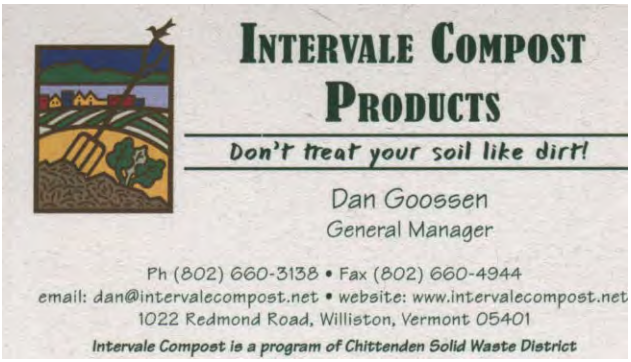
Williston Composting Facility (Intervale Composting Products)
Site visit on 10/6/11 (typos corrected on 10/26/11)

W. Pennebaker

On 10/6/11 I visited the Williston Composting Facility, one of the facilities in the Chittenden Solid Waste District (CSWD). My tour guide, Dan Gossen, manages the facility and spent more than an hour showing me the various parts of the facility. Dan's business card:



The Chittenden Solid Waste District (www.cswd.net), is a union municipal district established in 1987 to provide efficient, economical, environmentally sound disposal of solid waste generated by residences and businesses within 18 member municipalities of Chittenden County. These communities represent approximately one-quarter of Vermont's population and occupy 532 square miles. Recycling is mandatory in the district and the materials recycling facility, which services the entire district, is set up for single stream processing. The CSWD composting facility, one of many facilities in the District, is relatively new, officially starting operation on July 1 of this year. The CSWD formerly operated a site in the Burlington Intervale, having taken over operation of that facility several years earlier.

The Williston site is 6 acres in area and has a 1 acre concrete pad (see site map, figure 1) where the first and second phases of the composting process are carried out. An additional 2.2 acre parcel adjacent to the site is reserved for leachate application should the need ever arise. The site is zoned industrial, and is part of a 192 acre parcel owned by CSWD.

Referring to figure 1 below, A is a covered shed with two material-handling bays and six composting bays where active phase 1 composting is carried out. The compost mixture is prepared in the two bays to the right in A, and then placed in one of six phase 1 bays and covered with about one foot of finished compost. These phase 1 bays use active ventilation (i.e. blowers) to keep the oxygen concentration high enough to prevent anaerobic decomposition of the food waste. When phase 1 is complete after 14 to 18 days, the compost is moved to B where active phase 2 composting is carried out for another 35 to 42 days. Since both phase 1 and phase 2 are done on the one acre concrete pad, all leachates from the waste are collected. However, the phase 1 and phase 2 areas have different drainage systems. Leachate from phase 1 is stored in 20,000 gallon tank D, whereas leachate from phase 2 is stored in lined pond E. If possible, the leachates are reused in the composting process to maintain a moisture content of 60% to 65% in the composting material.

In common with other aerobic composting techniques, temperature is carefully monitored during phase 1 to be sure that a temperature of 131 °F is maintained for at least three days. This is sufficient to kill

all pathogens.

