Geosyntec supports our clients’ waterfront improvement projects by providing sustainable, surface, subsurface and subaquatic environmental and engineering solutions.

Geosyntec’s waterfront practitioners work collaboratively with a variety of clients, including municipalities, ports, private developers, civil engineers, and landscape architects, to provide multidisciplinary, technically advanced, innovative, value-added service offerings and comprehensive cost-saving solutions for nearshore, upland, and in-water improvements projects for our waterfront clients. Geosyntec’s waterfront-focused practitioners comprehensively serve our clients in multiple technical practices areas.

We understand the strategic importance of urban development of waterfront communities and waterfront commerce and the intersection of the societal commitments required to reduce impacts in watersheds for flood control (riverine and stormwater), sea-level rise, resiliency requirements. Geosyntec works collaboratively with project stakeholders to understand their vision. We then integrate their vision and scope with engineering solutions that address environmental conditions, geotechnical challenges, permitting, and regulatory requirements.

Waterfront projects face a number of risks based on climate change and natural physical processes. Geosyntec understands the need to evaluate, design, and construct projects for risks that can increase project costs. We have experience reducing coastal zone risks through a variety of approaches, including:

- structural interventions (e.g., seawalls and breakwaters) that decrease shoreline erosion, wave damage, and flooding; and
- natural or nature-based design features (e.g., wetlands and slopes) that attenuate waves and provide other ecosystem services

Because the emotional connection to water is strong for the public and stakeholders, waterfront projects present unique challenges. Geosyntec has years of experience with such challenges. We know how to accurately and effectively listen to concerns and communicate complex ideas to residents, lawmakers, and other stakeholders. Geosyntec proactively engages trust to build strong working relationships with stakeholders in order to successfully permit, design, and construct projects.

We routinely work on waterfront developments, remediation, and restoration projects. We understand the complexities of subsurface geological conditions in upland and in-water sediment (including groundwater management needs). Our experience includes developing foundational design requirements for nearshore buildings, designing seawalls and breakwaters, dredging and beneficially using dredged materials, filling nearshore areas, performing stormwater management designs, and developing wetland improvements designs.

Figure 1 – Geosyntec’s Technical Practices that Support Waterfront Improvement Projects
Waterfront Toronto Port Lands Flood Protection and Enabling Infrastructure Project

The Waterfront Toronto project is the largest urban redevelopment project currently underway in North America. This project includes (i) excavating a new river valley to naturalize the channel and connecting the mouth of the Don River for flood protection and (ii) redeveloping the uplands of former industrial areas into major park lands and a mixed-use complex. Geosyntec is the engineer-of-record for the geotechnical and environmental design of the long-term environmental risk management measures associated with developing the river channel and reusing impacted soil to mitigate transferring contaminants, including non-aqueous phase liquid (NAPL), into surface water and upland properties. The environmental, geotechnical, and construction challenges of implementing beneficial reuse and leaving impacted soil and groundwater in place necessitated developing multiple specialty construction solutions to navigate complex subsurface conditions, old buried shoreline structures, and significant remedial demands. The primary risk management measures to keep contamination in place was the design and construction of 9,200 linear feet of large-diameter secant pile and concrete diaphragm walls as vertical cutoff walls for the river valley, and a multilayer amended cap as a horizontal barrier layer in the newly constructed river channel. In addition to performing the engineering analysis, Geosyntec prepared construction drawings, specifications, and contractor bid support. Geosyntec is serving as the resident site inspector during the installation of the secant piles. Geosyntec’s continued collaborative approach to the river channel design has not only created a solid working relationship with Waterfront Toronto, landscape architects, the site construction manager, and other design team consultants, but also allows design optimization alternatives and potential challenges to be identified early, while still meeting strict design deliverable deadlines.

Ralph C. Wilson Jr. Centennial Park, Buffalo

Geosyntec led the marine engineering aspects of the design for the removal of linear concrete bulkheads to incorporate a more natural riprap shoreline with plantings and coves for kayak launching. The design reflected the community’s ongoing input as well as the coordination of a large team of consultants who examined technical feasibility of park features. Geosyntec’s role included reviewing design information, such as geotechnical assessments and hydrodynamic modeling, and design of marine engineering features, such as bulkheads, revetments, and living shorelines. The waterfront design included removing linear concrete bulkheads to incorporate a more natural riprap shoreline with plantings and coves for kayak launching. Geosyntec collaborated with other engineering consultants, ecologists, and planners on shoreline elements and provided sound engineering solutions to meet the overall look and function of the design. We took a complicated project from a schematic concept to a constructable and integrated design.

Rio Hondo Confluence Area Project, Los Angeles

As part of the Los Angeles River Master Plan effort, Geosyntec led a project design team that also included architects, landscape architecture, and urban design firms to design the SELA Cultural Center. SELA will be a multi-arts facility to support and showcase the Southeast Los Angeles community and provide a permanent place for the community to gather in creative expression. Geosyntec’s specific scope included civil engineering (including drainage, grading, utility infrastructure, stormwater management, and detailed river hydraulic modeling), geotechnical and geostuctural engineering, and environmental engineering for multiple brownfield sites located in the industrial corridor.

Multimodal Facility Waterfront Bank Stabilization, Massachusetts

Geosyntec selected a combination of structural and vegetative stabilization practices for the eroded riverbank to restore structural integrity to the bank and adjacent building foundations and to reduce future risk of erosion, while preserving adjacent critical spawning habitat of the endangered short nose sturgeon. To support the design and permitting of the shoreline stabilization project along the complex nature of the Merrimack River, Geosyntec conducted diver-led mapping of critical habitat of endangered species, analyzed tidal data, studied geotechnical conditions along the embankment, and evaluated the structural elements of the adjacent Merrimack Valley Regional Transit Authority (MVRTA) buildings. Geosyntec’s design and permitting strategy was to consult with the permitting agencies early and often to address working within a critical habitat of endangered species before filing for permits. We used hydraulic modeling to evaluate proposed shoreline protection measures and how these proposed measures might impact the floodplain, the floodway, and the habitat provided by the entire area. Geosyntec also supervised the structural and geotechnical evaluation of the MVRTA facility. This evaluation determined the cause(s) of the observed building movement and the extent of structural damage. Our geotechnical evaluation provided preliminary design recommendations for permanent repairs. Due to the unique constraints of this shoreline stabilization—specifically between existing infrastructure and critical habitat—Geosyntec designed a tailor-made combination of structural and vegetative practices, including sheet pile, revetment, boulder wall, block wall, and reinforced vegetative slopes.

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About Us

Founded in 1983, Geosyntec combines the expertise and experience of over 1500 scientists and engineers to address complex environmental and infrastructure problems all over the world.