Superfund Program
Proposed Plan

U.S. Environmental Protection Agency, Region 2

Ringwood Mines/Landfill Superfund Site Operable Unit Two
September 2013

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the Preferred Alternatives to address waste contained in three disposal areas of the Ringwood Mines/Landfill Superfund Site (Site), located in the Borough of Ringwood, Passaic County, New Jersey, and provides a rationale for these preferences. These three disposal areas, known as the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas, comprise Operable Unit Two (OU2) of the Site.

The U.S. Environmental Protection Agency's (EPA's) Preferred Alternative to address waste contained in the Peters Mine Pit Area of the Site is Alternative 6A, which provides for the removal and off-site disposal of historic fill surrounding Peters Mine Pit, backfilling of the Peters Mine Pit and installation of a permeable engineered cap over the Peters Mine Pit. The EPA's Preferred Alternative for the Cannon Mine Pit Area is Alternative 3A, which will provide for the installation of a permeable engineered cap over the Cannon Mine Pit Area. The EPA's Preferred Alternative for the O'Connor Disposal Area is Alternative 5A, which will provide for the excavation of all soil/fill material from the O'Connor Disposal Area down to the top of the underlying mine tailings and disposal and/or recycling of all of the excavated material at appropriately permitted off-site disposal facilities. The undisturbed mine tailings at the bottom of the O'Connor Disposal Area which are not comingled with wastes and other fill materials could be removed and potentially reused onsite within the Peters Mine Pit Area in place of clean fill that would otherwise need to transported through the community.
The EPA is also proposing a contingency remedy for the O'Connor Disposal Area as a result of information that it has received from the Borough of Ringwood. The Borough has recently presented the EPA with planning documents for construction of a new recycling center in the O'Connor Disposal Area. If the Borough of Ringwood proceeds in a timely manner to formally adopt and obtain all necessary approvals to construct a new recycling center at the O'Connor Disposal Area, EPA's preferred alternative would then be Alternative 4A. This alternative would provide for the consolidation of fill materials from the fringe areas to the center of the O'Connor Disposal Area, followed by the installation of a two-foot thick soil cap over the fill materials. The excavated areas beyond the engineered cap where soil/fill would be moved for consolidation under the cap would be backfilled with 6 inches of certified clean fill and rough graded to ensure proper drainage prior to revegetation. The cleaned up fringe areas would encompass approximately 4 acres.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
October 2, 2013 – December 2, 2013
EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING: November 7, 2013
EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Studies. Oral and written comments will also be accepted at the meeting. The meeting will be held in the Martin J. Ryerson Middle School, 130 Valley Road, Ringwood, NJ at 7:00 PM.

For more information, see the Administrative Record at the following locations:

U.S. EPA Records Center, Region 2
290 Broadway, 18th Floor.
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday - 9 am to 5 p.m., by appointment.

Ringwood Public Library
30 Cannici Drive
Ringwood, New Jersey 07456
Hours: Monday – Thurs. 10am to 9pm, Friday 10am – 5pm, Saturday 10am – 4pm

This Proposed Plan includes summaries of the cleanup alternatives for waste contained in the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas. This document is issued by the EPA, the lead agency for Site activities, in consulation with the New Jersey Department of Environmental Protection (NJDEP), the support agency. The EPA, in consultation with NJDEP, will select the final remedies for OU2 after reviewing and considering all information submitted during a 60-day public comment period. The EPA, in consultation with NJDEP, may modify the preferred alternatives or select other response actions presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this document.

The EPA is issuing this Proposed Plan as part of its community relations program under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, commonly known as Superfund). Monthly Community Advisory Group Meetings have been held with the community since 2007. This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigations and Feasibility Studies (RI/FSs) and Risk Assessments for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas and other documents contained in the Administrative Record for the Site.

SITE DESCRIPTION

The Ringwood Mines/Landfill Superfund Site (Site) consists of approximately 500 acres in a historic mining district, and is approximately 1.5 miles long and 0.5 miles wide. Portions of the Site are currently used as State of New Jersey parkland (Ringwood State Park), utility corridors (Public Service Electric & Gas and Rockland Electric Company), Borough of Ringwood facilities, including a Recycling Center and a Public Works yard, a power sub-station and open space (Borough of Ringwood property). In addition, 48 residential properties are dispersed throughout the Site. Residents living within the boundaries of the Site currently receive their drinking water from the municipal water supply, which obtains water from well fields located in a different watershed approximately two miles southeast of the Site. The Site is drained by four streams that ultimately lead to the Wanaque Reservoir, located approximately one mile south of the Site. The Wanaque Reservoir serves as a source of drinking water for over two million New Jersey residents.

United States Census Bureau records indicate that 866 people live within one mile of the Site. At least 200 people are estimated to live within the 48 residences located within the Site boundaries. Many of the residents living within the boundaries of the Site are members of the Ramapough Lenape Indian Nation, which is recognized as a Native American tribe by the State of New Jersey. Members of this community have strong ties to the land and hunt game and consume vegetation gathered from the Site.

SITE HISTORY

The land which comprises the Site has been utilized for the mining of iron ore almost continuously from the mid-1700s to the early 1900s. Prior to 1940, the entire mine area was purchased by the U.S. Government and administered by the U.S. Government Defense Plant Corporation. The mine area was subsequently leased to the Alan Wood Steel Company as part of the World War II effort. In 1956, the U.S. Government sold the property to the Pittsburgh Pacific Company. It is believed that there was some use of the mines during the period of Pittsburgh Pacific Company ownership.

Mining operations conducted at the Site consisted of the crushing and grinding of the iron ore, with magnetic separation of the iron from the other ore constituents (tailings). It has been reported that much of the mine tailings was sold off as road dressing. However, mine tailings are found throughout the Site, including the O'Connor Disposal Area, which was used for the disposal of fine mine tailings (this "slime pond" area was utilized for the settlement of waste mine tailings from wet ore processing operations).

In January 1965, the Ringwood Realty Corporation, a wholly-owned subsidiary of the Ford Motor Company, purchased the mine area. Records indicate that in 1967, Ringwood Realty entered into a contract with the O'Connor Trucking and Haulage Corporation for the disposal of wastes generated at the Ford factory located in Mahwah, New Jersey. This contract provided for the disposal of these wastes, which included plant trash, paint sludge, drummed waste and other non-liquid plant wastes, at the Site.

In 1969, the Ringwood Realty Corporation began selling or donating portions of the Site. In 1970, 290 acres of the Site were donated to the Ringwood Solid Waste Management Authority. During the same year, additional acreage was sold to the Public Service Electric and Gas Company for use as a transmission line right of way. In 1973, 109 acres were donated to the New Jersey Department of Environmental Protection (NJDEP), this area was added to the Ringwood State Park. In that same year, Housing Operation with Training Opportunity (HOW TO) a New Jersey not for profit corporation, accepted the donation of over 35 acres of the Site. It is believed that by December 21, 1973, Ford no longer owned any portion of the Site.

The results of a July 1982 Site Inspection conducted by NJDEP identified levels of benzene, ethylbenzene, and xylene in water samples collected from the Peters Mine Airshaft, which led to the Site's inclusion on the National Priorities List (NPL) in 1983.

In March 1984, Ford entered into an Administrative Order on Consent (ACO) with the EPA which required the performance of a RI for the Site. The required RI was conducted by Ford's contractor in four phases between March 1984 and April 1988. In June 1987, the EPA issued Unilateral Orders (UAOs) to Ford which required the performance of a FS, and the removal and off-site disposal of paint sludge and associated soil. Pursuant to these UAOs, Ford completed a FS and removed over 7000 cubic yards of paint sludge and associated soil from the

Site in 1988. As part of this removal, pockets of paint sludge were removed from the northern portion of the Site near the Peters Mine Pit and the O'Connor Disposal Areas, and from an area near the Cannon Mine Pit.

In September 1988, the EPA issued a Record of Decision (ROD) which selected long-term monitoring of groundwater and surface water as the remedy for the Site. The ROD noted that the known areas of paint sludge had been removed from the Site.

Additional paint sludge deposits and drums were identified in the O'Connor Disposal Area in 1989, prompting the removal of 600 cubic yards of paint sludge and 54 drum remnants in 1990. Some of the drum contents were reported to have contained polychlorinated biphenyls (PCBs) at concentrations in excess of 50 parts per million (ppm).

The Site was deleted from the NPL in 1994, with the presumption that all paint sludge and drums of hazardous substances had been removed from the Site. The deletion was further supported by the determination that groundwater at the Site did not pose an unacceptable threat to human health and the environment.

From 1990 through 1995, Ford conducted a five-year Environmental Monitoring Program which provided for the sampling of monitoring wells and potable wells in the area of the Site. The results of this program indicated that groundwater contaminant levels had been reduced since paint sludge had been removed from the Site.

In 1995, the EPA was notified by a local resident of additional paint sludge located in a utility right-of-way near the Cannon Mine Pit Area, prompting the removal of an additional 5 cubic yards of paint sludge. In 1998, another resident notified the EPA of the presence of paint sludge in the O'Connor Disposal Area, prompting the removal of an additional 100 cubic yards of paint sludge and soil.

In September 2003, representatives of the Upper Ringwood residents wrote to the EPA regarding their concern over past exposures and paint sludge remaining at the Site, but provided no details regarding the location of remaining paint sludge. Additional paint sludge areas were subsequently identified during an April 2004 Site visit arranged by the residents' representatives.

In December 2004, Ford began the voluntary removal of surficial pockets of paint sludge identified at the Site. The discoveries of additional significant quantities of paint sludge at the Site prompted the EPA to restore the Site to the NPL in September 2006. Ford has removed over 53,500 tons of paint sludge and associated soil from 15 distinct areas of the Site, in addition to the O'Connor Disposal Area and the Peters Mine Pit Area, since December 2004.

In September 2005, Ford signed an ACO which requires the performance of an additional RI and risk assessment for the Site. In May 2010, Ford signed an ACO which requires the performance of FSs for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas of the Site, as well as Site-Related Groundwater Contamination. The Borough of Ringwood, which has also been identified as a Potentially Responsible Party for the Site, is coordinating with Ford on the performance of the RI/FSs for the Site.

The Site historically has contained and presently contains significant amounts of buried and surficial household wastes. From 1972 through 1976, the Borough of Ringwood operated a municipal landfill at the Site. Investigations conducted at the Site indicated that areas of the Site other than this municipal landfill were also used for the disposal of household wastes. Household refuse and construction debris was detected in 57% of test pits installed at the Site as part of a Site-wide Test Pit Investigation.

Due to the extensive mining activities formerly conducted at the Site, subsidence issues have historically been a concern. Subsidence issues reportedly occurred at the Site in 1961, 1979, 1998 and again in July 2005, when a sinkhole formed on a residential property located about 600 feet from a paint sludge disposal area. In 2006, additional sinkholes formed between two residential properties located near the former Cannon Mine Pit. Investigations conducted on these properties identified the presence of shallow voids related to mining activities, resulting in the Borough of Ringwood declaring the properties uninhabitable. The EPA has required that vibration monitoring be conducted during performance of remedial activities in areas near mine workings to mitigate the possibility of work-related subsidence issues.

SITE CHARACTERISTICS

The 500-acre Site is located in the northern portion of the Borough of Ringwood, Passaic County, New Jersey. The Site terrain is mountainous with peaks up to 900 feet above sea level and valleys which are generally below 500 feet in elevation. Bedrock in the valleys and other topographically low areas is covered by overburden which consists of unconsolidated and reworked glacial deposits and weathered bedrock.

The Peters Mine Pit Area is located in the north central part of the Site and is bound to the north by Park Brook. Most of the Peters Mine Pit Area falls within the Ringwood State Park, and is expected to remain in use as

part of the state park in the future. From 1967 through 1971, the 375-foot long, 200-foot wide and 90-foot deep mine pit was filled to the ground surface with waste from Ford's Mahwah facility. Since this time, settling of the fill in this area has occurred and a 300-foot long pond currently occupies what was once the deepest part of the mine pit. The pond is believed to be an expression of the water table.

The Cannon Mine Pit Area is located in the southwestern part of the Site. The pit was reportedly 180 feet long, 140 feet wide and 200 feet deep when mining operations ceased. Attempts were made to blast the pit closed when Ford purchased the property, which resulted in reducing the depth of the pit to approximately 60 feet. During the period of Ford ownership, the pit was reportedly filled to the ground surface with waste from Ford's Mahwah facility. Only minimal settling of the fill material has been noted in this area.

The 12-acre O'Connor Disposal Area is located to the south of the Peters Mine Pit Area along the Peters Mine Road. During the period of active mine operations, this area was utilized for the settling of waste mine tailings from wet ore processing operations. Subsequently, during the period of Ford ownership, the O'Connor Disposal Area was utilized for the disposal of waste from Ford's Mahwah facility. The results of investigations conducted in this area indicate that waste and fill materials are present to a maximum depth of approximately 20 feet below ground surface. In general, a layer of undisturbed mine tailings appears to underlay waste materials disposed of by Ford's contractor and other fill materials. The O'Connor Disposal Area generally slopes to the east toward the Park Brook.

Paint sludge and other drummed industrial wastes originating from Ford's former Mahwah facility are the primary sources of contamination at the Site. However, levels of arsenic above New Jersey background soil levels have been found in some samples of mine tailings collected from the Site. Given that arsenic has also been found at elevated levels in some paint sludge samples collected from the Site, the EPA believes that paint sludge is also a source of arsenic in other media at the Site.

Peters Mine Pit Area Investigation

A supplemental RI of the Peters Mine Pit Area was initiated in March of 2006. As part of this RI, two test trenches and seven test pits were installed in the fill material which surrounds the Peters Mine Pit pond to characterize the fill material and to define the perimeter of the fill area. The historic fill surrounding the pit extends to an average depth of approximately 10 feet. In addition, four directional (diagonal) borings were installed through the fill material in the pit to the sidewall or base of the pit. Soil/solid waste samples were collected from each 10-foot core recovered during the advancement of these borings (38 total samples) to characterize fill material contained within the Peters Mine Pit.

