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PRE-FINAL REMEDIAL ENGINEERING DESIGN NARRATIVE

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES COLESVILLE LANDFILL BROOME COUNTY, NEW YORK

Prepared For

BROOME COUNTY DIVISION OF SOLID WASTE MANAGEMENT

Broome County, New York

AND

GAF CORPORATION

Wayne, New Jersey

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Wehran–New York, Inc.
Middletown, New York

Environmental Engineers • Scientists • Constructors

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WAYNE, NEW JERSEY

Prepared by

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WE Project No. 02260.GT

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TABLE OF CONTENTS

Page Number

1.0 INTRODUCTION 1-1

1.1 SCOPE 1-1
1.2 PROJECT LOCATION 1-2
1.3 PREVIOUS STUDIES 1-2
1.4 DRAFT FINAL PLANS AND SPECIFICATIONS 1-2

2.0 GROUNDWATER TREATMENT SYSTEM 2-1

2.1 BASIS OF DESIGN 2-1
2.2 SYSTEM DESCRIPTION 2-2

2.2.1 Groundwater and Seep Sources 2-2
2.2.2 Treatment Process 2-2
2.2.3 Process Building 2-4

2.3 TREATMENT SYSTEM CONTROLS 2-4

3.0 EQUIPMENT DESCRIPTION 3-1

3.1 PRELIMINARY TREATMENT 3-1
3.2 FILTRATION SYSTEM 3-1
3.3 AIR STRIPPER SYSTEM 3-2
3.4 DEWATERING SYSTEM 3-2
3.5 CHEMICAL ADDITION SYSTEMS 3-4
3.6 MISCELLANEOUS SYSTEMS 3-6

4.0 RELATED DESIGN CONSIDERATIONS 4-1

4.1 HEATING 4-1
4.2 VENTILATION 4-1
4.3 AIR CONDITIONING 4-1
4.4 SITE DRAINAGE 4-1
4.5 SITE UTILITIES 4-1

4.5.1 Water 4-1
4.5.2 Sanitary Sewage Disposal 4-2
4.5.3 Electric 4-2

4.6 CONSTRUCTION SCHEDULES 4-2

TABLE OF CONTENTS

Page
Number

APPENDICES

Appendix A – Site Map
Appendix B – Process Flow Diagram
Appendix C – Groundwater Treatment System and Related Facilities
Colesville Landfill Process Equipment List

LIST OF TABLES

Table No.		Follows Page No.
1	Pre-Final Drawing List	1-2
2	List of Specification Sections	1-2
3	Flow-Weighted Average of Groundwater and Seep Contaminant Levels	2-1
4	Groundwater Flow Rates	2-2

LIST OF FIGURES

Figure No.		Follows Page No.
1	Site Location Map	1-2

1.0 INTRODUCTION

1.0 INTRODUCTION

1.1 SCOPE

This Engineering Design Narrative on the Groundwater Treatment System and related facilities addresses the basic design criteria used in the development of treatment processes required for the treatment of groundwater flows that are generated and collected from Colesville Landfill.

Based on the groundwater quantity and quality and the draft effluent limits developed by the New York State Department of Environmental Conservation (NYSDEC) for discharge to the North Stream, a draft final facility design for the leachate treatment system has been developed and is described in this report. Some elements of this draft final design may change based on comments from the New York State Department of Environmental Conservation (NYSDEC) before the final design submission.

The following topics are discussed in this report:

1. ***Groundwater Treatment System*** will provide the basis of design, including a summary of influent characteristics and effluent criteria for the treatment system. Effluent limitations and monitoring requirements are set by the NYSDEC. This section will describe the treatment system and controls.

2. ***Equipment Description*** will provide a listing of the process equipment to be used in the treatment system. Unit sizing, material data and electrical information are also provided.

3. ***Related Design Considerations***

    a. ***HVAC Systems*** provides the basis of design, and recommendation of certain systems.
    b. ***Foundation Analysis*** provides information on subsurface soil for the site of the treatment facility, and recommends a foundation for the proposed treatment system and related facilities.

1.2 PROJECT LOCATION

The Colesville Landfill is located in Broome County, New York. It is a Superfund site that has been the subject of a Remedial Investigation/Feasibility Study performed by Wehran-New York, Inc.

The proposed groundwater treatment system project is located just west of Colesville Landfill and east of Meadow Road (Figure 1). Appendix A shows a portion of the landfill, 15 collection wells, collection trenches, and the location of the treatment system.

1.3 PREVIOUS STUDIES

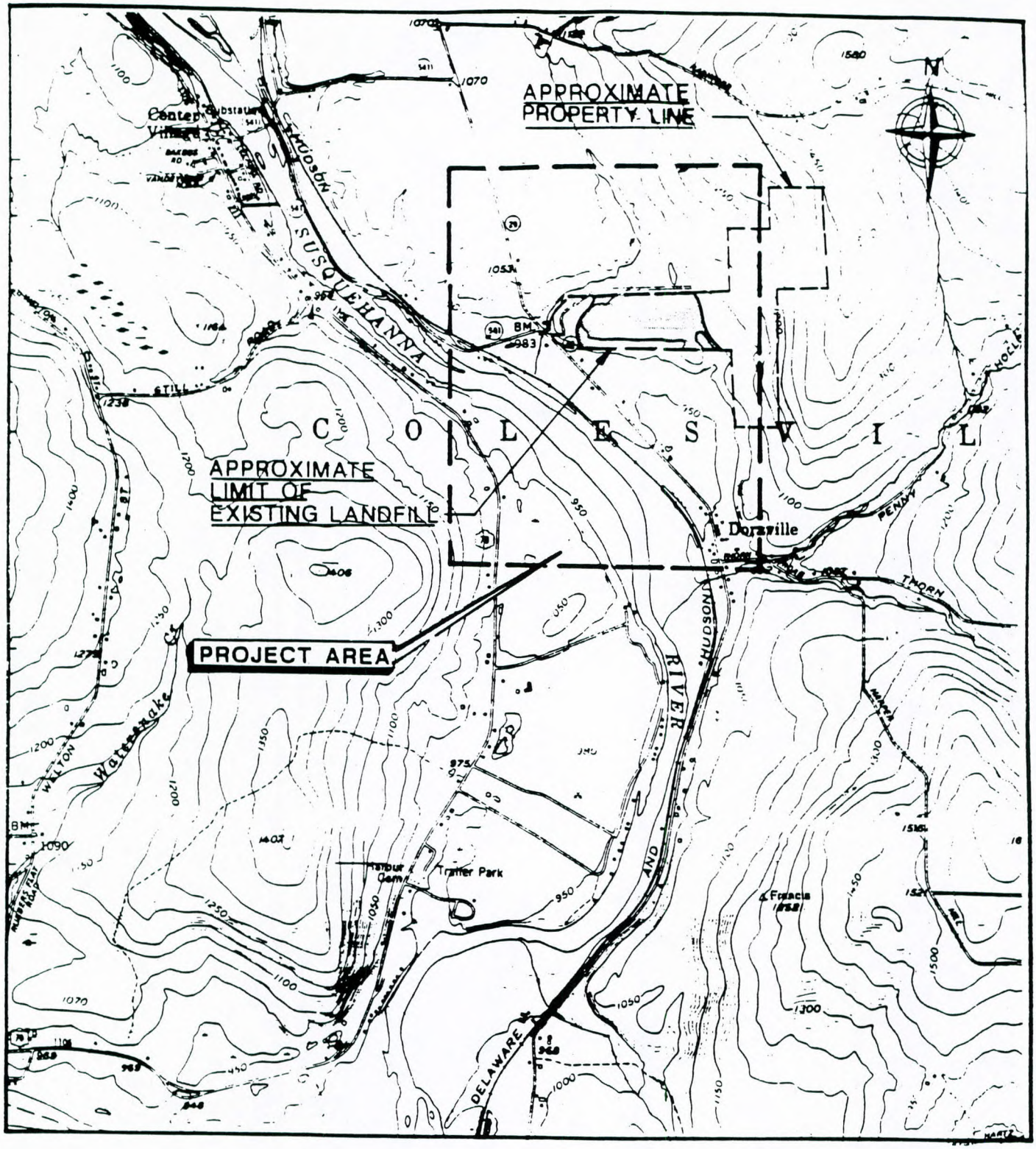
Previous studies for the remediation of the site include the following major components:

- Landfill capping
- Collect contaminated groundwater in the glacial outwash aquifer downgradient of the landfill using wells along the outside periphery of the landfill
- Seep collection
- Groundwater and seep treatment
- Discharge of treated effluent to surface water
- New water supply for affected residences

In May 1992, Wehran-New York, Inc. prepared the Colesville Landfill Remedial Design, Conceptual Design Report. The report was prepared to provide information for the present design effort and addressed: groundwater extraction system, groundwater and seep treatment processes required, treatment plant location and the effluent discharge location.

1.4 DRAFT FINAL PLANS AND SPECIFICATIONS

Table 1 provides a list of all of the anticipated drawings for the design. This phase of the project includes providing draft final engineering drawings, as shown in Table 1. This table shows the drawing number and title for the various engineering disciplines: site/civil, architectural, mechanical, and electrical. Table 2 provides an outline for all anticipated specification sections that will be included in the contract document. All



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TOPOGRAPHY TAKEN FROM
1957 AFTON, N.Y.
U.S.G.S. QUADRANGLE
7.5 MINUTE SERIES

SCALE: 1" = 2000'

FIGURE 1

SITE LOCATION MAP

WEHRAN ENGINEERING
CONSULTING ENGINEERS

TABLE 1

GROUNDWATER TREATMENT SYSTEM

AND RELATED FACILITIES

COLESVILLE LANDFILL

PREFINAL DRAWING LIST

COVER SHEET

SITE/CIVIL

SC-1 LANDFILL SITE PLAN

SC-2 TREATMENT PLANT SITE PLAN

SC-3 SOIL EROSION AND SEDIMENT CONTROL PLAN

SC-4 DETAILS

ARCHITECTURAL

A-1 PROCESS BUILDING FLOOR PLAN AND SCHEDULES

A-2 PROCESS BUILDING ELEVATIONS

STRUCTURAL

S-1 FOUNDATION PLAN

S-2 SLAB PLAN

S-3 EQUALIZATION TANK, SLAB AND FOUNDATION PLAN

S-4 CONCRETE DETAILS

MECHANICAL

M-1 PROCESS FLOW DIAGRAM AND HYDRAULIC PROFILE

M-2 PROCESS AND INSTRUMENTAITON DIAGRAM SHEET 1

M-3 PROCESS AND INSTRUMENTATION DIAGRAM SHEET 2

M-4 PROCESS AND INSTRUMENTATION DIAGRAM SHEET 3

M-5 PROCESS BUILDING EQUIPMENT PLAN

M-6 PROCESS BUILDING PIPING PLAN AND DETAILS

M-7 PROCESS BUILDING SECTIONS & DETAILS

M-8 EQUALIZATION TANK PLAN, SECTION & DETAILS

M-9 PLUMBING HVAC AND FIRE SUPPRESSION SYSTEMS

ELECTRICAL

E-1 SINGLE LINE DIAGRAM

E-2 ELECTRICAL SITE PLAN

E-3 POWER PLAN

E-4 LIGHTING PLAN

E-5 ELEMENTARY DIAGRAM

E-6 ALARM SYSTEMS

E-7 ELECTRICAL SCHEDULES

TABLE 2

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
TABLE OF CONTENTS FOR TECHNICAL SPECIFICATIONS (PRE-FINAL DESIGN)

