		<p>(12) Negligible air quality impact. Project has only negligible air pollution impacts or net zero impacts from criteria pollutants. (C)</p>	<p>(15) Air quality improvement. Project not only achieves zero net production of criteria pollutants but implements measures to improve existing air quality to a level higher than pre-development. (C)</p>
EVALUATION CRITERIA AND DOCUMENTATION				
<p>A. Has the project team designed the project follow the California Ambient Air Quality Standards?</p> <ol style="list-style-type: none"> Documentation of expected emissions according to CAAQS, and strategies implemented to reduce air pollutions to required levels. Monitoring and control program documents. <p>B. Has the project team designed the project to follow Sections XI and XIV of South Coast Air Quality Management Rules?</p> <ol style="list-style-type: none"> Documentation of applicable rules and strategies for compliance. <p>C. Does the project reduce air pollution to the required level, or improve existing air quality to a higher than pre-development level?</p> <ol style="list-style-type: none"> Documentation of expected emissions of the six criteria pollutants and strategies implemented to reduce air pollutions to required levels. 				

Table 12: South Los Angeles Wetland Park credit justification in Climate and Risk

Climate and Risk	Evaluation Criteria and Documentation Available	Current Score	Max. Points Possible
CR1.2 Reduce Air Pollutant Emissions	<p>The project is a former industrial site converted to public open space with walking trails. The project includes brownfields cleanup and wetlands restoration. The project team was involved in converting the land use designation of the site from Light Industrial to Open Space. According to the Environmental Impact Report (EIR), daily operational emissions associated with the project would be less than the SCAQMD thresholds. Project includes walking trails that would encourage walking/biking instead of car transportation, leading to further reductions in air pollutant emissions.</p> <p><u>Supporting documentation:</u> Section 3.3 – Air Quality from EIR</p>	12	15

Level of Achievement: CONSERVING

3.2.6 Envision® rating results

Table 13: SouthLos AngelesWetland Park Project Envision® Score⁴⁴

Credit Category	Applicable Points	Pursued Points	Percentage of applicable points
QUALITY OF LIFE	165	94	57%
LEADERSHIP	121	68	56%
RESOURCE ALLOCATION	182	79	43%
NATURAL WORLD	168	156	93%
CLIMATE AND RISK	122	26	21%
TOTAL POINTS	758	423	56%

3.2.7 The Role of ENV SP

The assessment process was facilitated by the fact that the Project Director for the project was an accredited Envision® Sustainability Professional and an ISI/Envision® trained verifier. His involvement with the project from the early to the final stages helped the team understand what to look for and where to look for it, in terms of specific credit-supporting documentation. Moreover, Tim Psomas⁴⁵ from the Psomas firm participated in the process of formulating Envision® and was familiar with its principles and framework.

Psomas is the prime consultant for the implementation of a number of City of Los Angeles Proposition O projects. The firm’s extensive experience in bond-funded sustainability programs facilitated their role as an extension of the City for storm water-related projects and ensured a successful project.⁴⁶ Psomas began the formal assessment process after the project was completed. This made the process a forensic exercise, in that many decisions had already been made during project development and design.

3.2.8 The Role of the Verifier

The role of the verifier within the Envision® system is undoubtedly decisive. He supervises the process of customizing the Envision® rating tool by the project team in relation to the project type and context. The Envision® system is intended to provide a broad framework for all types of infrastructure projects, and therefore it needs to be customized according to each project type, as not all credits apply to every project. Some credits can be omitted if not applicable to the project, after providing justification which will be confirmed by the verifier.

The review of the documentation to support the evaluation criteria of each credit, with corresponding feedback to the ENV SP, is a really constructive procedure, as the project team has stated. In some cases it can guide the team to a potentially higher level of achievement, pointing out ways to prove a better performance.

In the case of the South LA Wetland Park, the verification and authentication process was straightforward; the verifier’s input mainly concerned the concretization of the level of achievement targeted by the ENV SP and the applicability of credits that would shape the final rating result. The discussions leading to each outcome were thought-provoking and helpful. There were certain credits for which discussions with the verifier resulted in reconsideration of levels of achievement, and only two cases of disagreement regarding the applicability of credits to the project. This shows that in general the

⁴⁴ South LA Wetland Envision® Final Results Overall Scores and Graph, a pdf provided by the project team.

⁴⁵ At the initial ISI board meeting held February 8, 2011, Tim Psomas, P.E., FACEC, ExecEng, former chairman of the Board of Psomas and former chairman of ACEC, was named ISI chairman.

