

DESIGN CONSIDERATIONS FOR VEGETABLE WASHWATER TREATMENT SYSTEMS

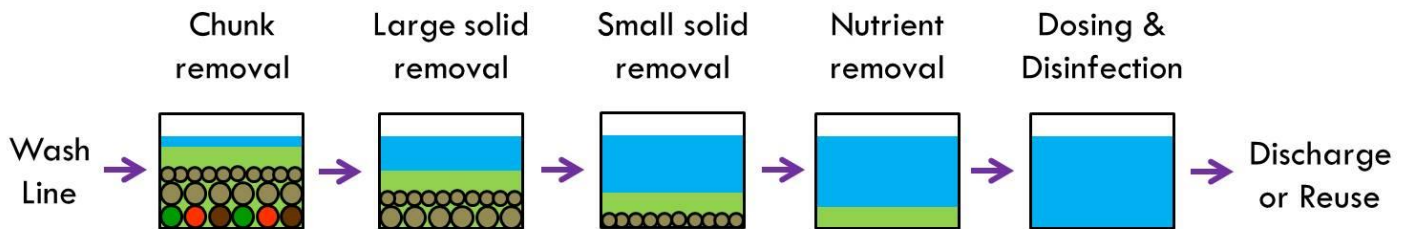
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Introduction

Vegetable washwater treatment systems should be planned well in advance of installing any equipment. Approvals may be required from conservation authorities, municipalities, or provincial government for the operation of the system. There are several factors to consider and this factsheet will outline many of the questions to ask prior to doing any planning or installation.

Generalized Treatment Process

A vegetable washwater treatment system may require more than one technology. Equipment needs to be installed in a specific order as one contaminant could impede the removal of another (Figure 1). The required steps depend on the quality of the water to be treated. For instance, if there are no vegetable pieces present in the water, that stage can be bypassed. However, all solids must be removed from the washwater before further treatment can efficiently occur.



Target	Tops, root pieces	Soil aggregates	Soil particles	Nutrients	DO, pH, pathogens
Example Technologies	Parabolic filter screen/ Hydrosieve Chopper pumps	Settling tanks Filter bags Geotubes Drum filters Hydrocyclone	Coagulation Flocculation	Biofilters Ultra-filtration Reverse osmosis Anaerobic digester	Aeration Ozone Chlorine UV

Figure 1: Generalized treatment process for vegetable washwater destined for discharge or reuse with example technologies within each category

Definitions

Chunks: These are large pieces of vegetative matter such as tops, leaves, roots, or culls.

Large Solids: Soil aggregates, sand, and silty soils that are both large in size and density.

Small Solids: Soil particles from clay and muck soils

Nutrient: Dissolved nutrients such as nitrogen and phosphorus

Chunk Removal: Very coarse filtration and pulverizing large pieces into smaller ones

Large Solid Removal: Medium to coarse filtration

Small Solid Removal: Fine filtration and chemical-assisted removal

Nutrient Removal: Biological processes and ion removal

Dosing & Disinfection: The stage of treatment targeting parameters such as pH, pathogens, and dissolved oxygen concentration

Design Considerations

There are four categories of information that should be considered: investment, functionality, site infrastructure, and labour requirements. Specific questions to guide the decision making process are outlined in the Design Considerations Worksheet. Each category is explained below.

Completing this worksheet prior to involving external aid such as consultants or technology providers will make the design process move more efficiently. The background information included below covers the data necessary to properly select and size equipment.

Investment

It is important to be realistic when preparing a budget for the treatment system. The costs involved will relate to the size and scope of the operation; a larger washing system with diverse products will require more complex treatment systems than a seasonal washer of one product.

There are two categories of investments: there will be capital costs and on-going operational costs including labour to consider. Some operations prefer a higher capital expenditure as long as operating costs are lower. Amortization periods are also important to consider. Generally the expenditure should not be paid out of cash flow; instead, a separate fund or budget line item should be used.

Functionality

This section is to set goals for the system and outline the factors that will affect technology selection such as water quality and flow rates. Always include the highest values for contaminant load and flows as equipment should be sized accordingly.

Water quality targets for the treated water are determined by the end use. If the water is to be cycled back into the washing operation it may need to reach potable water standards. If it is to be discharged there are regulations outlining limits for certain parameters.

Site Infrastructure

Technology requirements will range based on size, scope, and complexity. Existing infrastructure may or may not be compatible with the intended equipment and those issues are best sorted out prior to installation. If existing treatment technologies are to be worked in, they may need to be modified to suit the new system. In this section, outline all existing infrastructure as well as what could potentially be available. When estimating the project's cost the installation, remember to include the price of pulling electricity and coupling into plumbing.

A treatment system will produce more than treated water; there will be a waste stream from each technology, whether liquid or solid. A concentrated liquid stream will require further treatment before discharge. A strategy to deal with the waste should be in place prior to

installation. Additional equipment may be necessary to complete this task.

Labour Requirements

There are two types of labour required for washwater treatment systems: operational and then cleaning and equipment maintenance. There will be different training and time commitments for each. Decisions on maintenance will need to be made concerning whether the staff will be on-site or contracted third-parties. If the equipment requires regular monitoring during hours of operation there will be an impact on labour requirements. Some

equipment can be remotely monitored however they still require a facility maintenance person.

Worksheet

The following worksheet has been prepared to facilitate your own system assessment needs and for selecting the most appropriate technology. The categories match with the worksheet included in Factsheet # 007 “Choosing Washwater or Water Treatment Technologies” which can then be used to evaluate technologies for use within a treatment system.

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Design Considerations Worksheet

Costs	
Available Capital	
Available On-going	
Functionality	
Treated water is destined for what end use?	
Water quality target for end use/discharge	
Is potable water required?	
Flows (min/max; batch/continuous)	
Seasonality (year-round or seasonal washing)	
Site Infrastructure	
Existing treatment technologies	
Existing/available electricity	
Existing/available plumbing	
Existing/available computer network	
Indoor/outdoor	
Footprint available	
Soil profile	
Waste handling strategy complete?	
Labour Requirements	
Estimation of hours available for operation	
Estimation of hours available for cleaning and maintenance	
Desire a self-run or manually operated system?	
Able to constantly supervise?	