SCREENING LEVEL ASSESSMENT OF PINELANDS AREA LANDFILLS

Presented to:

Pinelands Municipal Council

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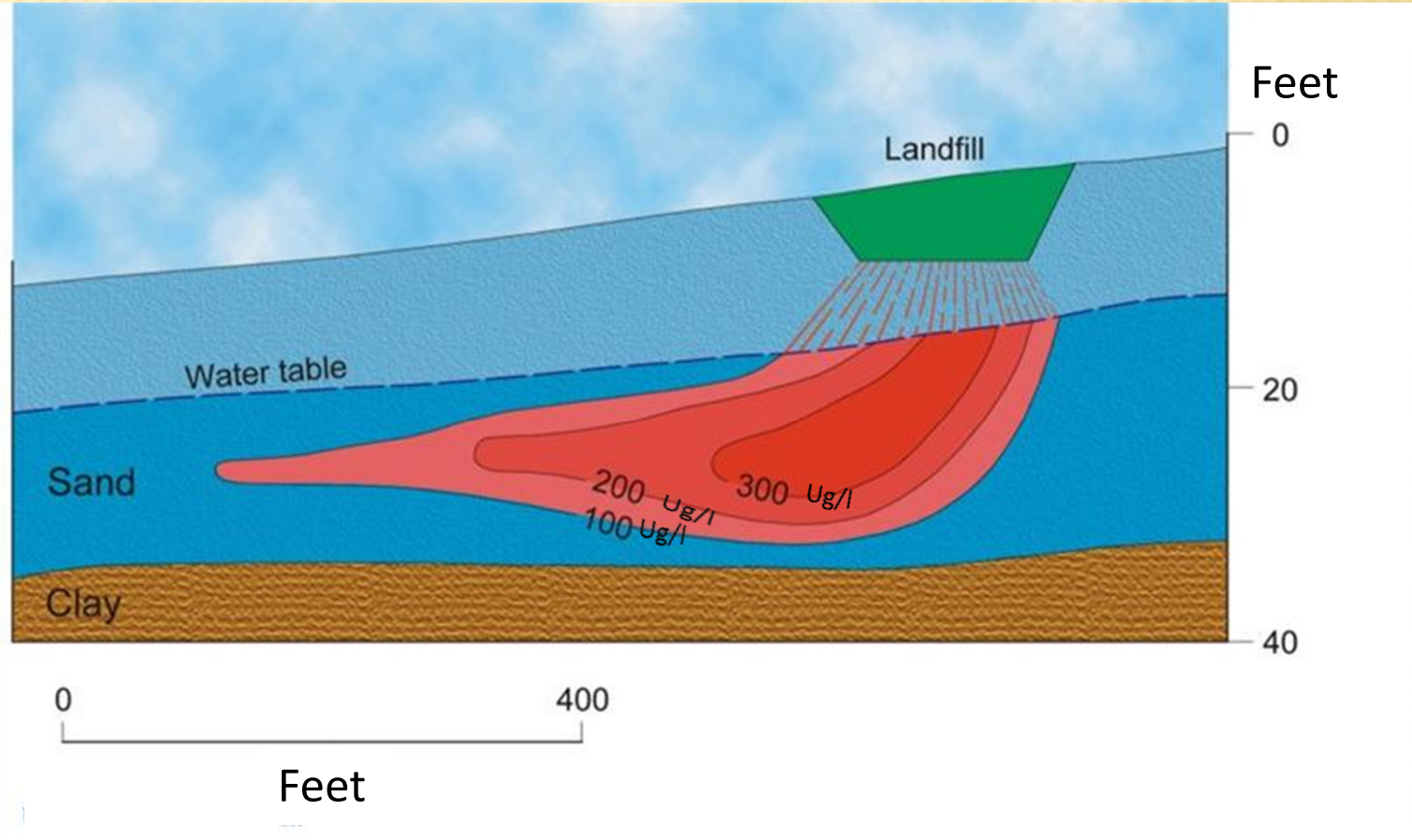
Pinelands Comprehensive Management Plan
N.J.A.C 7:50

N.J.A.C 7:50-6.75 Landfills

- (a) and (b) address vegetative waste (only) landfills associated with agricultural operations are not subject to the impermeable capping (or similarly protective engineering controls) requirement.

