DETAILED DESCRIPTION OF DISPOSAL AREA AS REQUIRED BY RCSA 22A – 209 – 13(G)

1. SITE HISTORY

THE EARLY HISTORY OF THE SITE IS UNCLEAR, BUT AS FAR AS CAN BE ESTABLISHED LANDFILLING OPERATIONS COMMENCED IN 1942, AND THE SITE HAS BEEN USED FOR THE DISPOSAL OF INCINERATOR ASH, EXCESS CONSTRUCTION AND FILL MATERIALS, MUNICIPAL SOLID WASTE AND BULKY WASTE. BY 1980 THE LANDFILL FORMED A MOUND ABOVE THE SURROUNDING MARSHLANDS WITH ITS SUMMIT AT APPROXIMATELY 50FT NGVD. FROM ABOUT 1984 THE FILLING UTILIZED AN ENGINEERED, CELLULAR ARRANGEMENT, WHICH ALLOWED THE LANDFILL TO REACH A FINAL HEIGHT OF ALMOST 140 FT NGVD.

LANDFILLING OPERATIONS GENERALLY CEASED ON OCTOBER 9TH, 1993, WITH THE EXCEPTION OF BULKY WASTES. DEPOSITION OF THESE MATERIALS CONTINUED UNTIL THE SPRING OF 1994. AVAILABLE RECORDS SHOW THE DEPOSITION OF APPROXIMATELY 120,000 TONS OF REFUSE PER ANNUM FROM 1986 TO 1989, 80,000 TONS IN 1990, AND APPROXIMATELY 55,000 TONS PER ANNUM IN 1991, 1992, AND 1993. DURING THIS PERIOD, IN ADDITION TO THE ABOVEMENTIONED WASTES, SEWAGE SLUDGE WAS ALSO DEPOSITED IN THE LANDFILL AT AN AVERAGE RATE OF 12,000 TONS PER ANNUM.

IN 1994 THE CITY OF NEW HAVEN SIGNED CONSENT ORDER SW–357 WITH THE DEP TO CLOSE THE LANDFILL, AND BETWEEN 1994 AND 1998 CAPPING AND GAS FLARE SYSTEMS WERE DESIGNED BY MALCOLM PIRNIE INC OF WHITE PLAINS AND SCS ENGINEERS INC OF WEST NYACK. CONSTRUCTION OF THE CLOSURE INFRASTRUCTURE WAS UNDERTAKEN BY R. BATES & SONS INC BETWEEN FEBRUARY 1998 AND JANUARY 2000, WITH A COMPLETION AND CERTIFICATION REPORT BEING ISSUED BY MALCOLM PIRNIE INC IN APRIL 2000. SINCE THAT DATE ROUTINE MAINTENANCE, MONITORING AND COMPLIANCE REPORTING TO DEP HAS BEEN UNDERTAKEN BY AN OUTSIDE CONTRACTOR UNDER AN ANNUALLY RENEWABLE CONTRACT.

2. IMPORTANT STATISTICS

THE LANDFILL IS KIDNEY SHAPED, ALIGNED ON A NORTH – SOUTH AXIS, AND COVERS APPROXIMATELY 34 ACRES. IT HAS SIDE SLOPES OF 1 (VERTICAL) TO 2.5 (HORIZONTAL), AND A MORE GENTLY GRADED SUMMIT AREA, WITH A MAXIMUM ELEVATION OF APPROXIMATELY 138 FT NGVD. AS THE ADJACENT MARSHLAND IS AT AN ELEVATION OF 10 FT TO 15 FT NGVD, THE LANDFILL STANDS APPROXIMATELY 120 FT ABOVE ITS SURROUNDINGS. IT IS ESTIMATED TO HAVE A TOTAL VOLUME OF 3.5 MILLION CUBIC YARDS, AND TO CONTAIN APPROXIMATELY 1.5 MILLION TONS OF WASTE MATERIALS.

