

# ENGEO VIEW

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Photo: Lake Merritt, Oakland, California  
Credit: ENGEO's Lawrence Lee

MAY 2016

# LEEVE VEGETATION MANAGEMENT

## REGULATORY APPROACH FOR OPERATION AND MAINTENANCE

by Nick Broussard, PE  
Rocklin, California



Vegetation management on levees has been a topic of on-going debate and research in California and throughout the world. The primary purpose of vegetation management, according to The International Levee Handbook, is to “preserve levee integrity, performance, visibility and access in the interest of public safety.” Both the California Department of Water Resources (DWR) and the US Army Corps of Engineers (USACE) are in agreement that certain vegetation is beneficial and necessary to reduce surface erosion of levees. Additionally, the two entities agree that if vegetation is not managed properly, there is a concern that levee access during high water events can become limited, and overall levee or floodwall stability can be detrimentally affected. In addition to these considerations, there are environmental and aesthetic benefits of vegetation that should be taken into account when developing a local vegetation management plan. Due to the many stakeholders involved and differing approaches from DWR and USACE, developing vegetation management guidelines for individual maintaining agencies can be complicated.

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In California, two primary references regarding vegetation on levees include USACE ETL 110-2-583 and DWR’s 2012 Urban Levee Design Criteria (ULDC). ETL 110-2-583 is an updated version of ETL 110-2-571, while the ULDC vegetation criteria are based on the 2012 Central Valley Flood Protection Plan (CVFPP) Vegetation Management Strategy.

ETL 110-2-583 generally provides a guide for managing vegetation on levees, with the ultimate goal being a “vegetation free zone” within the levee prism and within 15 feet of the landside and waterside levee toe. “Vegetation free” refers to vegetation other than approved grasses as outlined in the ETL. The guide states that the primary purpose of this “vegetation free zone” is to provide access for maintenance and inspections and to minimize potential impacts that root systems may have on the levee. The ULDC and CVFPP agree with this document for vegetation management criteria for newly constructed levees. According to the CVFPP, the USACE modified their original stance on levee vegetation after the Hurricane Katrina-related levee failures.

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# ASBESTOS EXPOSURE RISK REMAINS HIGH IN NEW ZEALAND

by Regan King  
Christchurch, New Zealand



On April 4, 2016, New Zealand's new Health and Safety at Work Act came into force. The new Act increases companies' responsibility for workplace safety and pays particular attention to asbestos in work environments.

There's no question that the amount of asbestos that has been used in construction throughout the years is substantial. Asbestos became popular in the early 1800s, known to line steam engines. It quickly became widely used in construction and manufacturing industries because it was cheap, durable, flexible and naturally acted as an insulating and fireproofing agent.

Asbestos is still a major concern in Christchurch, where the on-going rebuild efforts present much potential for exposure due to the sheer volume of buildings that have been and are scheduled to be demolished. These buildings were built during the prime era when asbestos was used in building products.

"Asbestos is really a fascinating material in all that it can do, and yet it's highly ironic that something so uniquely beautiful is so uniquely and inherently dangerous," says Gemma Newsome, Quality & Laboratory Manager of Guardian Environmental, a joint partnership of ENGEO and Ceres. "Being able to help identify areas where asbestos is a hazard and then mitigating/removing the risk

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"It's highly ironic that something so uniquely beautiful is so uniquely and inherently dangerous."

-Gemma Newsome

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of people becoming contaminated is really satisfying. If I am able to prevent exposure to just one person through the identification and removal of asbestos, I feel my work is worthwhile."

Gemma joined the asbestos industry ten years ago, beginning as an analyst at one of the UK's leading occupational and environmental health consultancies. She has developed a deep understanding of the material and the analytical and quality assurance process, has developed leading analytical laboratories, and brings her high-level training, mentorship and continuing technical and professional development to Guardian Environmental.

Gemma joined Guardian Environmental in 2015 to develop this leading analytical Laboratory and help guide New Zealand through regulatory change.

"In addition to analyzing both building materials and contaminated land, I enjoy training and auditing of asbestos laboratory technicians within the company. I am tasked with the preparation of technical data, work instructions, test methods, and technical analytical consultancy services to clients nationwide."

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# REGULATORY UPDATE

## ADOPTION OF PHASE II MS4 PERMIT PROMPTS CHANGE FOR CENTRAL VALLEY REGION BASIN DESIGN REQUIREMENTS

Randy Ludwig, CPESC, QSD  
Lathrop, California

In accordance with the 2015 Multi-Agency Post-Construction Stormwater Standards Manual, the Cities of Lathrop, Lodi, Manteca, Patterson, Tracy, and portions of the County of San Joaquin have adopted new Low Impact Development (LID) and Post-Construction Best Management Practices (BMPs) to satisfy the requirements of the Phase II Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System for new and redevelopment projects.