- (c) Generally requires that all landfills that ceased operation on or after September 1980 and January 1981, (depending on Pinelands Management Area) and from which a leachate plume is detected, must be capped or covered with an impermeable material or provided with similarly protective engineering controls to protect Pinelands surface and groundwater resources.

Screening Tool to Evaluate the Vulnerability of Down-gradient Receptors to Groundwater Contaminants from Uncapped Landfills



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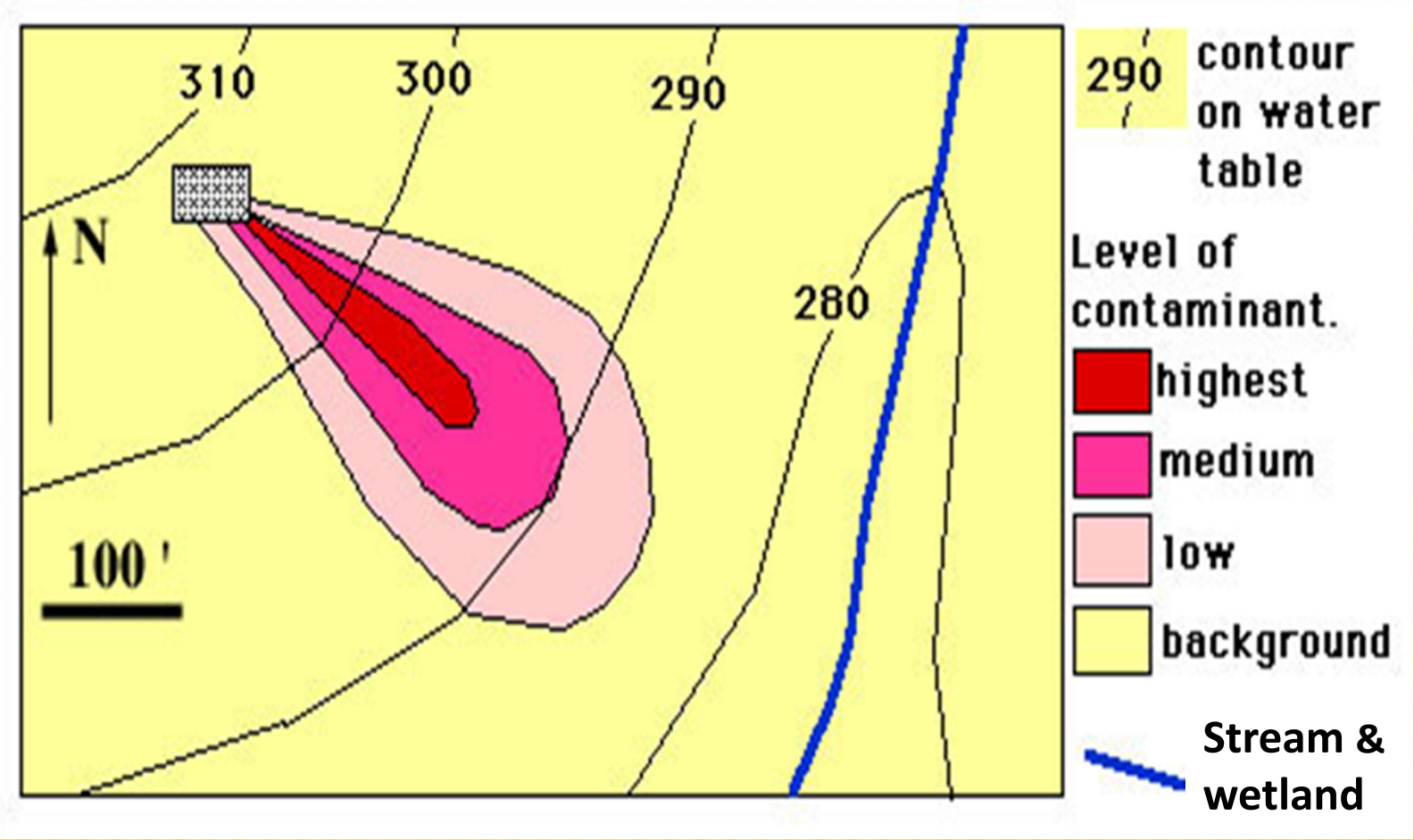


