

EPIC CASE STUDY

# WESTSIDE PARK

**CITY OF LOS ANGELES BUREAU OF ENGINEERING · PROPOSITION O · LOS ANGELES, CALIFORNIA**

A city park designed to irrigate itself from the storm drain running underneath it, and to return what it does not use to the channel significantly cleaner.

| 3,700 | $2.9m | 2 acres |
|---|---|---|
| ACRES OF CATCHMENT | PROPOSITION O | OF EPIC PIPE |
| Targeted | Municipal project | In a sand profile |

EVIDENCE LEVEL

**MEASURED · PARTIAL · US$2.9m municipal project · laboratory water and soil analysis**

EPIC chambers laid on the EPDM liner across the laser-levelled sub-grade benches, Westside Park, Los Angeles.

PROJECT RECORD

| | |
|---|---|
| CLIENT | City of Los Angeles Bureau of Engineering; project manager Ahmed Iftekhar |
| FUNDING | Proposition O · US$2.9 million |
| CATCHMENT TARGETED | Runoff from 3,700 acres of land adjacent to South Fairfax Avenue |
| RECEIVING WATERS | Ballona Creek and Santa Monica Bay |
| SYSTEM | A two-acre network of EPIC sub-surface irrigation pipes in a sand profile |
| PROFILE | 13 in sand over a 2 in gravel layer: 15 in total EPIC profile |
| CONFIGURATION | 15 sections of 300 to 500 ft linear length on laser-levelled benches, each with one inlet and one outlet |
| FLOW | 12 GPM per acre demand; 1 to 2 GPM per inlet |
| COMPLETION | Phase III as of mid-October 2010; scheduled to open February 2011; completion July 2011 |

# THE PROBLEM

On 7 July 2010 the US EPA Administrator designated all of the Los Angeles River a Traditional Navigable Water, strengthening environmental regulation for the river and for the tributary streams and wetlands of its watershed. Developers and businesses along the mostly 82 km cement-lined river, and those affecting water across the 216,000 hectares of watershed, now have to consider compliance with the Clean Water Act.

Twenty-six million gallons of water flow into the Pacific Ocean daily from drainage channels like the one under Westside Park.

“In a drought year, using rainwater for irrigation will drastically reduce potable water use in the area and cut our expenses significantly.” Wing Tam, City of Los Angeles Stormwater Programme.

# WHAT EPIC BUILT

The drainage channel runs underneath the park. Flow is intercepted and partially diverted into a pump lift station which supplies the EPIC system. It is a retrofit: normal drainage function continues whenever channel flow exceeds the park's irrigation demand.

Water is screened for floatable waste and heavy sediment, then delivered to the EPIC pipes in their sand profile, which feed the park's vegetation by root uptake. The system is non-pressurised and gravity driven, divided into laser-levelled sub-grade benches to suit the park's existing surface slope.

Chambers sit on Firestone EPDM liner with all sides folded upright to hold water in cells. Moisture reaches the finished surface by capillary influence between the level sub-grades and their serpentine flow pattern, inlet to outlet, high elevation to low.

Excess filtered stormwater is stored in underground chambers. By design, once they are at capacity the surplus “is discharged towards a dry creek and back into a storm drain significantly cleaner”. An existing tree was kept in place, its root mass buried to finish grade, irrigated by capillary movement up and over the liner side wall.



The drainage channel in flow: the park's irrigation source.



The pump lift station going in.

**3,700**
ACRES OF CATCHMENT TARGETED

**$2.9m**
PROPOSITION O MUNICIPAL PROJECT

**2 acres**
OF EPIC PIPE IN A SAND PROFILE

# THE RECORD

Soil and water samples were taken on 24 August 2011 and analysed by Wallace Laboratories, El Segundo.

| WATER, MG/KG (PPM) | INLET | OUTLET |
|---|---|---|
| Aluminium | 10.72 | < 0.05 |
| Iron | 19.29 | 2.58 |
| Silicon | 15.22 | 5.35 |
| Barium | 1.60 | 0.26 |
| Titanium | 1.51 | 0.08 |
| Vanadium | 0.83 | 0.18 |
| Zinc | 1.55 | 0.74 |
| Lead | 0.27 | < 0.08 |
| Phosphorus | 36.45 | 2,376.40 |

Laboratory samples 11-237F-01 (outlet) and 11-237F-02 (inlet). These are baseline grab samples, not a measure of EPIC treatment efficiency. EPIC's September 2011 site report states: "This sample should not be interpreted as the treatment results of the EPIC field… the incoming water is not entering the bio-filter zone of the sand profile," and of the phosphorus result: "A single reading is not a pattern." The laboratory notes that the outlet has significantly lower levels of aluminium, barium, iron and silicon than the inlet since the turbidity is lower; however phosphorus is considerably higher in the outlet.