Small, Regulated, or Hydromodification project applicants who submit development applications after July 1, 2015, or who have not had their applications deemed complete for processing by or received approval for a Vesting Tentative Map from the jurisdictional agency before July 1, 2015, must comply with the post-construction stormwater standards outlined in the manual.

Projects are required to incorporate infiltration-based stormwater treatment controls, LID and Post-Construction BMPs, including Bioretention Facilities, Infiltration Basins, Infiltration Trenches, and Dry Wells.

As part of the requirements, projects must be evaluated for the potential for infiltration and identify suitable and unsuitable locations at the project site for infiltration-based stormwater treatment control measures. Additionally, the manual requires site-specific testing of the infiltration rate(s) of the underlying soil, and the infiltration rate(s) must be determined using the Double-Ring Infiltrometer standard (American Society for Testing and Materials [ASTM] D3385) as part of the project conditions of approval.



ENGEО has performed countless infiltration tests in the Central Valley region for infiltration-based stormwater treatment control measure design purposes and often provides infiltration data as required for project approval in conjunction with the typical geotechnical services during project design.

## PLACER COUNTY HAS COMPLETED THE WEST PLACER POST-CONSTRUCTION STORMWATER DESIGN MANUAL

Mark Gilbert, GE, QSD  
Rocklin, California

Placer County has published a stormwater design manual for Western Placer County to achieve compliance with the State of California NPDES Municipal Permit (MS4 Permit No. CAS0000004). The Federal NPDES Program has been delegated to the State of California for implementation through the State Water Resources Control Board.

The West Placer Post-Construction Stormwater Design Manual is a joint effort among Placer County and the Cities of Roseville, Lincoln, Loomis, and Auburn. The design manual is in draft form and is expected to be completed in 2016. The West Placer Storm Water Quality Design Manual and Template are available on Placer County's website at <http://www.placer.ca.gov/lowimpactdevelopment>.

# ENGEO ON THE MOVE

## ENGEO NAMES NEW PRINCIPAL AND ASSOCIATES



**David Robotham, CEnvP, Principal**, has worked in environmental consultancy since 1994, cutting his teeth on an emerging contaminated land market. He has worked on diverse projects around the world including the United States, Canada, Great Britain, Azerbaijan, Kazakhstan, Algeria, Samoa and Romania.

His experience includes full site contamination characterization, remediation option study assessment, stakeholder consultations, production of site management plans, consent/permitting application assistance and environmental due diligence audits. Typically these projects required support to the client on providing documentation for consent/permit applications, ensuring a smooth process and dealing with a diverse range of contaminants including asbestos, metals, hydrocarbons, timber treatment chemicals, horticultural / sheep dip residues and many other potentially hazardous materials.



**Jonathan Buck, GE, LEED AP, Associate**, joined ENGEO in 2002 and has more than 20 years of experience in geotechnical and water resources engineering. Jon specializes in creek stabilization and restoration, post-construction stormwater management, construction water quality control and management,

hydrologic analysis of watersheds and wetlands, and complex permitting and regulatory issues related to land development.

Jon has developed implementation plans for several low-impact-development demonstration projects in the San Francisco Bay Area that have showcased the use of bioretention systems and permeable paving systems

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“These individuals have consistently gone above and beyond in service to clients and staff. Each one takes to heart what it means to mentor, serve and teach in ways that further the firm’s strategic vision,” says Uri Eliahu, President.

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when first introduced to the construction industry. He has completed many major wetland and creek restoration efforts for land development or infrastructure projects where mitigation offsets were required by Federal and State regulatory agencies. He has also worked on heavy infrastructure projects providing construction stormwater expertise including the 4th Bore of the Caldecott Tunnel, the Lake Merritt Restoration project and the San Francisco-Oakland Bay Bridge.



**Leroy Chan, GE, LEED AP, Associate**, joined ENGEO in 2004 and has more than 12 years of experience in geotechnical engineering with experience including infrastructure, public facilities, large residential and commercial developments, levees, educational facilities, airports, transit centers, and healthcare facilities.

Leroy has extensive knowledge of San Francisco Bay soil conditions, specializing in liquefiable, peaty, compressible and expansive soils. His experience includes slope stability assessment and remedial grading design, compressible soil consolidation evaluation and remediation, liquefaction and seismic susceptibility analysis, and deep and shallow foundation design.