During these investigations, paint sludge was identified in both test trenches and two of the seven test pits installed in the pit. In addition, paint sludge was identified at depth in cores collected from one of the four directional borings. Lead and arsenic were detected in soil/solid waste samples collected from the subsurface borings at maximum concentrations of 8300 ppm and 82.9 ppm, respectively, which exceed the State of New Jersey's Residential Direct Contact Soil Remediation Standards (RDCSRSs) of 400 ppm and 19 ppm for lead and arsenic. Benzene was detected at a maximum concentration of 1.1ppm, which is below the RDCSRS of 2ppm. In addition, these investigations indicated that the Peters Mine Pit contains approximately 113,000 cubic yards of fill material, including approximately 23,700 cubic yards of mine tailings at the base of the pit.

The RI also included the installation and sampling of overburden and bedrock groundwater monitoring wells in the pit and in the vicinity of the pit. The results of these investigations indicated that benzene is present in groundwater in and downgradient of the pit at concentrations up to 5.5 parts per billion (ppb). In addition, benzene was detected in water contained in an airshaft to the east of the pit at concentrations as high as 33.2 ppb, which exceeds the New Jersey Ground Water Quality Standard (GWQS) of 1 ppb. The levels of benzene detected in groundwater in the Peters Mine Pit Area during this RI are consistent with levels detected during previous groundwater sampling events. Contaminants of concern were not detected at elevated levels in surface water samples collected from the Peters Mine Pit pond.

Cannon Mine Pit Area Investigation

A supplemental RI of the Cannon Mine Pit Area was initiated in October 2007. As part of this RI, 12 test pits were installed in and around the perimeter of the pit to characterize the fill material and the extent of the pit. In addition, six borings were installed within the pit into the underlying blast rock. Soil/solid waste samples were collected from each 10-foot core recovered during the advancement of these borings (31 total samples) to characterize the fill material contained within the Cannon Mine Pit. Ten surface soil samples were also collected from within the Cannon Mine Pit.

Paint sludge was not identified during the installation of the test pits and borings. However, 10 drums were removed from one test pit during these investigations.

The contents of two of these ten drums failed the Toxicity Characteristic Leaching Procedure (TCLP) for lead, and were required to be disposed of offsite as a hazardous waste. No contaminants were detected at concentrations above New Jersey's RDCSRSs in the surface soil samples collected during this RI. Lead and arsenic were detected in soil/solid waste samples collected from the borings at maximum concentrations of 9030 ppm and 56.7 ppm, respectively, which exceed New Jersey's RDCSRSs of 400 ppm and 19 ppm for lead and arsenic. In addition, these investigations indicated that the Cannon Mine Pit contains approximately 46,000 tons of fill material, excluding the blast rock located at the bottom of the pit.

The RI also included the installation and sampling of bedrock groundwater monitoring wells in the vicinity of the pit. The results of the groundwater investigation indicate that the Cannon Mine Pit sits on top of a small ridge with groundwater in shallow bedrock to the east of the pit flowing to the southeast and groundwater to the west of the pit flowing to the southwest. Lead and arsenic, which have sporadically been detected in groundwater in the Cannon Mine Pit Area at concentrations above the GWQSs of 5 ppb and 3ppb respectively, were not detected above GWQSs during the 2012 sampling event. Trichloroethene, which was detected in one monitoring well at concentrations above the GWQS of 1 ppb during sampling events conducted in 2008 and 2009, has not been detected in subsequent sampling events. A groundwater contaminant plume has not been identified in the Cannon Mine Pit Area.

O'Connor Disposal Area Investigation

A supplemental RI of the O'Connor Disposal Area (OCDA) was initiated in July 2006, and was conducted in two phases. The initial phase of the RI included the installation of 14 test trenches and 10 test pits in the OCDA in order to characterize the fill material and to delineate the extent of the fill. 29 soil samples were collected from the fill material and the bottom of the test pits and trenches. In addition, 15 surface soil samples were collected from the OCDA. The second phase of investigation, which was conducted in 2010, included the completion of eight additional test trenches (3169 linear feet), with the collection of 40 samples from the base of the trenches and 34 samples from the sidewalls of the trenches.

During performance of these investigations, paint sludge deposits were identified at the northern and southern ends of the OCDA. 2200 tons of this paint sludge was excavated and disposed of offsite by Ford during early 2010. In addition, five drums of waste were identified during this RI. Three of these drums were disposed of offsite as hazardous waste while the contents of the remaining two drums were disposed of offsite as Toxic Substances Control Act waste with concentrations of polychlorinated biphenyls (PCBs) in excess of 50 ppm. These investigations indicated that approximately 183,600 cubic yards of fill material and mine tailings are present within the OCDA.

Arsenic was detected in five of the 15 surface soil samples at concentration ranging from 42.4 ppm to 51.1 ppm, which exceed New Jersey's RDCSRS of 19 ppm. Arsenic was also detected above its RDCSRS in four of the 29 test pit/trench samples collected during the initial phase of investigation, and 29 of the 74 samples collected during the second phase of investigation. Lead was detected at concentrations above its RDCSRS of 400 ppm in one test pit/trench sample collected during the initial phase of investigation and one test trench sample collected during the second phase of investigation.

The RI also included the installation and sampling of overburden groundwater monitoring wells in the OCDA. Arsenic was detected above New Jersey's GWQS of 3 ppb in one well in the OCDA during the 2012 sampling event. No other contaminants were detected at concentrations above GWQSs during the 2012 sampling event. A groundwater contaminant plume has not been identified in the OCDA.

Biota Study

Given that the Upper Ringwood residents reported that they regularly consume plants and wildlife at the Site and their concern about the potential for contaminants to enter the food chain, biota sampling was conducted by the EPA's Environmental Response Team in 2006-2007 and again in 2009. This study involved the collection of frogs, crayfish, small mammals (mice, voles and shrews), eastern gray squirrel, rabbits, turkey, eastern white-tail deer, wild carrot, dandelion greens, mushrooms, strawberries and raspberries. The intent of this study was to assess the potential migration of Site-related contaminants into the food chain and to determine whether contaminants are present in biota consumed by the Upper Ringwood community.

The results of this study indicated that lead was accumulating in small mammals and wild carrot collected from the Site, particularly those collected from the O'Connor Disposal Area. However, lead accumulation was not observed in the larger wildlife which is consumed by the community. Other Site-related metals were not found to be substantively entering the food chain. In addition, Site-related organic contaminants were not found to be entering the food chain.

PRINCIPAL THREATS

The remedial alternatives being evaluated for the Peters Mine Pit, Cannon Mine Pit, and the O'Connor Disposal Area would address paint sludge and drummed industrial waste which likely remain in these areas of the Site. However, principal threat wastes have not been identified at the Site.

WHAT IS A "PRINCIPAL THREAT"?

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water, surface water or air, or acts as a source for direct exposure. Contaminated ground water generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in ground water may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

SCOPE AND ROLE OF THE ACTION

The EPA is addressing the cleanup of this Site through immediate actions to address imminent threats to human health, and three phases of long-term cleanup.

Paint sludge and associated soil contamination located on non-residential properties outside of the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas are being addressed by Ford under removal authority. Furthermore, paint sludge and lead-contaminated soil located on residential properties at the Site are being addressed by the EPA under removal authority.

Operable Unit One (OU1) was originally intended to comprehensively address the Site. Subsequent to the restoration of the Site to the NPL, the EPA created two additional operable units, OU2 and OU3. OU2, which is the subject of this Proposed Plan, addresses waste, fill material and soil located in the Peters Mine Pit, Cannon Mine Pit and the O'Connor Disposal Areas. The FSs for these areas of concern evaluate a range of remedial options to limit direct exposure to contaminated soil and fill material and to mitigate their potential to serve as a source of contamination to groundwater and surface water.

A separate RI to evaluate groundwater contamination across the entire Site is now underway as part of a separate operable unit (OU3), and a separate Feasibility Study to evaluate remedial alternatives for Site-wide groundwater will follow. EPA expects that the RI and FS for OU3 will be completed and a proposed remedial plan for groundwater will be issued within the next few years. That plan and the subsequent record of decision will address long-term groundwater monitoring for the entire Site. In the interim, continued groundwater monitoring would also be implemented as a component of the remedial alternatives being proposed for the Peters Mine Pit, Cannon Mine Pit and the O'Connor Disposal Area. EPA intends to post the results of this groundwater monitoring on a publicly accessible website. EPA anticipates that implementation of the OU2 remedy will be consistent with future OU3 remedial actions.

SUMMARY OF OPERABLE UNIT 2 RISKS

As part of the RI/FSs for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas, baseline risk assessments were conducted to estimate the current and future effects of contaminants that currently exist at the site on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land, groundwater and surface water/sediment uses. The baseline risk assessment includes a human health risk assessment (HHRA).

Separate HHRAs have been completed for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas of the Site. While the EPA recognizes that individuals may spend only a portion of their time in a single area of the Site, the HHRAs calculate risk assuming that individuals confine their activities to a single area as it is possible that individuals may occasionally only spend time in a single area. In addition, in order to recognize that it is reasonable to assume people spend time at each area, the HHRAs include a second set of risk calculations which apportion exposures based upon the relative contribution of acreage of each area of concern to the total 22 acres of the three areas of concern at the Site.

The cancer risk and non-cancer health hazard estimates in the HHRAs are based on current and future reasonable maximum exposure scenarios. Consistent with risk assessment guidance that calls for characterizing activity patterns of site-specific populations (EPA, 1989) scenarios were developed based on conversations with Upper Ringwood community members who identified unique, site-specific exposure characterizations that address traditional and cultural uses of site plants and animals, as well as the land. In addition, EPA also evaluated default

assumptions regarding exposure that are consistently used in Superfund risk assessments. These sources of information – site-specific community input and traditional default information – were used to develop the exposure scenarios and assumptions that were carried into the HHRAs for the three areas, along with information on the toxicity of the chemicals of potential concern (COPCs). Cancer risks and non-cancer health hazard indices (HIs) for each of the areas of the Site are summarized below.

It is noted that areas of surficial paint sludge have been identified and removed as part of paint sludge removal actions conducted at the Site. As part of this paint sludge removal work, Ford also excavated buried paint sludge from within the Peters Mine Pit and O'Connor Disposal Areas. Because baseline risk assessments evaluates contamination that currently exists at the site, implementation of these removal actions has reduced the current and future risks that would have been identified had the removal actions not been conducted.

Peters Mine Pit Area Risk Assessment

The HHRA for the Peters Mine Pit Area evaluated Walker/Hiker/Dog Walker, Wader, Hunter and Current Outdoor Worker exposure scenarios, assuming an apportionment factor of 100%. This apportionment factor assumes that 100% of the receptors' exposure occurs within this area of the Site. The results of the HHRA indicate that the potential cancer risk for game hunters and gathers of wild plants in the Peters Mine Pit Area falls at the upperbound of the EPA's risk management range of 10^{-4} to 10^{-6}. The cumulative potential cancer risk for the hunter scenario for adult, young child and older child is 4×10^{-4}, which indicates that there may be an unacceptable risk to these receptors due primarily to ingestion of arsenic in plant and game tissue. Potential risks associated with all other exposure scenarios fell within or below the EPA's risk management range. Potential non-cancer risks were also estimated by calculating hazard indices. Under the Hunter scenario, hazard indices were above the EPA's target HI of 1.0 for the circulatory system, skin, kidney and gastrointestinal tract. However, following the EPAs process for evaluating non-cancer hazards, when modes of action for the COPCs are considered, non-cancer HIs are less than the benchmark value of 1.0.

The HHRA for the Peters Mine Pit Area also evaluated Walker/Hiker/Dog Walker and Hunter exposure scenarios, assuming an apportionment factor of 23%. The cumulative potential cancer risk for these exposure scenarios is 1×10^{-4}. The apportioned potential non-cancer risk under the Walker/Hiker/Dog Walker scenario was at or below the EPA's target hazard index of 1 for all receptors. For the Hunter scenario, the hazard indices for the adult, youth and young child are all below 1 when assessed by target organ.

Anticipated blood lead levels in Site receptors were also evaluated to determine whether exposure to lead in media at the Site presents an unacceptable risk. Blood lead levels for the young child hunter following exposure to lead in game and plant tissue were predicted to exceed 10 micrograms per deciliter (ug/dl) in 14 percent of the hypothetically exposed population, which exceeds the EPA's target threshold of 5 percent, indicating potential unacceptable risk due to exposure to lead.

Cannon Mine Pit Area Risk Assessment

The HHRA for the Cannon Mine Pit Area evaluated Walker/Hiker/Dog Walker, Dirt Biker/ATV Rider, Hunter, Current Outdoor Worker, Future Resident and Future Outdoor Worker exposure scenarios, assuming an apportionment factor of 100%. Results of the HHRA indicate that the potential cancer risk for game hunters and gathers of wild plants in the Cannon Mine Pit Area falls at the upperbound of the EPA's risk management range of 10^{-4} to 10^{-6}. The cumulative potential cancer risk for the hunter scenario for adult, young child and older child is 3×10^{-4}, which indicates that there may be an unacceptable risk to these receptors due primarily to ingestion of arsenic found in plant and game tissue. Potential non-cancer risks were also estimated by calculating hazard indices. Under the Hunter scenario, hazard indices were above the EPA's target hazard index of 1.0 for the circulatory system and gastrointestinal tract. However, following the EPA's process for evaluating non-cancer hazards, when modes of action for the COPCs are considered, non-cancer HIs are less than the benchmark value of 1. Potential risks associated with all other exposure scenarios fell within or below the EPA's risk management range.

The HHRA for the Cannon Mine Pit Area also evaluated Walker/Hiker/Dog Walker, Dirt Biker/ATV Rider, and Hunter exposure scenarios, assuming an apportionment factor of 23%. The cumulative potential cancer risk for these exposure scenarios is 7×10^{-5}. The apportioned potential non-cancer risk under the Walker/Hiker/Dog Walker and Dirt Biker/ATV Rider scenarios was below the EPA's target hazard index of 1 for all receptors. For the Hunter scenario, the hazard indices for the adult, youth and young child are all below one when assessed by target organ.

Blood lead levels for the young child hunter following exposure to lead in game and plant tissue were also predicted to exceed 10 ug/dl in 5.6 percent of the hypothetically exposed population, which slightly exceeds the EPA's target threshold of 5 percent, indicating potential unacceptable risk due to exposure to lead.

