

Eversource: Grant of Location Public Hearing

April 6, 2021

Resident Feedback

Emails received from Sudbury residents regarding the Grant of Location Hearing.

From: Nicholas Pernice

Sent: Tuesday, April 6, 2021 6:30 PM

To: Select Board <SelectBoard@sudbury.ma.us>

Cc: Dretler, Janie <DretlerJ@sudbury.ma.us>; Dan Carty <carty.dan@sudbury.ma.us>

Subject: Fw: Vote re request by NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY for the purpose of obtaining a Grant of Location

Dear Members of the Select Board:

I hereby request that the Board enter into the record the following 3 items as regards the vote concerning a request by Nstar and Eversource for a Grant of Location as regards the proposed Eversource DCR High Voltage Line Construction along the MBTA Right of Way.

Item 1: An NCBI report that purports to show that higher concentrations of contamination from train use such as PAH's (diesel and oil pollution) and heavy metals such as mercury and lead can be expected to be found in a rail corridor at various rail siding areas or areas of train use where trains stopped for prolonged periods of time for instance to load or unload passengers etc. or where loading occurred and or where there was heavy train movement such as at junctions. In our town these areas would be obviously located at the areas where stations once existed such as at Landham Road, South Sudbury Station at Station road and Union Ave, including the diamond track where north-south trains crossed those going east-west, and at Dutton Road. Logically this would mean that greater concentrations of pollutants could be found where the tracks currently cross over roadways (with the exception of Peakham Road and Horse Pond.)

In order to summarize the above results, it should be stated that railway transport may be an important threat to the natural environment. This concerns especially PAH contamination. Since the PAH level is much higher in the area of all the functional parts of the junction than in the surrounding areas, it seems necessary to monitor the level of contamination in all the intensively used railway infrastructure ... This is especially important in the railway siding where trains remain in one place for a long time and in platform area where the train movement is very intensive. The heavy metal concentration in the area of railway junction is also high, although not so extreme as in the case of PAHs. The railway siding and the platform area are the places highly contaminated with heavy metals.

Item 2: I am also attaching a second report called Understanding Underground Environmental Contaminants published by the Rails to Trails Conservancy which among other things states that "leaks from material transfers or accidents, loading practices and other instances of contamination may

be found in varying degrees along rail corridors... " and, "The most commonly reported contaminants along the rail corridors include arsenic, constituents of oil or fuel (petroleum products), which likely dripped from the rail cars as they passed over the corridor..." Additionally one can expect creosote, coal ash pollution, and numerous polynuclear aromatic hydrocarbons or PAH's from diesel exhaust.

Of note: the Greenbush Line in Hingham retrofit which didn't even involve the massive type of excavation planned by Eversource in our town, required an astonishing 622 soil samples. Eversource has performed I believe fewer than 50 and none that only a handful i am aware of in the stations areas.

Finally item 3 is a draft lease agreement published on the internet between Eversource (CPL) and the town of Ridgefield Ct. whereby Ridgefield wanted to construct a bike trail in an already existing utility corridor run by Eversource. Note the paragraph on pollution historically recognized from prior train use, including arsenic and other contaminants as well as the conditions that would allow Eversource to terminate the lease to the town for its bike trail project.

Sudbury should not approve the Grant of Location until 3 things are done :

1. Eversource performs sufficient soil testing at all three road crossing locations where stations once existed where the proposed construction crosses our roads,
2. Eversource performs sufficient groundwater hydrology and flow studies of the areas in and around that same once existing station areas,
3. a copy of Eversource's agreement with DCR is produced to the town for its review.

Sincerely,
Nick Pernice
Sudbury Resident

PLEASE NOTE: ATTACHMENTS INCLUDED AT END OF THIS DOCUMENT.