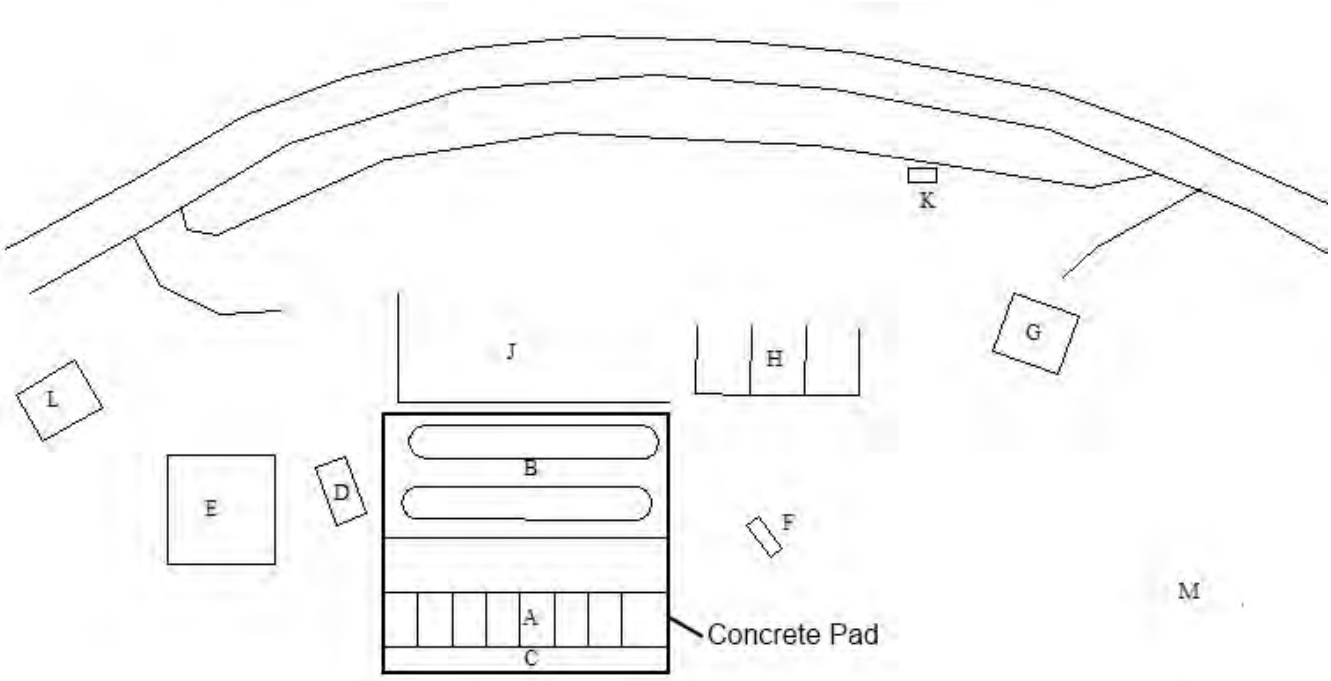


Figure 1: Map of Williston Composting Facility (not to scale)

Continuing with figure 1, F is where screening of the cured compost is done and H is where the finished product is stored. J is a public access area where brush and other yard waste is collected for use in the composting operation, K is a small dumpster where the public can drop off food waste, H is an office, and M is where the compost is cured for three to four months to finish the composting process. L is a residence owned and rented out by the facility that is approximately 300 feet from the composting pad. Except for M and G, the entire area is built on a three-foot thick bed of sand.

The blowers used to aerate the static piles in phase 1 are along the back wall of the covered area at C. These blowers, nominally about 1 HP, can be used for positive (air forced up through the piles) or negative (air drawn in through the piles) aeration. Generally, the facility expects to use positive aeration. When aeration is done in the positive mode, the compost that covers the piles filters virtually all odors. This observer found that a slight odor was noticeable, but it wasn't strong enough to be a problem. Independent of the composting technology, however, odors can be a problem for any composting operation if the source material is stored for more than a day or two before starting the composting process.

A few photographs:

Figure 2: Brush and leaf piles in the public area (J of figure 1). These appeared to be relatively decomposed. The roof of the shed covering the active phase 1 composting can be seen behind the brush pile.

Figure 3: Food waste collection dumpster in public area (K in figure 1).

Figure 4: Food waste in the dumpster of figure 3 . Note the biodegradable plastic in the waste.

Figure 5: Shed for active phase 1 composting. The blue vessel in the center is a blender where the mixture of food waste, horse manure and water is created with the desired carbon/nitrogen ratio and

moisture content (see Appendix A). A manure pile is in the bay to the left and a mixture being composted is in the bay at the far right. During phase 1, air is blown through the pile through pipes and grates set in the floor of each composting bay. A layer of finished compost about one foot thick covers the pile and filters the air to suppress odors. The pipes coming from the roof are used to adjust the moisture content of the compost mixture.

Figure 6: Phase 2 windrows. These are labeled B in figure 1.

Figure 7: Blowers in area D of figure 1. These blowers are fairly large (nominally 1+ HP) and

sufficiently noisy that Dan had to turn off the blower immediately adjacent to us in order for us to converse at normal volume. However, when one is on the other side of the building, the noise from the blowers is barely audible.