O'Connor Disposal Area Risk Assessment

The HHRA for the O'Connor Disposal Area evaluated Walker/Hiker/Dog Walker, Dirt Biker/ATV Rider, Wader, Hunter, Current Outdoor Worker and Resident exposure scenarios, assuming an apportionment factor of 100%. Results of the HHRA indicate that the potential cancer risk for game hunters and gathers of wild plants in the O'Connor Disposal Area falls at the upperbound of the EPA's risk management range of 10^{-4} to 10^{-6}. The cumulative potential cancer risk for the hunter scenario for adult, young child and older child is 3×10^{-4}, which indicates that there may be an unacceptable risk to these receptors due primarily to arsenic in plant and game tissue. Potential non-cancer risks were also estimated by calculating hazard indices. Under the Hunter scenario, hazard indices were above the EPA's target hazard index of 1.0 for the circulatory system, skin, kidney and gastrointestinal tract. Under the Resident scenario, hazard indices were above the EPA's target hazard index of 1.0 for the circulatory system and skin of the young child. However, following the EPAs process for evaluating non-cancer hazards, when modes of action for the COPCs are considered, non-cancer HIs are less than the benchmark value of 1.0. Potential risks associated with all other exposure scenarios fell within or below the EPA's risk management range.

The HHRA for the O'Connor Disposal Area also evaluated Walker/Hiker/Dog Walker, Dirt Biker/ATV Rider, Wader and Hunter exposure scenarios, assuming an apportionment factor of 54%. The cumulative potential cancer risk for these exposure scenarios is 3×10^{-04}, which indicates that there would be an unacceptable risk to these receptors . The apportioned potential non-cancer risk under the Walker/Hiker/Dog Walker, Dirt Biker/ATV Rider and Wader scenarios was at or below the EPA's target hazard index of 1 for all receptors. For the Hunter scenario, the hazard index for the adult, youth and young child for the gastrointestinal tract is 2, which is slightly above the EPA's target index of 1. However, when modes of action for the COPCs are considered, non-cancer HIs are less than the benchmark value of 1.0.

Blood lead levels for the young child hunter following exposure to lead in game and plant tissue were also predicted to exceed 10 ug/dl in 5.6 percent of the hypothetically exposed population, which slightly exceeds the EPA's target threshold of 5 percent, indicating potential unacceptable risk due to exposure to lead.

Potential human health risk associated with exposure of a future recycling center worker to waste in the O'Connor Disposal Area was also qualitatively assessed, given the Borough of Ringwood's expressed intent to construct a recycling center in this area. The cancer risk to a future recycling center worker was estimated to be 2×10^{-5}, which is within EPA's risk management range. In addition, evaluation of the potential non-cancer risk to a future recycling center worker resulted in an HI of 0.2, which is below EPA's benchmark value of 1.0.

Ecological Risk

Separate ecological risk assessments have been completed for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas of the Site. The results of the Screening Level Ecological Risk Assessment (SLERA) for the Peters Mine Pit Area indicate that there are contaminants in soil and sediment that are present at concentrations greater than ecological based screening levels (EBSLs), which indicates a potential risk to terrestrial invertebrates, plants and aquatic invertebrates. The results of the SLERA prompted the performance of a Baseline Ecological Risk Assessment (BERA) which incorporated dose modeling for aquatic exposure pathways and refinements to dose modeling for soil. The results of dose modeling for soil indicate that risks associated with potential exposure of ecological receptors (i.e. short-tailed shrew, meadow vole and the American robin) are low with no hazard quotient for any receptor exceeding 1. The results of dose modeling for sediment also indicated that risks associated with potential exposure of ecological receptors are low, with all Lowest Observed Adverse Effect Level (LOAEL) hazard quotients below 1, with the exception of copper in the tree swallow.

The SLERA for the Cannon Mine Pit Area indicates that there is a potential for adverse ecological impacts due to the presence of metals in soil at levels which exceed EBSLs. Furthermore, the results of food-chain modeling indicated that potential ecological risks within the Cannon Mine Pit Area were associated with exposures of metals in soil to the American robin, meadow vole and short-tailed shrew. The results of the SLERA prompted the performance of a BERA to provide an analysis of potential risks using more realistic exposure assumptions. The results of refined dose modeling for soil conducted as part of the BERA indicate that risks associated with potential exposure of ecological receptors (i.e. short-tailed shrew, meadow vole and the American robin) are low, with no LOAEL hazard quotient exceeding 1.

The SLERA for the O'Connor Disposal Area concludes that there are potential risks to meadow vole, short-tailed shrew, American robin and the tree swallow associated with exposure to soil and sediment in the O'Connor Disposal Area. These potential risks are primarily associated with exposure to antimony, lead and nickel. In addition, this SLERA concludes that low levels of bis (2-

ethylhexyl)phthalate and cadmium in surface water, and metals in surface soil and sediment may pose a potential risk to plants and invertebrates in the O'Connor Disposal Area. The results of the SLERA prompted the performance of a BERA to provide an analysis of potential risks using more realistic exposure assumptions. The results of refined dose modeling for soil and sediment conducted as part of the BERA indicate that risks associated with potential exposure of ecological receptors (i.e. short-tailed shrew, meadow vole, American robin, red-tailed hawk and tree swallow) are low, with no LOAEL hazard quotient exceeding 1.

Conclusions of the Risk Assessments

It is the EPA's judgment that the Preferred Alternatives identified in this Proposed Plan for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas are necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) were developed for waste and soil contained in the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas to address the human health risks presented by potential exposure to these materials. The RAOs for these areas are as follows:

- Limit direct exposure to soil or fill materials containing constituent levels above NJDEP's direct contact cleanup levels;
- Limit or reduce exposures by residents, recreators, hunters, and/or hikers to an additional lifetime cancer risk range of between 1×10^{-4} and 1×10^{-6}, and lifetime non-carcinogenic hazard index less than 1.0; and
- Reduce the potential for contaminants in soil or fill materials to migrate into groundwater and surface water.

An additional RAO for the Peters Mine Pit Area is as follows:

- Permit recreational use of the Peters Mine Pit Area given its location within the Ringwood State Park.

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the contaminants of concern at the site in various media (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines exposure information and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk). For noncancer health effects, a "hazard index" (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a noncancer HI is that a "threshold level" (measured as an HI of less than 1) exists below which noncancer health effects are not expected to occur.

SUMMARY OF REMEDIAL ALTERNATIVES

Potential applicable technologies and process options were identified and screened using effectiveness, implementability and cost as the criteria, with the most emphasis on the effectiveness of the remedial technology. Those technologies and process options which passed the initial screening were assembled into remedial alternatives for waste and soil contained in the Peter Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas. It should be noted that Alternative 6A for the Peters Mine Pit Area has been modified in the Proposed Plan to allow for the segregation of nonhazardous soil and fill from the collar area of the pit and its reuse as fill for the Peters Mine Pit. In addition, Alternative 5A and 5B for the O'Connor Disposal have been modified so that they no longer require that undisturbed mine tailings from the bottom of the O'Connor Disposal Area which are not commingled with wastes and fill materials either be used as fill for the Peters Mine Pit or disposed of at an off-site permitted facility.

.

Peters Mine Pit Area

Alternative 1 – No Action

No corrective action of any kind would be implemented under this alternative. The No Action Alternative was retained, as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and provides a baseline for comparison with other alternatives.

Total Capital Cost	$0
Operation and Maintenance	$0 (Total)
Total Present Net Worth	$0
Construction Duration	0 months

Alternative 2 – Institutional and Engineering Controls

Under this alternative institutional controls, such as a Deed Notice, would be implemented to help prevent potential exposure to contaminants in the fill material. In addition, engineering controls, such as the installation of fencing and the placement of boulders, would be implemented to restrict access. Inspections would be conducted on an annual basis to confirm that land use in the vicinity of the Peters Mine Pit Area is consistent with the selected remedy. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. The selection of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the entire site including the Peters Mine Pit Area. In the interim, for costing purposes, quarterly groundwater monitoring for a period of five years is assumed as a component of this alternative. However, as the program is implemented EPA anticipates that the sampling frequency or number of wells sampled will be revised based on review of the groundwater analytical data.

Total Capital Cost	$17,800
Operation and Maintenance	$708,900 (Total)
Total Present Net Worth	$726,700
Construction Duration	1-2 months

Alternative 3 – Engineered Permeable Cap of Peters Mine Pit Area with Institutional Controls, Peters Mine Pit Pond would Remain

Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. In addition, a two-foot thick clean soil cover would be placed over the Peters Mine Pit and the surrounding fill area. The pit would not be filled in prior to placement of the soil cover, leaving the pit topographically lower than the surrounding area and enabling the restoration of the pond.

Prior to placement of the soil cover, the pit would be dewatered and the fill material compacted. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the soil cap achieves design specifications prior to placing the cover. A permeable geotextile liner would be placed over the compacted base, followed by eighteen inches of clean soil and six inches of topsoil. Appropriate vegetation would then be established. The need for a passive gas management system would be evaluated during design of this alternative.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$2,560,800
Operation and Maintenance	$683,300 (Total)
Total Present Net Worth	$3,244,100
Construction Duration	5-6 months

Alternative 4A - Fill Peters Mine Pit, Permeable Engineering Cap of Peters Mine Pit Area and Institutional Controls, Peters Mine Pit Pond would not Remain

Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. In addition, clean imported fill would be placed within the Peters Mine Pit to raise the elevation of the pit to at least two feet above the average surface water elevation in the pit. Fill from areas surrounding the pit would then be consolidated within the pit. A geotextile fabric would be installed over the consolidated fill materials and the pit

and surrounding area would be backfilled with clean fill to provide an increase in elevation of approximately three feet around the perimeter area, which would result in positive drainage away from the pit. The need for a passive gas management system would be evaluated during design of this alternative.

Restoration of this area would also include vegetation with trees naturally present in Ringwood. The use of a permeable cap would permit the establishment of trees, including those with deep tap roots.

Prior to placement of the soil cover, the pit would be dewatered and the fill material compacted. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the soil cap achieves design specifications prior to placing the cover.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$4,345,500
Operation and Maintenance	$765,500 (Total)
Total Present Net Worth	$5,111,000
Construction Duration	8-9 months

Alternative 4B - Fill Peters Mine Pit, Impermeable Engineering Cap of Peters Mine Area and Institutional Controls, Peters Mine Pit Pond would not Remain

Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. In addition, clean imported fill would be placed within the Peters Mine Pit to raise the elevation of the pit to at least two feet above the average surface water elevation in the pit. Fill from areas surrounding the pit would then be consolidated within the pit. The area surrounding the pit would be backfilled with clean soil, and a Geosynthetic clay liner (GCL) would be installed over the filled pit. A vegetative and protective soil cap consisting if eighteen inches of clean fill and six inches of topsoil would then be installed to protect the GCL.Because the GCL is impermeable, a passive methane gas management system would need to be installed. This alternative also removes the pond from the Peters Mine Pit Area.

Prior to placement of the cap, the pit would be dewatered and the fill material compacted. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the cap achieves design specifications prior to placing the cover.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$4,476,800
Operation and Maintenance	$765,500 (Total)
Total Present Net Worth	$5,242,300
Construction Duration	9-10 months

Alternative 4C - Fill Peters Mine Pit, Impermeable Engineering Cap of Peters Mine Area, Barrier Wall and Institutional Controls, Peters Mine Pit Pond would not Remain

This alternative is the same as Alternative 4B except that it would include the installation of a bentonite slurry wall or similar subsurface barrier wall surrounding the pit beginning at the ground surface and extending into the underlying competent bedrock to minimize the potential for overburden groundwater flow through the pit area.

Total Capital Cost	$6,508,600
Operation and Maintenance	$765,500 (Total)
Total Present Net Worth	$7,274,100
Construction Duration	10-11 months

Alternative 5 - In-Situ Stabilization for Entire Peters Mine Pit Area with Institutional Controls, Peters Mine Pit Pond would Remain

Under this alternative, the institutional controls described in Alternative 2 would be implemented. All soil and fill materials within and surrounding the Peters Mine Pit would be stabilized in place by mixing the soil/fill material with an admixture, such as Portland cement, fly ash and/or bentonite. Conventional construction equipment, specialized injection systems, and/or specialized power augers could be utilized to achieve adequate mixing of the soil/fill material and the admixture.

After the stabilized material has solidified, at least one foot of soil will be placed over the area and seeded to reestablish vegetation. The pit would be left topographically lower than the surrounding area, which would allow restoration of the pond.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$25,792,200
Operation and Maintenance	$704,600 (Total)
Total Present Net Worth	$26,496,800
Construction Duration	22-23 months

Alternative 6A - Removal and Off-Site Disposal of Historic Fill Surrounding Peters Mine Pit, Fill Peters Mine Pit and Permeable Engineered Cap of Peters Mine Pit with Engineering and Institutional Controls, Peters Mine Pit Pond would not Remain

Under this alternative institutional controls, such as a Deed Notice, would be applied to this area to prevent uses other than for conservation land/recreational activities. In addition, the need for engineering controls, such as the installation of warning signs and the placement of boulders, to restrict access to this area by ATVs and other vehicles would be considered during the remedial design and included if necessary. Soil and fill material from the fill area surrounding the Peters Mine Pit would be excavated down to the water table. While this alternative assumes that all excavated soil and fill would be disposed of off-site at an appropriately permitted facility, the segregation and reuse of suitable non-hazardous soil and fill as fill for the pit could be considered during design of this alternative. Clean imported fill would be placed within the Peters Mine Pit to raise the elevation of the pit to at least two feet above the average surface water elevation in the pit. The area surrounding the pit would be filled with clean soil. A geotextile fabric would be installed over the fill materials and the pit and the surrounding area would be backfilled with clean fill to provide an increase in elevation of approximately three feet around the perimeter area, which would result in positive drainage away from the pit. The need for a passive gas management system would be evaluated during the design of this alternative.

Restoration of this area would also include vegetation with trees naturally present in Ringwood. The use of a permeable cap would permit the establishment of trees, including those with deep tap roots.