⁴⁶ Vargas, “Transforming Urban Blight into Wetlands Oasis.”

Envision® manual itself, as well as the Envision® professional training as part of the process, offer significant guidance on the project's sustainability "self-awareness." Ideally, when Envision® rating is applied during the planning process it can improve the project's sustainable performance. (In the case of South LA Wetland Park, the planning was already completed before Envision was applied.)

For certain credits, although the project team took into consideration some related issues, they were not thoroughly documented through concrete studies, or only on a level of baseline studies that could not support a higher level of achievement. This suggests that if a project pursues Envision® it should incorporate in its documentation new reports or metrics related to specific issues.

The project team often referred to the client's role in supporting the enhancement of sustainability, even when additional costs were involved.

4. CONCLUSION

The present case study aims to highlight the role of the Envision® rating tool in the planning and delivery of sustainable projects, and to familiarize planners, decision makers, and others with the process and understand, share, and reflect upon the participants' experience of the evaluation and rating process. It also aims to point out the importance of recognizing multi-benefit (social, environmental, and economic) sustainable infrastructure projects such as the South Los Angeles Wetland Park so they can serve as model projects. "It feels good when you take time to do something that adds value. And that's what we are doing," says Gary Lee Moore from BOE referring to the Envision assessment process.

Envision® takes a holistic view of infrastructure development, evaluating projects in terms of their value to communities, effective use of funds, and contributions to conditions of sustainability. It has been called the civil engineer's LEED, representing for horizontal infrastructure what LEED does for vertical infrastructure. And the project team, from their own experience, refers to this gap in evaluation methods that Envision® comes to fill. "You can't have a LEED certified wastewater sewer line, but you can have an Envision® certified one. And that demonstrates to the millions of people in the City of LA that 490 square miles can be looked at from an environmentally sustainable standpoint," as Kenneth Redd emphasizes. Envision® provides this opportunity.

The South Los Angeles Wetland Park project is a model for urban watersheds. It clearly demonstrates how urban planning visioning has matured. It has provided a unique opportunity to create a much-needed park and green space in an inner-city community, while at the same time protecting waterways from storm water pollution.

It is important to mention that the "neighborhood residents had already developed a favorable impression of the wetland park concept through recent experience. About a five-minute drive from the proposed South Los Angeles Wetland site, a small wetland, also championed by council member Perry, operates on 1.5 acres of the Augustus F. Hawkins Park. As in the case of the South Los Angeles Wetland, this park, too, had been recovered from an industrial site, albeit more than a decade ago. The wetland feature was added in 2001 to enhance the park's appeal, and Perry says it has proven a very popular draw for residents."⁴⁷ It served as a demonstration project and it performs a role in educating the community on water-quality issues, while building public support for storm water initiatives. It was the Augustus F. Hawkins Park that enabled the technical leap to the South LA Wetland Park project.

What is the ultimate lesson learned? Through innovation and partnership, a project of this nature is achievable and can be re-created in urban watersheds across the country. The fact that it earned the

⁴⁷ <http://foresternetwork.com/daily/water/restoring-a-link-to-nature/>

Envision® Platinum award, along with other awards, is a major recognition of the efforts of the project team to deliver it, despite the challenges.

In summary, the lessons learned from the Envision® process (with the input of the project team) are the following:

1. The involvement of a functional team member who was also an Envision® Sustainability Professional resulted in an efficient assessment. The team was able to readily produce documentation when instructed precisely where to find it.

2. The interaction with the independent verifier and authenticator was invaluable in that neither had prior knowledge of the project and they were therefore able to ask probing and incisive questions without bias. These discussions resulted in reconsideration of levels of achievement for certain credits.

3. The team determined that preparing and compiling credit-supporting documentation would have been far easier had it occurred during the normal course of design rather than during construction. According to Kendrick Okuda, “When we started to look at some of the Envision categories and rank ourselves and looked through the documents, this gave us sort of the context from which you could understand the project and what good things it was doing; especially with Quality of Life, I always felt we were doing something good for the community, when we were in the process, but we could not really quantify, enumerate it, or rank in any way the large transformation of the site that occurred.”⁴⁸

