

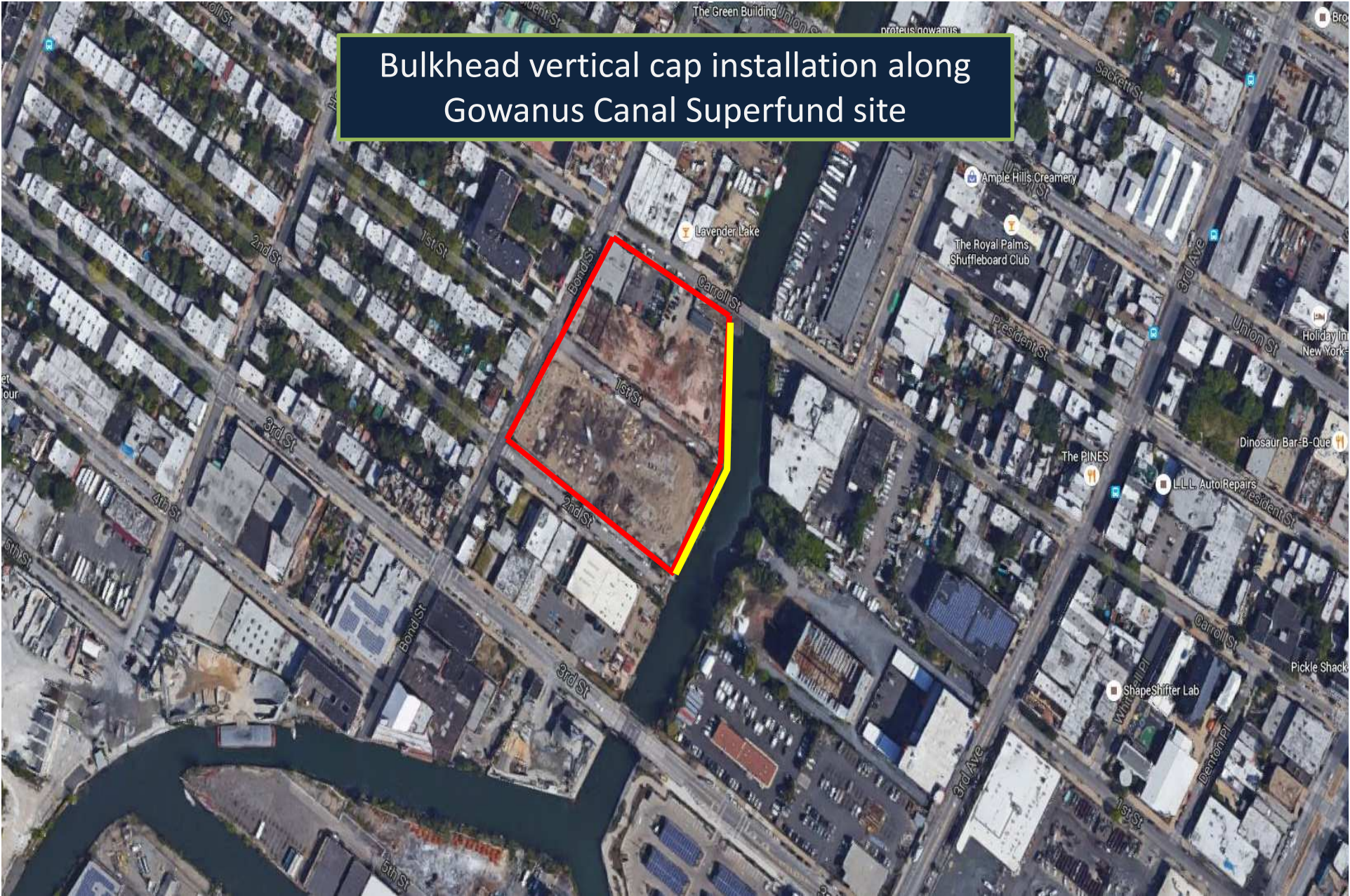
An Integrated Multiphase Extraction, Soil Vapor Extraction, and Air Sparging Approach for Treatment of LNAPL Impacts

Authors:

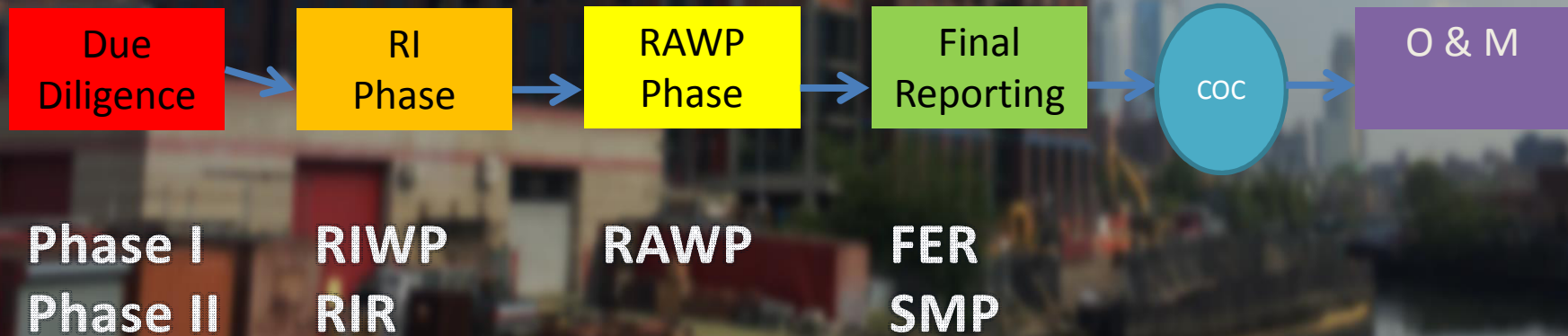
Kale Novalis, Nadira Najib, Omer
Uppal, Matthew Ambrusch, Imtiyaz
Khan, Stewart Abrams, P.E., Steve
Ciambuschini, LEP



Bulkhead vertical cap installation along
Gowanus Canal Superfund site



Typical Brownfields Project Timeline



Extended Excavation due to Field Observations

Supplemental RI Additional Excavation

Original Scope of Excavation



UST Locations and Excavations

LANGAN

Project **BOND STREET**

Drawing Title

Project No. **100287501**
Date

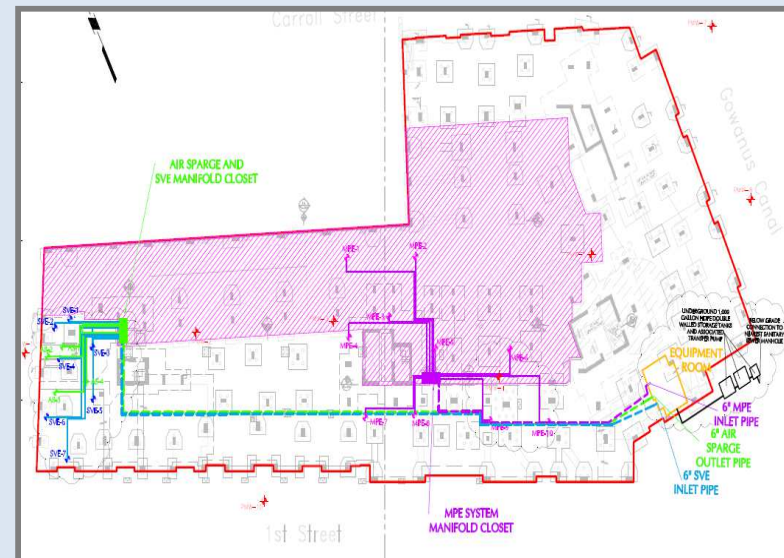
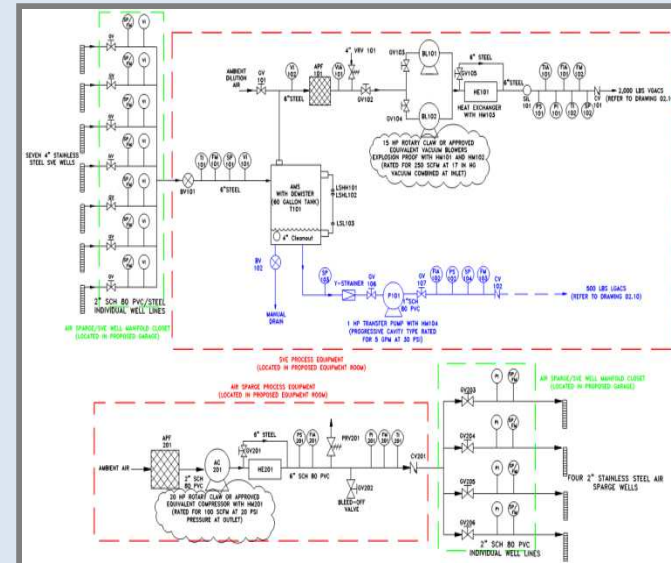
Figure