Page Number

TECHNICAL SPECIFICATIONS

DIVISION 0 – BIDDING AND CONTRACT DOCUMENTS

Legal Notice . . . . . LN-1 – LN-2
Notice to Bidders . . . . . NTB-1 – NTB-2
Information for Bidders . . . . . IFB-1 – IFB-4
Exemption from Sales and Compensating Use Taxes . . . . . EFSCAT-1 – EFSCAT-2
Labor Rates L-1
Proposal . . . . . PG-1 – PG-10
Affirmative Action (MBE) . . . . . MBE-1 – MBE-10
Emerging Business Assistance Program . . . . . EBAP-1 – EBAP-2
Contractor's Qualification Statement . . . . . CQS-1 – CQS-6
Standard Form Construction Agreement . . . . . SFCA-1 – SFCA-2
General Conditions . . . . . GC-1 – GC-39

DIVISION 1 – GENERAL REQUIREMENTS

01010 – Summary of Work . . . . . 1 – 7
01027 – Applications for Payment . . . . . 1 – 3
01039 – Coordination and Meetings . . . . . 1 – 5
01041 – Project Coordination . . . . . 1 – 3
01050 – Field Engineering . . . . . 1 – 4
01090 – Reference Standards . . . . . 1 – 9
01300 – Submittals . . . . . 1 – 5
01311 – Network Analysis Schedules . . . . . 1 – 5
01340 – Shop Drawings . . . . . 1 – 4
01400 – Quality Control . . . . . 1 – 4
01410 – Testing Laboratory Services . . . . . 1 – 4
01500 – Construction Facilities and Temporary Controls . . . . . 1 – 8
01501 – Health and Safety Provisions . . . . . 1 – 7
01502 – Environmental Protection . . . . . 1 – 7
01590 – Field Offices and Sheds . . . . . 1 – 5

TABLE 2

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
TABLE OF CONTENTS FOR TECHNICAL SPECIFICATIONS (PRE-FINAL DESIGN)

	Page Number
01600 – Material and Equipment	1 – 4
01650 – Starting of Systems	1 – 2
01700 – Contract Closeout	1 – 5
DIVISION 2 – SITE WORK	
02110 – Site Clearing	1 – 3
02140 – Dewatering	1 – 3
02150 – Shoring and Bracing	1 – 5
02200 – Earthwork	1 – 9
02202 – Rock Removal	1 – 3
02222 – Excavation	1 – 5
02225 – Trenching	1 – 6
02226 – Geotextile Material	1 – 3
02228 – Waste Material Disposal	1 – 3
02271 – Stone Rip-Rap	1 – 2
02519 – Paving	1 – 4
02540 – Erosion and Sedimentation Control	1 – 3
02601 – Outside Piping and Appurtenances	1 – 25
02675 – Disinfection of Water Piping and Water Storage Facilities	1 – 5
02720 – Stormwater Systems	1 – 5
02831 – Chain Link Fences and Gates	1 – 5
02937 – Site Restoration	1 – 6
DIVISION 3 – CONCRETE	
03200 – Concrete Reinforcement	1 – 5
03300 – Cast-in-Place Concrete	1 – 13
03305 – Pre-Cast Roof Planks	1 – 3
03345 – Concrete Finishes	1 – 3
03346 – Concrete Floor Finishing	1 – 3
DIVISION 4 – MASONRY	
04220 – Concrete Unit Masonry	1 – 11

TABLE 2

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
TABLE OF CONTENTS FOR TECHNICAL SPECIFICATIONS (PRE-FINAL DESIGN)

Page Number

DIVISION 5 – METALS

05120 – Structural Steel . . . . . 1 – 6
05311 – Steel Roof Deck . . . . . 1 – 3
05500 – Metal Fabrications . . . . . 1 – 5
05510 – Metal Stairs . . . . . 1 – 6
05520 – Handrails and Railings . . . . . 1 – 4
05530 – Grating and Floor Plates . . . . . 1 – 3

DIVISION 6 – WOOD (NOT USED)

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

07160 – Dampproofing . . . . . 1 – 4
07200 – Insulation . . . . . 1 – 2
07600 – Flashing and Sheet Metal . . . . . 1 – 5
07900 – Joint Sealers . . . . . 1 – 6

DIVISION 8 – DOORS AND WINDOWS

08100 – Metal Doors . . . . . 1 – 4
08101 – Metal Frames . . . . . 1 – 5
08331 – Overhead Coiling Doors . . . . . 1 – 7
08520 – Aluminum Windows . . . . . 1 – 5
08712 – Door Hardware . . . . . 1 – 9

DIVISION 9 – FINISHES

09110 – Metal Stud System . . . . . 1 – 3
09260 – Gypsum Wallboard System . . . . . 1 – 6
09510 – Acoustical Ceilings . . . . . 1 – 4
09650 – Resilient Flooring . . . . . 1 – 4
09900 – Painting . . . . . 1 – 16
09999 – Cleaning . . . . . 1 – 3

TABLE 2

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
TABLE OF CONTENTS FOR TECHNICAL SPECIFICATIONS (PRE-FINAL DESIGN)

Page Number

DIVISION 10 – SPECIALTIES

10441 – Plastic Signs . . . . . 1 – 3
10522 – Safety and First Aid Accessories . . . . . 1 – 6
10800 – Toilet Room Accessories . . . . . 1 – 3

DIVISION 11 – EQUIPMENT

11110 – Collection System Equipment . . . . . 1 – 5
11115 – Equalization Tanks . . . . . 1 – 6
11120 – Metals Removal Equipment . . . . . 1 – 7
11130 – Sand Filtration Equipment . . . . . 1 – 9
11135 – Neutralization and Air Stripping Equipment . . . . . 1 – 8
11140 – Dewatering Equipment . . . . . 1 – 5
11145 – Chemical Feed Equipment . . . . . 1 – 7
11160 – Miscellaneous Process Equipment . . . . . 1 – 5

DIVISION 12 – FURNISHINGS (NOT USED)

DIVISION 13 – SPECIAL CONSTRUCTION

13012 – Pre-Engineered Metal Building . . . . . 1 – 12

DIVISION 14 – CONVEYING SYSTEMS (NOT USED)

DIVISION 15 – MECHANICAL

15050 – Process Piping and Valving . . . . . 1 – 11
15070 – Supports and Anchors . . . . . 1 – 4
15110 – Pumps and Appurtenances . . . . . 1 – 3
15180 – Piping Insulation . . . . . 1 – 3
15190 – Drainage Accessories . . . . . 1 – 4
15195 – Mechanical Identification . . . . . 1 – 3
15200 – General Provisions – Plumbing . . . . . 1 – 6
15210 – Water Supply Accessories . . . . . 1 – 3
15220 – Plumbing Piping . . . . . 1 – 11
15230 – Domestic Water Heater . . . . . 1 – 3

TABLE 2

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
TABLE OF CONTENTS FOR TECHNICAL SPECIFICATIONS (PRE-FINAL DESIGN)

	Page Number
15240 – Water Supply Pressure Tanks	1 – 3
15250 – Plumbing Fixtures and Trim	1 – 7
15410 – Fire Suppression System General Provisions	1 – 4
15460 – Dry Chemical Fire Suppression System	1 – 6
15620 – Infrared Unit Heaters	1 – 2
15784 – Air Conditioners	1 – 3
15860 – Centrifugal Fans	1 – 5
DIVISION 16 – ELECTRICAL	
16000 – General Provisions	1 – 6
16110 – Raceways and Fittings	1 – 6
16120 – Wires and Cables	1 – 4
16160 – Cabinets and Enclosures	1 – 3
16180 – Equipment Wiring Systems	1 – 3
16190 – Supporting Devices	1 – 2
16195 – Electrical Identification	1 – 3
16420 – Service Entrance	1 – 2
16440 – Disconnect Switches	1 – 3
16450 – Grounding	1 – 4
16470 – Panelboards	1 – 6
16472 – Power Distribution Panelboard (PDP)	1 – 2
16476 – Enclosed Circuit Breakers	1 – 3
16480 – Motor Control	1 – 4
16481 – Motor Control Center	1 – 5
16483 – Variable Frequency Drives	1 – 6
16510 – Lighting System	1 – 3
16515 – Control and Miscellaneous Devices	1 – 2
16535 – Emergency Lighting Equipment	1 – 4
16670 – Lightning Protection Systems	1 – 4
16721 – Fire Alarm and Smoke Detection Systems	1 – 6
16722 – Intrusion Detection and Security Access System	1 – 4
16741 – Telephone Service Entrance and Automatic Dialer	1 – 3
16900 – Heat Tracing	1 – 3
16902 – Electric Controls and Relays	1 – 5
16950 – Instrumentation	1 – 30

specification sections will be organized according to CSI format. Under this phase of the project, all treatment processes are determined, including process units sizing, layout of the process building, including chemical room, electrical room, office and other facilities located outside the building.

2.0 GROUNDWATER TREATMENT SYSTEM

2.0 GROUNDWATER TREATMENT SYSTEM

2.1 BASIS OF DESIGN

The basis of design for the groundwater treatment system is derived from previous studies completed on the Colesville Landfill site including groundwater generation and its characteristics, and the NYSDEC effluent limitations and monitoring requirements. The effluent limits and monitoring requirements issued by NYSDEC are shown in Table 3. Characteristics of the composite influent to the proposed treatment facility are also shown in Table 3. The design influent quality present in Table 3 is based on a conservative scale-up of the flow weighted average for each listed parameter. Based on the analysis, the parameters of concern for treatment are as follows:

Conventionals	*Volatile Organics*	*Metals*
TSS	Vinyl Chloride	Iron
TDS	1,1,Dichloroethane	Copper
Settleable Solids	Trichloroethene	Manganese
pH	Benzene	Zinc
D.O.	Chlorobenzene	
Hardness	Ethylbenzene Xylene (Total)	

The total recovery flow from the groundwater and seep sources necessary to achieve groundwater and seep containment at the site has been estimated through mathematical modeling to be 79 gpm. Taking into account model assumptions and effective scale-up safety factors, the design flow for the treatment system has been conservatively estimated to be 100 gpm.

A process flow diagram is presented in the Appendix B. A description of the treatment system, unit processes, and control characteristics are included in the following sections.