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**Garreth Oddy, CEnvP, Associate**, has more than ten years of experience providing environmental consultancy services specializing in the identification of contaminated sites and their subsequent remediation, management and ultimately redevelopment and safe use.

His experience includes assessment and remediation of chemical manufacturing, waste management, property development, heavy and light manufacturing, transport, downstream oil and gas, printing works, timber treatment and defense sites. Past contaminated site projects have included working for a wide range of clients such as the Australian Government's Department of Defense, New Zealand Defense Force, Mobil Oil New Zealand Limited, Shell New Zealand Limited, Z Energy Limited, BP New Zealand Limited, Chemtura Corporation, Rohm and Haas (UK) Ltd, and a multitude of property developers and private landowners.

## EN GEO PRESENTS AT ISC'5 5TH INTERNATIONAL CONFERENCE ON GEOTECHNICAL AND GEOPHYSICAL SITE CHARACTERISATION

Jin Lee (Kuanjin Lee) will present her award-winning poster topic entitled "Dynamic Characterisation of Auckland Reclaimed Soils." The New Zealand Geotechnical Society (NZGS) recognised Jin Lee (Kuanjin Lee) with first place in the 2015 NZGS Student Presentation Awards Poster Competition. NZGS recognizes and encourages student participation in the fields of rock mechanics, soil mechanics, geotechnical engineering and engineering geology.

Jin Lee will discuss the original coastline along the central Auckland City waterfront, which has been progressively modified since 1840, through a series of reclamation fills. These fills are highly variable, comprising a range of materials including excavated rock fill, hydraulic fill and discrete lenses of industrial and domestic waste.

Traditional methods of characterizing the seismic behavior of soil are based on an assessment of Cone Penetration

Tests (CPTs) and Standard Penetration Tests (SPTs). However, these techniques fail to adequately capture heterogeneity of reclamation fills. Geophysical techniques, such as horizontal-to-vertical spectral ratio (HVSr) and multi-channel analysis of surface waves (MASW) have the potential to provide overall profile characteristics of the variability of these reclamation fills and lead to an improved understanding of their dynamic response during earthquakes.

The aim of this research is to characterize the dynamic properties of the soils in the reclaimed zones along the central Auckland City waterfront. To achieve this, historic documentation was collated to produce a comprehensive reclamation zone map and historic timeline. Additionally, past subsurface investigations were compiled to produce a depth to East Coast Bays Formation (ECBF) map and representative geologic profiles for each reclamation zone.

MASW was used to generate Vs profiles at eight locations and HVSr was used to determine fundamental period at 156 locations. These were conducted with in-situ dynamic soil properties that are considered largely undisturbed and then calibrated using past subsurface investigations. Geologic profiles for each reclamation zone were made using borehole data along with associated SPT and CPT data collated from past geotechnical investigations. These profiles were used to constrain MASW and HVSr to determine the characteristics of each reclamation zone and produce maps illustrating the fundamental period and site subsoil in accordance with NZS1170.5:2004. Site subsoil classes C and D were identified. Site subsoil D was located proximal to paleo-channels with rapid change in depth to ECBF and containing thickened deposits of reclamation fills overlying young, unconsolidated alluvial sediments.

The complexity of a site is compounded with the heterogeneous nature of reclamation fill deposits with the presence of paleo-channels. Results indicate highly variable Vs averages across zones and within the same zone, therefore site-specific assessment is necessary. Further, results indicate that HVSr is a valuable technique and can be considered a good alternative to deriving depth to bedrock and fundamental period at locations where MASW is not logistically possible. Findings gained from this research will allow more accurate hazard and risk estimates for Auckland City.



ENGEO's Ted Bayham, Jenny Ludwig, Valerie Davis and Uri Eliahu celebrated during the Best Places to Work Awards at the Hilton Union Square.

## ENGEO IS 4th BEST PLACE TO WORK IN THE BAY AREA

ENGEO has once again been honored with a Best Place to Work award by *San Francisco Business Times*. ENGEO competed in the 100- to 249-employee category, counting only employees who work in the Greater Bay Area region. At the ceremony on Tuesday, April 19th in San Francisco, the firm received the award placement of Number 4 in this category. This is the 12th consecutive year ENGEO has earned a top-10 ranking. This year there were over 500 participating companies from the 9-county Greater Bay Area. The list has recognized companies with exceptional workplace cultures for the past twelve years.

ENGEO's president, Uri Eliahu, who promotes an ethic of servant leadership throughout the firm, says, "We are very gratified and honored by this recognition as it confirms that we are on the right path to realizing our ultimate dream of being the most trusted service firm on earth."