From: Raphaelle Cruz
Sent: Tuesday, April 6, 2021 6:11 PM
To: Select Board <SelectBoard@sudbury.ma.us>
Subject: Against Eversource Transmission line

Hello, my house abutts the Sudbury rail trail where the proposed ever source transmission line is supposed to go. I am against this not only because my house abutts the beautiful rail trail that I use every day for exercise, but I am very worried about all the wildlife being killed. One of my jobs is a wildlife photographer and I take most of my pictures off the rail trail. I will fight this until the end. Thank you, Raphaelle Cruz, 60 Jarman Road Sudbury

From: Karen Louise Arpino
Sent: Tuesday, April 6, 2021 5:27 PM

To: Select Board <SelectBoard@sudbury.ma.us>

Subject: Please do NOT approve Grant of Location to Eversource

Dear Select Board,

Below are reasons why I believe the Sudbury Select Board should not approve the Grant of Location to Eversource.

Eversource has still never proven the line is necessary, and they may not even have the right to build a high voltage transmission line along the right of way. It is currently under question with the Surface Transportation Board whether or not the MBTA officially abandoned the line. Despite having been asked numerous times, Eversource has never shown our community the "agreement" between them and the DCR. Therefore, it would not be in Sudbury's best interest to allow Eversource any further foot in the door if we don't even know what the agreement is between Eversource and the other agencies involved.

Thank you for your consideration. Our community and why it is so valued, is at stake.

Karen Arpino
51 Colonial Road
Sudbury, MA 01776

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From: DeAnna McCart

Sent: Tuesday, April 6, 2021 4:42 PM

To: Select Board <SelectBoard@sudbury.ma.us>; Town Manager <TownManager@sudbury.ma.us>

Subject: Tonight's meeting.

Select board members- Just friendly reminder that when each of you ran for your seats you made a public commitment to your community that you would stand with them in their fight against Eversource. Do the RIGHT thing at tonight's meeting and vote No!

DeAnna Bisson
52 Basswood Ave
Sudbury ma

From: Chris Densel

Sent: Monday, April 5, 2021 6:14 AM

To: Select Board <SelectBoard@sudbury.ma.us>

Subject: Please no grant of location for Eversource

Select Board,

I just wanted to write a quick note to ask you to not approve a grant of location for Eversource at tonight's meeting. Thank you for all that you do to support our town's interests. My hope and expectation is that we are all in agreement that while we have a case still pending at the Supreme Judicial Court, it does not make sense to pave the way for Eversource to proceed with its plans.

Much thanks for your time and energy on this. My family truly appreciates it.

Chris Densel
109 Austin Road
c: 978-460-1470

From: Carol Gibbs
Sent: Tuesday, April 6, 2021 4:32 PM
To: Select Board <SelectBoard@sudbury.ma.us>
Subject: Do NOT approve Eversource Grant of Location

To the Sudbury Selectboard,

We request that you do not approve the Eversource Grant of Location.

There is no need for this line as their findings are over 10 years old and no longer necessary with solar panels and decrease use of energy. Plus, Intel has moved out of Hudson, which these transformers were mainly accommodating.

Also:

- Eversource has NEVER proven the line is necessary, have no proof that they even have the right to build a high voltage transmission line along the right of way - especially since it is currently under question whether or not the MBTA officially (legally) abandoned the line,
- Eversource has never (though we have asked many times) shown our community the "agreement" between them and the DCR (WHY?) which simply means it would NOT in the best interest of our community to allow Eversource any further foot in the door if we don't even know what the agreement is between them and the other agencies involved.

Thank you,
Carol Gibbs

From: R A
Sent: Tuesday, April 6, 2021 1:50 PM

To: Select Board <SelectBoard@sudbury.ma.us>

Subject: Grant of Location Hearing

Select Board -

Thank you all for all you do, and congratulations to Dan and to Janie for being re-elected.

As you all have at one time or another campaigned on protecting our community from the destructive Eversource high voltage transmission line, I write to you today to ask that you continue in those efforts.

Eversource should not be granted further permits for obvious reasons - some of which I state here:

1. Eversource has not ever proved the line is necessary. Ever. Not in the 5 years I have been opposing the line. However, there does exist publicly available data that shows the line is not necessary.
2. Eversource has a 5 year history of obfuscations, omissions, and lies to our community regarding the high voltage transmission line, including their unwillingness to share the MOU. Is there something in the MOU they do not want our community to see? And does not seeing it put our community at risk? [Why have they not answered Town Managers questions?](#)
3. The Supreme Judicial Court case is still pending. It would make sense to not move forward until we hear a decision from that case. If Sudbury lets Eversource in - it will be difficult (impossible?) to get them out.
4. The Surface Transportation Board has not yet responded as to whether or not the MBTA even has the right to let Eversource construct a high voltage transmission line since the line may have not been officially "abandoned" properly in the first place.

