

## 26. COMPOSTING OF SCREENINGS AND GRIT FROM THE WASTEWATER TREATMENT PLANT USING THE IN-VESSEL HOTROT™ SYSTEM

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The purpose of this report is to seek inform the Committee of the recommendation of the Waste Initiatives Subcommittee regarding the purchase of a new HotRot™ in-vessel composting system to enable the treatment and eventual reuse of screening and grit solids removed from the wastewater treatment process that currently are transported to and buried at the Burwood Landfill.

### BACKGROUND

The first stages of most wastewater treatment processes involve the removal from the flow of all the rag, fibre and gross solids usually through a screening system, followed by the removal of the coarser sand and grit particles usually by controlled settling. This is necessary to ensure trouble free operation of downstream processes and equipment as well as satisfactory effluent quality. These materials are highly offensive and odorous and contain faecal and other unpleasant material. It is necessary to carefully manage their disposal and this has been done by direct cartage to the landfill and immediate burial. Approximately 2 tonne per day of grit are removed from the preaeration tanks, washed and deposited in a skip, together with 2 tonne per day of screenings which are removed from the flow, washed and compacted to remove moisture and deposited in a skip for cartage to the landfill. The options for dealing with this highly putrescible and pathogenic material are very limited. The HotRot™ technology recommended for purchase clearly shows that these materials can be effectively treated to allow them to be used as a soil supplement or replacement.

### EARLY HOTROT™ TRIALS

The HotRot™ process is an in-vessel (enclosed) composting system that entails feeding the compostable material into one end of a large horizontal cylinder in which the intermittent rotation of a large “spoked” shaft provides the means to mix the feedstock, aerate and move the material slowly over a period of days to the discharge end of the cylinder. On site trials during 2001 with a small unit HotRot™ 1206 (1.2m diameter, 6 meter long) at the Christchurch Wastewater Treatment Plant has already proved that providing moisture content of the feed material is well controlled the finished soil like product is substantially reduced in both volume and weight (approximately 50%) and meets a very high pathogen standard (Class A – USEPA 504 Regulations relating to Biosolids). This standard means that the material can (from a health aspect) be used as compost on home gardens. Air that is drawn though the composting unit is blown through a soil biofilter to ensure the process is odour free.

The success of these and other trials has led the local producers (HotRot™ Composting Systems) to develop and market larger units for putrescible waste composting. These are now being marketed in Australia and in the UK and units sold overseas will be made in Christchurch. Currently there is a HotRot™ 1509 (1.5m diameter, 9m long) in operation at the Palmerston North Wastewater Treatment Plant that is composting their rag, grit and primary sludge screenings to produce a soil material. This has been in operation for nearly a year and apart from some modifications to the feed system has performed very satisfactorily. Another larger HotRot™ 1512 (1.5m diameter, 12m long) unit is being installed at the Whangaparaoa Plant near Auckland.

### COMPOSTING SCREENINGS AND GRIT AT THE CWTP

Initially during the HotRot™ trials it was anticipated that a staged approach to composting screenings and grit should be adopted by purchasing one HotRot unit capable of processing about half of the waste stream. This would have given the opportunity to fine tune the process, before determining the size and appropriateness of a second unit. Since that time however the Palmerston North unit is been shown to operate very successfully in a full-scale situation and HotRot™ are now proposing to develop a much larger unit that would process the entire screenings and grit waste stream and in addition provide capacity for further expansion as flows to the plant increase. This larger HotRot™ 3518 unit (3.5m diameter, 18m long) although not yet in production, is the same unit as proposed by HotRot™ for the in-vessel composting plant at Metro Place. This larger HotRot™ 3518 unit would handle the total daily screenings and grit at a lower loading rate (ie lower stress on the unit) to ensure improved final product quality while still allowing spare capacity for future expansion. It should be noted that given the nature of this waste stream and for market perception and public health reasons the screenings and grit would not be composted through the Metro Place Compost Plant.

## **BUDGET ALLOWANCE**

Given the success of the trials the sum of \$150,000 is included in the 2001/02 budget for installation of a single HotRot™ 1512 unit to compost approximately half the current screenings and rag production. Subsequently having seen the successful operation of the Palmerston North unit (with modified feed system) and with the impending closure of the Burwood Landfill and additional costs to dump at the new landfill it is now suggested that enough capacity should be installed right away to compost the total screenings and grit from the plant. For this to happen at least one further HotRot™ 1512 would be required and possibly a third unit in a few years time. A further \$250,000 has been requested in the coming years capital budget (02/03) to allow for the installation of a second 1512 HotRot™ unit. However it is now proposed to replace the proposed 2 (or 3) HotRot™ 1512's with a single HotRot™ 3518 – see below.

## **COST SAVINGS**

Currently the transportation and dumping costs of screenings and grit is \$113,000 as an operational cost on the treatment plant. (\$25,000 for transport and \$88,000 in dump fees). It is conservatively estimated that the successful operation of a HotRot™ system processing screenings and grit would save \$45,000 per year in operating costs at the Treatment Plant, mainly in transport costs and dump fees. These savings have been included in the 2002/03 budget and are expected to rise in future years as future landfill costs rise.

