Date:	March 27, 2024	File:	323072
To:	Town of Minto - Mark Robertson		
From:	Grant Parkinson, P.Eng.		
Project:	Clifford WWTP Assessment		
Subject:	Replacement of Filter Sand Media		

FILTER SAND SPECIFICATIONS

1. Introduction

The Town of Minto plans to replace the existing filter sand media at the Clifford wastewater treatment plant (WWTP) in Spring 2024. There are 4 outdoor intermittent sand filters at the plant that receive lagoon effluent for polishing prior to discharge to a local stream.

2. Description of Work

There are 4 sand filters, each with an approximate footprint of 21 metres by 22 metres. The total approximate volume of existing sand to be removed is 1,020 cubic metres (1,340 cubic yards) based on an existing average sand filter bed depth of 550mm (22 inches). New sand meeting the material specifications described in this document shall be supplied, placed, and levelled to a depth of 760mm (30 inches) for an approximate total volume of 1,400 cubic metres (1,830 cubic yards) of new filter sand.

See cross-section of existing filter bed shown below in Figure 1.

The Work generally includes the following :

1. Remove and stockpile all existing filter sand media on plant property. Existing sand shall be spread and leveled in the open area to the north of the existing sand filters as directed by Minto staff.
2. All underlying support gravel layers shall remain in place.
3. Provide geotechnical analysis of proposed filter sand with analysis by an independent geotechnical laboratory. Sand must meet the specifications described below.
4. Supply, place, and level new filter sand to a minimum depth of 760mm (30 inches) across the entire footprint of all filter cells.

3. General Contract Requirements

The Contract unit price for filter sand shall include all equipment, materials and labour for the delivery, hauling, placement, spreading, and levelling of the specified sand filter media.

Should any sand sample not meet specifications, the Engineer and Owner reserve the right to require that the uncompliant filter media be removed from the site at the sole cost of the Contractor.

During the spreading and levelling activities, the Contractor shall make every effort to avoid compaction of the sand filter layer. Only track-mounted low ground pressure vehicles are allowed to work within the footprint of the filter beds.

Cost of testing the filter media shall be paid under the Contract with appropriate Contractor markups as per OPSS 100. The Contractor shall not be paid for any analysis where the sample tests fails to meet the specifications below.

Payment quantity shall be per the metric tonne of uncompacted material placed and spread. The Contractor shall provide all weight tickets to the Owner's for documentation.

4. Material Specifications

The sand filter media shall meet the following material specifications.

The sand filter media shall consist of primarily silica-based sand with low percentage (less than 50%) of calcareous (calcium carbonate based) materials and no organic materials. It shall have an effective size (D10) between 0.2 mm and 0.3 mm, effective size between 0.8mm and 1.2mm, and shall have uniformity co-efficient (Cu) less than 3. The grain size distribution curve for all filter sand shall fall within the lower and upper ranges shown on the attached grain size distribution curve shown below in Figure 2.

The Contractor shall arrange to have analyses of the sand filter media performed as directed by the Engineer. Analysis of the filter media shall be performed by an approved independent company and shall consist of the following information as a minimum.

- Grain size distribution analysis
- Percent organic material estimate
- Percent calcareous material estimate
- Effective grain size D10 , D30, and D60 (grain size that corresponds to 10%, 30%, and 60% of particles passing)
- Coefficient of Uniformity (Cu)
- Percolation Time (min/cm)

At least one (1) geotechnical analysis shall be performed for each filter cell (i.e. minimum total of 4 tests).

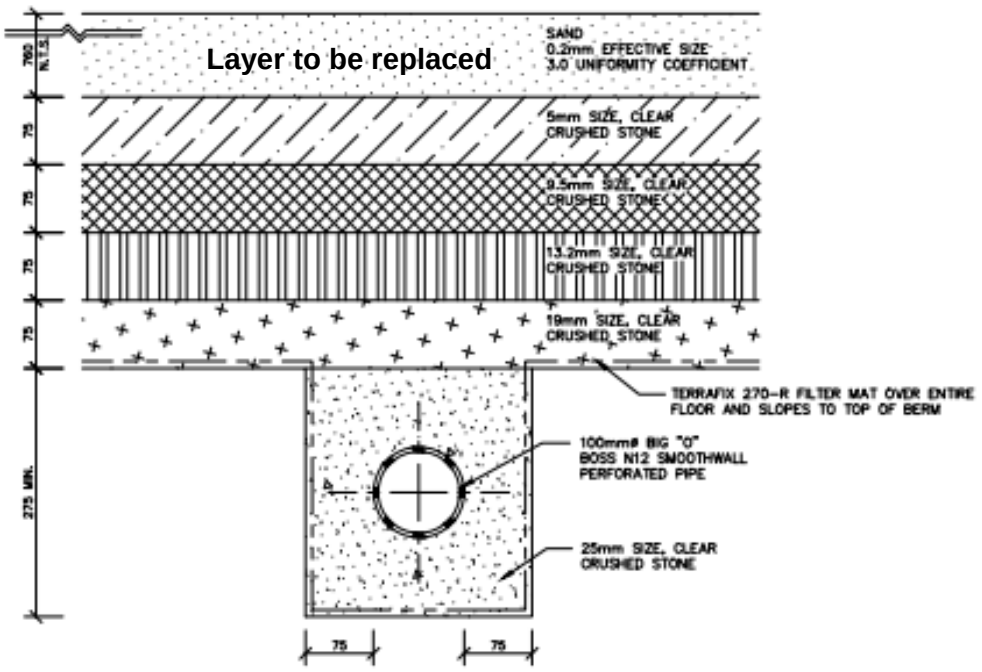

Figure 1. TYPICAL CROSS SECTION OF FILTER AND UNDERDRAIN

Figure 2. Grain Size Distribution Curves