I ask the select board to consider delaying the grant of location until all answers have been received.

Thank you for your continued vigilance.

Renata Aylward

Sent: Tuesday, April 6, 2021 1:18 PM

To: Select Board <SelectBoard@sudbury.ma.us>

Cc: 'Protect Sudbury WG' <protect-sudbury-wg@googlegroups.com>

Subject: FW: Select Board Meeting - April 5

Select Board,

I am resending this email as I had intended it to go to the entire board.

It is the opinion of Protect Sudbury that the answers recently supplied by Eversource are insufficient. Our community deserves answers to these very important health and safety concerns. Further, Eversource's non-answer regarding whether the proper process was followed at the Surface Transportation Board by the MBTA, needs to be answered directly by the MBTA. It is our opinion that the Select Board is under no legal obligation to conduct permitting activities until and unless the Surface Transportation Board affirms that all of the proper processes were followed and that they have not violated federal law. On that basis alone, the permit should be denied until it is determined whether Eversource even has the right to construct this project on what is certainly an active railroad corridor.

If Eversource appeals your decision, Massachusetts courts will also have to defer to the federal authority of the Surface Transportation Board in this matter just as they have in similar matters in the past.

Five years ago Eversource had to be forced to conduct an Open House in Sudbury. They also had to be forced to comply with the EFSB's regulation to provide an alternative street route. Eversource is once again attempting to hide the impact of this project from the community by denying us the right to view the draft agreement with the DCR.

For all these reasons and more, the Select Board should deny the Grant of Location permit until we have all of the facts in front of us.

Thank you for your consideration.

Regards,

Ray

Ray Phillips
President, Protect Sudbury Inc.
978-852-4840
www.protectsudbury.org



From: Pat Brown

Sent: Tuesday, April 6, 2021 1:08 PM

To: Select Board <SelectBoard@sudbury.ma.us>

Cc: Town Manager <TownManager@sudbury.ma.us>

Subject: Opposing the "Grant of Location" requested by Eversource for construction on town property (Agenda item #3, April 6, 2021, Select Board Meeting)

Dear Board,

I am submitting my comments concerning the request by Eversource for a Grant of Location to construct an underground power line across town-owned roads (the Public Hearing held as Agenda Item #3 of the April 6, 2021, Select Board meeting).

The Board should deny the Grant of Location because:

The Eversource underground "reliability" project is quite probably unnecessary, and does not increase reliability.

1) The energy-use projections upon which the need for the underground power line are predicated are outdated. Newer projections show much less demand, and the project should be required to use projections based upon an analysis done within the last three years. Current usage projections would establish the need (or not) for this project. Project permitting should await this analysis.

2) An underground transmission line along the rail right-of-way (or anywhere else) will not increase energy reliability in Sudbury, which is affected primarily by downed trees on overhead wires delivering "last mile" service to homes and neighborhoods. Whose "reliability" will increase? What evidence has been supplied to indicate that the grid supplying the surrounding region would become more reliable with this project?

The Eversource underground "reliability" proposal contains unresolved legal questions.

1) The rail corridor remains under the jurisdiction of the (federal) Surface Transportation Board (STB) until the STB declares the corridor either abandoned or railbanked. Until the STB resolves under what authority the "reliability" project could be permitted, it is premature to proceed to issue permits.

2) The relationship between the Eversource project (underground transmission line) and the Department of Conservation and Recreation (DCR) proposed rail trail remains unclear. DCR and Eversource appear together when applying for permits before town committees such as the Conservation Commission. Eversource has not needed to justify this project as a transmission project; the "combined" project meets only the lesser standards required of a rail trail. Yet there is no single

project plan or schedule; rather Eversource proposes to complete their project and then—after some unspecified period—DCR will begin their project. A memorandum of understanding (MOU) between Eversource and DCR is said to define the relationship between the two entities and project phases. Eversource has never produced this document although it has been requested multiple times. The Board should refuse the Grant of Location permit until they have received and considered thoroughly the MOU and other documents defining the combined Eversource/DCR proposal.