## **WIN/WIN FOR COUNCIL AND THE HOTROT™ COMPANY**

Extended discussions have taken place with the company HotRot™ Composting Systems over the different size combinations and prices of HotRot™ units with the aim of being able to provide a system that meets the long term future needs for composting screenings and grit without increasing the already proposed capital costs or increasing the current level of Treatment Plant operating costs. Clearly the installation of a single large capacity unit provides the best long-term option for the processing of screenings and grit however a larger unit (HotRot™ 3518) is considerably more expensive than two smaller HotRot™ 1512's.

The installation of the HotRot™ 3518 would be a win/win solution.

Advantages for the Christchurch City Council are:

- Additional capacity to ensure long residence time and good product quality (see note (1))
- Additional capacity to allow for future city growth
- Opportunity to trial other organic and putrescible wastes streams through the larger unit
- Potential revenue earner from processing other commercial waste products until the proposed new in-vessel composting system is operational
- Reduced operational costs
- 1200 tonnes of highly putrescible waste no longer going to landfill
- Discounted capital cost (see note (2))
- Support for a local business

Advantages for the HotRot™ Composting Systems Company are:

- Committed buyer for the first HotRot™ 3518 unit
- Opportunity to showcase the 3518 unit to other buyers close to manufacturing base
- Reliable and skilled operator of first unit
- Opportunity to monitor performance of new unit first hand (see note 3))
- Opportunity to monitor and fine tune performance on differing waste streams (see note 4))

Notes:

- (1) The extra capacity of the 3518 allows a longer residence time for the process and therefore a higher quality end product, and given the highly offensive nature of the feedstock this aspect will be very important in ensuring that the end product can be managed and reused without having to be dumped.
- (2) In recognition of the advantages to their company of securing the Council's order HotRot™ Composting Systems are offering 35% discount on the larger 3518 unit.
- (3) Provides HotRot™ with the opportunity to build and install the first of its largest systems (the HotRot™ 3518) in the local Christchurch market.
- (4) Provides the opportunity to trial other waste streams under tightly controlled conditions and to test the unit close to the point of manufacture.

## THE CURRENT PROPOSAL

### Capital Costs

Negotiations between City Water & Waste staff and the HotRot Company have progressed to a point where HotRot™ Composting Systems propose to provide, install and operate for a year a 3518 system including the composter, feed unit and discharge screen for a total capital cost of \$582,000 (this is a substantially discounted price from the list price). The Council would provide the site works foundation, electrical supply, leachate collection and soil biofilter for odour control at an estimated cost of \$30,000 – total cost \$612,000. Treatment plant staff would provide the day-to-day operation and loading of the system while HotRot™ would remotely monitor and control the process and make any required operational changes. Payment for the unit would be from the current - 2001/02 (\$150,000) and the proposed - 2002/03 (\$250,000) capital budget totalling \$400,000, with the remaining \$182,000 being met from a monthly rental payment that at the end of five years would see the Council own the unit. The monthly payments and the \$30,000 Council share of the costs would be met from the operational savings resulting from the reduced transport and dump charges.

HotRot™ Model	One 1512	Two 1512's	One 3518
Nominal Capacity Tonnes/day	2.0 (3)	4.0 (1)	10.0
Installed Costs	\$325,000	\$545,000	\$612,000 (2)

#### Notes:

- (1) current production of Screenings and Grit averages 4.0 tonnes per day (1,460 tonnes per year which is likely to yield around 1,200 tonnes of compost and 260 tonnes of reject screenings).
- (2) the \$582,000 from HotRot™ component of the price is discounted from \$891,000 – 35% in a partnering arrangement that provides a win/win to the Council and HotRot™.
- (3) It is anticipated that screenings and grit will not reach the capacity of the HotRot 3518 unit until at the least the 2030 current plant upgrade horizon.

HotRot™ Composting Systems clearly understands that the portion of the capital budget (\$250,000 out of \$400,000 for 2002/03) is not yet approved and that no payment from this source could be made until the budget is finally approved in July 2002, nevertheless they are building the unit anyway.

### Operational Costs

There will be substantial savings in operational costs arising from converting grit and screenings to usable compost instead of incurring dumping fees. Assuming that the HotRot™ 3518 unit becomes operational on 1 December 2002 then these savings will rise from \$45,000 in 2002/03 (already included in 2002/03 budget) to \$80,000 in 2004/05 and ongoing years giving a simple payback time for the \$612,000 capital cost of 7 years.

### SUMMARY

HotRot™ technology is now proven as a method of effectively treating a highly offensive, putrescible waste stream to produce a useable product. The installation of a HotRot™ at the Christchurch Wastewater Treatment Plant will allow for removal of 1,200 tonnes from the landfill waste stream using a locally developed and locally manufactured system and will provide for the opportunity to prove the new largest version of the system. The larger HotRot™ 3518 unit will provide the capacity to treat all of the screenings and grit with ample residence time to ensure good product quality, while still leaving spare capacity for future growth for at least two decades. In addition initial spare capacity could be used to explore the possibility of throughput of additional putrescible feedstock until the Council in-vessel composting system is operational. Purchase of the HotRot™ 3518 unit on the discounted terms offered will result in a win/win for the Council and HotRot™ Composting Systems Ltd and savings in operational costs will result in a payback of all capital costs in seven years.

### Subcommittee

**Recommendation:** That the HotRot™ 3518 be installed at the Christchurch Wastewater Treatment plant for a total capital cost of \$612,000 all as outlined in this report.