TABLE 3
COLESVILLE LANDFILL
FLOW WEIGHTED AVERAGE OF GROUNDWATER AND SEEP
CONTAMINANT LEVELS – COLESVILLE GROUNDWATER

PARAMETER	AVERAGE CONTAMINANT LEVEL	DESIGN INFLUENT QUALITY	DISCHARGE LIMITS
FLOW RATE (gpm)	79gpm	100gpm	180gpm
CONVENTIONAL PARAMETERS (mg/l Except Where Noted)			
Ammonia Nitrogen	0.57	1.0	1
BOD	8.36	15.0	15
COD	23.94	48.0	---
Suspended Solids	202.50	300.0	15 *
Dissolved Solids	258.11	300.0	500 *
Settleable Solids (ml/l)			0.1 *
pH (SU)	5.9-6.5	5.9-6.5	6.5-8.5 *
Dissolved Oxygen			7 *
Hardness (as CaCO3)	190.86	300.0	200 *
VOLATILE ORGANIC COMPOUNDS (ug/l)			
Vinyl Chloride	9.84	20.0	10 *
Chloroethane	3.83	8.0	10
Methylene Chloride	3.92	8.0	10
1,1-Dichloroethene	0.06	0.2	0.5
1,1-Dichloroethane	13.16	25.0	10 *
1,2-Dichloroethene (trans)	0.03	0.1	10
Chloroform	0.09	0.2	10
1,2-Dichloroethane	0.35	0.7	10
1,1,1-Trichloroethane	0.75	1.5	10
Trichloroethene	6.71	15.0	10 *
1,1,2-Trichloroethane	0.11	0.3	10
Benzene	3.60	7.0	6 *
Tetrachloroethene	0.08	0.2	10
Toluene	0.76	1.5	10
Chlorobenzene	16.82	30.0	5 *
Ethylbenzene	9.78	20.0	10 *
Xylene (Total)	43.04	85.0	10 *
Dichlorodifluoromethane	4.91	10.0	10
Trichlorofluoromethane	0.55	1.0	10
KETONES (ug/l)			
2-Propanone (Acetone)	7.37	15.0	20
2-Butanone	15.06	20.0	20
4-Methyl-2-Pentanone	0.69	1.5	20
2-Hexanone	BDL	BDL	---
METALS (ug/l)			
Arsenic	26.41	52.0	100
Barium	36.49	73.0	---
Iron	11,485.73	18,000.0	300 *
Lead	1.33	3.0	4
Copper	39	60.0	35 *
Magnesium	18405	28,000.0	35,000
Manganese	12008	18,000.0	300 *
Zinc	166	300.0	100 *

NOTES:

** PARAMETERS REQUIRING TREATMENT TO COMPLY WITH DISHARGE LIMITS*

BDL Below detection limit; counted as zero in average.

B Indicates substance also present in blank sample.

J Indicates quatified below method minimum detection limit.

2.2 SYSTEM DESCRIPTION

2.2.1 Groundwater and Seep Sources

The groundwater flow that will be intercepted and discharged to the treatment facilities is estimated to be 74 gpm collected from 15 wells as shown in Table 4. Three seeps are estimated to have a total flow rate of 5 gpm, for a total groundwater/seep flow rate of 79 gpm, say 80 gpm. Each source will discharge directly to the treatment building where flow will be indicated on rotameters before storage and equalization in the equalization tank.

2.2.2 Treatment Process

After collection, groundwater from each well will be conveyed to a groundwater equalization storage tank. The hydraulic retention time for the groundwater equalization tank is approximately nine hours including the anticipated process return flows. After equalization, the groundwater will flow by gravity to the metals precipitation process.

The precipitation process includes flash mixing, flocculation, and inclined plate sedimentation. In the first step of this process, the pH of the groundwater is raised to approximately 11.0 through the addition of a 50 percent solution of sodium hydroxide in a caustic mix tank. This is a carbon steel tank with a hydraulic detention time of approximately 14 minutes. Flash mixing would be applied for approximately 1 minute, while flocculation would be applied for 10 minutes. Polymer will be added to a rapid-mix polymer addition tank before the flocculation tank. The unit is designed to precipitate suspended solids from a 100 gpm groundwater feed stream containing approximately 475 ppm total suspended solids. The flash mixer will be a fixed speed propeller-type mixer with a hollow shaft gear reducer. The plate settlers are removable FRP, and continuous PVC I-beam stiffeners will run the full length of each plate. The flocculator mixer will be a variable slow-speed mixer comprised of a paddle-type mixer with a hollow shaft gear reducer.

The inclined plate separator is designed to remove flocculated solids and concentrate the solids to a sludge of approximately two percent solids.

The sand filtration system will consist of a 16-compartment traveling bridge dual media filter. The sand filtration unit will have the capacity to filter suspended solids from a peak flow of 120 gpm of a groundwater feed stream containing approximately 20 ppm

TABLE 4
COLESVILLE LANDFILL REMEDIAL DESIGN
ENGINEERING DESIGN NARRATIVE
GROUNDWATER FLOW RATES

Wells	***Flow Rate (GPM)***
PW-1	1.0
PW-2	1.0
PW-6	1.0
PW-7	7.5
PW-9	10.0
PW-10	10.0
PW-12	1.0
PWT-1	5.5
PWT-2	2.0
PWT-3	5.5
PWT-4	10.0
PWT-5	2.0
PWT-6	2.0
PWT-7	5.5
PWT-8	10.0
Total	***74.0***

TSS from the clarifier. Based on 60 square feet of total filtration area, the maximum loading rate shall be 2 gpm square feet. In this unit, only a small portion of the total filter bed is backwashed at any time, allowing for longer effective filtration. Backwash water is drawn up through the filter cell from a filtered water plenum beneath the filter cells. This eliminates the need for a large, dedicated clear well, as well as the associated large backwash pumps, piping, and valving. this system also generates low backwash water return rates, thereby reducing the equalization capacity required for attenuating the recycle of this waste stream to the head of the treatment system. The pH of the effluent from the sand filtration system will be adjusted by the addition of sulfuric acid to approximately 7.0 in a separate neutralization tank.

The effluent from the neutralization tank will flow by gravity to a multi-stage diffused bubble aeration system air stripper. The selected air stripper is to be a low-profile PT12 as manufactured by Lowry Engineering or equal, which fits well into the hydraulic profile of the treatment facility and avoids the need for intermediate pumping. The pretreatment steps upstream of the aeration process will mitigate scaling and iron fouling within the air stripper.

The air stripper will be acquired as a package complete with blower and air filter, air and water manifold, discharge pipe and all connecting fittings. Three regenerative type blowers will be provided, each sized to deliver 200 cfm. The system will utilize two blowers (400 cfm) and one blower is provided as backup.

The effluent from the air stripper will flow by gravity to an effluent channel where flow will be metered before leaving the treatment plant and discharge into the North Stream. The flow will be continuously recorded in order to meet the daily flow measurement requirement. The North Stream is a waterway northwest of Colesville Landfill and referred to by NYSDEC as Tributary 120. Tributary 120 has a Fresh Surface Water Classification of C and Water Quality Standard of C(T). The C(T) means that the tributary is a trout waterway.

The chemical feed tanks for caustic, polymer, and acid were sized to provide for up to four days of unattended operation.

Precipitated sludge from the inclined plate sedimentation tank will be conveyed to a sludge thickener tank and then dewatered in a plate and frame filter press. The sludge thickening unit will be a 20,000 gallon steel tank with a continuously-driven rake system

to ensure consistent sludge solids content. Sludge will be removed on a batch basis. In pressure filtration, the liquid is forced through the filter medium by a positive pressure. The filter press operates by pumping sludge between plates that are covered with filter cloth. The liquid seeps through the filter cloth, leaving the solids behind between the plates. When the spaces between the plates are filled, the treatment plant operator separates the plates and removes the solids.

2.2.3 Process Building

The overall project scope includes the construction of 4,500 square foot pre-engineered metal process building. The process building will consist of a main process area and separate rooms for chemical storage, an office/control room, electrical room, and restroom.

The main process area will contain process equipment, including the equipment for metals precipitation, sand filtration, air stripping, sludge dewatering, the effluent channel pumps, piping and valving.

2.3 TREATMENT SYSTEM CONTROLS

The treatment process will be operated by a part-time operator who will be at the site approximately twice per week to dewater sludge and inspect the system. The operator will also be on site during chemical deliveries. The proposed control system will, therefore,be automatic and it will be hard-wired. It will consist of the following components:

- Field instruments
- Central control panel
- Control relays and master terminal cabinet
- Clean, uninterruptible power system (UPS)
- Variable frequency drive units and associated isolation transformer

Various hard-wired interlocks will be in place to start and stop the pumps, open and close control valves, and annunciate alarms in order to provide safe, automatic, and efficient operation and effluent quality consistent with the required effluent limits.

The flow controller can be set to maintain a continuous flow of up to approximately 100 gpm. The flow set point will control the feed pumps and chemical feed systems for the precipitation process.

The influent groundwater flow rate will be used to automatically control the addition rate of caustic and polymer. A pH controller element within the caustic mixing tank will monitor pH levels This will, in turn, control caustic addition accordingly to maintain a pH close to 11.0 within the caustic mixing tank to ensure that a pH close to 11.0 is achieved. A pH controller element within the neutralization tank will, similarly, provided to control acid addition to maintain a pH of 7 in that tank.

The office room will house the control system, all variable frequency drive units, and the operator's desk.

Controllers, recorders, totalizers, indicating lights, hand control switches, annunciators, horns, pushbuttons, etc., will be mounted on the central control panel. Where local control panels are used, they will be installed adjacent to the associated equipment. All field wiring will be terminated in terminal strips.

The control relay panel and master terminal cabinet will be located in the motor control center (MCC) room (electrical room). The relays will be for interlock operation; the wiring from various panels/locations will be terminated in terminal strips.

All instrument wiring will be in conduits. Separate conduits will be provided for low power (4 to 20 mA) signals, and for 120V AC signal/power wiring.

3.0 EQUIPMENT DESCRIPTION

3.0 EQUIPMENT DESCRIPTION

This section describes equipment for various unit processes and chemical feed systems. A complete listing of equipment is shown in Appendix C.

3.1 PRELIMINARY TREATMENT

- ***Equalization/Storage Tank*** – Groundwater will be pumped to a groundwater equalization tank with a capacity of 60,000 gallons. In addition, anticipated process return flows (approximately 10,000 gpd) will be directed to this equalization tank. The effective hydraulic detention times for the groundwater equalization tank would then be approximately 9 hours.

- ***Metals Removal System*** – The design includes two rapid mixing tanks for caustic and polymer, a flocculation tank and an inclined plate separator. Caustic slurry and polymer will be added at the mixing tanks. The caustic addition will raise influent pH to 11.0 to precipitate the heavy metals of concern. One inclined plate separator will be 172 " x 60" x 160" high. All mixers will be single phase.