I will also mention the environmental damage that the Eversource underground “reliability” will cause, and the steadfast community opposition to this project as shown in many town meeting votes and appropriations.

I ask the Board to deny the Eversource Grant of Location.

Thank you.

Pat Brown
34 Whispering Pine Road
Sudbury

From: Jon Sirota
Sent: Tuesday, April 6, 2021 12:23 PM
To: Select Board <SelectBoard@sudbury.ma.us>
Subject: Eversource hearing

I understand that there is a hearing tonight regarding Eversource and them getting additional approvals for their project regarding the transmission line through Sudbury under the MBTA right of way.

As a long time (54 year) resident, I am opposed to the project for a number of reasons - including the fact that the study which resulted in initiating the project is old, and with the changes in energy usage and increased efficiencies in electrical equipment and the idea of smaller, local generating capabilities, a new study might very well come up with a very different result. With this project, we are looking backwards, instead of looking forward.

Jon Sirota
34 Webster Cir

From: M. Carty
Sent: Tuesday, April 6, 2021 11:22 AM
To: Select Board <SelectBoard@sudbury.ma.us>
Subject: Please Vote No on Agenda Item #3 - Eversource

Select Board,

I would like to request all of Select Board members continue with your campaign promises of doing everything in your power to block Eversource from the MBTA ROW. Why would we allow Eversource in our protected areas? Eversource has proven to be a non-friendly neighbor with their dealings in other parts of Sudbury.

In addition, Eversource has never constructed a project like this before. Do you want Sudbury to be Eversource's experiment?

Please do not approve the Grant of Location to Eversource this evening.

Thank you,
Maura Carty
15 Stonebrook Rd, Sudbury, MA 01776

----- Forwarded message -----

From: **M. Carty**
Date: Mon, Dec 14, 2020 at 10:06 AM
Subject: Please Vote No on Agenda Item #6 - Eversource
To: <boardofselectmen@sudbury.ma.us>

Board of Selectmen,

I am writing in reference to Tuesday, December 15 agenda item, "Vote whether to approve a request by NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY for the purpose of obtaining a Grant of Location to construct upon, along, under, or across the following public way(s) of the Town of Sudbury, wires, cables, piers, abutments, conduits, or fixtures in accordance with plan(s) made by Eversource dated March 1, 2019, on file with said petition: Dutton Road (at its intersection with the MBTA rail corridor); Peakham Road (at its intersection with the MBTA rail corridor); Horse Pond Road (at its intersection with the MBTA rail corridor); Union Avenue (at its intersection with the MBTA rail corridor). This work is necessary to construct a new underground electric transmission line"

I would like to ask the Board of Selectmen to vote "No" on this agenda item.

- 1) Eversource has not adequately proven this project is necessary.
- 2) The town of Sudbury is in active litigation against this project. The only option the Board has is to vote "No" since the town is fighting in the courts against the project. Eversource should not be allowed to access our precious conservation land and water supply.

3) Fifty years ago the Sudbury Board of Selectmen voted "No" to "Grant of Location to Boston Edison", and was critical in the fight against a similar unwanted and unnecessary project.

Therefore, I think a similar approach here is definitely warranted.

Thank you for your time,

Maura Carty
15 Stonebrook Rd

Sent: Tuesday, April 6, 2021 11:13 AM
To: Select Board <SelectBoard@sudbury.ma.us>
Subject: Grant of Location vote

Hello. As a Sudbury resident concerned about the human and environmental health and safety in our town, I strongly oppose the construction of this project in our town, especially as the plan currently locates it, passing through extremely sensitive wetlands. I do question the very need for the transmission lines given how the energy demand landscape has changed since the project was first proposed.