4. Though supporting documentation for a number of credits was not available (it was never prepared during the design), the resultant design reflected a thoughtfully conceived process. In retrospect, the team appreciated the value of Envision® as a tool to document good decisions and as a shift of thinking and working methods for future projects. The wetland park was the City’s first experience of Envision®, and as Kenneth Redd explains, “two things happened within the Bureau of Engineering; we should now go forward with other projects that from the get-go will be handled as Envision® projects. So, we are starting to make certain decisions, looking at ways to get some level of certification. The second thing that occurred is that we have seen a shift within the department, because we have a number of people now who are Envision-certified. Even on projects that were not seeking an Envision® certification, our designers are now thinking that way. I think that’s an interesting shift and that’s something we have seen in the last two years.”⁴⁹

5. The project was constructed in California and was subject to the California Environmental Quality Act (CEQA). A number of the studies from the Environmental Impact Report (EIR) satisfy requirements for elevated levels of achievement,⁵⁰ which is really encouraging for future projects. It reaffirmed that the framework that supports the city’s planning shares objectives and encourages sustainable actions.

⁴⁸Interview by Professor S.N.Pollalis with representatives of both the project’s consultants and the Bureau of Engineering.

⁴⁹Interview by Professor S. N. Pollalis.

⁵⁰Vargas, “South Los Angeles Wetland Park Sets the Standard for Achievement in Sustainability.”

EXHIBITS

EXHIBIT A: South Los Angeles Wetland Park

Table 1: Final scorecard⁵¹

Credit	Subcategory	Credits	Comments	Points Awarded	Level of Achievement
QUALITY OF LIFE	PURPOSE	1.1	Improve community quality of life	20	Conserving
	WELLBEING	2.2	Minimize Noise and Vibration	1	Improved
		2.3	Minimize light pollution	11	Restorative
		2.4	Improve community mobility and access	4	Enhanced
		2.5	Encourage alternative modes of transportation	6	Superior
		2.6	Improve site accessibility, safety, and wayfinding	15	Restorative
		3.1	Preserve Historic & Cultural Resources	13	Conserving
	COMMUNITY	3.2	Preserve Views & Local Character	3	Enhanced
		3.3	Enhance Public Space	13	Restorative
		Innovation Credit	0.0	Innovate or Exceed Credit Requirement	8
QUALITY OF LIFE TOTAL				94	
LEADERSHIP	COLLABORATION	1.1	Provide Effective Leadership & Commitment	17	Conserving
		1.2	Establish A Sustainability Management System	7	Superior
		1.3	Foster Collaboration & Teamwork	8	Superior
		1.4	Provide for Stakeholder Involvement	5	Enhanced
	MANAGEMENT	2.1	Pursue By-Product Synergy Opportunities	1	Improved
		2.2	Improve Infrastructure Integration	13	Conserving
	PLANNING	3.1	Plan For Long-Term Monitoring & Maintenance	10	Conserving
		3.2	Address Conflicting Regulations & Policies	4	Superior
		3.3	Extend Useful Life	3	Enhanced
LEADERSHIP TOTAL				68	
RESOURCE ALLOCATION	MATERIALS	1.4	Use Regional Materials	6	Enhanced
		1.5	Divert Waste From Landfills	8	Superior
	ENERGY	2.1	Reduce Energy Consumption	18	Conserving
		2.2	Use Renewable Energy	13	Superior
		2.3	Commission & Monitor Energy Systems	11	Conserving
	WATER	3.1	Protect Fresh Water Availability	4	Enhanced
		3.2	Reduce Potable Water Consumption	13	Superior
		3.3	Monitor Water Systems	6	Superior
RESOURCE ALLOCATION TOTAL				79	
NATURAL WORLD	SITING	1.2	Protect Wetlands & Surface Water	18	Restorative
		1.4	Avoid Adverse Geology	5	Conserving
		1.7	Preserve Greenfields	23	Restorative
	LAND + WATER	2.1	Manage Stormwater	21	Restorative
		2.2	Reduce Pesticide & Fertilizer Impacts	9	Conserving
		2.3	Prevent Surface & Groundwater Contamination	18	Restorative
	BIODIVERSITY	3.1	Preserve Species Biodiversity	16	Restorative
		3.2	Control Invasive Species	9	Conserving
		3.3	Restore Disturbed Soils	10	Restorative
		3.4	Maintain Wetland & Surface Water Functions	19	Restorative
Innovation Credit	0.0	Innovate or Exceed Credit Requirements	8	Maximum	
NATURAL WORLD TOTAL				156	
CLIMATE & RISK	EMISSIONS	1.2	Reduce Air Pollutant Emission	12	Conserving
	RESILIENCE	2.4	Prepare For Short-Term Hazards	10	Superior
		2.5	Manage Heat Island Effects	4	Superior
CLIMATE & RISK TOTAL				26	
TOTAL POINTS AWARDED				423	

⁵¹Vargas, "South Los Angeles Wetland Park Sets the Standard for Achievement in Sustainability."

