A long-standing challenge for industry and government is the sustainable and beneficial management of biosolids. The changing regulatory climate, increased public scrutiny and a reduction in available options for disposal make biosolids management one of the more complex problems in industry today.

Identifying needs

Biosolids are a valuable resource which can be used in a sustainable manner, much like recycled paper, glass and aluminium. In preparing and managing this product for reuse, our clients look to reduce the odour emanating from the source, achieve higher grades for reuse, lessen the inconsistencies in the treatment process and establish more sustainable disposal methods. Heightened regulation makes this an intricate process.

Our clients (including utilities that own and operate wastewater treatment plants) seek to manage and dispose of biosolids in ways that adhere to regulatory requirements, meet public expectations, and contribute positively to their operations’ sustainability objectives.

Biosolids are a high-value product and can be repurposed for a number of uses (compost, fertiliser, alternative power source). Our dedicated offering in this space will help you to shift the way you think about biosolid treatment and reuse at your facility.

Solutions

We have extensive experience in the planning, environmental assessment, design, and implementation of biosolids management, handling, processing, beneficial reuse, residuals management and energy recovery strategies and facilities:

- Biosolids management planning
- Energy recovery and technology evaluation and design
- Risk and life cycle assessment
- Odor and air pollution control, assessment and design
- Greenhouse gas assessment and reporting
- Concept and process design, alternatives analysis
- Detailed design for bid/tender
- Design-build, owner’s engineering and alliance services
- Construction phase engineering services
- Construction management and inspection
- Startup and commissioning services
- Permitting and regulatory assistance

We’ll work with you from the initial assessment of alternatives to permitting and implementation of solutions to achieve your goals in a cost effective manner.

Benefits

Work with us to lower biosolids disposal costs and explore new alternatives for disposal and reuse.

Ever considered turning biosolids into energy? We can help you to turn your facility’s waste into green energy or directly into liquid or gas energy products.

Tackle regulatory hurdles with confidence and improve public perception by engaging a globally recognised leader in biosolids treatment and reuse - that’s us!

We’ll help define a strategy which ends the perception of biosolids as a problem and shifts the focus to biosolids as a valuable resource.
Experience

GHD has extensive experience in the planning, environmental assessment, design, and implementation of biosolids management, handling, processing, beneficial reuse, residuals management and energy recovery strategies and facilities. Some projects we have recently been involved with include:

**Sydney Biosolids management strategy, New South Wales, Australia**

Sydney Water operates 29 sewage treatment plants in the metropolitan Sydney area. Almost all of the captured solids across all plants are beneficially used in agriculture, composting or land rehabilitation. Biosolids production is expected to increase 38% over the next 20 years as the population of Sydney increases. The engineering team of GHD and a subconsultant were appointed to lead a Biosolids Management Strategy for the 20 year planning period. The strategy focused on assessing the likely capacities of marketplaces for high and low value biosolids products and the risks associated with the present practices. A technology assessment was performed as an integral part of the strategy development to assess performance improvement strategies and develop conceptual level cost estimates for identified alternatives. The Biosolids Management Strategy, completed in 2011, allowed Sydney Water to select a path forward that represents a logical technology optimization for the sustainable markets with respect to the strategic goals for pathogen reduction, product odor reduction, volume reduction, energy recovery, nutrient recovery, reduction in greenhouse gas emissions, and carbon sequestration.

**Biosolids handling improvements, New York, USA**

As part of a joint venture, GHD was retained by Onondaga County to evaluate the capacity and performance of biosolids handling systems at the 303 ML/d (80 MGD) Metropolitan Syracuse WWTP, and to develop and implement needed improvements through design and construction phase services. Based on computer modeling results, recommendations were developed to improve biosolids handling at Metro by increasing anaerobic digester detention time by installing gravity belt thickeners for thickening of waste activated sludge, the addition of two thickened sludge blend tanks with 24-hour detention time for blending thickened primary and waste activated sludge prior to feeding the anaerobic digesters, and increasing sludge dewatering capacity by replacing belt filter presses that were approaching the end of their useful life with new high-solids sludge dewatering centrifuges. The biosolids handling improvements also included the design and construction of a cogeneration system, consisting of a 375 kW dual-fuel gas engine-generator package equipped for heat recovery from the engine coolant and exhaust. The cogeneration system provides for energy recovery, in the form of heat and electricity, from the digester gas. The biosolids handling improvements were completed in 2007. Following the construction project, GHD was responsible for developing and implementing recommendations for cleaning and repairs to the facility’s four 30 m (100 ft) diameter anaerobic digesters. The digester cleaning and improvements are currently ongoing with completion anticipated in 2012.