### SOIL, AND THE OPERATING FINDING

| MEASURE | VALUE | NOTE |
|---|---|---|
| Soil pH | 7.77 | Moderate alkalinity |
| Salinity, ECe | 0.73 millimho/cm | Low |
| Estimated texture | Sand | Organic matter low; relative infiltration fair/good |
| Root depth at two months | 4 to 5 in | From core samples |
| Root depth in a correctly cycled profile | over 10 in | Roots migrate deeper to seek moisture near the saturated zone |

Soil values from the Wallace Laboratories soils report of 26 August 2011; root depths from EPIC's September 2011 site report. The report's diagnosis: continuous operation of the pump lift station gave the profile no resting period to breathe and exchange atmospheric gases, producing an abundance of moisture that does not encourage deep root growth. Recommendation: set the pump uplift irrigation duty cycle to a 36-hour cycle once per week.

# ALSO ON THE RECORD

- **The two conclusions of the September 2011 report.** "1. There is no reason that the drainage ditch storm water cannot be used as irrigation water. 2. Nutrients present in the storm water are not sufficient to provide the nutrient needs for establishing vibrant and healthy turf grass in the park, and supplemental fertilization is required."
  EPIC site report, Westside Park, September 2011

- **No Black Plug Layer.** A sand sample profile cut revealed a thatch layer at the surface and no indication of anaerobic Black Plug Layer.
  Same report

- **Found on the August 2011 site visit.** All EPIC custom inlets found set incorrectly were corrected during the visit. Drain port "M" was left as a recommendation to label and verify. Section "D" showed evidence of previous surface pooling.
  Same report

- **The pollutants are nutrients.** The 2000 river study attributes nitrate, nitrite, ammonia and total phosphate to the three water reclamation plants (72% of the river's volume during that study) and bacteria including total coliform, E. coli and Enterococcus to the flowing storm drains and tributaries. In a sub-surface system, "all of these pollutants are nothing more than nutrients that can be used in the vegetative plant growth… without any public health exposure or concerns".
  EPIC sustainability case study, Westside Park

- **EPIC's efficiency claim in the project presentation.** "EPIC is 100% efficient irrigation using 60-80% less water than pressurized sprinkler and drip systems." This is EPIC's general figure for the system, not a Westside Park measurement.
  Westside Park study presentation

- **Community.** "It is multi-beneficial projects like this that make our communities better."
  Cynthia Ruiz, President, Board of Public Works



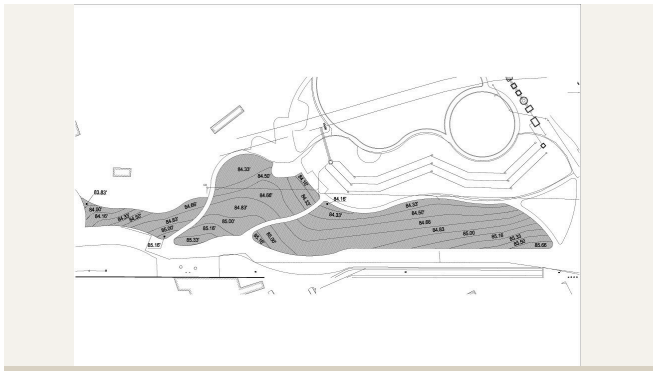
Laser-levelled benches, liner folded upright to hold water in cells.



An existing tree kept in place, the system built around it.



Sand fill over the chambers: 13 in of sand on 2 in of gravel.



Park layout: EPIC areas shaded, the level of each bench marked.

**RECORDS** EPIC sustainability case study and project presentation for Westside Park; EPIC site report, September 2011; Wallace Laboratories soil and water analysis and nutrient application recommendation, August 2011; EPIC maintenance manual for Westside Park.