- ***pH Adjustment (Neutralization) Tank*** – One fiberglass tank with a 1,654-gallon capacity is included in the design. A mixer bracket and a mixer platform are to be included as standard with the tank. The pH of the effluent from the sand filter will be adjusted to 7 from a pH of 11 by the addition of concentrated sulfuric acid. The mixer motor will be single phase.

3.2 FILTRATION SYSTEM

The filtration unit will be an automatic traveling bridge, dual media filter with 16 discreet filter beds within a single common tank. The filter will have a loading rate of 2 gpm/ft^2, and a backwash rate of 20 gpm/ft^2. The filter will be fabricated of ASTM A36 steel plate, and will include a continuous backwash trough sloped to a common end, and

a continus plenum of filtered water beneath the filter compartments, which is to be used as the backwash water supply wet well.

Principal items included with this system are:

- Filter tank and media
- Traveling bridge with grating and handrails
- Backwash pump (1.5 HP), surfash wash pump (1.5 HP), and drives
- Backwash hood with electromechanical activator system
- Pre-wired control panel
- Factory-programmed solid state controller

3.3 AIR STRIPPER SYSTEM

The air stripper system will consist of a single aeration vessel which will be constructed of high density polyethylene of an average wall thickness of 0.25 inch. The vessel will have a detachable lid fastened to the body by stainless steel quarter-turn catches. The vessel will be divided into 16 stages by polyethylene and stainless steel dividers. The aerators within the vessel will be fabricated of PVC in a manifold and lateral configuration. The manifold will be 3/8-inch in diameter, and the lateral orifices will be 0.04-inch in diameter.

Air will be delivered to the vessel by two blowers, each rated at 200 gpm. Each blower will be a 1-phase, 230 volt, and of a regenerative type. Three such blowers will be provided.

3.4 DEWATERING SYSTEM

The system being provided under this design is designed to dewater the sludge resulting from the metals removal system prior to the off-site disposal of this material. Descriptions of the dewatering system components are as follows:

- ***Sludge Transfer Pump*** – One pump for transferring sludge from the aerated sludge storage tank to the filter press day tank is included in the design. Each pump shall be a double diaphragm air-actuated pump with a capacity of 23 gpm against a discharge pressure of 45 psig, at an air supply pressure of

60 psig and an air consumption of 20 scfm. Pump construction materials will be cast iron with neoprene elastomers. Includes pressure regulator, lubricator, and muffler.

- ***Metal Sludge Thickener*** - The sludge thickener will be 15 feet in diameter by 15 feet high and manufactured from carbon steel (providing approximately 4 days solids retention time). The tank will include a 0.5 HP drive motor for the rake drive. Metal sludge from the inclined plate separator will be discharged to the metal sludge thickener tank, then to the sludge day tank by a metals sludge transfer pump similar to the sludge transfer pump described above and, finally, to the plate and frame press.

- ***Filter Press Day Tank*** – The design includes one 7-foot, 6-inch diameter by 9-foot, 11-inch straight side carbon steel tank with flat bottom, access cover and mixer mounting flange. It's capacity will be 3,250 gallons.

- ***Filter Press Day Tank Mixer*** – The filter press day tank will have one mixer with a 1-1/2-inch diameter by 108-inch shaft of 316 stainless steel. The mixer will have a 15.1-inch diameter, 316 stainless steel axial flow impeller. The mixer motor will be single phase.

- ***Filter Press Feed Pump*** – The design includes one pump for transferring solids from the day tank to the filter press. The pump will be a double diaphragm air-actuated pump with a capacity of 47 gpm against a discharge pressure of 50 psi at an air supply pressure of 60 psig and an air consumption of 40 scfm. Pump construction materials will be cast iron with neoprene elastomers, and the pump assembly will include pressure regulator, lubricator, and muffler.

- ***Filter Press*** – One plate and frame filter press with an installed capacity of 26 cubic feet will be provided. The filter press being provided with this design

is sized to undergo an average of two operating cycles per 8-hour day. Appurtenant items that are included as part of the filter press are:

- Platform (3 sides)
- Safety cords on both sides
- Splash drapes
- Power pack
- Automatic plate shifter
- Reinforced cloth

3.5 CHEMICAL ADDITION SYSTEMS

- ***Caustic Slurry Tank*** – The tank will be 1,500 gallons constructed from A-36 steel, sized to be 7 feet diameter by 7 feet, 7-inch side height. The tank will be provided with 316 stainless steel mixer, 1-3/4 HP, 1,800 RPM, single phase.

- ***Caustic Slurry Pump*** – The pump will be a hydraulically actuated diaphragm pump, 1/2 HP, 7,500 rpm, single phase, with a capacity of 4 to 40 gph.

- ***Polymer Tank*** – The design includes one polymer tank for storage and mixing. The tank shall be of 270 mil polyethylene with painted carbon steel stand, and have a minimum capacity of 100 gallons. Tank will be equipped with mixer having 316 stainless steel shaft and propeller. The motor will be single phase.

- ***Polymer Pumps*** – Each pump will have a capacity of 0 to 3 gph at 40 psi. Pump motors will be single phase.

- ***Acid Pump*** – Acid feed consists of one pump (hydraulically actuated diaphragm) for the addition of acid to the pH adjustment tank. Acid will be pumped directly from its shipping container. Pump capacity shall range from 0 to 3 gph. Pump will receive a 4 to 20 mA signal from pH controller. Motor will be single phase.

3.6 MISCELLANEOUS SYSTEMS

- ***Air Compressor*** – One tank mounted duplex reciprocating air compressor with a rated output of 300 cfm at 125 psig, shall be provided. The unit will be powered by a single phase motor.

- ***Building Drains Sump and Pumps*** – A concrete sump with two submersible pumps shall be provided. Each unit is to be provided with a single phase, explosion-proof motor. Each pump shall be capable of pumping 100 gpm at 50 feet TDH and 300 gpm at 38 feet TDH. Sump pumps will discharge to the equalization tank at the head of the plant.

4.0 RELATED DESIGN CONSIDERATIONS

4.0 RELATED DESIGN CONSIDERATIONS

4.1 HEATING

The heating system will be based on electric resistance heater in the office, chemical room, electrical room and restroom, and a propane gas-fed infra-red heater for the process area. The propane gas supply for the heaters will be obtained from a storage tank located outside the building. The design conditions will be winter outside dry-bulb 0°F, and winter inside dry-bulb of 78°F, 55 percent relative humidity.

4.2 VENTILATION

Ventilation will be provided through louvers and exhaust fans. Ventilation will be based on 12 air changes per hour for process areas. Alternatively, a system of two-speed ventilation with a higher initial ventilation rate and automatic switch over to lower rate may be used to conserve heat.

Ventilation for office/control room, electrical room, laboratory, bathroom, mechanical room, and maintenance area shall be as required by code.

4.3 AIR CONDITIONING

Air conditioning will be provided in the office area. The air conditioning unit will be a self-contained, through-wall type with a minimum cooling capacity of 8,100 BTU.

4.4 SITE DRAINAGE

Drainage from the process building roofs and the developed site will be directed to a swale for surface discharge.

4.5 SITE UTILITIES

4.5.1 Water

Water supply for domestic use and fire fighting capability is not available. A 3,000-gallon water storage tank will be installed to provide water for domestic use and dilution water for the polymer system.

WHERE WILL WATER FOR THIS TANK COME FROM? TRUCKED IN? EXPENSIVE FOR PROCESS WATER.

4.5.2 Sanitary Sewage Disposal

While the Groundwater Treatment Facility will operate continuously (24 hours per day), it will employ approximately 1 employee on a 2- to 3-day per week basis. An electric toilet will be included in the construction of the treatment facility.

Process area drains and laboratory drains will be conveyed to the head of the treatment facilities (equalization tank) for treatment along with the groundwater flows.

4.5.3 Electric

4800 volt, 600 amp single-phase electrical service will be supplied to the site by New York State Electric and Gas (NYSEG).

4.6 AIR EMISSIONS

The aeration tank will be provided with a dedicated vent line which will discharge at the roof. Based on the influent VOC concentrations, groundwater flow rate and air stripper characteristics, control of air emissions from the stripper is not required. In accordance with the Draft New York State Air Guide-1 (1991 Edition), the maximum annual impact and short-term impact are well within the Annual Guideline Concentration (AGC) and Short-Term Guideline Concentration (SGC), respectively, for the Hiogh Toxicity Air Contaminants (benzene and vinyl chloride), as shown below.

Because the stack height (hs) will be less than 2.5 times the building height (h_b), plume rise need not be considered and the effective stack height (h_e) will equal the actual stack height ($h_{s)}$ from ground elevation. The stack height (he), for the purposes of the following calculations, will be the same height as the building (24 feet).

The worst case emission rates, ie., 100 percent stripping, for benzene and vinyl chloride (at 7 ug/l and 20 ug/l in the influent, respectively) at a 100 gpm groundwater flow rate, is 3.5×10^{-4} amd 1×10^{-3} lb/hr for benzene and vinyl chloride, respectively.

- Annual Impact:

$$c_p = \frac{4218\ Q}{h_e^{2.16}}$$

Where C_p = maximum potential annual impact, ug/m^3

Q = contaminant emission rate, lb/hr

h_e = stack height, ft

- benzene (AGC = 0.12)

$$C_p = \frac{4218 \times 10^{-3}}{24^{2.16}} = 0.0044$$

- vinyl chloride (AGC = 0.02)

$$C_p = \frac{4218 \times 3.5 \times 10^{-4}}{24^{2.16}} = 0.0015$$

In both cases, C_p <AGC,

- Short-Term Impact $C_{st} = 420\ C_p$
  - benzene (SGC) = 30)

$$C_{st} = 420 \times 0.0044 = 1.848$$

  - vinyl choride (SGC = 1300)

$$C_{st} = 420 \times 0.0015 = 0.63$$

In both cases, C_{st} <SGC. Consequently, no air emission controls are deemed to be necessary for the air stripper treatment unit described below.

Emissions from other process equipment would be vented through the building's ventilation system.

4.7 CONSTRUCTION SCHEDULES

A. Contractor shall prepare network analysis diagrams using the Critical Path Method, under concepts and methods outlined in AGCs "The Use of CPM in

Construction – A Manual for General Contractors and the Construction Industry."

B. Contractor shall provide diagrams to illustrate an interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Contractor shall illustrate complete sequence of construction by activity, identifying work of separate stages. The Contractor shall provide dates for submittals, including those for Owner-furnished items, and return of submittals; dates for procurement and delivery of critical products; and dates for installation and provision for testing. The Contractor shall provide a legend for symbols and abbreviations used on the network analysis diagrams.

