

LPWRP Biosolids Project Webpage Content

The following is taken from the Executive Summary of the Preliminary Engineering Report, November 2014 prepared by HDR Engineering, Inc.:

Howard County is proceeding with a Biosolids Processing Facilities Improvements project (the Project) at the Little Patuxent Water Reclamation Plant (LPWRP). The Project will implement the recommendation from the County's 2013 Biosolids Master Plan Study to replace the current biosolids stabilization practice, consisting of advanced lime stabilization of undigested primary and waste activated solids, with anaerobic digestion and direct heat drying. While both stabilization processes produce Class A, exceptional-quality (EQ) biosolids, beneficial use of lime stabilized biosolids is limited to bulk agricultural land application, which is becoming more restricted under Maryland regulations. Anaerobic digestion and heat drying produces a more versatile biosolids product suitable for a variety of beneficial uses. The recommended improvements provide the County with reliable, cost-effective, and socially responsible treatment and beneficial use of LPWRP biosolids in a changing and unpredictable regulatory environment, as elucidated in the objectives statement for the Master Plan Study.

The recommended improvements also provide to the County the benefits of biosolids volume reduction and annual operations and maintenance cost savings. As shown by the comparison in Table ES-1, replacing advanced lime stabilization with anaerobic digestion and heat drying is expected to reduce biosolids volume and truck traffic by over 80 percent and save almost \$2 million/year in annual operations and maintenance costs.

Table ES-1 Biosolids Improvements Volume Reduction and Cost Savings

Parameter	Advanced Lime Stabilization	Anaerobic Digestion and Heat Drying
Type of Class A, EQ biosolids produced	Limed Dewatered Cake 35% to 40% solids	Dried Granule 90% to 95% solids
Total biosolids volume, wet tons/year	50,270	6,890
Biosolids hauling, average trucks/day	7	1
Biosolids operations and maintenance, \$/year	\$4.4 million	\$2.5 million

The Preliminary Engineering phase of the Project was undertaken to:

- identify viable beneficial use markets for dried biosolids in Maryland and neighboring states;
- determine which drum and belt dryer options can reliably produce the type of dried biosolids preferred in each viable beneficial use market;
- evaluate and select the recommended alternatives for drying, anaerobic digestion, and supporting solids handling process improvements;
- refine design criteria, equipment configurations, and facility layouts for the recommended solids and biosolids improvements to serve as the basis for final detailed design; and prepare a preliminary opinion of probable construction cost for the Project for the County's capital improvements program budgeting.

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Key decisions that emerged from the Preliminary Engineering evaluations to align selected alternatives and preliminary design configurations with the County's biosolids management objectives are summarized in Table ES-2.

Table ES-2 Key Preliminary Design Decisions

Key Decision	Justification
Soil blending is the primary target market for LPWRP dried biosolids; agricultural land application is the secondary market	Market survey showed a viable Maryland soil blending market with significant interest in and capacity for dried biosolids, but little interest for dried biosolids in local specialty fertilizer markets
Provide belt dryers for the LPWRP; final selection of the specific dryer model to be made during final design	Belt dryers produce a granular dried biosolids product that is suitable for agricultural uses and preferred by soil blenders over the spherical pellets produced by drum dryers.
Repurpose two anaerobic pretreatment reactors as anaerobic digesters and add a third digester of equal size	Provides operational flexibility; retention times for well-stabilized, low odor solids to drying; and reliable Class B biosolids as a backup to drying.
Minimize encroachment of new facilities on lime stabilization and staging area	Maintain and minimize impacts to lime stabilization, staging and hauling operations during construction.
Co-locate centrifuges and belt dryers	More efficient dewatering and drying operations and avoids pumping/conveying dewatered solids long distances
Provide sidestream centrate treatment	Maintains nutrient removal capacity in mainstream process for future growth
Provide new gravity belt thickeners for waste activated solids (WAS) thickening	More consistent and thicker solids feed to anaerobic digestion improves process performance

Major elements of the recommended improvements for the Project are shown on Figure ES-1 and summarized in Table ES-3.