Project Drivers

- Evaluate groundwater conditions at uncapped landfills to assess the level of contamination and refocus efforts to remediate those posing the greatest level of concern.
- Facilitate / expedite redevelopment on uncapped landfills where mitigation requirements are minimal.

USGS Review of NJDEP Landfill Files

Landfills in the Pinelands with groundwater monitor well data on file.

- Ancora Psychiatric Hospital Landfill
- Bass River Township Landfill
- Berkeley Township Landfill
- Buena Borough Landfill
- Buena Vista Landfill
- Colliers Mills Wildlife Management Area Landfill
- Dennis Township Belleplain and Seaville Landfill
- Egg Harbor City Landfill
- Estell Manor City Landfill
- Folsom Borough Landfill
- Woodbine Borough (F&S) Landfill
- Galloway Township Landfill
- Hamilton Township Landfill
- Hammonton Town Landfill
- Manchester Township Landfill
- Maurice River Township Landfills No. 1 and No. 2
- Medford Township Landfill
- Port Republic City Landfill
- South Toms River Landfill
- Tabernacle Township Landfill
- Weymouth Township Landfill
- Winslow Township Landfill
- Woodland Township Landfill

Solute Transport Model Selected by USGS

Domenico Transport Model (1985 and 1987)

- Screening tool
- Used to predict movement of contamination from point sources to receptors (streams, wetlands, etc).
- Supported by the USEPA.
- Supported and improved upon by Penn DEP (2008)
  - Developed Quick Domenico Spreadsheet Application
  - Added retardation factor for solute carbon interactions
  - Limits dispersion to downward direction (below the water table).