Figure 8: Lined pond for collecting leachates (and rain water) during active phase 2 composting. The water in this pond is almost free of contamination. The residence on the other side of the pond labeled L in figure 1 is owned by CSWD and is rented at a reduced rate.

Impacts:

It appears that with the precautions taken at this facility, odor and water contamination impacts are quite minor, and so far, vectors have not been a problem. A cross-hatched grid of mono-filament lines spaced at 10 foot intervals is supposed to suppress sea gulls and other birds (a common vector at the old location in the Intervale). This appears to work, but we did see one crow on the phase 2 windrow when I visited. Dan mentioned dogs as another vector that had caused problems in the Intervale, but said that racoons, skunks and rodents have not been a problem in either location.

Odor impact is difficult to assess and it is therefore difficult to know what setback distance would be adequate to keep odor from being a problem. This is also a function of the observer. In the Intervale odor was apparently a problem for one resident of the Old North End of Burlington (the Intervale is located in the river valley just to the north of the Old North End). That resident, who apparently had an extremely sensitive nose, could tell them exactly what phase of the operation they were performing, just from the odor. Other than from that one person, however, they had no complaints. My daughter, who lived in the Old North End until recently, tells me that odor was not a problem for her, even during

her frequent visits to the gardens in the Intervale near the composting operation. It is worth noting, however, that if there are nearby neighbors, a carelessly run operation would be likely to generate odors strong enough to be objectionable.

In the Intervale, a windrow system was used in which the piles of compost were aerated by turning them with bucket loaders. According to Dan (who managed both operations) it is more difficult to control both oxygen and moisture using the windrow system, and the trick with windrow systems is to turn the pile frequently during phase 1. While this turning operation is necessary to keep the pile properly aerated, turning the pile also tends to release odors. In the new facility in Williston, static piles aerated by blowers are used for phase 1 and, in part because the piles are not turned, this system is intrinsically less prone to odors.

Since no complaints have come from a relatively high income residential area located about ½ mile from the Williston facility, a setback of 2500 feet is certainly sufficient and perhaps excessive for this type of composting. There are a few residences within ½ mile of the facility, but these are owned by the District. The residence in figure 7, for example, is only about 300 feet from the concrete pad, and even with static piles and active aeration, it would be impossible to guarantee that odors would never reach this residence.

Size:

The Williston facility is just now up and running and has not yet reached full production. However, the Intervale facility that has now been replaced by the Williston facility was processing 2,500 tons/year of food waste (about 4,000 cubic yards or less), along with 6,000 tons of horse manure, 6,000 tons of yard waste and 1,000 tons of wood chips. The Williston facility will use a slightly different mixture and use more wood chips, but will be comparable in tonnage.

The total population of the municipalities served by CSWD is just over 156,000 whereas Bennington County population is just over 37,000. The food waste sources for the Williston facility are the numerous restaurants in Chittenden County, the University of Vermont (enrollment about 13,500), other nearby colleges, public schools, commercial sources (such as Ben and Jerry's), and collection from the general public.

According to the Williston DRB minutes of 7/27/10, the solid waste permit allows for 20,000 tons/year and the facility is designed for up to 33,000 tons/year. However, the CSWD representative stated that no more than 24,000 tons/year would ever be processed at the site and they expected to start at about 15,000 tons/year (which is about what the Intervale facility was processing before it closed).

What do these figures imply for a composting facility in our area? Given the food waste sources listed above and the current processing volume of less than 4,000 cubic yards/year at CSWD, a facility permitted in our area for 5,000 cubic yards of food waste appears to be a factor of five larger than would be needed to serve our own population. Only by collecting from an area considerably beyond the borders of Vermont could a food waste stream of 5,000 cubic yards/year be realized.