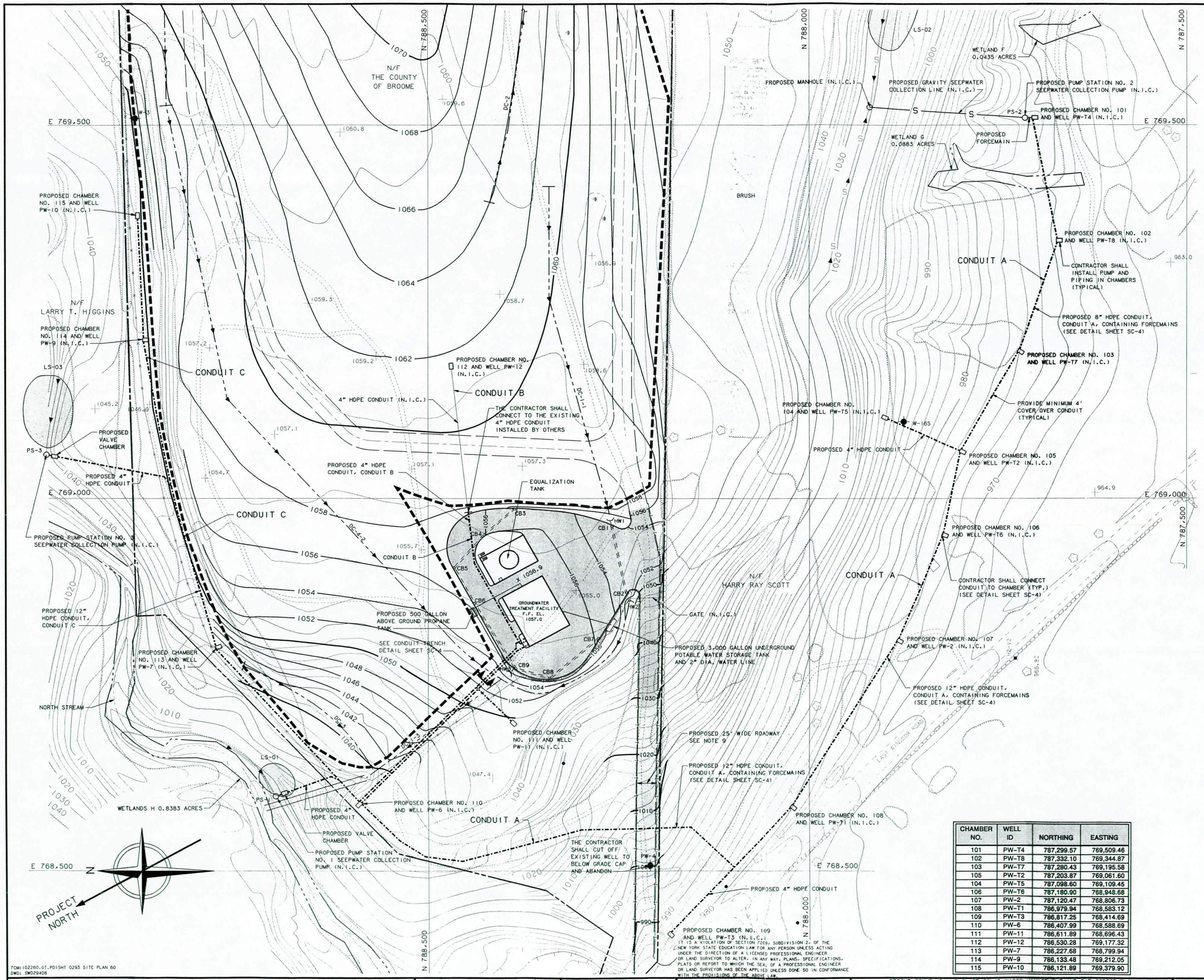
D. Contractor shall tabulate each activity of detailed network diagrams, using calendar dates, and identifying for each activity:

1. Preceding and following event numbers.
2. Activity description.
3. Estimated duration of each activity, on maximum 15-day intervals.

E. The duration of construction activity is estimated to be 8 months, including 1 month of initial startup and operations.

APPENDICES

APPENDIX A
SITE MAP



LEGEND:

- EXISTING WOODS
- 960 — EXISTING GROUND SURFACE ELEVATION CONTOUR (IN FEET, MSL)
- EXISTING ROADWAY
- EXISTING STREAMS/WATER BODIES
- 1064.7 — EXISTING SPOT ELEVATION
- PROPOSED CHAMBER AND PUMPING WELL (N.I.C.)
- W-1 — MONITORING WELL/PILOT WELL
- TP-1 — TEST PIT
- PROPERTY BOUNDARY
- APPROXIMATE LIMIT OF LANDFILL
- DC-3 — PROPOSED DRAINAGE SWALE (N.I.C.)
- 1050 — PROPOSED CONTOUR
- PROPOSED PAVEMENT AND CONCRETE CURBING
- WETLAND LIMIT
- LS-03 — APPROXIMATE SEEP LOCATION
- S — SEEP COLLECTION LINE (N.I.C.)
- PS-1 — PUMP STATION (N.I.C.)
- PERIMETER FENCE (N.I.C.)
- S — GRAVITY SEEPWATER COLLECTION LINE (N.I.C.)
- EXISTING UTILITY POLE
- CBI — PROPOSED STORMWATER CULVERT AND CATCH BASIN
- PROPOSED GUARDRAIL

NOTES:

1. TOPOGRAPHIC MAPPING WAS PREPARED PHOTOGRAMMETRICALLY BY R.M. KEDDALL ASSOCIATES FROM AERIAL PHOTOGRAPHY DATED 12-31-91.
2. TOPOGRAPHIC MAPPING CONTROL IS BASED UPON U.S.G.S. DATUM OF 1929. ELEVATIONS WITHIN THE LANDFILL LIMIT HAVE BEEN FIELD VERIFIED.
3. PROPERTY LINE LOCATION BASED UPON FIELD SURVEY PERFORMED NOVEMBER 1992.
4. LIMITS OF LANDFILL SHOWN ON THIS PLAN ARE FROM INTERPRETATION OF AERIAL PHOTOGRAPHY SUPPLIED BY BROOME COUNTY AND FIELD VERIFIED BY FIELD TEST PIT PROGRAM PERFORMED JULY 22, 1992 THROUGH JULY 24, 1992.
5. THE LOCATION OF ALL MONITORING WELLS, BORINGS, PIEZOMETERS, STAFF GAUGES AND TEST PITS ARE BASED UPON FIELD SURVEY.
6. GRID COORDINATES SHOWN HEREON ARE BASED UPON NEW YORK STATE PLANE COORDINATE GRID SYSTEM.
7. PROPOSED CONTOURS WITHIN THE LIMITS OF THE LANDFILL REPRESENT TOP OF THE FINAL COVER OF THE LANDFILL. (N.I.C.)
8. THE INSTALLATION OF THE PUMPING WELLS IS NOT IN THIS CONTRACT.
9. EXISTING ROADWAY TO BE REGRADED TO ACHIEVE AN AVERAGE GRADE OF APPROXIMATELY 13.3 PERCENT AND WIDENED TO 25 FEET AND PAVED AS PER DETAIL SHOWN ON SHEET SC-4.
10. FORCEMAINS SHALL BE INSTALLED IN CONDUITS 'A','B' AND 'C'. FORCEMAIN SIZES AND CONFIGURATIONS FROM VALVES AND PUMP STATIONS ARE SHOWN ON PROCESS AND INSTRUMENTATION DIAGRAM, SHEETS M-2, M-3 AND M-4.
11. CHAMBER NUMBERS ASSIGNED TO THE GROUNDWATER RECOVERY WELLS CORRESPOND TO NUMERICAL PORTION OF THE TAG NUMBERS FOR THE ASSOCIATED GROUNDWATER COLLECTION PUMPS.
12. INSTALLATION OF ALL GROUNDWATER COLLECTION PUMP, TRENCHING, FORCEMAINS, CONDUITS AND ELECTRICAL WORK ARE INCLUDED IN THIS CONTRACT. IN ADDITION SEEPWATER COLLECTION FORCEMAINS AND APPURTENANCES INCLUDING ATTACHMENTS FOR PUMPS AT PUMP STATIONS, SHALL BE INSTALLED UNDER THIS CONTRACT. THE INSTALLATION OF SEEPWATER COLLECTION PUMPS ARE NOT INCLUDED IN THIS CONTRACT.
13. PROVIDE CHECK VALVE AND BALL VALVE ON PUMP STATION NO. 2 FORCEMAIN IN CHAMBER NO. 101.
14. PROVIDE AN AIR RELEASE VALVE AT LOCAL HIGH POINTS ON FORCEMAINS, TO INCLUDE AT CHAMBER NO. 104, CHAMBER NO. 113 AND CHAMBER NO. 114.

CHAMBER NO.	WELL ID	NORTHING	EASTING
101	PW-T4	787,299.57	769,509.46
102	PW-T8	787,332.10	769,344.87
103	PW-T7	787,280.43	769,195.58
105	PW-T2	787,203.87	769,061.60
104	PW-T5	787,098.60	769,109.45
106	PW-T6	787,180.90	768,948.68
107	PW-2	787,120.47	768,806.73
108	PW-T1	786,979.94	768,583.12
109	PW-T3	786,817.25	768,414.69
110	PW-6	786,407.99	768,588.69
111	PW-11	786,611.89	768,696.43
112	PW-12	786,530.28	769,177.32
113	PW-7	786,227.68	768,799.94
114	PW-9	786,133.48	769,212.05
115	PW-10	786,121.89	769,379.90

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B	3/26/93	PREFINAL SUBMITTAL TO DEC	MOH	3/26/93
A	3/22/93	CLIENT REVIEW COMMENTS	MOH	3/22/93

7CM:102260.GT.PDISHT 0293 SITE PLAN 60
DWG: SW029408

WehranEnviroTech
Wehran-New York, Inc.