Table ES-3 Summary of the Recommended Improvements

Process or Facility	Recommended Improvements
Heat Drying	<ul style="list-style-type: none"> New Dewatering and Drying Building Two direct belt dryer systems Odor control biofilter for dryer exhaust Dried biosolids storage silos and truck loading station Backup dewatered solids truck loading station
Dewatering	Relocate three existing centrifuges to new Dewatering and Drying Building
Anaerobic Digestion	<ul style="list-style-type: none"> Convert two 1.75 MG anaerobic pretreatment reactors into anaerobic digesters with gas holder membrane covers and pumped mixing Add third 1.75 MG anaerobic digester with fixed cover and pumped mixing New Digester and Boiler Buildings housing digester pumping, mixing and heating equipment
Centrate Treatment	Convert existing aerobic pretreatment basins into centrate storage and a deammonification treatment process for nitrogen removal
Digester Gas Handling	<ul style="list-style-type: none"> Gas treatment system, including hydrogen sulfide removal, moisture removal and compression, to allow use of digester gas as dryer fuel New enclosed digester gas flare

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Table ES-3 Summary of the Recommended Improvements (continued)

Process or Facility	Recommended Improvements
Solids Storage	Repurpose Thickened Primary Solids Storage to Digester Feed Tanks Convert Thickened WAS Storage to Digested Solids Storage with mechanical mixing
Solids Thickening	Rehabilitate Gravity Thickener No. 2 for primary solids thickening Two new gravity belt thickeners to replace existing dissolved air flotation thickening for WAS
Electrical Distribution	Replace existing Primary Substation PS-2 with new, larger 4,000 KVA substation serving all solids and biosolids facilities New Motor Control Centers (MCC) in the Dewatering and Drying Building Reuse two existing MCCs 15 and 23 to supply new anaerobic digestion equipment loads Replace MCCs 9 and 10 with single new MCC
Administration Building	2,400 square foot addition to replace office and storage space demolished to make space for Anaerobic Digester No. 3.
Site Improvements	Stormwater management facilities to handle runoff from added impervious area and improved handling of runoff from existing impervious areas per Howard County stormwater management requirements New natural gas service to provide supplemental fuel for heat drying
Lime Stabilization Facilities	Remove lime silos, both lime stabilization trains, and truck loading station Clear and clean the lime stabilization process areas to provide building space for potential future uses

The preliminary opinion of probable construction cost for the Biosolids Processing Facilities Improvements Project is \$62,730,000, not including engineering services, Howard County legal and administration expenses, and changes during construction. Adding project costs brings the project budget to \$72,767,000.

Since the 2014 PER, the County solicited for design consultants via a Qualifications Based Selection process and has selected HDR Engineering. HDR and the County agreed to separate the design and construction into two phases. The first phase of the project will include addition of the anaerobic digestion facilities including gas storage and conditioning equipment, centrate treatment, solids thickening improvements, dryer technology selection, odor control improvements, and improvements to the solids storage tanks.

The second phase of the project will include the heat drying facilities (new building, dryers, relocated centrifuges, odor control equipment, site improvements, and demolition of the existing lime stabilization facilities. It should be noted that the original plan to retrofit the existing anaerobic pretreatment reactors and add one more unit has been modified to replacing the two anaerobic tanks with three new tanks in the same basic footprint. The smaller diameter, taller tanks will provide a number of process benefits and this option eliminates the need to modify the existing Administration Building.

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HDR was given Notice to Proceed in October 2015 and they are on target for a 30% submission of Design Phase I in April 2016. The Phase I design is targeted for completion in September 2016. The Phase II design will begin in the summer of 2016 and be completed in the spring of 2017.

The County has chosen the Construction Manager at Risk (CMAR) alternative delivery method in place of the traditional design-bid-build approach. This delivery presents a number of benefits including the opportunity to involve the CMAR early in the design and gain valuable constructability reviews, early procurement of equipment, and cost estimating at each phase of the design. The CMAR was solicited via a Qualifications Based Solicitation and Clark Construction Group, LLC was selected as the top firm for negotiations. Contract negotiations for preconstruction services were complete in March 2016 and the County is targeting a mid-to-late April 2016 purchase order and Notice to Proceed. If the design remains on schedule, Clark should have solicited subcontractors and be in position to negotiate a Phase I Guaranteed Maximum Price (GMP1) by February 2017 and a GMP2 by October 2017.