EXHIBIT B: Project Timeline

November 2004: Proposition O approved by LA voters

July 2006: Draft Project Concept Report by CDM for City of LA, Department of Public Works, Bureau of Sanitation, Watershed Protection Division

January 2007: City of LA Proposition O South LA Wetland Park BOS/BOE/Psomas kickoff meeting

August 2007: Draft Environmental Impact Report for the South LA Wetland Park Project, by CDM.

August 2007: City of LA Program Review Committee Project Approval & Change Authorization Request Form.

October 2007: Final Environmental Impact Report for the South LA Wetland Park Project, by CDM.

February 2008: Final Preliminary Design Report, by Psomas for City of LA Department of Public Works, Bureau of Engineering

February 2008: Final Pre-Design Report for Proposition O South LA Wetland Park by Psomas, for City of LA, Department of Public Works, Bureau of Engineering (Draft Concept Report (CDM 2006) was reviewed and further data was compiled to provide a basis of design for each design element as presented in this report)

April 2008: Project approved unanimously by the LA City Council

Upon the approval of the COAC the concept reports completed by the city were forwarded to Psomas Engineering to begin preliminary design work.

February 2009: The COAC hears a presentation requesting an increase of \$5.3 million in Proposition O funding for the South LA Wetland Park project. COAC continues the item, and requests staff to report back on water quality elements and the status of CAO Program Budget report.⁵²

February 2009: The AOC approves the increase of \$5.3 million in Proposition O funding for the South LA Wetland Park project to implement the project scope contained in the Concept Report and recommended by the Pre-Design Report.⁵³

February 2009: The AOC concurs with the BOE recommendation⁵⁴ to continue project activities for South LA Wetland Park among other projects.⁵⁵

February 2009: The park property is purchased from MTA

June 2009: Groundbreaking ceremony (kicking off the site demolition)

January 2012: Envision is launched

February 2012 Construction completed

Project optimization during remainder of year

February 2012: Park's grand opening to the public (ribbon cutting)

March 2013: Project's registration with ISI

December 2013: ISI Verification date

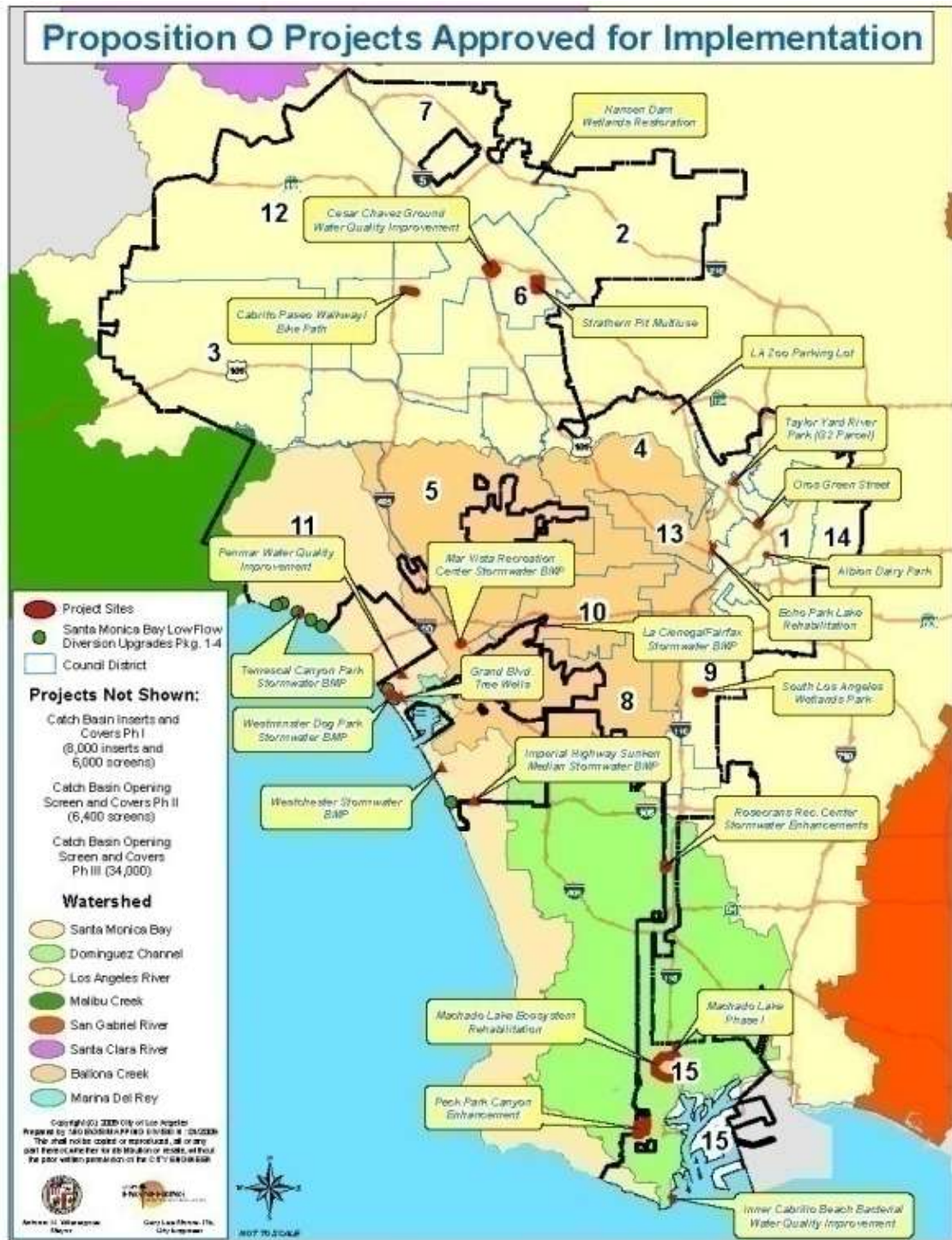
⁵² Proposition O – Clean Water Bond Program, February 2009 Monthly Report, prepared by Bureau of Engineering, PROP O – Clean Water Bond Team.