NO RECORDS ARE AVAILABLE AS TO THE LOCATIONS OF PARTICULAR TYPES OF WASTE WITHIN THE LANDFILL HOWEVER, AS THE CITY INCINERATED MUCH OF ITS REFUSE PRIOR TO THE EARLY 1980S, IT IS LIKELY THAT ASH WILL PREDOMINATE BELOW THE 50 FT NGVD ELEVATION, WITH MUNICIPAL SOLID WASTE, BULKY WASTE, AND CONSTRUCTION AND DEMOLITION WASTE PREDOMINATING ABOVE THIS ELEVATION.

THE COVER MATERIALS, WHICH ARE MORE FULLY DETAILED IN THE NEXT SECTION, ARE AS FOLLOWS :–

(I) 12 INCHES OF INTERMEDIATE COVER
(II) 60 MIL TEXTURED HDPE GEOMEMBRANE
(III) HDPE FILTER FABRIC DRAINAGE NET COMPOSITE
(IV) GEOGRID REINFORCING (AS REQUIRED IN LOCALIZED AREAS OF STEEPER SIDE SLOPES)
(V) 12 INCHES OF VEGETATIVE SOIL COVER
(VI) EROSION CONTROL MATERIALS (AS REQUIRED IN LOCALIZED AREAS)
(VII) VEGETATION

3. COVER DETAILS

(I) INTERMEDIATE COVER

AFTER THE LANDFILL SURFACE HAD BEEN SMOOTHLY GRADED AND COMPACTED, IT WAS COVERED WITH A FURTHER 12 INCHES OF MATERIAL DESCRIBED AS INTERMEDIATE COVER. THIS MATERIAL CONSISTED OF WELL GRADED SILTY SAND WITH A MINIMUM ANGLE OF INTERNAL FRICTION OF 31 DEGREES. IT WAS COMPACTED TO A MINIMUM OF 85 PERCENT MODIFIED PROCTOR DENSITY USING SMOOTH DRUM ROLLERS, AND ITS SURFACE WAS HAND RAKED TO PROVIDE A SMOOTH AND UNIFORM SURFACE.

(II) GEOMEMBRANE

TEXTURED HDPE GEOMEMBRANE LINER PANELS MANUFACTURED BY SOLMAX GEOSYNTHETICS INC WERE PLACED AND SEAMED ON THE INTERMEDIATE COVER SURFACE. THIS MATERIAL WAS SUBJECTED TO EXTENSIVE TESTING TO ENSURE SPECIFICATION COMPLIANCE. ADDITIONALLY, FIELD TESTING WAS UNDERTAKEN TO ENSURE THAT THE MINIMUM INTERNAL FRICTION ANGLE OF 31 DEGREES WAS MAINTAINED AT THE INTERMEDIATE COVER INTERFACE, AND ALSO WITH THE OVERLYING DRAINAGE NET COMPOSITE. ALL SEAMS WERE TESTED TO VERIFY THEIR STRENGTH AND CONTINUITY. IN THE FIELD EXTRUDED SEAMS WERE SUBJECTED TO VACUUM BOX TESTING, AND AIR PRESSURE TESTING WAS APPLIED TO WEDGE WELDED SEAMS. LABORATORY TESTING WAS ALSO UNDERTAKEN ON SAMPLES CUT FROM SEAMS AT 500 FT INTERVALS TO VERIFY STRENGTH AND QUALITY.

(III) DRAINAGE NET COMPOSITE

THE DRAINAGE NET WAS MANUFACTURED BY FLUID SYSTEMS INC, AND INSTALLED BY NEW LININGS SOLUTIONS INC. THIS MATERIAL CONSISTS AN HDPE NET CORE, WITH FILTER FABRIC BONDED TO BOTH ITS UPPER AND LOWER SURFACES. ITS PURPOSE IS TO COLLECT ANY PRECIPITATION THAT PERCOLATES THROUGH THE TOPSOIL TO THE LINER SURFACES, REDUCING THE HEAD ON THE GEOMEMBRANE, AND IMPROVING THE OVERALL STABILITY OF THE CAPPING SYSTEM. STORMWATER THAT IS COLLECTED BY THE FILTER FABRIC DRAINS TO THE SURFACE EITHER THROUGH THE GRAVEL DRAINS AT THE TOE OF THE SIDESLOPES, OR IN TO THE DRAINAGE SWALES ON THE SIDE SLOPES.

