

# Creating Value from Waste

By Mollie Bogardus



IOS Ranch of Bainbridge Island, Washington is a sustainably designed 8 acre private farm. Equine Facility Design of Oregon City, Oregon incorporated features such as solar panels, rain water catch basins, bamboo stall panels, no water arena footing and water runoff containment wherever possible while maximizing the open space around the existing structures. The owners, Philippe and Juliet Le Dorze, ride competitively in the jumper and dressage discipline respectively, and have an active breeding program with their Dutch stallion Big Boy and their Westphalian stallion Cornet Fever. With an average of 15-20 horses on site the facility produces 2-4 cubic yards of waste per day. Bainbridge Island like so many other communities is losing its farmland to development, placing Philippe's agreement with a local farmer to take the stable waste in a tenuous position. Philippe also realized that increased regulation of the waste disposal could end such agreement at any time and was placing restraints on what he could



do to store and dispose of the manure and soiled bedding. Due to the small footprint, containment of material and odor, and end product of a GMT Earthflow-22, it was an easy decision for him to purchase one for IOS Ranch, which now composts all of their stable waste on site creating a zero waste scenario. Philippe uses composted material as soil amendment on his jumping field, pastures and hay fields and sells the remaining amount for a price that is higher than his per yard shavings purchase cost. The Earthflow system also gives him the option of reclaiming and reusing bedding material.

Philippe and the Oregon design team worked hard to maximize the available space, wanting open space for pasture turn out and the outdoor arena. Already existing on site was an outdoor arena, indoor arena, tack room, viewing area, bathroom, storage area, cross ties, wash rack and row of indoor stalls in one structure, a free standing line of 16 stalls set just off the indoor arena and several outside paddock areas filling the area around the center of the farm. The Earthflow22, with a footprint of 22' x 8.5' and a 20'x20' concrete pad off the dump end of the vessel to hold the exiting compost, fit well into the facility's available space. Also already existing was a covered concrete manure retention pad, 24' x 24', made with ecology block sides. The location of the Earthflow and the exit pad was chosen to be just 50 feet from the retention bin.

Labor was also a concern for Philippe and his staff. This waste management process could not make for more work. The efficiency of the loading process for the Earthflow proved to be an excellent time management choice. Taking a small amount of time daily to move the material out of the retention bin ultimately saved considerable time when eliminating the need to load and haul off the material to local farmers, something that could take days when the bin was full and was necessary every 2-3 weeks. With the Earthflow, the stall waste could be loaded daily and the composted material could be stored in the exit bin and be moved to the fields as needed.

The IOS retention bin includes the concrete pad surrounded on three sides by 5'x2'x2' ecology blocks sitting within the footprint, staggered from a one block height in the front to three stacked at the back of the sides and rear of the bin. The back 30 feet of the retention bin is



covered to minimize water contamination. This structure was originally built to bring the farm into compliance with the Department of Ecology manure waste storage regulations. Stall waste is collected daily and dumped in the 24' x 24' retention bin which is designed to contain any liquid runoff that could contaminate ground water. After the waste collection is complete a John Deere 26 tractor is used to load the waste into the loading end of the Earthflow vessel. The bucket of this size tractor fits easily into the vessel for easy loading and carries approximately .5 cubic yard per bucket scoop. Loading the daily waste in this manner takes only 4-6 scoops. With the retention bin less than 50' from the vessel the load time is less than 20 minutes. To assist the loading process, the control panel is set to "load" and runs for a set amount of time to assist in pulling the material back into the vessel. The operator then can turn the panel back to mix and the system will run on its automated schedule.

Once in the Earthflow, the material takes 10-14 days to move through the vessel. During this time the temperature of the material rises to well above the level necessary to destroy most weed seeds and to destroy any harmful pathogens. Throughout the three month trial period, samples were taken and sent to both Udder Health and Soiltest

*"Horse manure is an excellent feedstock for composting. Horses are not ruminants and therefore do not extract as much nutrient from the grasses they eat. This leaves more energy available for the compost process. Typically horse manure is collected with bedding material which is saturated in urine which has available urea and ammonia. The wood shavings are also an excellent bulking agent and carbon source for the compost process. The bedded horse manure has a high C: N ratio of 30:1 or higher. However, much of the N is in the form of ammonia which is readily available. The net effect is that if the horse manure balls are blended with the shavings before the ammonia dissipates, it will create an ideal compost matrix.*