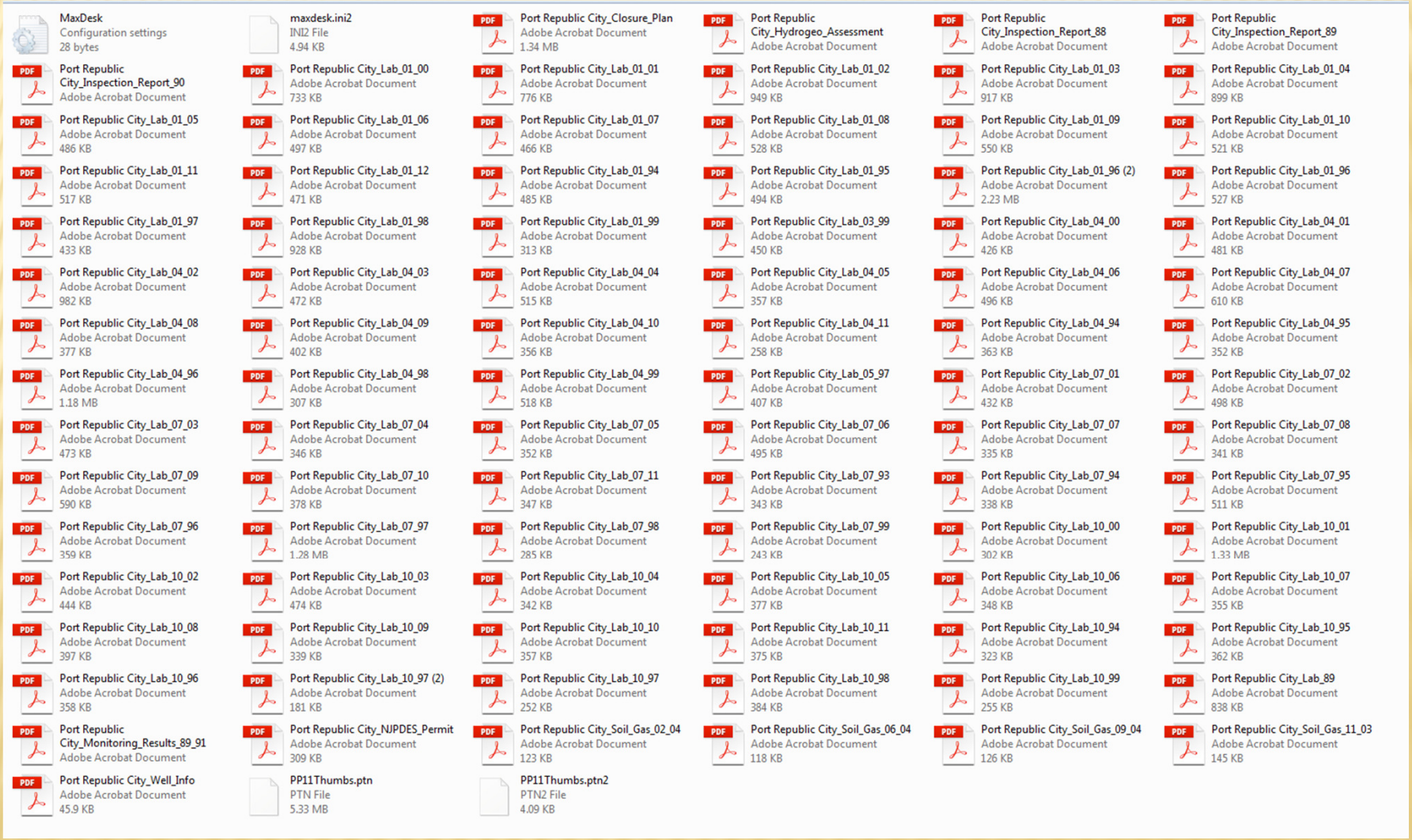
Quick Domenico Solute Transport Model Inputs

Twenty-two parameter values are required to simulate pollutant transport.

- Six inputs are literature values
  - Contaminant reaction constant (dimensionless)
  - KOC (soil organic carbon-water partitioning coefficient) - chemical adsorbed in soil (dimensionless)
  - Regulatory value (ug/l)
  - Soil bulk density (dimensionless)
  - Effective porosity (dimensionless)
  - Fraction organic carbon (dimensionless)
- Two are obtained from previous aquifer studies or regional groundwater flow models
  - Hydraulic conductivity (ft/day)
  - Hydraulic gradient (ft/foot)
- Two are distance measurements
  - Distance to receptor (wetland, stream or residential property) (ft)
  - Distance from plume centerline (ft)
- Six are calculated automatically by the spreadsheet
  - Longitudinal dispersity (ft)
  - Lateral dispersity (ft)
  - Vertical dispersity (ft)
  - Simulation time (days)
  - Seepage velocity ((ft/day)
  - Length of model area (ft)
  - Width of model area (ft)
- One is from monitoring well data
  - Contaminant source concentration (ug/l)
- Three are related to landfill geometry
  - Source thickness (ft)
  - Source width (ft)
  - Depth below land surface (ft)
- One is the model simulation number (fixed counter)