Economics:

Owing to special problems that presumably would not be relevant to composting facilities in our area, the Intervale composting operation operated at a loss during its last few years. This was not due to the intrinsic economics of composting, however. Rather, it was due to problems caused by archeological

sensitivity of the Intervale site as well as the Intervale site being in a flood plain. The Williston site has none of these problems. However, because it is still in a start up phase, it has not yet become profitable. According to press reports, the facility cost about $2 million, almost double what it was initially projected to cost and this extra capital cost is undoubtedly contributing to the current operating deficit. However, since I was told that the net deficit at this time is several hundred thousand dollars per year, the extra capital costs are only part of the problem. But, Dan tells me that they do expect to eventually become profitable.

While the static pile/blower system tends to produce less odor, it is more capital intensive to implement. However, the static pile/blower system also shortens the time needed to complete the composting operations. Therefore, for a given size facility, the throughput is significantly greater.

Appendix A:

Descriptive material given me by Dan, scanned. Please ignore the barely legible notes I took during the tour.

Chittenden Solid Waste District
Organic Material Processing Facility – Summary

1. **Feedstocks** – Design capacity up to 20,700 tons per year – all feedstocks are tracked according to tonnage
   Current projection = 15,500 tons per year:

Manures (horse, cow and chicken)	= 6,000 tons/year	stored on impervious pad and under cover
Yard Waste	= 6,000 tons/year	stored outside on hardened surface
Food Waste	= 2,500 tons/year	mixed immediately on impervious pad and under cover
Wood Chips	= 1,000 tons/year	stored outside on hardened surface

as of two months ago.

2. **Blending** – The operator will follow a recipe mixing the feedstocks to achieve a Carbon to Nitrogen (C:N) ratio of ~25-30 to 1. Water will be added to get the initial mix between 60 and 65% moisture. We will add approximately 20 gallons of water for every cubic yard of new materials. This mixing will be done in the covered mixing bay using a special mixer.

3. **Composting, Active Phase 1** – The mixed material will be transferred to one of the Aerated Static Pile Bays by a bucket loader. These covered bays will have perforated air lines imbedded in the floor connected to electrically powered air blowers located behind the bays. The blowers will be on timers and also have variable speed controllers. The mixed material will be immediately covered with a foot of aged compost that will act as a biofilter for odor control and as a blanket to provide insulation, nutrient and moisture entrapment and a barrier to vectors. We are proposing keeping this active phase going for a minimum of 14 days at design quantities and 18 days at initial start up. All the liquid runoff from the phase 1 area and the travel pad will be sent to a 20,000 double walled underground storage tank.

   Monitoring, Active Phase 1 - Each aerated static pile will have a recorded "born on" date, % moisture and recipe mix level documentation. Temperatures will be taken at different locations and depths to ensure that regulations are met. Specifically, we must document a "Process to Further Reduce Pathogens" (PFRP). To meet both state and federal regulations, the compost must heat up and maintain a temperature of 131°F for a minimum of 3 continous days. Air is added to provide essential oxygen and to carry off excess heat. The amount of air added is dependent upon the pile temperature. Each blower will have the ability to blow air into the pile (positive aeration) or to suck air through the pile (negative aeration). In the positive mode, the compost blanket atop of the pile will provide odor control, a function carried out by a biofilter when in the negative mode. It is expected that the piles will be predominantly aerated via the positive mode. The oxygen level will be maintained between 10 and 18%.

   blowers are ~ 10 to 14 hp., compost is covered in phase 1.