(IV) GEOGRID REINFORCING

IN LIMITED AREAS SIDE SLOPES AS STEEP AS 1 (VERTICAL) TO 2.0 (HORIZONTAL) WERE NECESSARY DUE TO THE MOUND'S GEOMETRY. TO MAINTAIN SLOPE STABILITY A GEOGRID MANUFACTURED BY TENSAR CORPORATION WAS INSTALLED WHERE THE SIDE SLOPES WERE BETWEEN 1:2.5 AND 1:2.0. IT WAS INSTALLED BY R. BATES & SONS INC UNDER THE MANUFACTURER'S SUPERVISION. IT WAS ANCHORED AT ITS UPPER EDGE USING CONCRETE DEADMEN PLACED IN AN ANCHOR TRENCH.

(V) TOPSOIL

THE TOPSOIL WAS SPECIALLY PREPARED FOR THIS PROJECT USING A BLEND OF 50% SAND AND 50% COMPOSTED WOOD AND LEAF MULCH, AND THEN PLACED TO A DEPTH OF 12 INCHES OVER THE DRAINAGE NET. IT WAS TESTED TO ENSURE IT WOULD MAINTAIN THE 31 DEGREE MINIMUM ANGLE OF INTERNAL FRICTION AT THE DRAINAGE NET INTERFACE.

(VI) EROSION CONTROL

EROSION CONTROL MEASURES WERE DESIGNED TO REDUCE SOIL LOSS FROM THE COMPLETED CAP SURFACE, AND TO REINFORCE THE PERMANENT VEGETATIVE ROOT MASS. SEVERAL TYPES OF BIODEGRADEABLE MATTING AND SYNTHETIC TURF REINFORCEMENTS WERE USED. ADDITIONALLY, TWO DRAINAGE SWALES WERE CONSTRUCTED TO INTERCEPT STORMWATER RUN–OFF, AND ROUTE IT TO A DETENTION BASIN ON THE EAST SIDE OF THE LANDFILL MOUND, FROM WHICH IT IS DISCHARGED AT A CONTROLLED RATE TO THE LITTLE RIVER.

(VII) VEGETATION

THE TOPSOIL WAS SEEDED WITH A MIX THAT WAS DEVELOPED TO PROVIDE A DENSE ROOT MASS, AND TO BE DROUGHT RESISTANT. IT CONSISTED THE FOLLOWING :–

CLEMFINE TALL FESCUE	39.60%
WEEPING LOVEGRASS	21.78%
REUANT HARD FESCUE	10.89%
KENTUCKY BLUEGRASS	9.90%
PALMER PERENNIAL RYE	5.94%
WHITE CLOVER	4.95%
BLACKWELL SWITCHGRASS	5.94%

4. GAS MANAGEMENT SYSTEM

THE GAS COLLECTION SYSTEM CONSISTS A SERIES OF VERTICAL EXTRACTION WELLS CONNECTED BY HORIZONTAL CONNECTORS TO HEADER PIPING LEADING TO A BLOWER SYSTEM THAT REMOVES THE GAS. THERE IS ALSO A HORIZONTAL EXTRACTION WELL ON THE EAST SIDE OF THE LANDFILL, TO PREVENT GAS BUILD UP ADJACENT TO CITY OF NEW HAVEN BUILDINGS. DOWNSTREAM OF THE BLOWER THE EXTRACTED GAS IS FLARED, AND THE RESULTING CONDENSATE IS DISCHARGED TO A SANITARY SEWER.