Prior to placement of the soil cover, the pit would be dewatered and the fill material compacted. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the soil cap achieves design specifications prior to placing the cover.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$9,456,600
Operation and Maintenance	$1,463,600 (Total)
Total Present Net Worth	$10,920,200
Construction Duration	8-9 months

Alternative 6B - Removal and Off-Site Disposal of Historic Fill Surrounding Peters Mine Pit, Fill Peters Mine Pit, Barrier Wall and Impermeable Engineered Cap of Peters Mine Pit with Engineering and Institutional Controls, Peters Mine Pit Pond would not Remain

Under this alternative, the institutional and engineering controls would be implemented as described in Alternative 6A. Soil and fill material from the fill area surrounding the Peters Mine Pit would be excavated down to the water table. While this alternative assumes that all excavated soil and fill would be disposed of off-site at an appropriately permitted facility, the segregation and reuse of suitable non-hazardous soil and fill as fill for the pit could be considered during design of this alternative. Clean imported fill would be placed within the Peters Mine Pit to raise the elevation of the pit to at least two feet above the average surface water elevation in the pit. A bentonite slurry wall, or similar subsurface barrier wall, would be installed surrounding the pit beginning at the ground surface and extending into the underlying competent bedrock to minimize the potential for overburden groundwater flow through the pit area. The area surrounding the pit would then be backfilled with clean soil, and an impermeable Geosynthetic clay liner (GCL) would then be installed over the filled pit. A clean soil layer of sufficient thickness would be placed over the GCL to protect the liner, provide for drainage away from the pit and to allow vegetation to be reestablished.

Because the GCL is impermeable, a passive methane gas management system would need to be installed. This alternative also removes the pond from the Peters Mine Pit Area.

Prior to placement of the cap, the pit would be dewatered and the fill material compacted. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the cap achieves design specifications prior to placing the cover.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$11,327,500
Operation and Maintenance	$1,463,600 (Total)
Total Present Net Worth	$12,791,100
Construction Duration	14-15 months

Alternative 7 - Removal and Off-Site Disposal of All Fill Material, Peters Mine Pit Pond would Remain
Under this alternative, soil/fill material within the Peters Mine Pit and surrounding fill area would be excavated to bedrock or clean overburden and transported off-site for disposal or recycling at an appropriately permitted facility. Post excavation soil sampling would be conducted in the base and sidewalls of the soil excavations to confirm that all contamination has been addressed. The area would then be backfilled with clean fill to a level which would permit the establishment of a pond. Long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$41,305,600
Operation and Maintenance	$445,800 (Total)
Total Present Net Worth	$41,751,400
Construction Duration	25-26 months

Cannon Mine Pit Area

Alternative 1 – No Action
No corrective action of any kind would be implemented under this alternative. The No Action Alternative was retained, as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and provides a baseline for comparison with other alternatives.

Total Capital Cost	$0
Operation and Maintenance	$0 (Total)
Total Present Net Worth	$0
Timeframe	0 months

Alternative 2 – Institutional and Engineering Controls
Under this alternative, institutional controls would be implemented to help prevent potential exposure to contaminants in the fill material. In addition, engineering controls such as the installation of fencing and the placement of boulders, would be implemented to restrict access. Inspections would be conducted on an annual basis to confirm that land use in the vicinity of the Cannon Mine Pit Area is consistent with the selected remedy and to ensure that zoning and deed restrictions are complied with. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. The selection of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the for the entire site including the Cannon Mine Pit Area. In the interim, for costing purposes, annual groundwater monitoring for a period of five years is assumed as a component of this alternative. However, as the program is implemented the sampling frequency or number of wells sampled may be revised based on review of the groundwater analytical data.

Total Capital Cost	$42,800
Operation and Maintenance	$384,300 (Total)
Total Present Net Worth	$427,100
Construction Duration	1-2 months

Alternative 3A – Permeable Engineering Cap of the Cannon Mine Pit Area
Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. Existing pit fill material would be compacted and clean fill material would be placed within the pit to raise the grade as necessary to promote drainage off of the cap. A two-foot thick engineered soil cap, consisting of a minimum of eighteen inches of clean soil and six inches of topsoil, would then be constructed over the Cannon Mine Pit. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the soil cap achieves design specifications prior to placing the cover. The need for a passive gas management system would be evaluated during design of this alternative.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$974,600
Operation and Maintenance	$374,900 (Total)
Total Present Net Worth	$1,349,500
Construction Duration	5-6 months

Alternative 3B – Impermeable Engineering Cap of the Cannon Mine Pit Area
Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. Existing pit fill material would be compacted and clean fill material would be placed within the pit to raise the grade as necessary to promote drainage off of the cap. A Geosynthetic Clay Liner (GCL) would then be placed over the pit, followed by the placement of a soil cover to protect the liner and to allow vegetation to be established. Because the GCL is impermeable, a passive methane gas management system would need to be installed. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the soil cap achieves design specifications prior to placing the cover.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of

this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$1,214,900
Operation and Maintenance	$374,900 (Total)
Total Present Net Worth	$1,589,800
Construction Duration	5-6 months

Alternative 4 – In-Situ Stabilization of the Entire Cannon Mine Pit Area

Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. Fill materials within and surrounding the Cannon Mine Pit would be stabilized in place by mixing the soil/fill material with an admixture, such as Portland cement, fly ash and/or bentonite. Conventional construction equipment, specialized injection systems, and/or specialized power augers could be utilized to achieve adequate mixing of the soil/fill material and the admixture. After the stabilized material has solidified, clean soil would be placed in low-lying areas to ensure drainage of surface water runoff. A soil cover consisting of a minimum of eighteen inches of clean soil and six inches of topsoil, would then be constructed over the Cannon Mine Pit to allow vegetation to be established.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$5,926,300
Operation and Maintenance	$374,900 (Total)
Total Present Net Worth	$6,301,200
Construction Duration	7-8 months

Alternative 5 – Removal and Off-Site Disposal of All Industrial and Municipal Fill Material within the Cannon Mine Pit Area

Under this alternative, all of the fill/waste material within the Cannon Mine Pit Area would be excavated and disposed of off-site at an appropriately permitted facility. The blast rock at the bottom of the pit would not be removed. The pit would then be backfilled with clean fill material and graded to achieve a relatively flat topography. A minimum of six inches of top soil would be placed over this area and vegetation will be established. Long-term groundwater monitoring would also be implemented as a component of this alternative. The selection of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the for the entire site including the Cannon Mine Pit Area. In the interim, for costing purposes, annual groundwater monitoring of a subset of existing wells surrounding the Cannon Mine Pit Area for a period of five years is assumed as a component of this alternative. However, as the program is implemented the sampling frequency or number of wells sampled may be revised based on review of the groundwater analytical data.

Total Capital Cost	$10,844,200
Operation and Maintenance	$168,500 (Total)
Total Present Net Worth	$11,012,700
Construction Duration	14-15 months

Alternative 6 – Relocation of Mine Tailings from the O'Connor Disposal Area and Placement of a Permeable Engineered Cap

Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. Existing pit fill material would be compacted and mine tailings from the O'Connor Disposal Area would be placed within the pit to raise the grade as necessary to promote drainage off of the cap. A two-foot thick engineered soil cap, consisting of a minimum of eighteen inches of clean soil and six inches of topsoil, would then be constructed over the Cannon Mine Pit. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the soil cap achieves design specifications prior to placing the cover. It is expected that a passive methane gas management system would need to be installed as part of this alternative because the mine tailings would become relatively impermeable once compacted.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$1,065,800
Operation and Maintenance	$347,500 (Total)
Total Present Net Worth	$1,413,300
Construction Duration	5-6 months

O'Connor Disposal Area

Alternative 1 – No Action

No remedial action of any kind would be implemented under this alternative. The No Action Alternative was retained, as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and provides a baseline for comparison with other alternatives.

Total Capital Cost	$0
Operation and Maintenance	$0 (Total)
Total Present Net Worth	$0
Timeframe	0 months

Alternative 2 – Institutional and Engineering Controls

Under this alternative, institutional controls would be implemented to help prevent potential exposure to contaminants in the fill material. In addition, engineering controls such as the installation of fencing and the placement of boulders, would be implemented to restrict access. Inspections would be conducted on an annual basis to ensure that the implemented engineering controls remain protective and to confirm that land use in the vicinity of the O'Connor Disposal Area is consistent with the selected remedy. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. The selection of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the for the entire site including the O'Connor Disposal Area. In the interim, for costing purposes, annual groundwater monitoring for a period of five years is assumed as a component of this alternative. However, as the program is implemented the sampling frequency or number of wells sampled may be revised based on review of the groundwater analytical data.

Total Capital Cost	$111,500
Operation and Maintenance	$320,500 (total)
Total Present Net Worth	$432,000
Construction Duration	1-2 months

Alternative 3 – Permeable Engineered Cap – Minimal Grading

Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. Minimal grading of fill materials would be conducted to ensure drainage from this area, fill materials would be compacted and a two-foot thick soil cap would be installed over the fill materials. The soil cap would consist of a geotextile fabric, eighteen inches of clean soil and six inches of top soil. Vegetation would also be restored in this area. Because there are wetlands within the area to be capped, these wetlands would be restored within the O'Connor Disposal Area. The need for a passive gas management system would be evaluated during design of this alternative.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$4,947,500
Operation and Maintenance	$484,900 (total)
Total Present Net Worth	$5,432,400
Construction Duration	13-14 months

Alternative 4A – Site Grading and Permeable Engineered Cap

Under this alternative, the institutional and engineering controls described in Alternative 2 would be implemented. Fill from the fringe areas of this area would be consolidated to the center of this area to minimize the size of the required cap and to permit the potential reuse of this area**.** During consolidation of the fill material from the fringe areas, the soil/fill material will be visually inspected to verify the findings of the RI. Should anything be encountered in the fill that is not suitable for reuse as sub-grade fill underneath the engineered cap, it will be segregated and transported for off-site disposal as the work progresses. After consolidation, fill materials would be compacted and a two-foot thick soil cap would be installed over the fill materials. The soil cap would consist of a geotextile fabric, eighteen inches of clean soil and six inches of top soil. Vegetation would also be restored in this area. The excavated areas beyond the engineered cap where soil/fill would be moved for consolidation under the cap would be backfilled with 6 inches of certified clean fill and rough graded to ensure proper drainage prior to revegetation. The cleaned up fringe areas would encompass approximately 4 acres. Because there are wetlands that would be disturbed during implementation of this remedy, these wetlands would be restored within the O'Connor Disposal Area. The need for a passive gas management system would be evaluated during design of this alternative.

This Alternative would be compatible with the Borough of Ringwood's expressed interest in reuse of the site as the Borough's recycling center.

Long-term monitoring and maintenance of the capped area would be required. In addition, long-term groundwater monitoring would also be implemented as a component of this alternative. Long-term groundwater monitoring would be addressed as described in Alternative 2.

Total Capital Cost	$4,865,100
Operation and Maintenance	$484,900 (total)
Total Present Net Worth	$5,350,000
Construction Duration	13-14 months

Alternative 4B – Site Grading and Impermeable Engineered Cap

This alternative is the same as Alternative 4A, except that a GCL would be placed over the fill materials instead of a two-foot thick soil cap. Soil cover would be placed over the liner to protect the liner and to allow vegetation to be established. Because the GCL is impermeable, a passive methane gas management system would need to be installed. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to

verify that the base for the cap achieves design specifications prior to placing the cover.

Total Capital Cost	$5,950,200
Operation and Maintenance	$484,900 (total)
Total Present Net Worth	$6,435,100
Construction Duration	15-16 months

Alternative 5A – Removal of Fill for Off-Site Disposal with On-Site Reuse of Mine Tailings
This alternative provides for the excavation of all soil/fill material from the O'Connor Disposal Area down to the top of the underlying mine tailings and disposal and/or recycling of all of the excavated material at appropriately permitted off-site disposal facilities. The undisturbed mine tailings at the bottom of the O'Connor Disposal Area which are not comingled with wastes and fill materials could be removed and potentially reused onsite within the Peters Mine Pit Area in place of clean fill that would otherwise need to be transported through the community.

Following the excavation and disposition of fill and tailings, six inches of topsoil would be placed throughout the excavated area to enable revegetation of the O'Connor Disposal Area. Because there are wetlands that would be disturbed during implementation of this remedy, these wetlands would be restored within the O'Connor Disposal Area The selection of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the for the entire site including the O'Connor Disposal Area. In the interim, for costing purposes, annual groundwater monitoring of a subset of existing wells surrounding the O'Connor Disposal Area would be performed for a period of five years is assumed as a component of this alternative. However, as the program is implemented the sampling frequency or number of wells sampled may be revised based on review of the groundwater analytical data.

Total Capital Cost	$32,437,200
Operation and Maintenance	$168,700 (total)
Total Present Net Worth	$32,605,900
Construction Duration	23-24 months

Alternative 5B – Removal of Fill for Off-Site Disposal
This alternative is the same as Alternative 5A except that instead of reusing the mine tailings as fill for the Peters Mine Pit, all undisturbed mine tailings located beneath the fill material would be left in place in the O'Connor Disposal Area.

Total Capital Cost	$26,023,100
Operation and Maintenance	$168,700 (total)
Total Present Net Worth	$26,191,800
Construction Duration	18-20 months

EVALUATION OF REMEDIAL ALTERNATIVES

Nine criteria are used to evaluate the different remedial alternatives individually and against each other in order to select the best alternative. This section of the Proposed Plan profiles the relative performance of all alternatives against the nine criteria, noting how they compare to the other options under consideration. The nine evaluation criteria are discussed below. A more detailed analysis of the presented alternatives can be found in the Feasibility Study Reports for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas.

Peters Mine Pit Area

Overall Protection of Human Health and the Environment

Alternative 1 would not provide for protection of human health and the environment as waste material would remain at the Site. In addition, no action would be taken to restrict exposure to contaminated fill material. While Alternative 2 would use institutional and engineering controls to reduce the likelihood of exposure to contaminated fill material, the potential for exposure to waste material would remain. Therefore, Alternative 2 would not be as protective of human health and the environment as other alternatives.

Alternatives 3 through 7 eliminate exposure pathways to the waste material by either containing the fill under an engineered cap, solidifying the fill material and/or through excavation and off-site disposal of the fill material. Therefore, Alternatives 3 through 7 are considered protective.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternatives 1 would not address fill material which contains contaminants at levels in excess of promulgated soil standards and would not comply with ARARs.

Alternatives 2 through 7 address the contaminated fill material by either containing the fill behind boulders or under an engineered cap, solidifying the fill material and/or through excavation and off-site disposal of the fill material. In addition, all of the alternatives are expected to comply with location-specific and action-specific ARARs. Therefore, Alternatives 2 through 7 are expected to comply with all applicable ARARs.

Long-Term Effectiveness and Permanence

The No Action Alternative would not be effective in the long-term because no actions would be taken to address the contamination. Alternative 2 provides some effectiveness by restricting land use. However, its overall effectiveness is limited in comparison to other alternatives.