⁵³ Ibid.

⁵⁴ AOC heard a BOE update on the impact of the suspension of State Grant reimbursements on Proposition O projects.

⁵⁵ Proposition O – Clean Water Bond Program, February 2009 Monthly Report, prepared by Bureau of Engineering, Prop O – Clean Water Bond Team.

EXHIBIT C: Proposition O Projects Approved for Implementation



List of projects funded by Proposition O:

- Albion Dairy Park Land Acquisition, Demolition, and Remediation
- Catch Basin Inserts and Covers
- Cesar Chavez Groundwater Improvement
- Echo Park Lake Rehabilitation
- Elmer Avenue Phase II: Elmer Paseo
- Glenoaks-Sunland Storm Water Capture

- Grand Boulevard Tree Wells
- Hansen Dam Wetlands Restoration
- Imperial Highway Sunken Median
- Inner Cabrillo Beach Bacterial Water Quality Improvement
- Los Angeles Zoo Parking Lot
- Machado Lake Ecosystem Rehabilitation
- Mar Vista Recreation Center Improvements
- Oros Green Street
- Peck Park Canyon Enhancement
- Penmar Water Quality Improvement Project
- Rosecrans Recreation Center Storm Water Enhancements
- Santa Monica Bay Low-Flow Diversion Upgrades
- South Los Angeles Wetland Park
- Strathern Wetlands Park
- Temescal Canyon Park Storm Water Enhancements
- Taylor Yard River Park Land Acquisition
- Westchester Storm Water Improvement
- Wilmington Drain Rehabilitation
- Westminster Dog Park
- Westside Park Rainwater Irrigation Project

ABBREVIATIONS

CR	Climate and Risk
Envision®	Envision® Rating system for Sustainable Infrastructure
ENV SP	Envision® Sustainability Professional
ISI	Institute for Sustainable Infrastructure
LD	Leadership
NW	Natural World
QL	Quality of Life
RA	Resource Allocation
LoA	Level of achievement
AOC	Administrative Oversight Committee
BOE	Bureau of Engineering
BOS	Bureau of Sanitation
CAAQS	California Ambient Air Quality Standards
CEQA	California Environmental Quality Act
COAC	Citizens Oversight Advisory Committee
EIR	Environmental Impact Report
LA	Los Angeles
MTA	Metropolitan Transit Authority
PROP O	Proposition O – Clean Water Bond Program of the City of Los Angeles
RAP	Department of Recreation and Parks
RWQCB	Regional Water Quality Control Board
TMDL	Total Maximum Daily Load
SUSMP	Standard Urban Storm Water Mitigation Plan