5. GROUND WATER

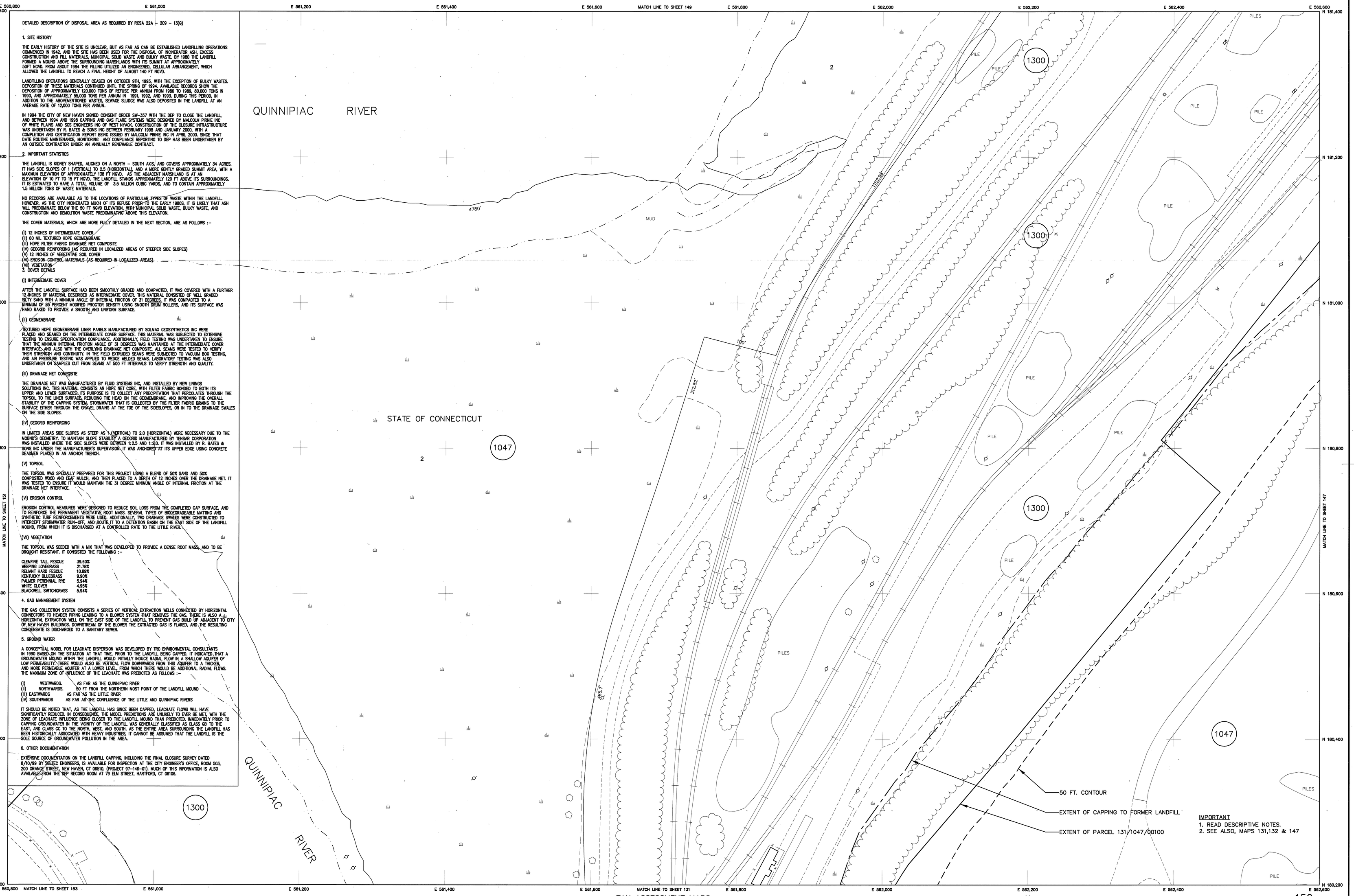
A CONCEPTUAL MODEL FOR LEACHATE DISPERSION WAS DEVELOPED BY TRC ENVIRONMENTAL CONSULTANTS IN 1990 BASED ON THE SITUATION AT THAT TIME, PRIOR TO THE LANDFILL BEING CAPPED. IT INDICATED THAT A GROUNDWATER MOUND WITHIN THE LANDFILL WOULD INITIALLY INDUCE RADIAL FLOW IN A SHALLOW AQUIFER OF LOW PERMEABILITY. THERE WOULD ALSO BE VERTICAL FLOW DOWNWARDS FROM THIS AQUIFER TO A THICKER, AND MORE PERMEABLE AQUIFER AT A LOWER LEVEL, FROM WHICH THERE WOULD BE ADDITIONAL RADIAL FLOWS. THE MAXIMUM ZONE OF INFLUENCE OF THE LEACHATE WAS PREDICTED AS FOLLOWS :–