Alternatives 3, 4A, 4B and 4C employ covers to protect against direct contact with contaminated fill material and to limit the migration of contaminants to groundwater, and are considered to be effective. However, these covers would need to be maintained to remain effective in the long term. Alternative 6A and Alternative 6B provides for the permanent removal of approximately 22,000 tons of relatively shallow fill material in addition to the installation of a cover to prevent direct contact with the remaining fill material. Therefore, Alternative 6A and Alternative 6B are considered to be more effective in the long term than Alternatives 3, 4A, 4B and 4C.

Alternative 5 would permanently stabilize the contaminated fill material, and Alternative 7 would permanently remove all of the fill material from the Site. Therefore, Alternatives 5 and 7 are the most effective at achieving long-term effectiveness and permanence at the Site.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives 1 and 2 would not treat the contaminants and would not reduce their toxicity, mobility, or volume.

Alternatives 3 and 4A would reduce the mobility of contaminants present in the fill material by reducing the infiltration of precipitation by capping the fill, but would not reduce the toxicity or volume of contaminated fill. Alternatives 4B, 4C would further reduce the mobility of contaminants through installation of a GCL and/or subsurface barrier wall. Alternative 6A and Alternative 6B provides for the permanent removal of approximately 22,000 tons of fill in addition to the installation of a cover, and would reduce the volume of contaminated fill at the Site as well as the mobility of contaminants.

Alternative 5 would reduce both the toxicity and mobility of contaminants through stabilization of the contaminated fill. Alternative 7 would provide for the greatest reduction in the volume of contamination in the Peters Mine Pit Area.

THE NINE SUPERFUND EVALUATION CRITERIA

1. Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

3. Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

4. Reduction of Toxicity, Mobility, or Volume (TMV) of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

6. Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. A discount rate of 7% was utilized in the calculation of present worth costs for the Site. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

8. State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

***9.* Community Acceptance** considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Short-Term Effectiveness

The No Action Alternative includes no construction and would have no short-term impacts at the Site. Alternative 2 provides for minimal construction to install engineering controls and would have very limited short-term impacts.

Alternative 3, which consists of capping of the fill material in place, would minimize impacts to workers and the community because the handling of contaminated fill is minimized. Alternatives 4A, 4B and 4C are expected to

have greater potential impacts on the community and workers due to the additional handling and transportation of impacted fill material.

Alternative 5 leaves the impacted fill material in place, but there is a higher potential for worker exposure to impacted fill material as a result of the mixing process. Workers and the surrounding community may also have some additional potential for exposure to contaminants through dust and air emissions from the mixing process, though plans would be developed to mitigate dust and air emissions.

Alternative 6A and Alternative 6B pose a greater risk of exposure to contaminated fill material than the previously discussed alternatives due to the excavation of fill material. Workers and the community could potentially be exposed to fill material during the excavation, segregation, loading and off-site disposal of the contaminated fill. Furthermore, the Ringwood community would be subjected to the additional truck traffic associated with off-site disposal of the fill material.

Alternative 7 presents the greatest potential for impacts on the community and workers during implementation. The extensive excavation, loading and off-site transportation of contaminated fill associated with this alternative presents the greatest potential for community and worker exposure to contaminated material. It is estimated that more than 28,700 truck trips through the Ringwood community would be required to transport all of the waste material off site as part of this alternative. In addition, voids, large concrete structures and other barriers may be encountered during excavation of fill from the Peters Mine Pit, which could pose an additional hazard to Site workers.

Alternative 1 would require no time to implement since no action would be taken. Alternative 2 would require the least time to construct of the active remedies, because it only involves implementation of limited engineering controls. Alternatives 3, 4A, 6A, 4B, 4C and 6B would involve additional time to construct associated with construction of engineered caps. Alternatives 5 and 7 would involve the greatest construction time as they would involve either processing or excavation of all of the fill in the Peters Mine Pit.

Implementability

Alternative 1 is the most readily implementable as no action would be required. Alternative 2 would only involve the implementation of institutional controls and routine engineering controls, in addition to long-term groundwater monitoring and is also readily implementable.

Alternative 3 is expected to be the next easiest alternative to implement as the soil cap would be installed without the need to move fill materials to prepare the base for the cap. Alternatives 4A and 4B and 6A, while implementable, will require additional work to consolidate or excavate impacted fill material prior to installation of the cap.

Alternatives 4C and 6B would require more extensive excavation work with specialized equipment to install an impermeable barrier wall into the crystalline bedrock. Therefore, Alternatives 4C and 6B are expected to be more difficult to implement than Alternatives 1, 2, 3, 4A, 4B and 6A.

Alternatives 5 and 7 are expected to be the most difficult of the alternatives to implement. Alternative 5 would likely require specialized equipment to mix admixture into the fill material at depth. Alternative 7 may also require the use of specialized equipment to excavate fill material to a depth of 90 feet below ground surface. In addition, the heterogeneity of the fill material, including the potential presence of concrete structures and metal, and the potential structural instability of the pit would complicate implementation of these alternatives.

Cost

Alternative 1 would have no cost as no action would be required. Alternative 2 would be expected to have minimal costs, which are primarily due to the implementation of a long-term groundwater monitoring program.

The total estimated present worth costs for the remaining alternatives, from lowest to highest cost, are as follows: Alternative 3 ($3,244,100), Alternative 4A ($5,111,000), Alternative 4B ($5,242,300), Alternative 4C ($7,274,100), Alternative 6A ($10,920,200), Alternative 6B ($12,791,100), Alternative 5 ($26,496,800) and Alternative 7 ($41,751,400). Alternatives 5 and 7 are significantly more costly than the other alternatives due to the need to effectively treat or remove all of the fill material contained within the Peters Mine Pit to an approximate depth of 90 feet below ground surface. Alternative 6A and Alternative 6B are more costly than Alternatives 3, 4A, 4B and 4C due to the added cost of excavation and off-site disposal of fill material down to the water table.

State/Support Agency Acceptance

The State of New Jersey agrees with the preferred alternative for the Peters Mine Pit Area, which is presented in this Proposed Plan.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Responsiveness Summary of the OU2 Record of Decision for this Site. The Record of Decision is the document that formalizes the selection of the remedy for a site.

Cannon Mine Pit

Overall Protection of Human Health and the Environment

Alternative 1 would not provide for protection of human health and the environment as waste material would remain at the Site. In addition, no action would be taken to restrict exposure to fill material. While Alternative 2 would use institutional and engineering controls to reduce the likelihood of exposure to fill material, the potential for exposure to waste material would remain. Therefore, Alternative 2 would not be as protective of human health and the environment as Alternatives 3 through 6.

Alternatives 3 through 6 eliminate exposure pathways to the waste material by either containing the fill under an engineered cap, solidifying the fill material and/or through excavation and off-site disposal of the fill material.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternative 1 would not address fill material which contains contaminants at levels in excess of promulgated soil standards and would not comply with ARARs.

Alternatives 2 through 6 address the contaminated fill material by either containing the fill material behind a fence or under an engineered cap, solidifying the fill material and/or through excavation and off-site disposal of the fill material. In addition, all of the alternatives are expected to comply with location-specific and action-specific ARARs. Therefore, Alternatives 2 through 6 are expected to comply with all applicable ARARs.

Long-Term Effectiveness and Permanence

The No Action Alternative would not be effective in the long-term because no actions will be taken to address the contamination. Alternative 2 provides some effectiveness by restricting land use. However, its overall effectiveness is limited in comparison to other alternatives.

Alternatives 3A, 3B and 6 employ covers to protect against exposure with contaminated fill material and to limit the potential migration of contaminants to groundwater, and are considered to be effective. However, these covers would need to be maintained to remain effective in the long term.

Alternative 4 would permanently stabilize the contaminated fill material which would minimize the potential for direct contact with contaminants and the potential migration of contaminants to groundwater. Furthermore, Alternative 5 would remove all of the fill material above the blast rock from the Site, eliminating the potential for exposure to this fill material at the Site. Therefore, Alternatives 4 and 5 are the most effective in the long term.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives 1 and 2 would not treat the contaminants and would not reduce their toxicity, mobility, or volume.

Alternatives 3A, 3B and 6 would reduce the mobility of contaminants present in the fill material by reducing the infiltration of precipitation by capping the fill, but would not reduce the toxicity or volume of contaminated fill. Alternative 4 would reduce both the toxicity and mobility of contaminants through stabilization of the contaminated fill. Alternative 5 would provide for the greatest reduction in the toxicity, mobility and volume of contamination in the Cannon Mine Pit Area by completely removing all of the fill located above the blast rock from the Site.

Short-Term Effectiveness

The No Action Alternative includes no construction and would have no short-term impacts at the Site. Alternative 2 provides for minimal construction to install engineering controls and would have very limited short-term impacts.

Alternative 3A and 3B, which consist of capping fill material in place, would minimize impacts to workers and the community because the handling of contaminated fill is minimized. Alternative 6 is expected to have greater potential impacts on workers and the community than Alternatives 3A and 3B, due to the need to transport and handle mine tailings from the O'Connor Disposal Area.

Alternative 4 leaves the impacted fill material in place, but there is a higher potential for worker exposure to impacted fill material as a result of the mixing process. Workers and the surrounding community may also have some additional potential for exposure to contaminants through dust and air emissions from the mixing process.

Alternative 5 presents the greatest potential for impacts on the community and workers during implementation. The extensive excavation, loading and off-site transportation of contaminated fill associated with this alternative presents the greatest potential for community and worker exposure to contaminated material. It is estimated that more than 7800 truck trips through the Ringwood community would be required to transport all of the waste material off site as part of this alternative. The impacts associated with these activities would need to be addressed through the development of transportation control plans, air monitoring and dust mitigation control plans.

Alternative 1 would require no time to implement since no action would be taken. Alternative 2 would require the least time to construct of the active remedies, because it only involves implementation of limited engineering controls. Alternatives 3A, 3B, 6 and 4 would involve additional time to construct associated with construction of engineered caps or stabilization of the fill. Alternative 5 would involve the greatest construction time as it would require excavation of all of the fill above the blast rock in the Cannon Mine Pit.

Implementability

Alternative 1 is the most readily implementable as no action would be required. Alternative 2 would only involve the implementation of institutional controls and routine engineering controls, in addition to long-term groundwater monitoring and is also readily implementable.

Alternative 3A and 3B are expected to be the next easiest alternatives to implement as construction of the engineered caps can be conducted with minimal disruption of the existing fill materials in the pit and with minimal consolidation of materials surrounding the pit. Alternative 4, which also provides for the construction of an engineered cap, is expected to be more difficult to implement than Alternatives 3A and 3B, due to the need to excavate and transport mine tailings from the O'Connor Disposal Area to the Cannon Mine Pit Area.

Alternatives 4 and 5 are expected to be the most difficult of the alternatives to implement. Alternative 4 would likely require specialized equipment to mix admixture into the fill material at depth. Alternative 5 will require the use of sloping and shoring systems to allow for excavation of fill to the depth of blast rock. In addition, the heterogeneity of the fill material and the potential presence of voids in the pit would complicate implementation of these alternatives.

Cost

Alternative 1 would have no cost as no action would be required. Alternative 2 would be expected to have minimal costs, which are primarily due to the implementation of a long-term groundwater monitoring program.

The total estimated present worth costs for the remaining alternatives, from lowest to highest cost, are as follows: Alternative 3A ($1,349,500), Alternative 6 ($1,413,300), Alternative 3B ($1,589,800), Alternative 4 ($6,301,200), and Alternative 5 ($11,012,700). Alternatives 4 and 5 are significantly more costly than the other alternatives due to the need to effectively treat or remove all of the fill material contained within the Cannon Mine Pit to the depth of blast rock.

State/Support Agency Acceptance

The State of New Jersey agrees with the preferred alternative for the Cannon Mine Pit Area, which is presented in this Proposed Plan.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Responsiveness Summary of the OU2 Record of Decision for this Site. The Record of Decision is the document that formalizes the selection of the remedy for a site.

O'Connor Disposal Area

Overall Protection of Human Health and the Environment

Alternative 1 would not provide for protection of human health and the environment as waste material would remain at the Site. In addition, no action would be taken to restrict exposure to fill material. Because Alternative 2 would rely on institutional and engineering controls to reduce the likelihood of exposure to fill material, the potential for exposure to waste material would remain.

Alternatives 3, 4A and 4B would protect human health and the environment by limiting potential exposure to fill materials by containing them with a cap; the caps would also reduce infiltration of precipitation through the fill materials and the potential for migration of contaminants from the fill into the groundwater and surface water. Because this disposal area is located directly adjacent to Peters Mine Road and is therefore readily accessible, it may be attractive to tresspassers (potentially including ATV users) and therefore these capping alternatives would require diligent monitoring and maintenance to

ensure the integrity of the caps over time. If the area was reused as the site of a Borough recycling center, concerns regarding damage to the cap and trespassing would be reduced. Alternatives 5A and 5B provide the greatest level of protection of human health and the environment at the Site through the complete excavation and off-site disposal and/or reuse of the fill material.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternative 1 would not address fill material which contains contaminants at levels in excess of promulgated soil standards and would not comply with ARARs.

Alternatives 2 through 5B address the contaminated fill material by either containing the fill material behind a fence or under an engineered cap or through excavation and off-site disposal of the fill material. In addition, all of the alternatives are expected to comply with location-specific and action-specific ARARs. Therefore, Alternatives 2 through 5B are expected to comply with all applicable ARARs.

Long-Term Effectiveness and Permanence

The No Action Alternative would not be effective in the long-term because no actions would be taken to address the contamination. Alternative 2 provides some effectiveness by restricting land use. However, its overall effectiveness is limited in comparison to other alternatives.

Alternatives 3, 4A and 4B employ engineered caps to protect against exposure with contaminated fill material and to reduce the potential migration of contaminants to groundwater, and are considered to be effective. However, these engineered caps would need to be maintained over the long term to remain effective. These alternatives would also leave waste within the State of New Jersey Category 1 stream buffer zone/floodplain of Park Brook which would potentially subject these engineering controls to additional maintenance issues associated with flooding and erosion. As noted above, because this disposal area is located directly adjacent to Peters Mine Road and is therefore readily accessible, it may be attractive to trespassers (potentially including ATV users) whose use could present some maintenance challenges. If the area was reused as the site of a Borough recycling center, concerns regarding damage to the cap and trespassing would be reduced because the center would be in active use.