Quick Domenico Solute Transport Model Inputs

Contaminant source data from historic laboratory monitoring well reports



Quick Domenico Solute Transport Model Run

Quick Domenico Multi-scenario (QDM) Spreadsheet

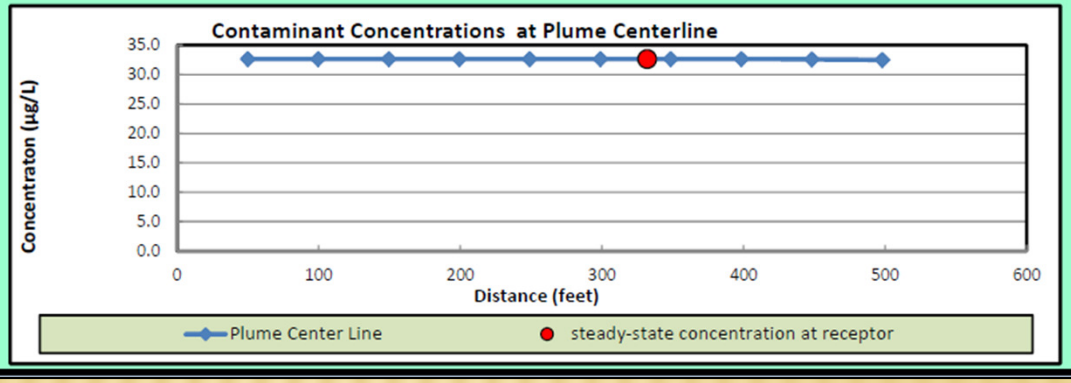
Project:	Port Republic Landfill	Password:		Date:	7/16/2014	Prepared by:	RJB

Simulation Number:	5	Contaminant:	Lead, Dissolved	Receptor:	Wetland

Steady-State Concentraton (ug/L)	32.67
Regulatory Value (ug/L)	2.50
Percent of Regulatory Value	1306.61

Source Concentration (µg/L)	Dispersivity Ax (ft)	Ay (ft)	Az (ft) >=.001	Lambda day-1	Width (ft)	Thickness (ft)	Time to reach Steady State (days)	Receptor Distance from Source x(ft)	y(ft)	z(ft)
32.667	9.74	0.97	0.001	0	543	10	634	332	0	0

Hydraulic Conductivity (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^3)	KOC (dec. frac.)	Fraction Organic Carbon	Retardation (dec. frac.)	Velocity (ft/day)	Model Domain Length (ft)	Width (ft)	Peclet Number
50	0.01	0.358	1.7	14.0	0.001	1.07	1.31	498	543	48