*The Earth Flow auger shreds the horse manure and blends it with the bedding bringing the nitrogen in contact with the grass fibers. The blended material with readily generate heat, driving off moisture as vapor. The heat also sterilizes the compost with temperatures rising to 135-150F. The auger moves the compost mix steadily toward the rear of the vessel as new manure is added. In 10-14 days, the Earth Flow discharges a compost product that is inoffensive to touch and devoid of any manure or ammonia smell. The lab testing shows that the compost is stable and free of pathogens according to EPA regulations. The result is a salable compost product in as little as 3 weeks!"*

Michael Bryon Brown,

Green Mountain Technologies

Laboratories for testing. All tests fell well within acceptable limitations. With daily loading, the vessel works at capacity and the end product exits out the back, pushed by the auger. To assist in the movement of the material out the back of the vessel the control panel is put on the dump cycle. The



auger's movement pushes the compost out the opened back doors and onto the concrete pad. Again the controls are adjusted back to mix and the system automatically returns to the auto mix cycle. The control panel is very easy to operate and takes very little interaction, an important component for the yard operation. As Philippe noted, "This needs to run whether I am here or not".

With escalating expenses for equestrian facilities everywhere, the financials of any waste management decisions had to make sense, literally dollars and cents. The opportunity to eliminate waste disposal costs, eliminate soil amendment costs, create a saleable product and/or cut bedding costs in half were all selling points for the Earthflow system. Once Philippe saw the by-product of the composting system he was thrilled with the potential it had for use in his hay fields and grass jumping arena and as a valuable compost to sell. He is very passionate about his jumping field and has studied best practices extensively. The compost from the stable waste is just what he is looking for as a soil amendment. What he doesn't use he will sell to the local landscaping market and already has requests coming to him for the product. The price he is able to get for the compost is more per yard than what he pays for his clean shavings. As Philippe says, "It is hard to argue with the numbers. Do the math! This process is better environmentally and it is better economically."

When the season comes that the market for the compost might soften, Philippe will turn to bedding re-use. The compost product has been laboratory tested and found to pass all pathogen testing and be lower in moisture content than the green bulk or bagged shavings. When used in the stalls it is mixed with new shavings in a 50/50 ratio. This does two things, it allows for the continuance of larger pieces of shavings in the compost recipe and creates the perfect mix for a dry, odor free stall. The fines that come from the composted re-use bedding offer tremendous absorption leaving the stall much drier than the stalls bedded with entirely green shavings and yet, the green shavings are what create the barrier between the moisture soaked bedding and the horse's feet and skin decreasing the effects of

*"The composting process appears to be very good and the product consistency and texture were excellent. This is a great opportunity for large horse owners who want to create a value added product from what has historically been considered a waste product."*

Brian Stahl, Financial  
Coordinator, Technical  
Resource Coordinator, Kitsap  
Conservation District

smell and potential health issues. The pelleted bedding offered in the market today cannot make that claim, leaving the moisture soaked bedding in direct contact with the horse's feet and skin. At IOS there is an older horse, retired show jumper, who has battled scratches for the past 10 years. Scratches is a skin condition, seen as dermatitis but created by a variety of issues including dermatophilus bacteria, dermatophytosis fungus, chorioptic mange, or contact allergies. The bacteria and fungus thrive where moisture remains in contact with their skin. It manifests itself as open sores and serum soaked skin that can be very painful for the horse. This horse had been treated with every known traditional and non-traditional product with little to no effect. After a month on the mix of bedding re-use and new shavings, his pasterns began to clear of the sores and he even began to get hair growth in areas that hadn't seen it in years. Currently GMT is working together with WSU to investigate whether this is a similar consequence to the experience WSU had at their dairy when they began using compost for bedding.

Washington State University was being pushed by financial tension to adopt a bedding re-use composting project at the school's dairy. An important and unintended consequence of this composted re-use bedding was a radical reduction in the presence of mastitis. It was found that the composted material offered an environment that was unsustainable for the mastitis. A preliminary indication at IOS is that a like situation could be at work there as well.

The GMT Earthflow solved problems for IOS Ranch by offering an in-vessel system that confined material and controlled odor, possessed a small footprint, offered ease and efficiency of operation with low operating cost. Philippe believes that the Earthflow "doesn't add any extra labor and is certainly easier than finding a place for raw manure. It renders the manure non-toxic so it can be used anywhere and not be a danger to the environment, especially water run-off."