Alternatives 5A and 5B would provide for the removal of all of the contaminated fill material from the O'Connor Disposal Area, permanently eliminating the potential for exposure to this fill material at the Site. Therefore, Alternatives 5A and 5B are the most effective in the long term. Additionally, Alternatives 5A and 5B would allow the community to continue to hunt game and gather plants according to their cultural and traditional practices without any inhibitions or restrictions that would be required under the other alternatives.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives 1 and 2 would not treat the contaminants and would not reduce their toxicity, mobility, or volume.

Alternatives 3, 4A and 4B would reduce the mobility of contaminants present in the fill material by reducing the infiltration of precipitation by capping the fill. In addition, installation of an engineered cover would reduce the potential of contaminated fill washing into the Park Brook during rain events. However, these alternatives would not reduce the toxicity or volume of contaminated fill.

Alternative 5A and 5B would provide for the greatest reduction in the toxicity, mobility and volume of contamination in the O'Connor Disposal Area by permanently removing all of the contaminated fill from this area of the Site.

Short-Term Effectiveness

The No Action Alternative includes no construction and would have no short-term impacts at the Site. Alternative 2 provides for minimal construction to install engineering controls and would have very limited short-term impacts.

Alternative 3, which consist of capping fill material in place without consolidation of fill, would minimize impacts to workers and the community because the handling of contaminated fill is minimized. Alternatives 4A and 4B are expected to have greater short term impacts on workers and the community than Alternative 3, due to the need for additional handling and consolidation of the contaminated fill.

Alternative 5A and 5B present the greatest potential for impacts on the community and workers during implementation. The extensive excavation, loading and off-site transportation of contaminated fill associated with these alternatives presents the greatest potential for community and worker exposure to contaminated material. It is estimated that 12,519 truck trips through the Ringwood community would be required to transport all of the waste material off site under these alternatives. The impacts associated with these activities would need to be addressed through the development of transportation control plans, air monitoring and dust mitigation control plans.

Alternative 1 would require no time to implement since no action would be taken. Alternative 2 would require the least time to construct of the active remedies, because it only involves implementation of limited engineering controls. Alternatives 3, 4A and 4B would involve additional time to construct associated with construction of engineered caps. Alternatives 5A and 5B would involve the greatest construction time as they would involve excavation of all of the fill material from the O'Connor Disposal Area.

Implementability

Alternative 1 is the most readily implementable as there are no activities associated with this alternative. Alternative 2 would only involve the implementation of institutional controls and routine engineering controls, in addition to long-term groundwater monitoring and is also readily implementable.

Alternatives 3, 4A and 4B are expected to be the next easiest alternatives to implement as they involve the construction of engineered caps over contaminated fill materials, which will be left in place beneath the caps. While Alternative 3 provides for minimal grading of fill before placement of a soil cap, the existing steep slope in this area raises concerns regarding slope stability during construction and the minimization of erosion of the cap and fill after construction. Alternatives 4A and 4B will require additional work during construction to consolidate fill material from the fringe areas of the O'Connor Disposal Area to the center of this area prior to the installation of an engineered cap. However, these caps would have a more stable top and side slope than the cap that would be installed under Alternative 3. In addition,
If the area was reused as the site of a Borough recycling center, additional paving, grading and landscaping would add to the cap's stability.

Alternatives 5A and 5B, which involve excavation and off-site disposal of contaminated fill from the O'Connor Disposal Area, are also considered to be implementable. It is expected that conventional construction equipment would be utilized to remove fill from this area, given that the depth of fill does not exceed 20 feet. However, dewatering of groundwater and/or diversion of a portion of the Park Brook may be required to remove fill in portions of this area.

Cost

Alternative 1 would have no cost as no action would be required. Alternative 2 would be expected to have minimal costs, which are primarily due to the implementation of a long-term groundwater monitoring program.

The total estimated present worth costs for the remaining alternatives, from lowest to highest cost, are as follows: Alternative 4A ($5,350,000), Alternative 3 ($5,432,400), Alternative 4B ($6,435,100), Alternative 5B ($26,191,800), and Alternative 5A ($32,605,900). Alternatives 5A and 5B are significantly more costly than the other alternatives as they provide for the complete removal and off-site disposal of contaminated fill material from the O'Connor Disposal Area. Alternative 5A may achieve significant cost savings over Alternative 5B by providing for the reuse of mine tailings as fill for the Peters Mine Pit Area in lieu of off-site disposal.

State/Support Agency Acceptance

The State of New Jersey has no comment regarding the preferred remedy and will await to evaluate the community comments regarding this remedy.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Responsiveness Summary of the OU2 Record of Decision for this Site. The Record of Decision is the document that formalizes the selection of the remedy for a site.

SUMMARY OF THE PREFERRED ALTERNATIVES

Peters Mine Pit Area

Alternative 6A, Removal and Off-Site Disposal of Historic Fill Surrounding Peters Mine Pit, Fill Peters Mine Pit and Permeable Engineered Cap of Peters Mine Pit with Engineering and Institutional Controls, Peters Mine Pit Pond would not Remain, is the preferred alternative for the Peters Mine Pit Area of the Site. The topography in the Peters Mine Pit Area, coupled with the removal of the historic fill surrounding the pit as deep as the water table, would allow for the construction of a very thick permeable cap that would permit the establishment of trees and allow this area to return to a state similar to that of the surrounding areas of the Ringwood State Park. This alternative is recommended because it is expected to achieve substantial and long-term risk reduction through the permanent removal of shallow contaminated fill and containment of the remaining fill, with less short-term impacts and cost than other alternatives which provide for removal or treatment of waste, while still enabling Ringwood State Park visitors and area residents to utilize the property for recreational use.

Under this alternative zoning restrictions and institutional controls, such as Deed Notices, would be applied to this area to prevent uses other than for conservation land/recreational activities. In addition, the need for engineering controls, such as the installation of warning signs and the placement of boulders, to restrict access to this area by ATVs and other vehicles would be considered during the remedial design and implemented if necessary.

As part of this Alternative, soil and fill material from the fill area surrounding the Peters Mine Pit would be excavated down to native soil or the water table, whichever is encountered first. If drums of waste or paint sludge are encountered, the excavation would continue until these materials are removed, even if they are located below the water table. While this alternative assumes that all excavated soil and fill would be disposed of off-site at an appropriately permitted facility, the segregation and reuse of non-hazardous soil and fill as fill for the pit may be considered during design of this alternative. It is estimated that 22,700 tons of fill material will be disposed of off-site as part of this action. Clean imported fill would then be placed within the Peters Mine Pit to raise the elevation of the pit to at least two feet above the average surface water elevation in the pit. As noted above, if Alternative 5A is selected for the O'Connor Disposal Area, excavated mine tailings from this area could be used as fill in lieu of importing fill. The area surrounding the pit would be filled with clean soil. A geotextile fabric would be installed over the fill materials and the pit and surrounding area would be backfilled with clean fill and topsoil to provide an increase in elevation of a minimum of approximately three feet around the perimeter area, and greater elevation towards the center of the cap, which would result in positive drainage away from the pit. The need for a passive gas management system would be evaluated during design of this alternative.

Prior to placement of the soil cover, the pit would be dewatered and the fill material compacted. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the soil cap achieves design specifications prior to placing the cover. Water generated during the dewatering operations will be sampled, treated as necessary, and discharged to a dissipater pad at the Site.

Restoration of this area would also include vegetation with trees naturally present in Ringwood. The use of a permeable cap would permit the establishment of trees, including those with deep tap roots. Restoration of the Peters Mine Pit Area in this manner will allow this area to return to a state similar to that of surrounding areas of the Ringwood State Park and allow recreational use of this area.

Long-term monitoring and maintenance of the capped area would be required to ensure the integrity of the permeable cap. The selection of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the entire site including the Peters Mine Pit Area. In the interim, for costing purposes, quarterly groundwater monitoring for a period of five years is assumed as a component of this alternative. However, as the program is implemented EPA anticipates that the sampling frequency or number of wells sampled will be revised based on review of the groundwater analytical data.

Cannon Mine Pit Area

Alternative 3A, Permeable Engineering Cap of the Cannon Mine Pit Area, is the preferred alternative for the Cannon Mine Pit Area of the Site. This alternative is recommended because it is expected to achieve a comparable level of long-term risk reduction with less impact on the community and less cost than other protective alternatives.

Under this alternative, institutional controls, such as a Deed Notice, will be implemented to help prevent potential exposure to contaminants in the fill material. In addition, engineering controls such as the installation of fencing and the placement of boulders, would be implemented to restrict access to this area. Inspections would be conducted on an annual basis to confirm that land use in the vicinity of the Cannon Mine Pit Area is consistent with the selected remedy and to ensure that zoning and deed restrictions are complied with.

As part of this Alternative, shallow fill materials, which are present to an approximate depth of five feet (estimated to be less than 1900 cubic yards) around the Cannon Mine Pit would be removed and placed within the pit. The fill material contained within the pit would then be compacted using construction equipment. Clean fill material would then be placed within the pit and compacted to fill the area as necessary to raise the grade to promote drainage off of the cap. A two-foot thick engineered soil cap, consisting of a minimum of eighteen inches of clean soil and six inches of topsoil, would then be constructed over the Cannon Mine Pit. Vegetation would then be established in order to stabilize the surface of the cap. Soil testing, such as geotechnical, agronomic, chemical and compaction testing would be conducted to verify that the base for the soil cap achieves design specifications prior to placing the cover. The need for a passive gas management system would be evaluated during design of this alternative.

Due to the discovery of drums of waste within the pit during performance of the RI, the possibility exists that additional drums of waste will be encountered during preparation of the pit for installation of the permeable cap. Any drums of waste encountered during implementation of the selected remedy would be excavated, characterized and disposed of off-site at an appropriately permitted disposal facility.

Long-term monitoring and maintenance of the capped area would be required to ensure the integrity of the permeable cap. In addition, long-term groundwater monitoring would also be implemented in order to ensure that the fill materials continue to have only a minimal impact on groundwater quality. The selection of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the for the entire site including the Cannon Mine Pit Area. In the interim, for costing purposes, annual groundwater monitoring for a period of five years is assumed as a component of this alternative. However, as the program is implemented the sampling frequency or number of wells sampled may be revised based on review of the groundwater analytical data.

O'Connor Disposal Area

Alternative 5A, Removal of Fill for Off-Site Disposal with On-Site Reuse of Mine Tailings, is the preferred alternative for the O'Connor Disposal Area of the Site. This alternative is recommended because it is expected to achieve substantial and long-term risk reduction through the permanent removal of contaminated fill from the Site. Unlike most of the other alternatives evaluated, this alternative would allow the portion of the Site that is most readily accessible to the residents to be used without restriction. Removal of the contaminated material would allow the community to continue to hunt game and gather plants according to their cultural and traditional practices without any inhibitions or restrictions that would be present if a cap or cover were selected.

In the years since disposal of wastes on this portion of the Site ended, this area has become wooded. Until sampling activities were recently carried out in furtherance of the RI, this portion of the Site looked much like, and was used by the local community in the same manner as, the immediately adjacent State park. Members of the local community have long been accustomed to enter this area and use it for recreation and, among other purposes, for gathering plants that have cultural and traditional significance and nutritional value. All of the other alternatives (except Alternative 5B) would allow wastes to remain on this portion of the Site, but the engineering and institutional controls specified in these alternatives would thus eliminate the possibility of its use by the local community for these culturally and traditionally significant activities. Indeed, if this 12-acre area was to be capped it is likely that access to the area for residents would have to be prohibited to protect the cap from damage and protect the residents from possible contact with the wastes. However, it is highly likely that *unauthorized* access would take place, quite possibly including unauthorized use of motorized "all terrain vehicles" (ATVs, which are routinely used in the surrounding area). Possible use of ATVs across the capped area would likely harm the cap, requiring repeated maintenance efforts in perpetuity. Selection of the preferred alternative would: allow restoration of the area to approximately its natural condition; allow unrestricted use of the area by local residents to pursue culturally and traditionally significant activities; eliminate the need for and cost of perpetual maintenance of a cap; and eliminate the perpetual irritant to the local community that a capped and restricted access area would represent.

The preferred alternative provides for the excavation of all soil/fill material from the O'Connor Disposal Area down to the top of the underlying mine tailings and disposal and/or recycling of all of the excavated material at appropriately permitted off-site disposal facilities. It is estimated that approximately 110,500 cubic yards of soil/fill would be disposed of off-site as part of this remedy. In addition, the layer of undisturbed mine tailings located at the bottom of the O'Connor Disposal Area would then be available and could be removed and potentially reused onsite within the Peters Mine Pit Area.

It is estimated that approximately 73,100 cubic yards of mine tailings could be excavated from the O'Connor Disposal Area and used as fill in the Peters Mine Pit Area as part of this remedy. Undisturbed mine tailings at the base of the OCDA which are not used as fill for the Peters Mine Pit would remain in place. Due to the depth to groundwater in the O'Connor Disposal Area and the area's proximity to the Park Brook, dewatering of groundwater and/or diversion of a portion of the Park Brook may be required to remove fill in portions of this area.

Following the excavation and disposition of fill and tailings, six inches of topsoil would be placed throughout the excavated area to enable revegetation of the O'Connor Disposal Area. Restoration activities would focus on restoring the O'Connor Disposal Area to a pre-disposal condition. Because there are wetlands that would be disturbed during implementation of this remedy, these wetlands would be restored within the O'Connor Disposal Area. The restoration of these wetlands will be coordinated with NJDEP's Land Use Program In addition, long-term groundwater monitoring will be conducted as a component of this remedy. The selection

of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the for the entire site including the O'Connor Disposal Area. In the interim, for costing purposes, it is assumed that annual groundwater monitoring of a subset of existing wells surrounding the O'Connor Disposal Area would be performed for a period of five years. However, as the program is implemented the sampling frequency or number of wells sampled could be revised based on review of the groundwater analytical data.

The Borough of Ringwood has recently notified EPA of its intention to seek necessary approvals to construct a new Borough recycling center in the O'Connor Disposal Area. The Borough has indicated that Alternative 4A, Site Grading and Permeable Engineered Cap, would be the alternative that is most compatible with this use. The Borough has also noted that the capping called for in Alternative 4A would create a level area near the center of the O'Connor Disposal Area, facilitating construction of the proposed recycling facility. The Borough has indicated that the new recycling facility would replace the existing recycling facility and that the existing recycling facility property would be converted to greenspace for use by the surrounding community.