**Anaerobic Digestion and Cogeneration Facilities, Victoria, Australia**

GHD was engaged to design the upgrade and expansion of the Surbiton Park Recycled Water Plant (RWP) to increase capacity from 8 ML/day (2.1 mgd) to 18 ML/day (4.8 mgd). A key part of the project is the upgrade of the existing anaerobic digester, construction of a new anaerobic digester, and addition of a cogeneration facility using a biogas fueled microturbine that uses biogas produced from the anaerobic digestion process to generate electricity, thereby reducing the plant’s greenhouse gas emissions and reliance on grid power supply. The project also included sludge thickening area including rotary drum thickeners, primary sludge buffer tank, polymer batching/dosing room and control room, a 17 m (55 ft) diameter anaerobic digester with sequential gas lancing, upgrade of an existing anaerobic digester with new gas lancing system, and a fully enclosed digester control building. The first two phases of the project are complete with the third phase under construction with projected completion in 2014.

**Indirectly dried biosolids, Maryland, USA**

GHD designed the new solids handling processing at the 12 ML/d (3.2 mgd) Elkton WWTP which included two 2m extended gravity deck belt filter presses, conveyors, polymer feed system, and a mechanical sludge dryer. The solids handling building was constructed using a combination of block walls (for durability and corrosion resistance) and pre-engineered metal framing (to reduce project cost) and has dedicated control and electrical rooms. Odorous air from the entire solids handling building is treated using a low-profile horizontal chemical wet scrubber, while a separate engineered biofilter provides dedicated odor control for the drier off-gas stack. The project also include sludge feed pumps in another building and a dried sludge storage silo and truck loading station. The facility, completed in 2009, can dry up to 43.5 tons (48 US tons) of wet sludge per day and produces a Class A product which is distributed for horticultural reuse. GHD also designed a similar Class A indirect drier at the 15 ML/d (4.0 mgd) Easton WWTP.
Nashua Wastewater Treatment Facility, New Hampshire, USA
GHD was retained by the City of Nashua to evaluate Class A biosolids processes for the 60 ML/d (16.0 mgd) wastewater treatment facility. GHD had previously designed the facility’s egg-shaped anaerobic digester, secondary digester, gas storage tank, and cogeneration system. The City was searching for a process that they could use to upgrade their Class B sludge to a product that had a more beneficial reuse. The three processes that were found to be the most applicable to the City of Nashua were heated drying, plug flow pasteurization, and aerobic/anaerobic phased digestion. The recommended alternative was the plug flow pasteurization process. The study was completed in 2009.

Biosolids-to-Energy sustainability assessment, Connecticut, USA
GHD was retained by the City of Bridgeport to review the current waste disposal practices from the City’s two municipal wastewater treatment plants, which process a total of 151 ML/d (40 mgd) of wastewater per day. Our team prepared an extensive feasibility study comparing alternative biosolids-to-energy options for two municipal wastewater treatment plants in Bridgeport. The objective of the feasibility study was to find a sustainable alternative to the current practice of hauling 114,000 tons/year (126,000 US tons/year) of liquid sludge to the New Haven incinerator, which is 40 km (25 miles) away. Ten biosolids processing and disposal alternatives were reviewed for economic feasibility, environmental feasibility, operational feasibility, sustainability, and community acceptance. A complete carbon footprint analysis was prepared for the selected alternatives. Results of this study, completed in 2011, will allow the City to plan for future facility modifications, using the identified sustainable alternatives.

Solids dewatering upgrade, Victoria, Australia
GHD was responsible for the solids dewatering upgrade design for the 12 ML/d (3.1 mgd) Warrnambool Water Reclamation Plant. The project included a new belt filter press, biosolids handling conveyor system and a polymer batching and dosing system to accommodate future increases in flows and loads arising from catchment growth, and a reduction in operating sludge age. GHD was the design consultant through all phases of the project, undertaking options assessment, functional and detail design of preferred upgrade option, equipment analysis and selection along with tender assessment and contract administration. The upgraded sludge dewatering facility has a capacity of approximately 1,200 kg (2,600 lbs) dry solids/hr. The project was completed in 2008 and has resulted in increased solids handling capacity, reduced manual labor to operate, reduced polymer consumption, and automated conveying which has reduced downtime during biosolids bin loading and unloading.

Power master plan and combined heat and power (CHP) design, California, USA
GHD was the prime consultant for the City of Santa Rosa, California, responsible for implementing a comprehensive Power Master Plan associated with the expansion of their tertiary water recycling facility to 98 ML/d (25.9 mgd). The engine generators used in the existing cogeneration system were nearing the end of their useful lives and posed future permitting problems. Eight power generation alternatives were evaluated, including cogeneration systems, fuel cells, heat pumps, solar power, FOG and food waste addition to the cogeneration system, and power sales back to the power utility. The analysis concluded that replacing the engine generators with new, high-efficiency units was the best alternative. “Charging” the digesters with FOG and food waste remains a viable future option and with only a limited amount of FOG, digester gas production could be increased by as much as 30%. We completed the design of four 1.1 MW engines, auxiliary systems, and building. The combined heat and power (CHP) design also involved improvements to cogeneration engine exhaust and heat recovery systems. Construction completion is expected in 2012 and has a goal of achieving LEED Silver certification.

