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Alternatives to Aquatic Placement Applying Regional Sediment Manufacturing to Innovative Stabilization for Brownfields Beneficial Use

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Introduction: The placement and environmental management of dredged materials in aquatic environments such as oceans, seas and estuaries are strictly governed practices in the European Union and the United States (US). Open water disposal sites are regulated for acceptance of dredged materials that pass stringent testing protocols. Sediments that exceed testing criteria cannot be placed in these disposal sites and need alternative management strategies such as Confined Aquatic Disposal and/or Facilities (CADs/CDFs). However, the CADs/CDFs option is becoming increasingly challenged by concerns over the loss of benthic habitat, impacts to economically critical fish nurseries, and the realization of long-term monitoring and maintenance costs. Public perception regarding the disposal of contaminated sediments has also been strongly influenced by decades of pollution prevention programs. In sum, currently employed disposal sites, both open water and confined, are nearing capacity and will either need to be expanded or replaced through new site designation processes. Both of these options are time consuming and require overcoming public sentiment, completion of extensive environmental compliance, and commitment to long-term monitoring/compensatory mitigation, which may include potential liability for unanticipated consequences. All of these burden aquatic disposal alternatives with growing costs which may exceed their benefits.

Challenge/Case Study: Alternative processes for dredged materials that do not meet aquatic placement criteria have been applied with success for some time. Structural modifications and/or treatments allow these sediments to be placed beneficially at upland locations. Beneficial use of sediment programs focusing on materials science (structural) and treatment include Sedi.Port.Sil, CEAMas, SETARMS, SEDILAB, EcoSed, GeDSET, the Sedimateriaux Approach, and the USEPA/NJDOT New York and New Jersey Harbor Sediment Decontamination Program. These programs have been at the forefront of changing the perception of sediments as a *waste* – to a sustainable resource. From a regulatory, programmatic and cost-effective perspective, applying innovative sediment treatment processes as part of a Regional Sediment *Manufacturing* Facility(s) (RSMF) that integrates multiple back-end beneficial use needs for upland Brownfield and Greenfield development is gaining attention globally. This RSMF approach should drive policy and legislative changes that encourage economic development and revitalization of impacted urban landscapes. These strategies should reduce processing costs (and encourage manufacturing) through a life cycle approach that combines treatment with end use applications.

Long Island Sound (LIS), USA, an estuary of National Significance, managed by federal, and Connecticut/New York governmental agencies has a long maritime history. Recurring maintenance dredging is required for LIS navigation channels and harbors. Open water disposal of these materials has become a controversial issue and New York is opposed to all aquatic disposal activities in LIS. Two of the three existing open water disposal sites in LIS have been closed. Lacking local disposal alternatives, a large number of marina facilities have deferred maintenance dredging and federal projects may also be impacted. The loss of safe navigation impedes the maritime economy resulting in loss jobs and revenue from commerce, manufacturing and tourism.

Technology: One of the available innovative sediment stabilization techniques, Pneumatic Flow Tube Mixing (PFTM) will be presented. PFTM has been successfully used in Japan for the last decade in large scale reclamation projects utilizing stabilized soft sediments. PFTM is a process that provides several advantages over traditional stabilization techniques, highlighted by its small footprint, greater structural integrity and the ease at which it can pump stabilized dredged material relatively large distances to the placement site and/or by rail transport from the RSMF. The development in 2017 of a RSMF employing PFTM in Connecticut will be discussed from the perspective of life-cycle Urban Sediment Management that blends dredged material/sediment programs with Brown/Greenfields as one integrated alternative to projects not meeting aquatic placement criteria.