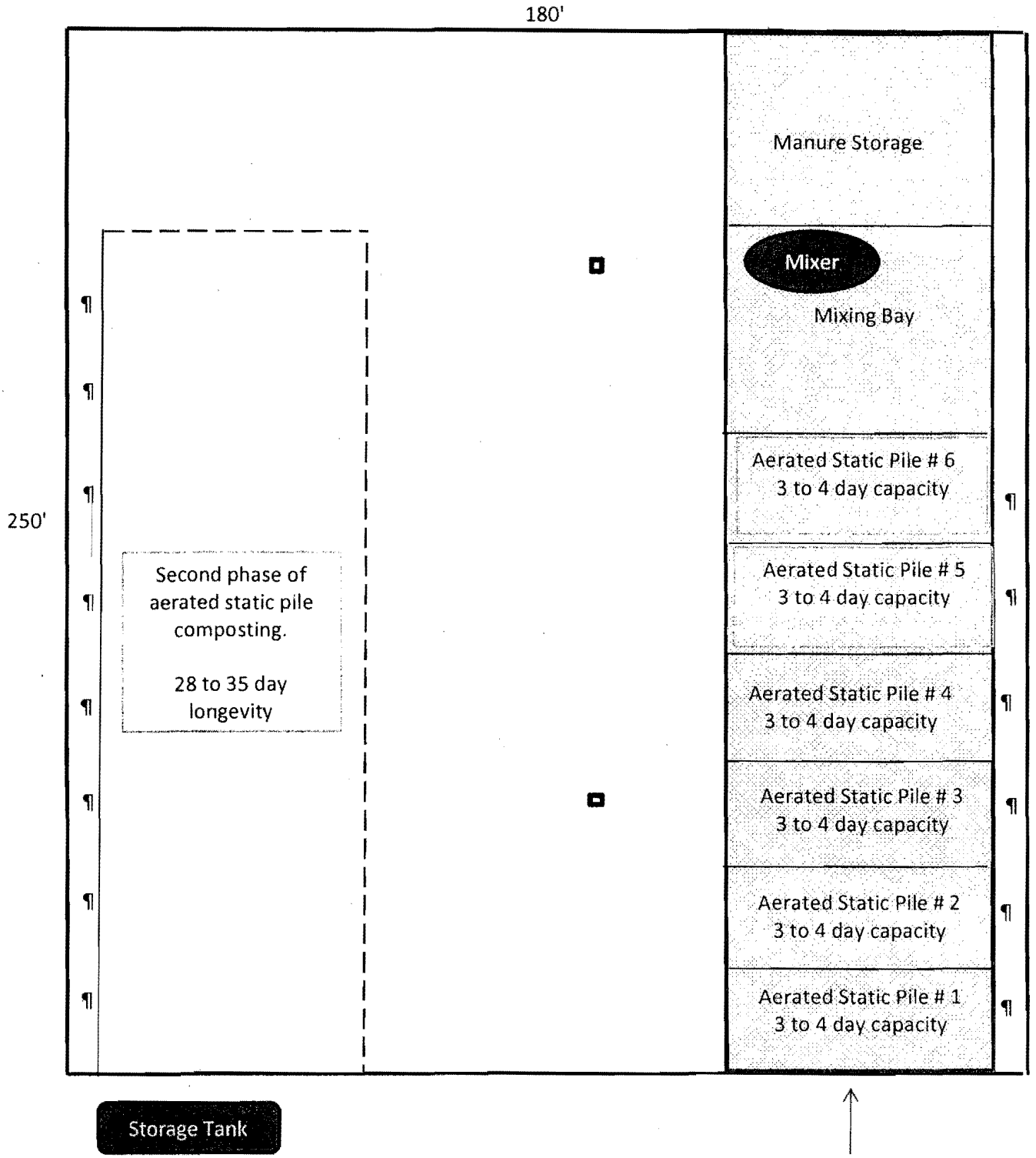
4. **Composting, Active Phase 2** – After the first 14 to 18 days of composting has finished in the covered bays, the material will be transferred by bucket loader to the other side of the impervious pad that has aeration pipes on the surface of the concrete pad. At this location there is no roof over the piles. All runoff from the phase 2 pad will be directed to the lined lagoon. Additional moisture, as either precipitation or clean water may need to be added to the piles during this phase. Again, the blowers in phase 2 can be operated in either the positive or negative aeration mode. The time for this phase will be between 35 and 42 days. No temperature monitoring is required for this phase though we are recording it to determine activity. Again, the oxygen concentration will be maintained between 5 and 15%.

5. **Composting, Curing Phase** – After active aeration for a minimum of 45 days, the compost is considered stable but must "age" or "cure" for an additional 90 to 120 days. The compost from the active phase 2 pad will be transferred by a bucket loader to a curing area located on a hardened surface and open to the atmosphere. The compost may be screened either before or after the curing phase to remove contaminants (trash- mostly plastic and metal cutlery) and large particles (wood chips recycled to start of process). Air may be added during the curing stage either by turning the pile with an excavator, by blowing in air with an electrical blower or by convective action. At the end of the curing phase, all batches of the finished compost will be tested for maturity, nutrient concentrations, phytotoxicity, pathogens and heavy metal concentrations.