(I) WESTWARDS. AS FAR AS THE QUINNIPIAC RIVER
(II) NORTHWARDS. 30 FT FROM THE NORTHERN MOST POINT OF THE LANDFILL MOUND
(III) EASTWARDS AS FAR AS THE LITTLE RIVER
(IV) SOUTHWARDS AS FAR AS THE CONFLUENCE OF THE LITTLE AND QUINNIPIAC RIVERS

IT SHOULD BE NOTED THAT, AS THE LANDFILL HAS SINCE BEEN CAPPED, LEACHATE FLOWS WILL HAVE SIGNIFICANTLY REDUCED. IN CONSEQUENCE, THE MODEL PREDICTIONS ARE UNLIKELY TO EVER BE MET, WITH THE ZONE OF LEACHATE INFLUENCE BEING CLOSER TO THE LANDFILL MOUND THAN PREDICTED. IMMEDIATELY PRIOR TO CAPPING GROUNDWATER IN THE VICINITY OF THE LANDFILL WAS GENERALLY CLASSIFIED AS CLASS GB TO THE EAST, AND CLASS GC TO THE NORTH, WEST, AND SOUTH. AS THE ENTIRE AREA SURROUNDING THE LANDFILL HAS BEEN HISTORICALLY ASSOCIATED WITH HEAVY INDUSTRIES, IT CANNOT BE ASSUMED THAT THE LANDFILL IS THE SOLE SOURCE OF GROUNDWATER POLLUTION IN THE AREA.

6. OTHER DOCUMENTATION

EXTENSIVE DOCUMENTATION ON THE LANDFILL CAPPING, INCLUDING THE FINAL CLOSURE SURVEY DATED 8/10/99 BY SELTEC ENGINEERS, IS AVAILABLE FOR INSPECTION AT THE CITY ENGINEER'S OFFICE, ROOM 503, 200 ORANGE STREET, NEW HAVEN, CT 06510. (PROJECT 97–146–01). MUCH OF THIS INFORMATION IS ALSO AVAILABLE FROM THE DEP RECORD ROOM AT 79 ELM STREET, HARTFORD, CT 06106.



STREET & CURB LINE
PAVED STREET NO CURB
TRAIL
WALK & DRIVEWAY
WATERLINE
CITY BOUNDARY
PROPERTY LINE
FENCE LINE
RAILROAD
RAILROAD (ABANDONED)
WOODLINE
BRUSHLINE
BUILDING
HEDGE LINE
SWAMP
GUIDRAIL
RETAINING WALL
STONE WALL
FIRE HYDRANT
CATCH BASIN
MANHOLE
POLE
TREE
UTILITY POLE W/ LIGHT
LAMP POST
TRAFFIC POLE
TRAFFIC POLE W/ ARM
TRAFFIC POLE W/ 2 ARM
FLAGPOLE
TRANSMISSION POLE
TRANSMISSION TOWER
BUOY
1047 BLOCK NUMBER
24 LOT NUMBER

TAX ASSESSMENT MAPS SCALE 1"=40'

CITY OF NEW HAVEN, CONNECTICUT

TAX ASSESSMENT MAPS

SCALE 1"=40'

40 0 40 80 120 160 FEET

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NOTES:
1. COMPLIED FROM AERIAL PHOTOGRAHPY – APRIL 11, 1997
2. COORDINATES BASED ON CONNECTICUT RECTANGULAR COORDINATE SYSTEM.
3. LANDFILL INFORMATION ADDED FEBRUARY 2005.