**Presence of NAPL
during foundation
construction**

Design Constraints

- Structural/architectural design components
 - **NO** access to remedial wells and associated manifold piping
 - Tidally influenced water table
 - Large distances between process equipment and remedial wells
-
- **Careful piping layout to minimize friction loss and prevent moisture traps**
 - **Unique well construction design to ensure wells are always functional**



Site 1 Excavation



Tidal and Seasonal
Water Table

Site 2 Excavation



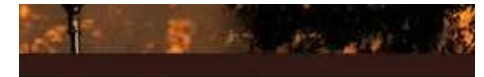


THURSDAY, JUNE 12, 2014

A Whole Lot Of Noise, Shaking, Toxic Smells, And Traffic Jams At Lightstone Group's Mega Construction Site In Gowanus



Rendering Of Lightstone Group's 700-unit development at 363-365 Bond Street in Gowanus



Asking Brooklyn, And Beyond

PMFA In France In The Past

FOLLOW PMFA



Development / Gowanus

Activists crash Gowanus

Noxious Fumes Co Site Terr

Community Action Groups



Bklynebeth

I would add if y 'strong or overv site at 363-365 prompts a diffe they are not sur when their call i

Reply



Photo courtesy of Michael M.



Fig: A group of activists descended on the Bond Street to protest the development — and