If a portion of the O'Connor Disposal Area were to be reused as the Borough's recycling center, many of EPA's concerns that inform selection of Alternative 5A would be addressed with respect to that reused portion. Among the primary reasons for EPA's selection of Alternative 5A are concerns regarding the potential for unauthorized access to the area and associated damage to the cap which may result if a containment alternative was selected. However, under the Borough's recent proposal, the portion of the O'Connor Disposal Area that would be used for the recycling facility would be capped with asphalt which would mitigate concerns regarding damage to the cap. Furthermore, the routine presence of Borough employees at the recycling center would discourage unauthorized access to this property. The Borough has communicated its view that the existing recycling facility property would be a better greenspace asset than the steeply sloped property that would remain at the O'Connor Disposal Area if Alternative 5A were to be implemented.

Consideration of the future use of a site is an integral component of the remedy selection process. While it is not EPA's role to specify how a municipality or other property owner may reuse a remediated site, EPA endeavors to work with communities and property owners to ensure that implemented remedies do not create barriers for safe, viable reuse of site properties. If the property is reused as proposed by the Borough, EPA believes that with respect to the portion of the O'Connor Disposal Area on which the recycling facility would be located, Alternative 4A would best satisfy the nine evaluation criteria and EPA's objective to advance environmental protection while facilitating reuse of sites as valuable community assets. Therefore, EPA is proposing that Alternative 4A could be selected as a contingency remedy for that portion of the O'Connor Disposal Area to be used for the proposed recycling center, and that would become the remedy for this portion of the O'Connor Disposal Area if the Borough of Ringwood demonstrates to EPA within 6 months of the signing of the ROD that it will in fact proceed with construction of the recycling center without any significant delays in the schedule for remediating this area relative to Alternative 5A.

Under Alternative 4A, fill from the fringe areas of the O'Connor Disposal Area would be consolidated to the center of this area to minimize the size of the required cap and to permit the reuse of this area. After consolidation, the fill materials would be compacted and a two-foot thick soil cap would be installed over the fill materials. The soil cap would consist of a geotextile fabric, eighteen inches of clean soil and six inches of top soil. Vegetation would also be restored in this area. The excavated areas beyond the engineered cap where soil/fill would be moved for consolidation under the cap would be backfilled with 6 inches of certified clean fill and rough graded to ensure proper drainage prior to revegetation. The cleaned up fringe areas would encompass approximately 4 acres. Because there are wetlands that would be disturbed during implementation of this remedy, these wetlands would be restored within the O'Connor Disposal Area. The need for a passive gas management system would be evaluated during design of this remedy.

Institutional controls, such as a Deed Notice, would be implemented to help prevent potential exposure to contaminants in the fill material. In addition, engineering controls such as the installation of fencing and the placement of boulders, would be implemented to restrict access. Inspections would be conducted on an annual basis to ensure that the implemented engineering controls remain protective and to confirm that land use in the vicinity of the O'Connor Disposal Area is consistent with the selected remedy. In addition, long-term groundwater monitoring would be implemented as a component of this alternative to ensure that the fill materials continue to have only a minimal impact on groundwater quality. The selection of a groundwater remedy for the operable unit 3 ROD, which is anticipated within the next few years, will address long-term groundwater monitoring that is needed for the for the entire site including the O'Connor Disposal Area. In the interim, for costing purposes, annual groundwater monitoring for a period of five years is assumed as a component of this alternative. However, as the program is implemented the sampling frequency or

number of wells sampled may be revised based on review of the groundwater analytical data.

Based on information currently available, the EPA believes that the Preferred Alternatives for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas meet the threshold criteria and provide the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the Preferred Alternatives to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element or explain why the preference for treatment will not be met.

Implementation of OU2 remedial actions are expected to reduce the potential for direct exposure and ingestion of contaminants, as well as to reduce the potential for contaminants to migrate to groundwater and surface water by either removing waste material or containing waste material in a manner which will reduce the percolation of precipitation through the waste. Such actions should serve to shorten the timeframe necessary to achieve New Jersey Ground Water Quality Standards in groundwater at the Site.

Consistent with the EPA Region 2's Clean and Green policy, the EPA will evaluate the use of sustainable technologies and practices with respect to any remedial alternatives selected for the Site.

Because these remedies will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedies are, or will be protective of human health and the environment.

COMMUNITY PARTICIPATION

The EPA provided information regarding the cleanup of the Ringwood Mines/Landfill Superfund Site to the public through public meetings, the Administrative Record file for the Site and announcements published in the Bergen Record newspaper. The EPA encourages the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

For further information on the EPA's preferred alternatives for the Ringwood Mines/Landfill Superfund Site:

Joe Gowers	Pat Seppi
Remedial Project Manager	Community Relations
(212) 637-4413	(212) 637-3679

U.S. EPA
290 Broadway, 19th Floor
New York, New York 10007-1866

The dates for the public comment period; the date, the location and time of the public meeting; and the locations of the Administrative Record files are provided on the front page of this Proposed Plan.

GLOSSARY

ARARs: Applicable or Relevant and Appropriate Requirements. These are Federal or State environmental rules and regulations that may pertain to the Site or a particular alternative.

BERA: Baseline Ecological Risk Assessment

Carcinogenic Risk: Cancer risks are expressed as a number reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, the EPA's acceptable risk range for Superfund hazardous waste sites is 1×10^{-4} to 1×10^{-6}, meaning there is 1 additional chance in 10,000 (1×10^{-4}) to 1 additional chance in 1 million (1×10^{-6}) that a person will develop cancer if exposed to a Site contaminant that is not remediated.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act. A Federal law, commonly referred to as the "Superfund" Program, passed in 1980 that provides for response actions at sites found to be contaminated with hazardous substances, pollutants or contaminants that endanger public health and safety or the environment.

COPC: Chemicals of Potential Concern.

SLERA: Screening Level Ecological Risk Assessment. An evaluation of the potential risk posed to the environment if remedial activities are not performed at the Site.

FS: Feasibility Study. Analysis of the practicability of multiple remedial action options for the Site.

Groundwater: Subsurface water that occurs in soils and geologic formations that are fully saturated.

HHRA: Human Health Risk Assessment. An evaluation of the risk posed to human health should remedial activities not be implemented.

HI: Hazard Index. A number indicative of noncarcinogenic health effects that is the ratio of the existing level of exposure to an acceptable level of exposure. A value equal to or less than one indicates that the human population is not likely to experience adverse effects.

HQ: Hazard Quotient. HQs are used to evaluate noncarcinogenic health effects and ecological risks. A value equal to or less than one indicates that the human or ecological population are not likely to experience adverse effects.

ICs: Institutional Controls. Administrative methods to prevent human exposure to contaminants, such as by restricting the use of groundwater for drinking water purposes.

Nine Evaluation Criteria: See text box on Page 15.

Noncarcinogenic Risk: Noncancer Hazards (or risk) are expressed as a quotient that compares the existing level of exposure to the acceptable level of exposure. There is a level of exposure (the reference dose) below which it is unlikely for even a sensitive population to experience adverse health effects. The USEPA's threshold level for noncarcinogenic risk at Superfund sites is 1, meaning that if the exposure exceeds the threshold; there may be a concern for potential noncancer effects.

NPL: National Priorities List. A list developed by the USEPA of uncontrolled hazardous substance release sites in the United States that are considered priorities for long-term remedial evaluation and response.

Operable Unit (OU): a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site.

Present-Worth Cost: Total cost, in current dollars, of the remedial action. The present-worth cost includes capital costs required to implement the remedial action, as well as the cost of long-term operations, maintenance, and monitoring.

Proposed Plan: A document that presents the preferred remedial alternatives and requests public input regarding the proposed cleanup alternatives.

Public Comment Period: The time allowed for the members of a potentially affected community to express views and concerns regarding the USEPA's preferred remedial alternative.

RAOs: Remedial Action Objectives. Objectives of remedial actions that are developed based on contaminated media, contaminants of concern, potential receptors and exposure scenarios, human health and ecological risk assessment, and attainment of regulatory cleanup levels.

Record of Decision (ROD): A legal document that describes the cleanup action or remedy selected for a site, the basis for choosing that remedy, and public comments on the selected remedy.

Remedial Action: A cleanup to address hazardous substances at a site.

RI: Remedial Investigation. A study of a facility that supports the selection of a remedy where hazardous substances have been disposed or released. The RI identifies the nature and extent of contamination at the facility and analyzes risk associated with COPCs.

TBCs: "To-be-considereds," consists of non-promulgated advisories and/or guidance that were developed by the EPA, other federal agencies, or states that may be useful in developing CERCLA remedies.

USEPA: United States Environmental Protection Agency. The Federal agency responsible for administration and enforcement of CERCLA (and other environmental statutes and regulations), and final approval authority for the selected ROD.

VOC: Volatile Organic Compound. Type of chemical that readily vaporizes, often producing a distinguishable odor.

Water Table: The water table is an imaginary line marking the top of the water-saturated area within a rock column.