6. **Liquids Management** – The facility is designed so that little or no leachate is generated before the compost has achieved PFRP (pathogen reduction). Any leachate that is collected will be used either to add moisture to new batches or be sent to a wastewater treatment plant. Any water that drains from areas with compost that has already achieved PFRP will be directed to a lined lagoon and additional use could include application to field crops under an approved nutrient management plan (on and off site).

Chittenden Solid Waste District

Organic Material Processing Facility - Layout of initial phases



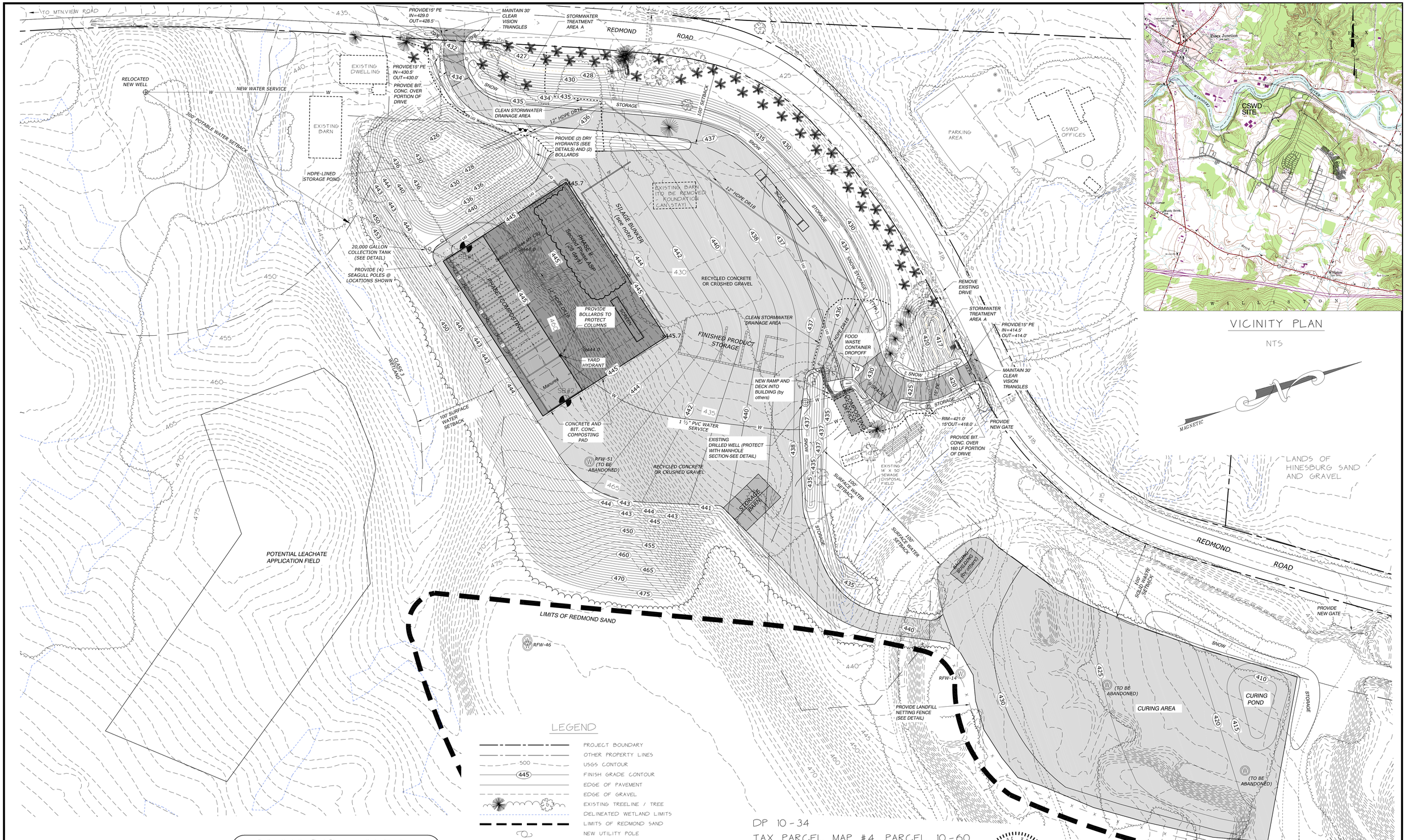
Building area = 50' X 250' = 12,500 Ft^2. Will house the first 15 to 24 days of composting