Groundwater Remediation

Remedial Components

- Air Sparge
- Soil Vapor Extraction
- Multi-Phase Extraction
- Active SSDS



Target Treatment

- Gasoline
- Fuel No. 4



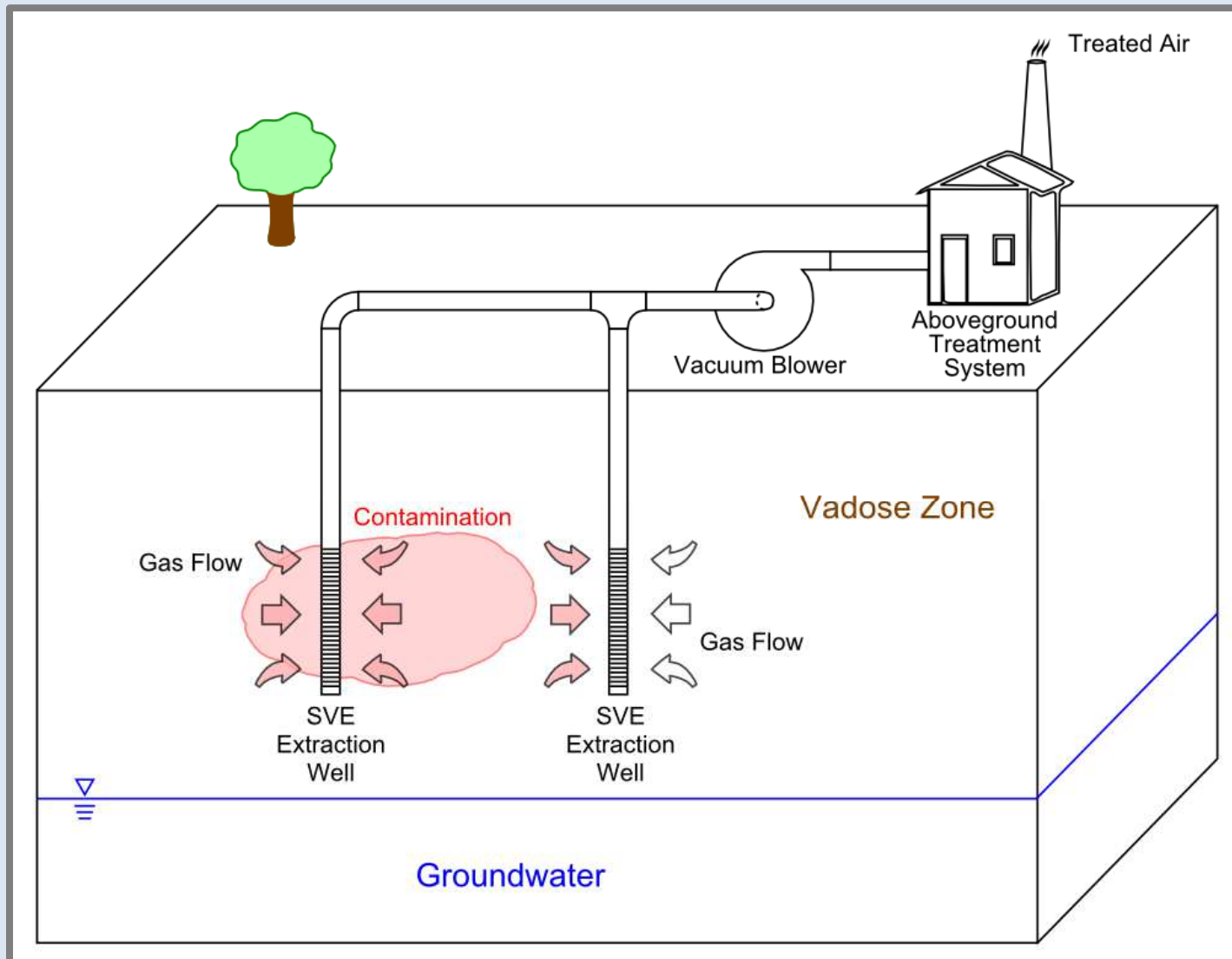
Field Constraints

- Coordination of schedules with other contractors
- Maintaining system effectiveness with changing building elevations and pipe routes
- Varying GW elevations – prefabricated wells
- Ensuring the H&S of all workers

COMMUNICATION throughout the entirety of the process was key to the successful installation