## TECH TALK

### APPLICATION MONITORING GENERATES UNEXPECTED INSIGHTS

"Enterprises provide engineering and productivity software to their employees, but have surprisingly poor understanding of who, what, how and when the applications are being used," said Erik Hoogerhuis, Vice President of Sales and Marketing at Cetrus. "Having this information allows companies to reduce license expenditures, move license costs from overhead to project billing, and improve worker efficiency."

ENGEO has been working with Cetrus to develop Process Meter, a next-generation application monitoring solution that provides insights into how applications are being used, and has seen both significant cost savings and incremental billable revenue as a result.

Cetrus will be exhibiting Process Meter at the ENR FutureTech conference in San Francisco May 31 - June 2, 2016.



## ASBESTOS EXPOSURE (CONT'D FROM PG. 2)



ENGEO's collaboration with Guardian Environmental allows us to provide full service to our clients in relation to asbestos in soils. This means our clients are able to fully understand the risk that is presented to them from our laboratory results.

"I think this is probably my favorite part of coming to work; I'm a technical, detail-oriented person and this collaboration



allows us to ensure that our results really do mean something, that they are not just random numbers on a page that are meaningless to the client and that they make a difference to the advice and reporting done by ENGEO," says Gemma. "This ultimately leads to people being better informed about the dangers of asbestos, and how to mitigate/remove the risks effectively. After all, that's what the industry is all about."

Established in 2015, Guardian Environmental Ltd. is an asbestos testing laboratory. Guardian Environmental offers a range of technical analytical services including; asbestos in bulk materials and contaminated land including quantification of asbestos in soils.

## LEEVE VEGETATION MANAGEMENT (CONT'D FROM PG. 1)



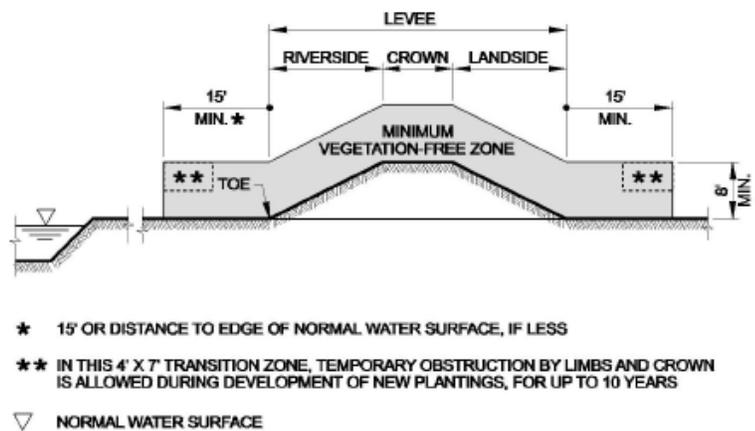
Source: ULDC, 2012

For existing levees however, the ULDC generally states that the ultimate goal is to meet the USACE guidelines described above progressively over many decades by applying a Life-Cycle Management (LCM) approach. Additionally, the goal is to maintain woody vegetation and trees near the base of the waterside slope in the long term for their engineering and environmental benefits. The LCM criteria generally state that woody brush and trees less than 4 inches in diameter at breast height should be removed along with weeds that are taller than 12 inches, and that existing tree limbs shall be trimmed up to 5 feet above the ground surface on the slopes and 12-feet above ground surface over the levee crown. This LCM defines the levee prism, and within 15 feet of the landside and waterside levee toe, as being a “vegetation management zone” rather than a “vegetation-free zone” as defined by the USACE.

### Local Agency Responsibilities

Within the Sacramento and San Joaquin Valley, California law now requires urban or urbanizing areas to make a Finding (an official declaration made by a city or county related to an urban level of flood protection) related to the ULDC before approving new developments. Therefore, many levees maintained by local agencies are subject to the ULDC and CVFPP vegetation management criteria.

Since adoption of CVFPP vegetation management criteria may contradict the USACE criteria, the local maintaining agencies have to determine whether they are willing to expend funds to also comply with USACE criteria or risk losing rehabilitation funding through the USACE’s Federal PL 84-99 program.



Source: ETL-110-2-583

ENGEO recently completed a vegetation evaluation for San Joaquin Area Flood Control Agency (SJAFC). The local agency adopted a life-cycle management approach similar to CVFPP criteria.

### References:

DWR; 2012 Central Valley Flood Protection Plan.

DWR; Urban Levee Design Criteria; May 2012.

USACE; ETL110-2-583 – Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures; April 30, 2014.

USACE; The International Levee Handbook; 2013.