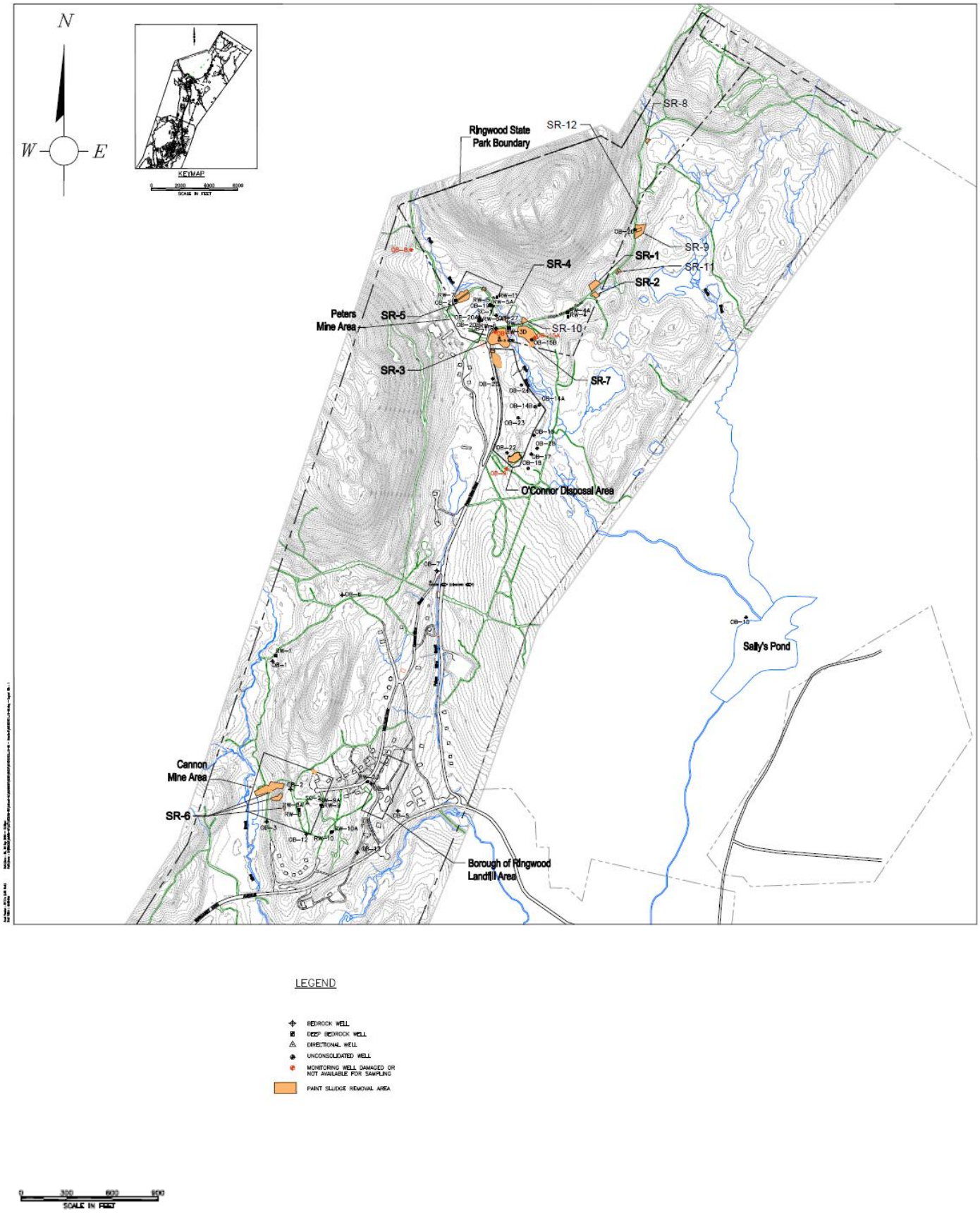


Figure 1 – Location of the Ringwood Mines/Landfill Site Areas of Concern

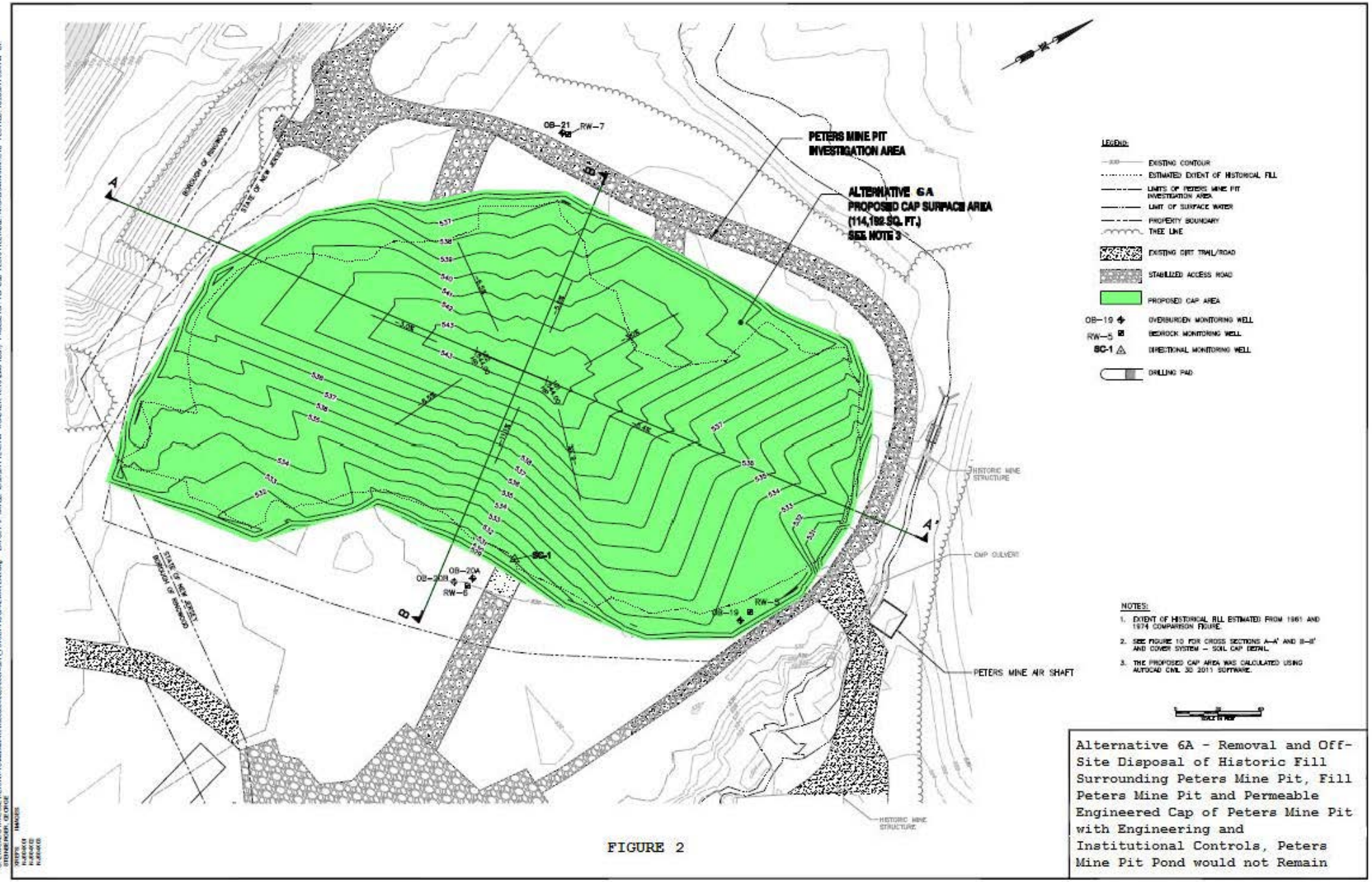
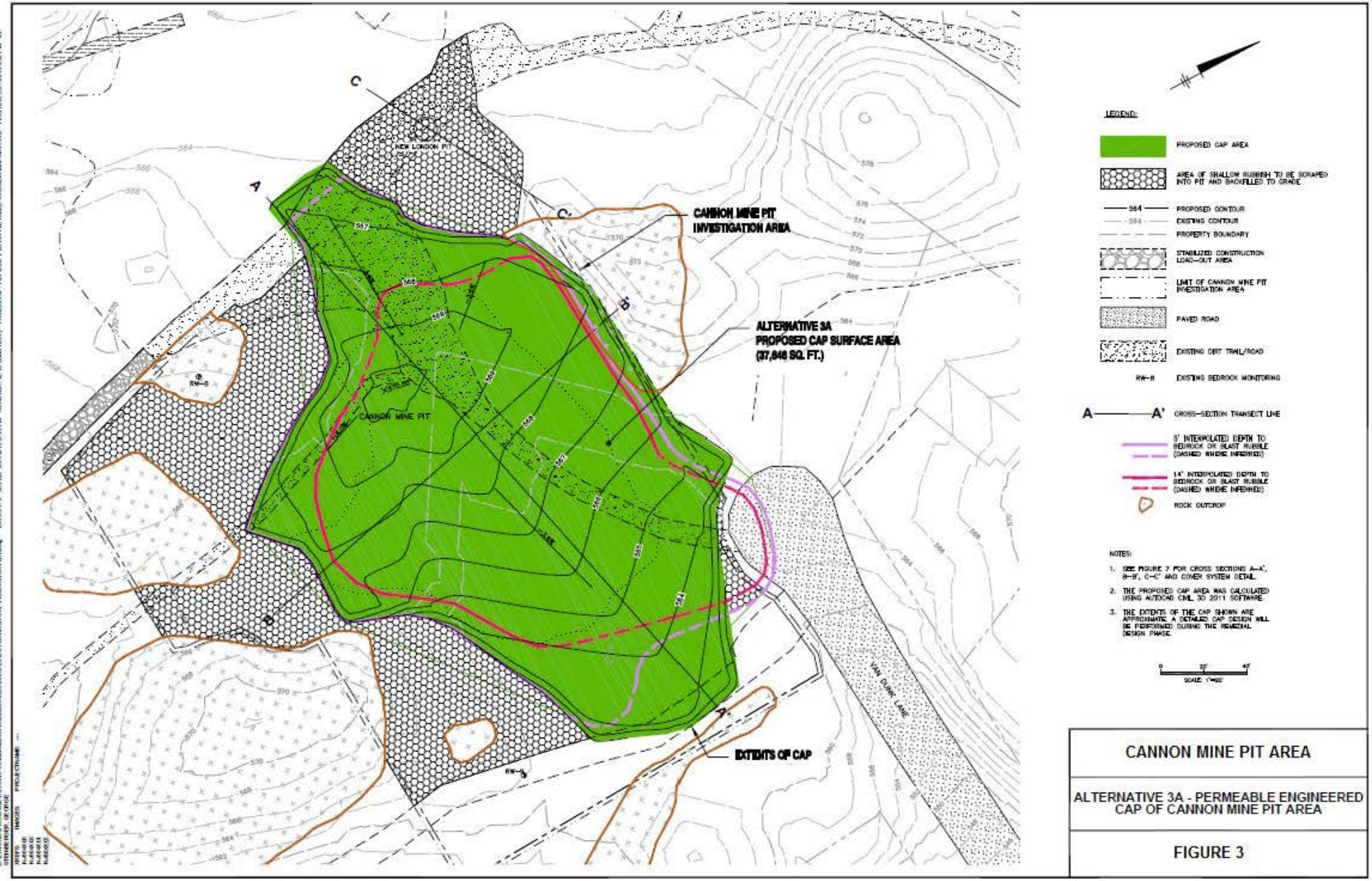


FIGURE 2

Alternative 6A - Removal and Off-Site Disposal of Historic Fill Surrounding Peters Mine Pit, Fill Peters Mine Pit and Permeable Engineered Cap of Peters Mine Pit with Engineering and Institutional Controls, Peters Mine Pit Pond would not Remain

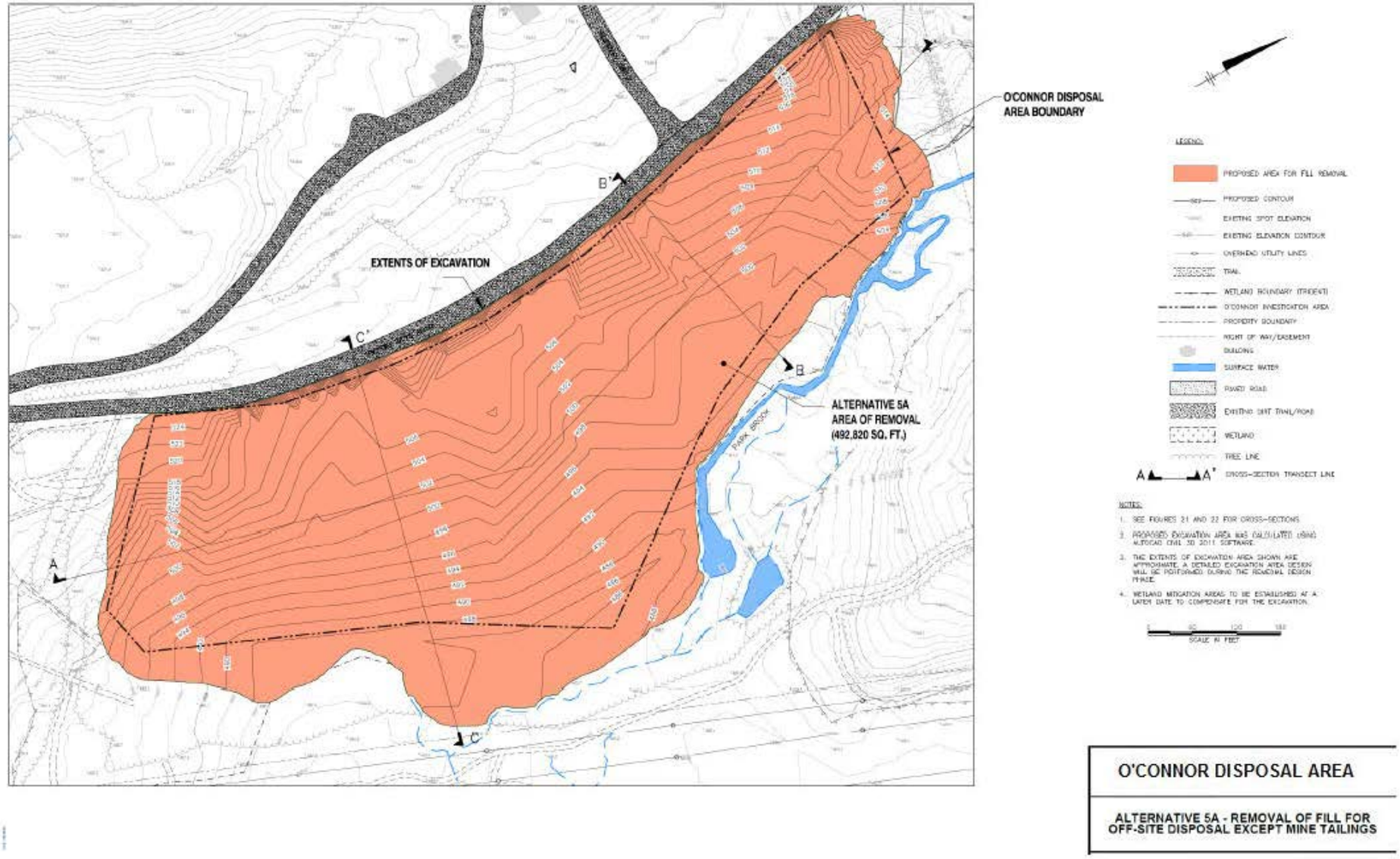


CANNON MINE PIT AREA

ALTERNATIVE 3A - PERMEABLE ENGINEERED CAP OF CANNON MINE PIT AREA

FIGURE 3

R2-0007468



O'CONNOR DISPOSAL AREA

ALTERNATIVE 5A - REMOVAL OF FILL FOR OFF-SITE DISPOSAL EXCEPT MINE TAILINGS

FIGURE 4

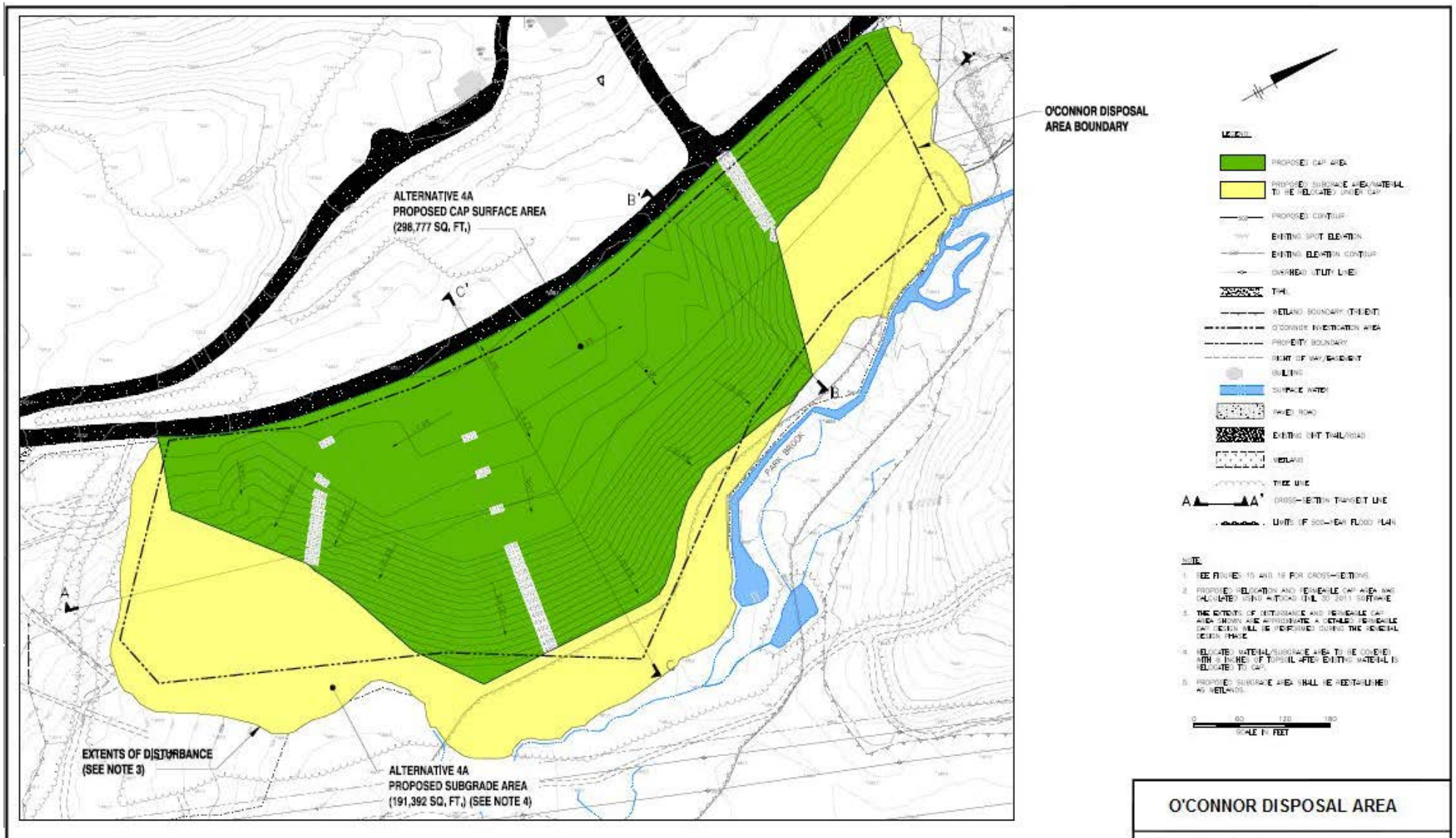


FIGURE 5

O'CONNOR DISPOSAL AREA

ALTERNATIVE 4A - SITE GRADING AND PERMEABLE ENGINEERED CAP