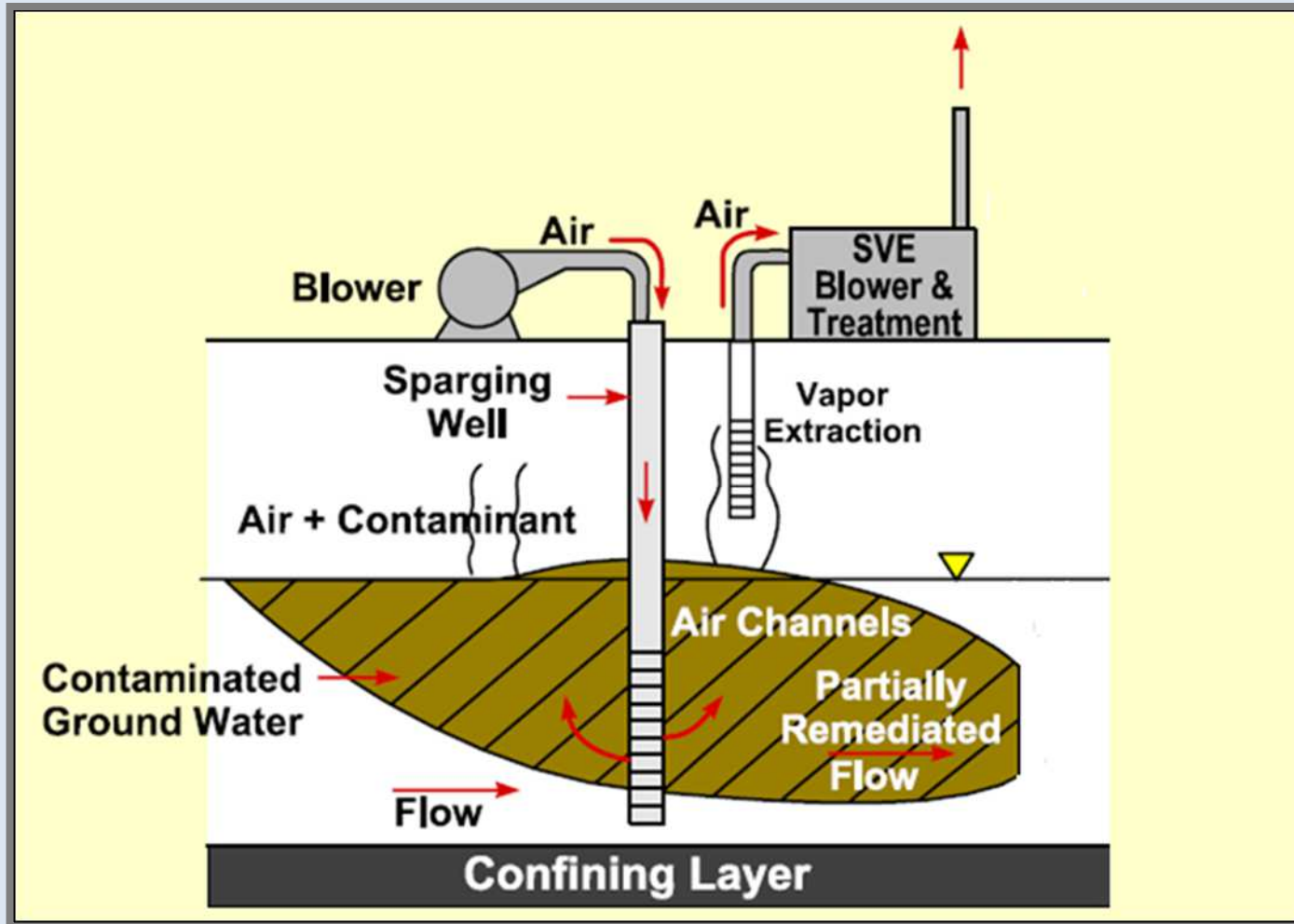


Soil Vapor Extraction

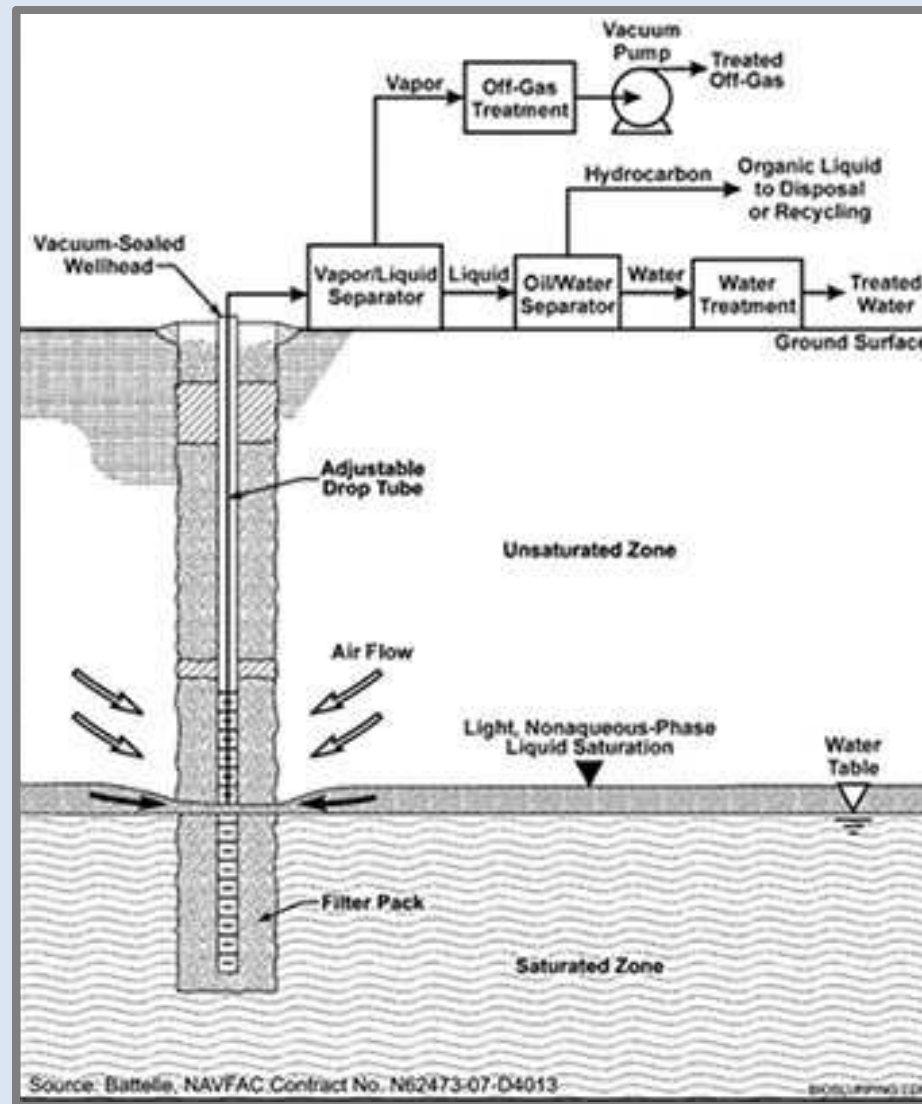


<https://commons.wikimedia.org>

Air Sparging

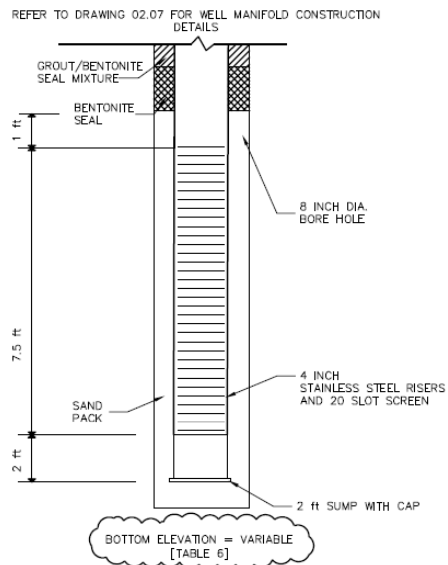


Multiphase Extraction