Port Republic Landfill and Surrounding Receptors

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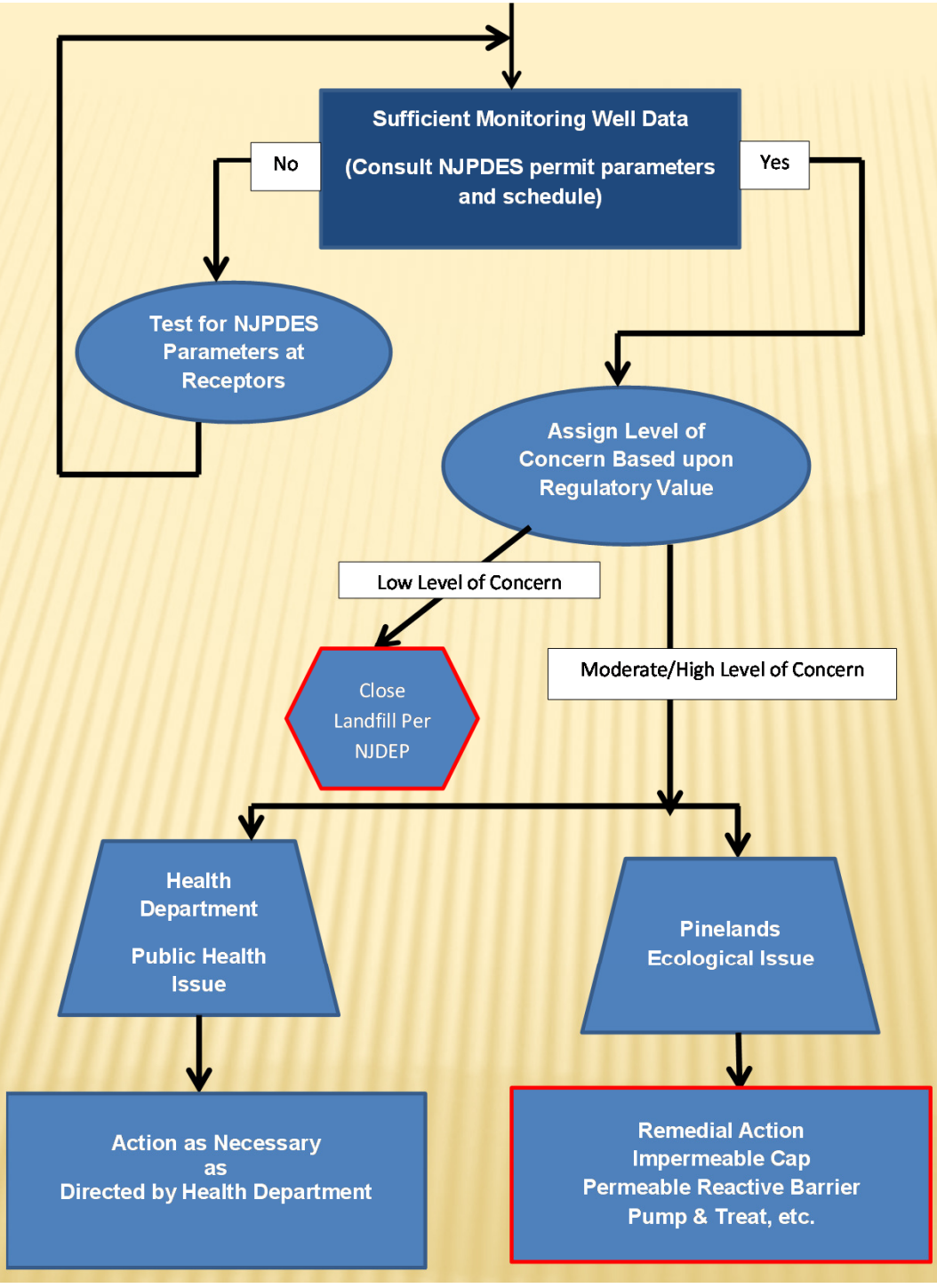
Port Republic Landfill Levels of Concern for Specific Analytes and Receptors								
	Organics and Inorganics Excluding Nutrients					Nutrients		
	Chloride	Lead, Dissolved				Ammonia as N	Nitrate as N	Total P
Stream	High (A). but not a COC[1]	High (A)				Low	Moderate	Low
Wetland or Hydric Soil	High (A), but not a COC	High (A)				Low	High	Low
Residential	High (A), but not a COC	High (A)				Moderate	High	Low

[1] COC = Contaminant of concern

Summary of Domenico Results: Level of Concern		
Level of Concern	**Criteria**	**Meets criteria?**
Unknown	Data are insufficient to characterize the presence of COCs.	no
Low	COCs do not reach receptors at concentrations greater than the practical quantitation limit (PQ).	yes
Moderate	COCs reach receptors at concentrations greater than the PQL but less than 50% of any relevant regulatory standard.	yes
High (A)	COCs reach receptors at concentrations greater than or equal to 50% of one or more relevant regulatory standards.	yes
High (B)	Receptor coincides with landfill location, where COC concentration is greater than or equal to 50% of one or more relevant regulatory standards	no