	DATE
DESIGN BY: KMP/PRF	3/93
DRAWN BY: DBT	3/93
CHECKED BY: MOH	3/93
SUPV. BY: MOH	3/93
APP'VD BY: AKM	3/93

Scales
60 0 60
SCALE IN FEET

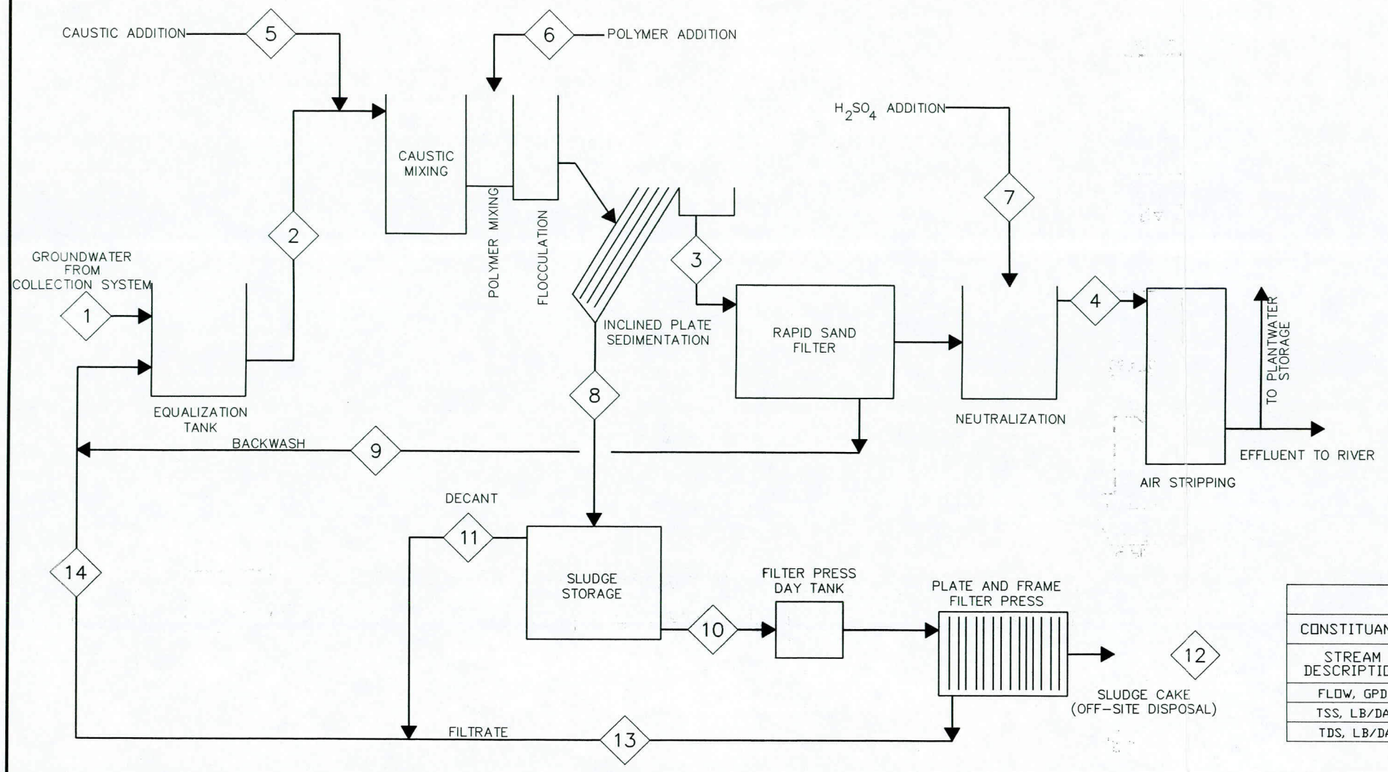
AZIZ K. MUREEBE, P.E.
N.Y.P.E. Lic. No. 50567 Date

BROOME COUNTY DIVISION OF SOLID WASTE MANAGEMENT AND GAF CORPORATION
COLESVILLE LANDFILL
GROUNDWATER TREATMENT PLANT AND RELATED FACILITIES
TOWN OF COLESVILLE BROOME COUNTY NEW YORK

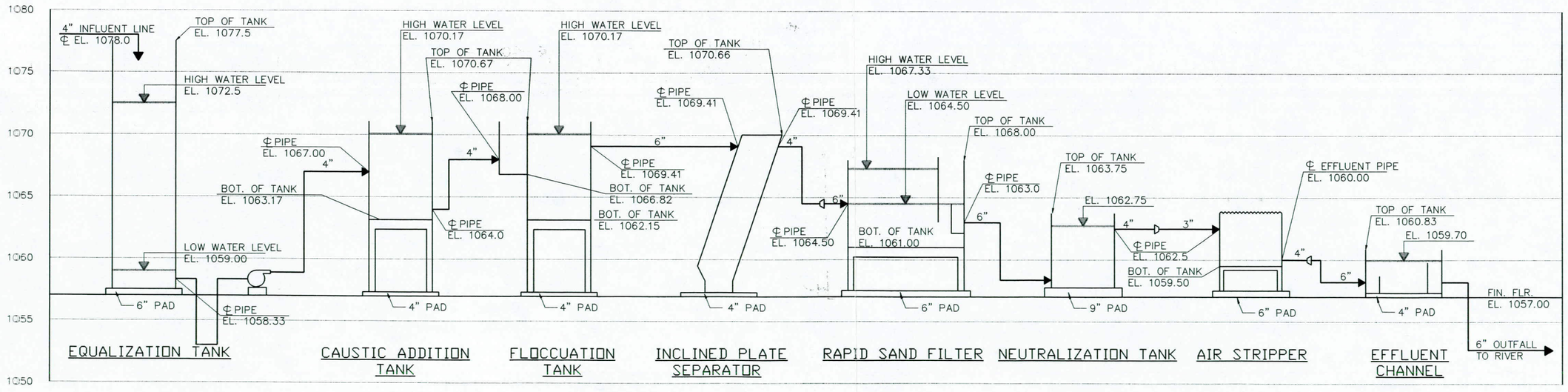
SITE/CIVIL
LANDFILL SITE PLAN

Sheet SC-1 Rev B
Project No. 02260 GT

APPENDIX B
PROCESS FLOW DIAGRAM



FLOW DIAGRAM
NOT TO SCALE



HYDRAULIC PROFILE
SCALE: HORIZ. : N.T.S.
VERT.: 1"=50'

MATERIAL BALANCE

CONSTITUANTS	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
STREAM DESCRIPTION	INFLUENT	INFLUENT & SIDESTREAMS	METALS REMOVAL EFFLUENT	RAPID SAND FILTER EFFLUENT	CAUSTIC	POLYMER	H_2SO_4	SLUDGE	BACKWASH	SLUDGE TO PRESS	DECANT	SLUDGE CAKE	FILTRATE	FILTRATE & DECANT
FLOW, GPD	144,000	163,390	158,774	143,966	122	58	23	4,796	14,831	2,398	2,398	237	2,161	4,559
TSS, LB/DAY	360	–	–	–	–	–	–	800	–	760	40	–	–	40
TDS, LB/DAY	360	–	–	–	–	–	–	–	–	–	–	–	–	–

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A	3/22/93	CLIENT REVIEW COMMENTS	MOH	3/22/93

Wehran EnviroTech

		DATE
DESIGN BY:	PRF	3/15/93
DRAWN BY:	FDG	3/15/93
CHECKED BY:	PRF	
SUPV. BY:	MOH	
APP'VD BY:	AKM	

Scales: AS NOTED

AZIZ K. MUREEBE, P.E.
N.Y.P.E. Lic. No. 50567 DATE

BROOME COUNTY DIVISION OF SOLID WASTE MANAGEMENT AND GAF CORPORATION
COLESVILLE LANDFILL
GROUNDWATER TREATMENT PLANT
AND RELATED FACILITIES
TOWN OF COLESVILLE BROOME COUNTY NEW YORK

MECHANICAL
PROCESS FLOW DIAGRAM
AND HYDRAULIC PROFILE

Sheet M-1 Rev B
Project No. 02260-GT

FDG: \WEHRAN\02260-GT\BC-M-01.DWG

APPENDIX C
GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL PROCESS EQUIMENT LIST

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

1. Collection System Equipment
   A) Groundwater Collection Pumps (P-101 & P-102)
   B) Groundwater Collection Pumps (P-103)
   C) Groundwater Collection Pumps (P-104 through P-107)
   D) Groundwater Collection Pumps (P-108, P-109 and P-113)
   E) Groundwater Collection Pumps (P-110, P-111 & P-112)
   F) Groundwater Collection Pumps (P-114, P-115)
   G) Seepwater Collection Pumps (P-116 & P-118)
   H) Seepwater Collection Pumps (P-117)

2. Equalization Equipment
   A) Equalization Tank (T-110)

3. Metals Removal Feed Equipment
   A) Metals Removal Feed Pumps (P-201 & P-202)

4. Metals Removal Equipment
   A) Caustic Addition Tank (T-210)
   B) Caustic Addition Tank Mixer (A-211)
   C) Polymer Addition Tank (T-220)
   D) Polymer Addition Tank Mixer (A-221)
   E) Flocculation Tank (T-230)
   F) Flocculator Drive (A-231)
   G) Inclined Plate Separator (PS-240)
   H) Metals Removal Sludge Pump (P-241)
   I) Sludge Thickening Tank (T-610)
   J) Sludge Thickening Tank Drive (A-612)

5. Chemical Feed Equipment
   - A) Caustic Storage Tank (T-211)
   - B) Caustic Feed Pump (P-212)
   - C) Caustic Containment Tank (T-212)
   - D) Polymer Mixing Tank (T-221)
   - E) Polymer Mixing Tank Mixer (A-222)
   - F) Polymer Feed Pump (P-223)
   - G) Acid Storage Tank (T-411)
   - H) Acid Feed Pump (P-412)
   - I) Acid Containment Tank (T-412)

6. Filtration Equipment
   - A) Rapid Sand Filter (F-310)
   - B) Surface Wash Pump (P-311)
   - C) Backwash Pump (P-312)
   - D) Surface Wash Transfer Pump (P-313)
   - E) Travelling Bridge Drive (BD-314)
   - F) Hood Lift Drive (HD-315)

7. Neutralization Equipment
   - A) Neutralization Tank (T-410)
   - B) Neutralization Tank Mixer (A-411)

8. Air Stripping Equipment
   - A) Air Stripper Unit (T-510)
   - B) Air Stripper Blowers (AB-511, AB-512, AB-513)

9. Dewatering Equipment
   A) Sludge Transfer Pump (P-611)
   B) Filter Press Day Tank (T-620)
   C) Filter Press Day Tank Mixer (A-622)
   D) Filter Press Feed Pump (P-621)
   E) Filter Press (FP-630)

10. Miscellaneous Equipment
   A) Effluent Channel (T-710)
   B) Air Compressor (CA-810)
   C) Air Dryer (DA-820)
   D) Floor Drain Sump (S-800)
   E) Floor Drain Sump Pumps (P-801 & P-802)
   F) Plantwater Distribution Pump (P-911)
   G) Plantwater Pressure Tank (T-910)
   H) Potable Water Pump (P-1011)
   I) Potable Water Pressure Tank (T-1020)
   J) Underground Water Storage Tank (T-1010)