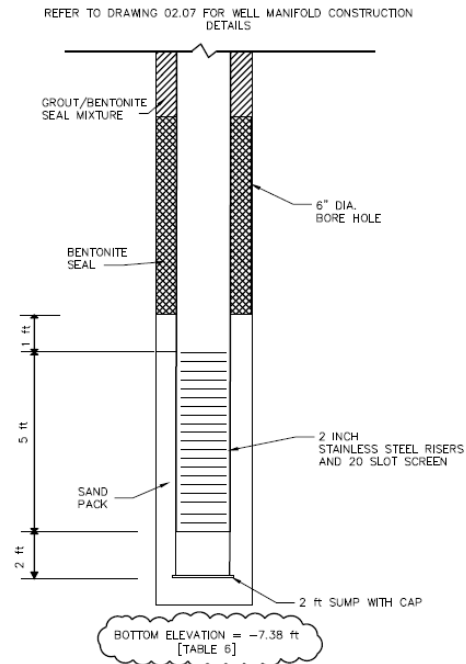


Well Constructions

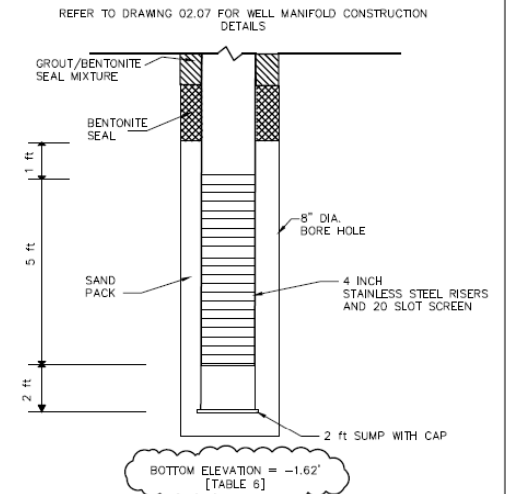
TYPICAL MPE WELL CONSTRUCTION DETAIL



TYPICAL AIR SPARGE WELL



TYPICAL SVE WELL



NOTES:





SVE - SOIL VAPOR EXTRACTION
 MPE - MULTI-PHASE EXTRACTION

ft - FEET

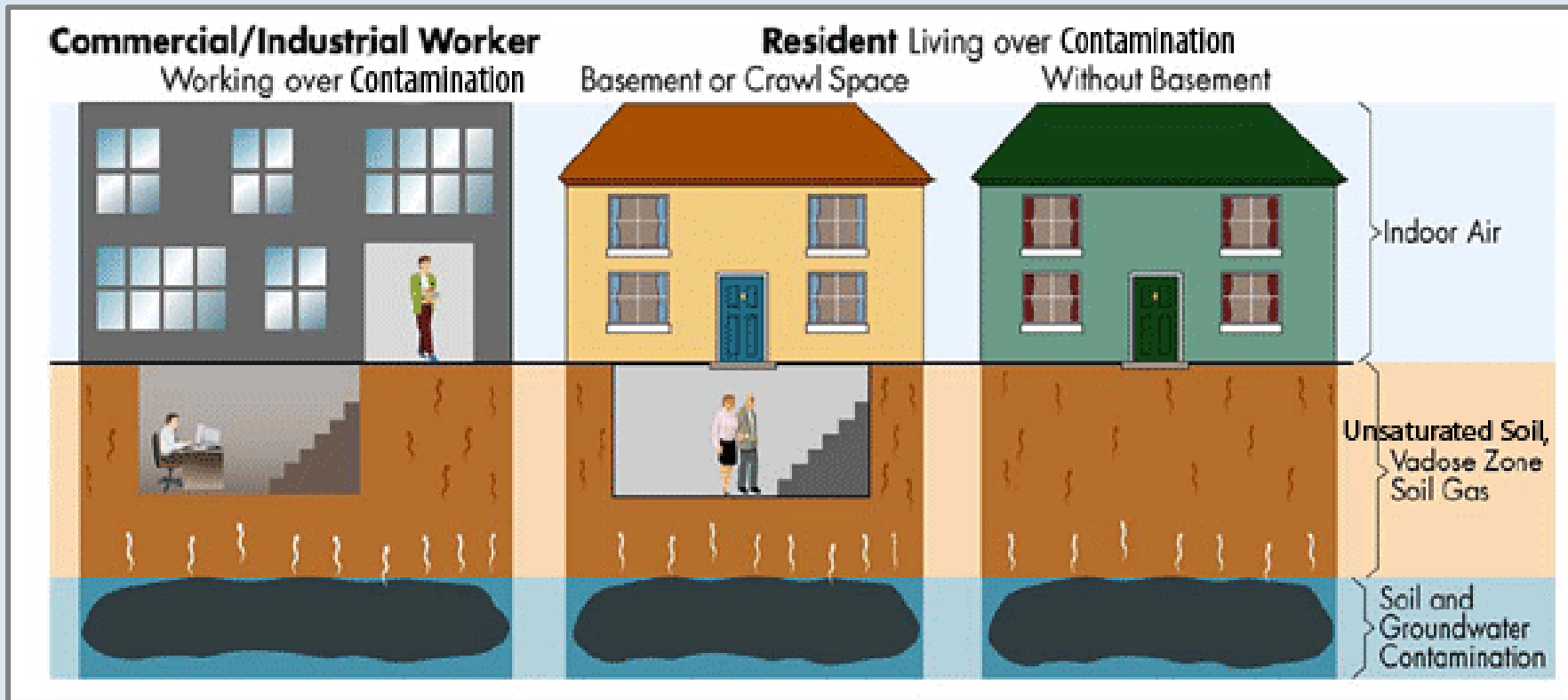
ft bgs - FEET BELOW PROPOSED FINISHED GRADE

1. DRAWING IS NOT TO SCALE
2. THE SCREEN INTERVALS AND WELL DEPTHS SHOWN ABOVE ARE SUBJECT TO CHANGE BASED ON THE RESULTS OF THE PROPOSED EXCAVATION ACTIVITIES, POST EXCAVATION SAMPLING ACTIVITIES AND OBSERVATIONS MADE IN THE FIELD DURING DRILLING.