Concrete area = 180' X 250' = 45,000 Ft^2 or 1.0 acre. All runoff from outside drains and phase 1 pad goes to double walled leachate tank

¶ = Air blower/pump

Appendix B:

Detailed site map forwarded to me by Dan. Note the map insert in the upper left corner showing the site in relation to surrounding properties. One of the neighbors on the other side of Redmond Road is an IBM facility, and IBM required that storm water runoff into their site would not be contaminated.



VICINITY PLAN

NTS

MAGNETIC

LEGEND

- PROJECT BOUNDARY
- OTHER PROPERTY LINES
- 500 — USGS CONTOUR
- 445 — FINISH GRADE CONTOUR
- EDGE OF PAVEMENT
- EDGE OF GRAVEL
- EXISTING TREELINE / TREE
- DELINEATED WETLAND LIMITS
- LIMITS OF REDMOND SAND
- NEW UTILITY POLE
- WATERCOURSE
- CLEAN STORMWATER RUNOFF LINE
- MS — SOIL TEST PIT (BY MARSH ENGINEERING 6-23-10)
- LEACHATE DRAINLINE
- SB#1 — SOIL BORING
- DRILLED WELL (POTABLE)
- RFW-51 — MONITOR WELL (GROUNDWATER)
- UG — BURIED ELECTRIC CONDUIT

NOTE: CSWD TO PROVIDE (32) SILAGE BUNKER WALLS (8' WIDE X 12' HIGH) FOR CONTRACTOR TO SET IN PLACE AND BOLT TOGETHER. GROUND BASE MUST BE GRADED UNIFORMLY FOR PANELS TO FIT TIGHT. ALL INSTALLATION WORK, INCLUDING CRANE USE AND REQUIRED HARDWARE SHALL BE INCLUDED IN THE CONTACTORS PRICE.

Upon finding that the Final Plans complied with all requirements of the Williston Development Bylaw and all conditions imposed on the approval of Discretionary Permit 10-34, the Williston Development Review Board/Administrator approved the Final Plans for the Chittenden Solid Waste District's Organic Materials Composting Facility on the __ day of _____, 20__.

Presiding member or Administrator's signature

DP 10-34

TAX PARCEL MAP #4, PARCEL 10-60

GRAPHIC SCALE

50 0 25 50 100 200

1 inch = 50 ft.

6-23-10	REVISED FOR CONSTRUCTION AND PER DISCRETIONARY APPROVAL CONDITIONS	HLS
6-11-10	REVISED FOR ACT 78 SUBMITTAL	HLS
7-21-10	STORMWATER POND RELATED CHANGES	HLS

PAUL J. O'LEARY JR. No. 5477 REGISTERED PROFESSIONAL ENGINEER STATE OF VERMONT

DATE 6-17-10 — REVISION: REVISED PER PRE-APPLICATION COMMENTS — BY HLS

SURVEY OBCA | DESIGN PJO/CSWD | DRAWN RHP | CHECKED PJO | SCALE 1"=50'

☐ RECORD DRAWING ☐ PRELIMINARY ☐ FINAL ☐ SKETCH/CONCEPT

DATE 4-01-10 | JOB# 2010-10 | FILE v26-2.dwg | PLAN SHEET # C2

O'LEARY-BURKE CIVIL ASSOCIATES, PLC
1 CORPORATE DRIVE, SUITE #1
ESSEX JCT., VT
PHONE: 878-9990
FAX: 878-9989
E-MAIL: obca@olearyburke.com

CHITTENDEN SOLID WASTE DISTRICT

REDMOND ROAD - WILLISTON, VT

ORGANIC MATERIAL PROCESSING FACILITY

SITE PLAN