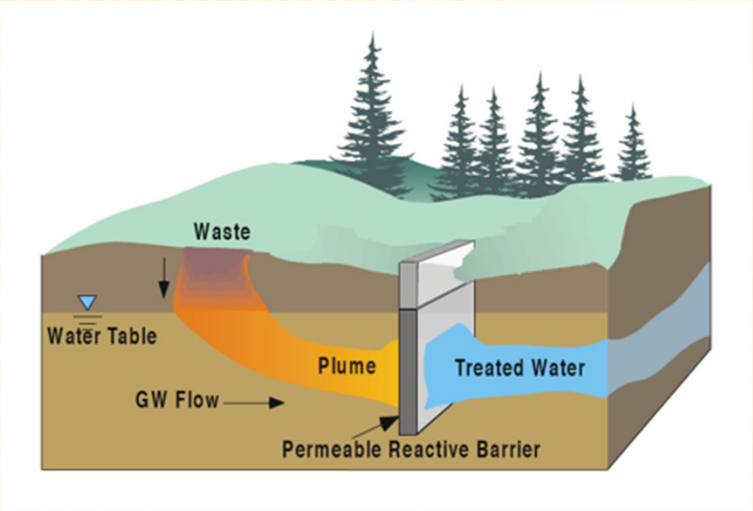
Pinelands Landfill Assessment Flow Chart



Geoprobe sampling

Conventional monitoring well sampling

Select Landfill Leachate Plume Remedies

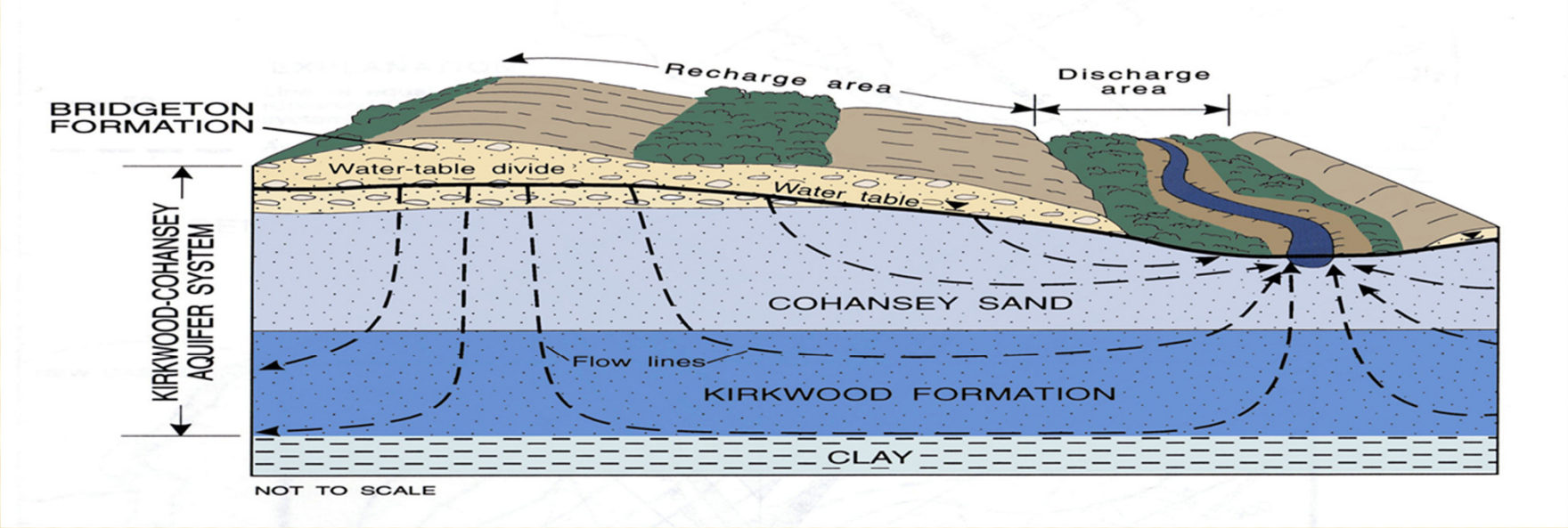


Permeable Reactive Barrier

Groundwater Pump and Treat Equipment

Impermeable Landfill Cap

Kirkwood Cohansey Aquifer System



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