LEGEND:

-  BENTONITE SEAL
-  GROUT/BENTONITE SEAL MIXTURE
-  SAND PACK
-  0.02" SLOTTED SCREEN

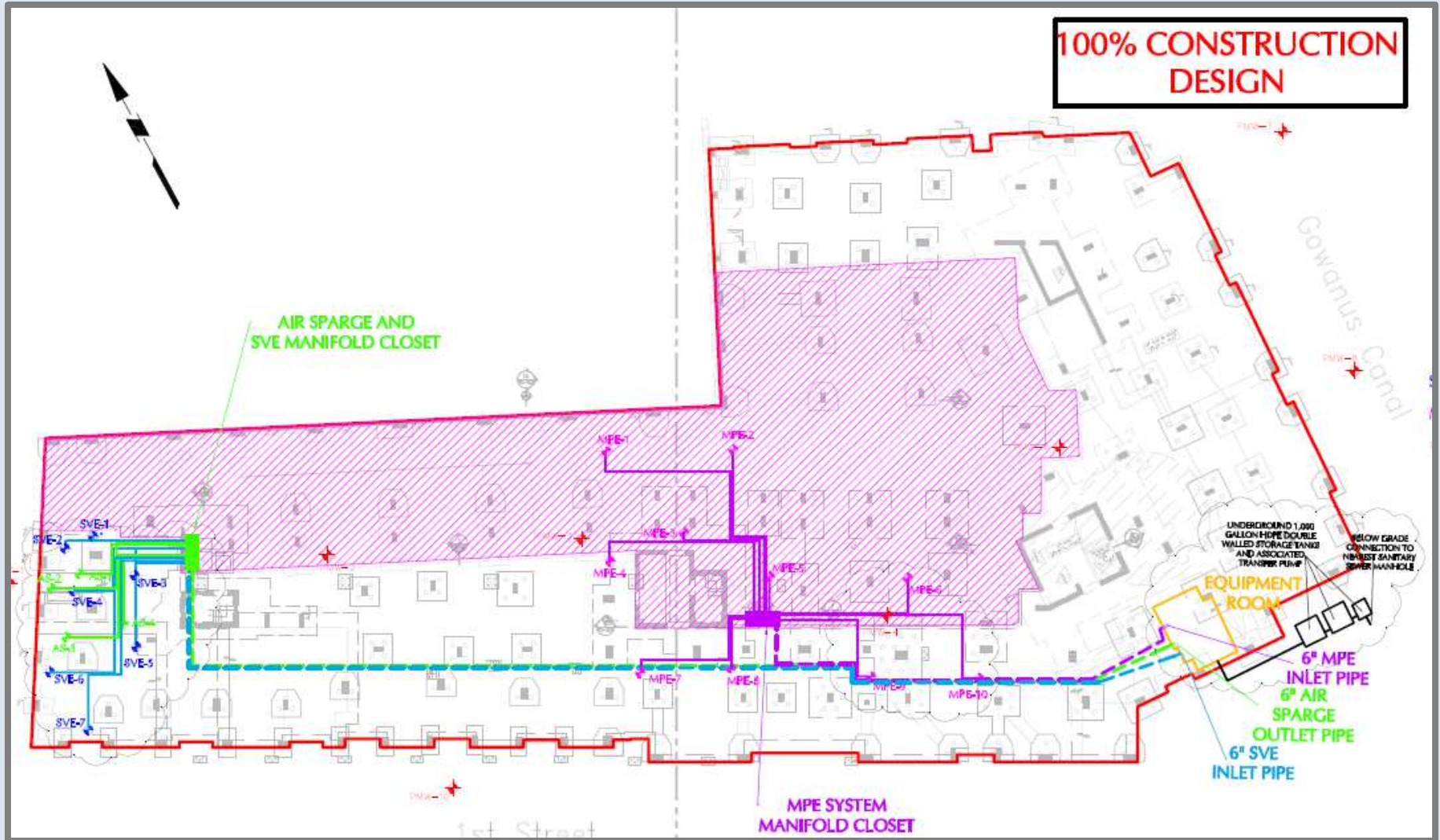
Vapor Intrusion Mitigation



<http://www.nj.gov/dep/srp/guidance/vaporintrusion/subsurface.htm>

Manifold Layout

100% CONSTRUCTION DESIGN



Before



After



ANY
QUESTIONS
?