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
1.Groundwater Pumping System P-101 P-102	A) Groundwater Collection Pump Manufacturer: Grundfos Model: Rediflo 10E13 (Destaged 10E14) No. of Stages: 13 Design Flow: 8 GPM @ 262' TDH and 12 GPM @ 175' TDH Electrical Data: 1.0 HP\1PH\230V Material: Stainless Steel with Teflon Seals Number Supplied: Two	Pumps to function automatically or by hand operation. Batch totalizer will control daily flow quantities. Low level in individual wells or high level in equalization tank will stop pumps.
P-103	B) Groundwater Collection Pumps Manufacturer: Grundfos Model: Rediflo: 10E8 No. of Stages: 8 Design Flow: 5GPM @ 190' TDH and 8GPM @ 162' TDH Electrical Data: 0.5HP\1PH\230V Material: Stainless Steel with Teflon Seals Number Supplied: One	Pumps to function automatically or by hand operation. Batch totalizer will control daily flow quantities. Low level in individual wells or high level in equalization tank will stop pumps.
P-104 P-105 P-106 P-107	C) Groundwater Collection Pump Manufacturer: Grundfos Model: Rediflo 5E8 No. of Stages: 8 Design Flow: 1 GPM @ 210' TDH and 4 GPM @ 160' TDH Electrical Data: 0.33 HP\1PH\230V Material: Stainless Steel with Teflon Seals Number Supplied: Four	Pumps to function automatically or by hand operation. Batch totalizer will control daily flow quantities. Low level in individual wells or high level in equalization tank will stop pumps.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
P-108 P-109 P-113	D) Groundwater Collection Pump Manufacturer: Grundfos Model: Rediflo 10E6 (Destaged 10E8 Pump) No. of Stages: 6 Design Flow: 5 GPM @ 143' TDH and 10 GPM @ 105' TDH Electrical Data: 0.5 HP\1PH\230V Material: Stainless Steel with Teflon Seals Number Supplied: Three	Pumps to function automatically or by hand operation. Batch totalizer will control daily flow quantities. Low level in individual wells or high level in equalization tank will stop pumps.
P-110 P-111 P-112	E) Groundwater Collection Pump Manufacturer: Grundfos Model: Rediflo 5E6 (Destaged 5E8) No. of Stages: 6 Design Flow: 6 GPM @ 158' TDH and 11 GPM @ 111' TDH Electrical Data: 0.5 HP\1PH\230V Material: Stainless Steel with Teflon Seals Number Supplied: Two	Pumps to function automatically or by hand operation. Batch totalizer will control daily flow quantities. Low level in individual wells or high level in equalization tank will stop pumps.
P-116 P-118	G) Seepwater Collection Pump (Pumpstation No. 1 & 3) Manufacturer: Grundfos Model: Rediflo 10E6 (Destaged 10E8) No. of Stages: 6 Design Flow: 5 GPM @ 143' TDH and 10 GPM @ 105' TDH Electrical Data: 0.5 HP\1PH\230V Material: Stainless Steel with Teflon Seals Number Supplied: Two	Pumps to be automatically controlled by liquid level in pumpstation. High level in equalization tank will stop pumps in hand or auto mode.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
P-117	H) Seepwater Collection Pump (Pump Station No. 2) Manufacturer: Grundfos Model: Rediflo 10E11 No. of Stages: 11 Design Flow: 6 GPM @ 250' TDH and 11 GPM @ 170' TDH Electrical Data: 0.33HP\1PH\230V Material: Stainless Steel with Teflon Seals Number Supplied: Four	Pumps to be automatically controlled by liquid level in pumpstation. High level in equalization tank will stop pumps in hand or auto mode.
2. Equalization Equipment T-110	A) Equalization Tank Manufacturer: Northeast Aquastore Type: Steel Bottom Glass Fused to Steel Capacity: 74,000 Gallons (nominal) Dimensions: 25' Diameter x 20' High Material: Steel Tank with Aluminum Access Ladder.	Equalization tanks have actual water volume of 66,100 gallons, giving an effective hydraulic detention time of 9.7 hours when sidestreams are considered. Level sensing elements will be installed in equalization tanks.
3. Metals Removal Feed Equipment P-201 P-202	A) Metals Removal Feed Pumps Manufacturer: Moyno Progressing Cavity Pumps Model: Series 1F036-G1-CDQ-AAA Design Flow: 90 to 120 GPM @ Range of -5' to 15' TDH (Variable Speed Drive) Electrical Data: 5HP\1PH Material: Body-Cast Iron, Rotor-316SS, Stator and Seals-Nitrile Service: Groundwater Number Supplied: Two	Magnetic flowmeter will measure flow. Flow controller will automatically regulate Metals Removal Feed Pumps thereby controlling flow rate into Treatment Plant. Hand operation is also provided. Low level in equalization tank or downstream critical alarm will stop pumps.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
4. Metals Removal Equipment T-210	A) Caustic Addition Tank Manufacturer/Supplier: Davis Water and Waste. Design Flow: 120 gpm Dimensions: 5.75'x5.75'x7' SWH Caustic Mixing Volume: 1,730 Gallons Material: Carbon Steel Number Supplied: One	The tank is sized to provide 15 minutes mixing time.
A-211	B) Caustic Addition Tank Mixer Manufacturer: Mixing Equipment Co. Model: Lightnin XJQ-87 Type: Top Entering Beam Mounted Mixer Shaft: 1 1/4" dia x 84" long. 316 Stainless Steel Impellers: Dual 12.8" dia. 316L Stainless Steel Impeller Type: A-310 Axial Flow with Stabilizing Ring Impeller Speed: 350 RPM Drive Connection: Direct Coupled to a Gear Reducer Motor: Chem Duty Motor Size: 0.87 HP\1PH\115VAC\60HZ Motor Speed: 1800 RPM Number Supplied: One	NEMA Design "B" Control will be manual. Motor must be operational for caustic feed system to operate.
T-220	C) Polymer Addition Tank Manufacturer/Supplier: Davis Water and Waste. Model: Rapid Mix Tank Design Flow: 120 gpm Dimensions: 21" Radius Half Circle x 40" SWH Polymer Mixing Volume: 120 Gallons Material: Carbon Steel Number Supplied: One	1 minute mixing time is provided in polymer addition tank.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
A-221	D) Polymer Addition Tank Mixer Supplier: Mixer to be provided as part of package with polymer addition tank. Manufacturer: Neptune Model: AG 1.0 Type: Gear Type Mixer Shaft: 3/4" Dia. 316 Stainless Steel Impeller Material: 316L Stainless Steel Impeller Type: Axial Flow with Stabilizing Ring Impeller Speed: 350 RPM Drive Connection: Direct Coupled to a Gear Reducer Motor Size: 0.25HP/1PH/115VAC Number Supplied: One	NEMA Design "B" Control will be manual. Motor must be operational for polymer feed pump P-221 to operate.
T-230	E) Flocculation Tank Manufacturer/Supplier: Davis Water and Waste. Model: Flocculation Tank Design Flow: 120 gpm Dimensions: 54½"x54½"x96" SWH Flocculation Volume: 1200 Gallons Material: Carbon Steel Number Supplied: One	10 minutes flocculation time is provided.
A-231	F) Flocculator Drive Supplier: Drive to be provided as part of package with flocculation tank. Manufacturer: Type: Reducer Unit Double reduction ratio -- Flocculator Arm Speed: Variable Motor Size: 0.5HP/1PH Motor Speed: RPM Number Supplied: One	Control will be manual, and paddle speed will be adjustable.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
PS-240	G) Inclined Plate Separator Manufacturer/Supplier: Davis Water and Waste. Design Flow: 120 gpm @ 0.25 GPM/sq ft Effective Plate Area: 480 sq ft Dimensions: 112"x60"x160" Height Material: Carbon Steel Number Supplied: One	The design loading rate for the inclined plate separator is 0.25 gpm/sq. ft. A sludge Hopper is located in the sedimentation chamber.
P-241	H) Metals Removal Sludge Pump Manufacturer: Wilden Pump and Engineering Co. Model: M4/WO/NE/NE/NE Type: Air Actuated Diaphragm Capacity: Variable Service: Metals Sludge Number Supplied: One	Desired flow capacity if 35 GPM. Transfer pumps will be Controlled by a timer or by hand operation. High level in sludge storage tank will stop pumps.
T-610	I) Sludge Thickening Tank Manufacturer: Davis Water & Waste Model: Eimco Thickeners Size: 15' Dia x 15' Side Water Height Capacity: 20,000 Gallons Material: Carbon Steel	Tank sized for 4 days hydraulic detention time. Solids retention time will be greater than 7 days.
A-612	J) Sludge Thickening Tank Drive Manufacturer: Eimco Thickeners Model: Torque Rating: 4000 ft.-lbs. Output Speed: Motor Size: 0.5HP\1PH Motor Speed: RPM Number Supplied: One	Control will be manual.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
5. Chemical Feed Equipment T-211	A) Caustic Storage Tank Manufacturer: Poly Processing Company Type: Upright Tank Size: 7'-10" Dia x 12'-4 3/4" Height Capacity: 4,000 Gallons Material: Crosslinked Polyethylene Number Supplied: One	Tank sized for 32 days hydraulic detention time. This will allow chemical deliveries every 4 weeks with 4 days spare chemical in tank.
P-212	B) Caustic Feed Pump Manufacturer: Neptune Chemical Pump Co. Model: 525-A-N3 Type: Hydraulically Operated Diaphragm Pump Capacity: 0-7 GPH Material: 316 Stainless Steel/Teflon/Viton Motor Size: 1/3 HP/1PH/115VAC Motor Speed: 17'25 RPM Service: Caustic Number Supplied: One	pH controller will automatically regulate Caustic Feed Pump
T-212	C) Caustic Containment Tank Manufacturer: Poly Processing Tank Type: Overflow Basin Size: 11'-11" Dia x 6' Height Capacity: 4,300 Gallons Material: Crosslinked Polyethylene Number Supplied: One	Tank sized for approximately 110 percent of caustic storage tank volume.
T-221	D) Polymer Mixing Tank Manufacturer: Neptune Chemical Pump Co. Model: 260 PT (Bottom Mounted) Size: 41¼" OD x 54" High Capacity: 260 Gallons Material of Construction: 270 Mil P.Ethylene Service: Polymer Number Supplied: One	Tank to be provided with approximately 4½ days hydraulic detention time.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
A-222	E) Polymer Mixing Tank Mixer Manufacturer: Neptune Chemical Pump Co. Model: (AG-1.0) Impeller Speed: 350 RPM Motor Size: 0.25HP Number Supplied: One	Control will be manual.
P-223	F) Polymer Feed Pump Manufacturer: Neptune Chemical Pump Co. Model: 515-A-N3 Type: Hydraulically Operated Diaphragm Pump Capacity: 0-3 GPH Material: 316SS/Teflon/Viton Motor Speed: 1725 RPM Motor Size: 1/3 HP\1PH\115VAC Service: Polymer Number Supplied: One	Control will be manual, but will be interlocked to stop if polymer tank mixer is inoperable or if critical alarm stops process flow.
T-411	G) Acid Storage Tank Manufacturer: Poly Processing Company Type: Upright Tank Size: 5'-4" OD x 9'-9 3/4" Height Capacity: 1,500 Gallons Material: Crosslinked Polyethylene Number Supplied: One	Tank sized for 65 days hydraulic detention time. This will allow bi-monthly chemical deliveries with 5 days spare chemical in tank.
P-412	H) Acid Feed Pump Manufacturer: Neptune Chemical Pump Co. Model: 515-A-N4-EC 5000 Type: Hydraulically Operated Diaphragm Pump Capacity: 0-3 GPH Material: C-20/Teflon/Viton Motor Size: 1/3 HP\1PH\115 VAC Motor Speed: 1725 RPM Service: Sulfuric Acid Number Supplied: One	pH controller will automatically regulate Acid Feed Pump