Design/build of an MSW and Biosolids co-composting facility, New York, USA
GHD provided a Municipal Solid Waste (MSW) co-composting facility for Delaware County through a design/ build process (turnkey agreement). Design capacity of the system is 35,000 tons per year for MSW and 6,500 tons per year for biosolids. The facility uses a rotary drum for accelerated decomposition of organics and is totally enclosed inside of a 1.2 hectare (3 acre) processing building, which also includes a waste receiving area and a fully enclosed storage and curing area with 90 days of storage. Odorous air from the building is treated using a biofilter. The Delaware County MSW co-composting facility began performance testing in 2006, and was accepted in 2007. To date, Delaware County has recognized the sale and use of 100% of the compost (United States Environmental Protection Agency Class A), landfill diversion of greater than 70% by volume (60% by weight), and extension of the landfill life by over 25 years.
Anaerobic digester improvements and microturbine system installation, New York, USA

GHD was retained to upgrade the existing anaerobic digesters at the 45 ML/d (12 mgd) Jamestown Wastewater Treatment Plant. GHD’s design included a new 22.8 m (75 ft) diameter fixed steel primary digester cover and new 22.8 m (75 ft) diameter dual membrane secondary digester cover system, five new bubble mixing guns to assist in gas production in the primary digester, installation of a digester gas treatment system, installation of a 65 kW microturbine to produce supplemental power from treated digester gas, a heat exchanger was installed integral to the microturbine, to recapture heat produced during combustion to supplement the WWTP’s hot water loop. This in turn reduced the amount of natural gas required to run the plant’s boilers and other components of the design include new chopper-type sludge recirculation pumps, new progressive cavity belt filter press feed pumps, mechanical process piping improvements, and electrical and controls upgrades. Construction was completed in 2011.

Co-Digestion evaluation, New South Wales, Australia

GHD was appointed to undertake a study to identify and explore opportunities for co-digestion at Sydney Water’s wastewater treatment plants. Anaerobic co-digestion involves the simultaneous digestion of two or more organic wastes. Substrates used for co-digestion can include fats, oils and grease (FOG), food waste, glycerine as well as other various industrial and agricultural wastes. The study included a waste market review for the Sydney area to identify potential organic waste sources based on a range of criteria including handling requirements, contamination, pre-treatment requirements, potential adverse digestion process impacts, and current disposal method. The study also included an assessment of the spare capacity for both anaerobic digestion and biogas utilisation at Sydney Water’s wastewater treatment plants. Consideration of this capacity assessment and the waste market review identified opportunities for increased renewable electricity generation at specific Sydney Water wastewater treatment plants. The 2011 study provided recommendations to Sydney Water regarding further development of co-digestion, including pilot testing which is currently being undertaken.

Composted facility upgrade, Maryland, USA

GHD was commissioned to expand the capacity of the City’s existing biosolids composting operation. The new facility includes a new compost handling area, along with conversion of existing tankage into aerobic digesters for stabilization and solids reduction and the installation of two centrifuge dewatering units to replace the aging belt filter presses. These improvements gave the City the flexibility to produce Class A composted biosolids or Class B biosolids that can be hauled off-site by an independent contractor (if there is any interruption in the distribution of the Class A biosolids). The facility, completed in 2010, currently produces 800 tons per year of Class A composted biosolids and distributes approximately 75% of the biosolids to agricultural users and the remainder to the public.

Anaerobic digestion upgrade, Perth, Australia

As part of the upgrade and expansion of the 120 MLD (31.7 mgd) Beenyup WWTP in Western Australia, GHD designed major refurbishments of five mesophilic anaerobic digesters. The works consisted of sequentially draining and cleaning each digester (approx. 5 ML each) while maintaining operation of another four digesters under conditions of increased loading, digester wall extension (approx. 1.2m higher) to increase process volume, refurbishment of floating roofs, digester internals (pipework) and biogas collection pipework and valving, replacement of biogas instrumentation, replacement of gas mixing compressors, and recommissioning of the units. The project also included an extensive plant-wide odor control system. The work was completed in 2005.

Waste to energy upgrade, Connecticut, USA

GHD was retained by Norwich Public Utilities for the design of upgrades to the existing anaerobic digesters and installation of microturbines for combined heat and power generation. Although initially deemed to have too long a payback period to be financially attractive, available grant funding substantially reduced the effective cost of the microturbines, making them cost effective. The final design includes two 65 kW microturbines which will be fueled by a mixture of digester biogas and natural gas. All the biogas produced by the digester will be used to fuel the microturbines to generate electricity all year round. A digester gas cleaning system will be provided to remove siloxanes, moisture and hydrogen sulfide from the biogas before being fed to the microturbines. The new facilities went on-line in 2012.

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