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
T-412	I) Acid Containment Tank Manufacturer: Poly Processing Company Type: Overflow Basin Size: 8' Dia x 5'-6" Height Capacity: 2,000 Gallons Material: Crosslinked Polyethylene Number Supplied: One	Tank sized for approximately 110 percent of acid storage tank volume.
6. Filtration Equipment F-310	A) Rapid Sand Filter Manufacturer: Davis Water and Waste Type: Travelling Bridge Filter Size: 18' x 6' x 7' Height Capacity: 200,000 GPD Number Of Filter Cells: 16 Material: Carbon Steel Number Supplied: One	The rapid sand filter unit is sized by the manufacturer based on an application rate of 2 GPM per sq. ft. (at a flow rate of 200,000 gpd). The actual Design flow through the unit is anticipated to be 158,775 GPD. During backwashing of a particular cell the remaining 15 cells remain in service. The inflow to the unit should be greater than 90 gpm in order to prevent liquid drawdown in the clearwell during backwashing.
P-311	B) Surface Wash Pump Supplier: To be provided as part of rapid sand filter package Capacity: 9 GPM Construction: Cast Iron Motor Size: 1.5 HP\1PH\230VAC Drive Connection: Belt Driven Service: Surface Wash Number Supplied: One	This pump will be selected and provided by the rapid sand filter manufacturer. It will convey 9 gpm from the surface wash trough to the filter. It will be controlled by the standard surface wash package controls provided by the filter manufacturer.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
P-312	C) Backwash Pump Supplier: To be provided as part of filter package Type: Horizontal Self-Priming Capacity: 90 GPM Construction: Cast Iron Motor Size: 1.5 HP\1PH\230VAC Drive Connection: Belt Driven Service: Backwash Number Supplied: One	This pump will be selected and provided by the rapid sand filter manufacturer. It will convey 90 gpm from the clearwell through the filter and discharge to the backwash trough.. It will be controlled by the standard surface wash package controls provided by the filter manufacturer.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
P-313	D) Surface Wash Transfer Pump Supplier: To be provided as part of filter package Type: Submersible Capacity: 50 GPM Construction: Cast Iron Motor Size: 0.5 HP\1PH\230VAC Service: Surface Wash Transfer Number Supplied: One	This pump will be selected and provided by the rapid sand filter manufacturer. It will convey a required flow from the clearwell to the surface wash trough. It will be controlled by the standard surface wash package controls provided by the filter manufacturer.
BD-314	E) Travelling Bridge Drive Supplier: To be provided as part of filter package Type: Constant Speed Reversible Electric Motor Brake: 3 ft lbs Gear Reducer: 500:1 Double Reduction Motor Size: ¼ HP/1PH/115VAC	
HD-315	F) Hood Lift Drive Supplier: To be provided as part of filter package Type: Constant Speed Reversible Electric Motor Motor Size: 0.5HP\1PH	
7. Neutralization Equipment T-410	A) Neutralization Tank Manufacturer: Warner Fiberglass Product Inc. Size: 8' Diameter x 5' SWH Material: Fiberglass Capacity: 1654 Gallons Minimum Number Supplied: One	Tank will be provided with approximately 15 minutes hydraulic detention time.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
A-411	B) Neutralization Tank Mixer Manufacturer: Mixing Equipment Co. Model: Lightnin XJQ-87 Type: Top Entering Beam Mounted Shaft Size & Material: 1 1/4" Diameter x 84" Long, 316 Stainless Steel Impeller Size & Material: 12.8" Diameter, 316 Stainless Steel Impeller Type: Dual A-310 Axial Flow with Stabilizing Ring Impeller Speed: 350 RPM Drive Connection: Direct Coupled to a Gear Reducer Motor Size: 0.87HP\1PH\115VAC\60HZ Motor Speed: 1800 RPM Number Supplied: One	Control will be manual. However, low level in neutralization tank will stop mixer.
8. Air Stripping Equipment T-510	A) Air Stripper Unit Manufacturer: Lowry Engineering Type: Low Profile Diffused Air Unit Model: PT-12 Configuration Stripper Material: HDPE Vessel Capacity: 100 GPM Aerators: 0.04" size Air/Water Ratio: 29.9 Number Supplied: One	Unit can be field-modified for a hydraulic capacity of 150 GPM (with baffle modification)
AB-511 AB-512 AB-513	B) Air Stripper Blowers Supplier: Provided as part of package by air stripper manufacturer Type: DR6D5 Size: Capacity: 200 SCFM Inlet Volume Discharge Pressure: psig Drive Connection: Direct Drive Motor Speed: 1750 RPM Motor Size: 5HP\1PH\60HZ\230VAC Service: Air Number Supplied: Three	Required air volume established for >88.24% removal of xylene, which is parameter controlling design. Control will be interlocked to operate automatically when metals removal feed pumps are in operation. Manual operation will also be possible.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
9. Dewatering Equipment P-611	A) Sludge Transfer Pump Manufacturer: Wilden Pump and Engineering Co. Model: M8/WO/NE/NE/NE Type: Air Actuated Diaphragm Capacity: Variable Service: Wastewater Sludge Number Supplied: One	Desired flow capacity is 80 GPM. Control of pump will be manual. However, high level in filter press day tank will stop pump.
T-620	B) Filter Press Day Tank Manufacturer: Merrill Iron and Steel, Inc. Size: 8'-0" Diameter x 12" Height Capacity: 4130 Gallons Material: Carbon Steel	Provided with filter press and filter press feed pump and controls.
A-622	C) Filter Press Day Tank Mixer Manufacturer: Mixing Equipment Company Model: XJC-174 Shaft Size/Material: 1-1/2" x 132" Long, 316SS Impeller Size/Material: Dual 15.1" Diameter, A-310, 316SS Impeller Speed: 350 RPM Drive Connection: Standard Stuffing Box Motor Size: 1.74HP\1PH\230VAC Motor Speed: 1750 RPM Number Supplied: One	Control will be by hand switch. However, low level in filter press day tank will stop mixer.
P-621	D) Filter Press Feed Pump Manufacturer: Wilden Pump and Engineering Co. Model: M8/WO/NE/NE/NE Type: Air Actuated Diaphragm Capacity: Variable Service: Sludge Number Supplied: One	Desired flow capacity is 80 GPM. Control will be interlocked with filter press controls. However, low level in filter press day tank will stop pump.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
FP-630	E) Filter Press Manufacturer: Zimpro Passavant Environmental Services, Inc. Model: 1000-100-78-1.18 Capacity: 42 Cubic Foot Expandable to 60 cubic foot Number of Chambers: Installed 55	Control will be by hand switch, interlocked with Filter Press Feed Pump and control valve for sludge intake to filter press, as part of package filter press and controls.
10. Miscellaneous Equipment T-710	A) Effluent Channel Supplier: Davis Water and Waste Size: 10' Total length (8.5' upstream and 1.5' downstream of Weir) 5' Channel width Weir Configuration: 90° V-notch 24" Depth from channel base to Weir vertex	Channel upstream of Weir will provide quiescent uniform flow. Normal flow range will be between 13 gallons per minute.
CA-811 CA-812 CA-813	B) Air Compressor Manufacturer: Quincy Type: Tank Mounted Duplex Provided with a third identical unit Model: QTD-10 Receiver Size: 240 Gallons Total Capacity: 114 CFM at 125 psi Drive Connection: V-Belt Motor Size: 10HP\230\1\60 Number Supplied: Three on one receiver	
DA-820	C) Air Dryer Manufacturer: Wilkerson Model: H05-AH-POO	Refrigerated air dryer capable of producing clean and dry air to 35° F dewpoint.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
S-800	D) Floor Drain Sump Type: Concrete sump in process building	Minimum wetwell volume will be 180 gallons.
P-801 & P-802	E) Floor Drain Sump Pumps Manufacturer: ABS Model: SJE-15W Type: Submersible Sewage Ejector Capacity: 150 gpm @ 28' TDH and 200 gpm @ 24' TDH Drive Connection: Direct Coupled Motor Size: 1.5HP/1PH/60HZ/230VAC Service: Filtrate, Decant & Floor Drain Water Number Supplied: Two	Control will be by level in Floor Drain Sump.
P-911	F) Plantwater Distribution Pump Manufacturer: Goulds Model: Type: Flooded Suction Pump Capacity: 16 gpm @ 92' TDH and 50 gpm @ 44' TDH Drive Connection: Direct Coupled Motor Size: 1½HP\1PH\60HZ\230\VAC Service: Plantwater Number Supplied: One	Pump will start/stop at low and high pressure set points. Low level in effluent channel will stop pump.
T-910	G) Plantwater Pressure Tank Manufacturer: Goulds Model: Aqua Air Tank V-350 Size: 26"Dia. x 61½"H tank Capacity: 115.9 Gallons Material: Steel	Tank will provide a drawdown of 42.9 gallons between the high and low set points of 40 psi and 20 psi, respectively. This drawdown was selected to match the average pump output over this pressure range.

GROUNDWATER TREATMENT SYSTEM AND RELATED FACILITIES
COLESVILLE LANDFILL
PROCESS EQUIPMENT LIST (PRE-FINAL DESIGN)
3/26/93

ITEM AND TAG NO.	SYSTEM	DESIGN BASIS AND PROPOSED CONTROL
P-1011	H) Potable Water Pump Manufacturer: Goulds Model: XSH07 Type: Selfpriming Pump Capacity: 14 gpm @ 100' TDH and 38 gpm @ 60' TDH Drive Connection: Direct Coupled Motor Size: 3/4HP\1PH\60HZ\230VAC Service: Plantwater Number Supplied: One	Pump will start/stop at low and high pressure set points. Low level in Underground water storage tank will stop pump.
T-1020	I) Potable Water Pressure Tank Manufacturer: Goulds Model: AquaAir Tank V-250 Supplier: Goulds Size: 26"Dia. x 46"H tank Capacity: 83.5 Gallons Material: Steel	Tank will provide a drawdown of 30.9 gallons between the high and low set points of 40 psi and 20 psi, respectively. This drawdown was selected to match the average pump output over this pressure range.
T-1010	J) Underground Water Storage Tank Manufacturer: Highland Tank Company Model: Double Wall Sti-P3 Tank Size: 5'-4"Dia. x 18' Long tank Capacity: 3,000 Gallons Material: Steel Underground Storage Tank	Tank will provide a minimum Capacity of 2,835 gallons between the high and low set points .