Here I will quote the Protect Sudbury organization a question that seems extremely important to clear up before "granting location":

- Eversource has never (though we have asked many times) shown our community the "agreement" between them and the DCR (WHY?) which simply means it would NOT in the best interest of our community to allow Eversource any further foot in the door if we don't even know what the agreement is between them and the other agencies involved.

Thank you for your consideration,

Elizabeth Hanna
18 Blueberry Hill Lane
Sudbury, MA 01776

From: Susan Goswami
Sent: Tuesday, April 6, 2021 10:31 AM
To: Select Board <SelectBoard@sudbury.ma.us>
Cc: Bobby Goswami <bobby.goswami@comcast.net>
Subject: Eversource Grant of Location

Hello,

We'd like to voice our opposition to approving the Eversource Grant of Location at the Select Board meeting tonight.

Eversource should not be putting any high voltage lines through conservation land, whether above or below ground. The damage to the conservation area could not be repaired, and it seems more logical to put the lines under existing roadways. It is also questionable whether the power line is needed at all.

Stay the course, keep up the opposition.

Thank you very much,

Susan and Bobby Goswami

36 White Oak Lane

From: Marie Rock

Sent: Tuesday, April 6, 2021 10:29 AM

To: Select Board <SelectBoard@sudbury.ma.us>

Subject: Please do Not approve a Grant of Location to Eversource

In the interests of the long-term health and safety of Sudbury residents, their water supply, their right to a healthy ecosystem and their right to not have toxic chemicals pollute the land, water, fragile flora and fauna, please reject the Grant of Location to Eversource. They have not proved that this line is necessary to go through a fragile ecosystem, that would be destroyed if they do. How many generations do you want to saddle with Eversource's mistakes if you approve this? Now that would be expensive and very short sighted. Please reject their application for Grant of Location. Thank you.

Marie Rock,

26 Whispering Pine

Sudbury

From: Christine Barrett

Sent: Tuesday, April 6, 2021 9:47 AM

To: Select Board <SelectBoard@sudbury.ma.us>

Subject: Vote NO -Eversource Grant of location

Hi,

I wanted to express my strong disapproval of the Eversource Grant of Location before the hearing tonight.

LACK OF NEED

Our electrical needs have diminished as solar production has increased, this project is unnecessary. And if they want to do it despite the lack of need, going underground in our streets is a much better option.

SAFETY OF OUR WATER SUPPLY

PFAS is repeatedly in the news, both in Hudson a few years ago and now in Wayland. We do not need to do any project that could disrupt sensitive ground and affect our water supply. As one of many women in Sudbury who has been diagnosed with breast cancer, including one of 4 within a quarter mile of my house, I can't help but be extra nervous about what is in there already and how much worse it could get.

BIKE TRAIL

Please know that I am not an abutter or even close. Please also know that I would love a bike path along the rail! However, I would like to use the Assabet River Rail Trail as a reference for both good and bad. The section in Stow/Hudson, shaded by trees, is an absolute delight to ride on. The section in Marlboro, with a wide cut of no trees and blacktop is uninspiring in cool weather and miserable to ride on in our increasingly hot summer months. I am greatly afraid that with Eversource clear-cutting the land and coming back periodically to maintain the way they have in South Sudbury (knocking down neighbors' trees and gardens), we will be left with a hot blacktop trail, not the lovely tree-lined path it has the potential to be.

I am hopeful this message to you is a mere formality, as all of you have campaigned on your dedication to protecting Sudbury and fighting the Eversource project.

Thank you for your time,
Christine Barrett
151 Peakham Rd.

From: Harish Parwani
Sent: Tuesday, April 6, 2021 9:41 AM
To: Select Board <SelectBoard@sudbury.ma.us>
Subject: Please do not approve the Grant of Location to Eversource

Dear Select Board,
Writing to ask you not to approve the Grant of Location to Eversource as they have not proven the line is necessary.
Thanks,
Harish Parwani
45 Amanda Road.

From: Silvia Nersessian
Sent: Tuesday, April 6, 2021 8:59 AM
To: Select Board <SelectBoard@sudbury.ma.us>
Cc: Town Manager <TownManager@sudbury.ma.us>
Subject: 4/6/21 Public Hearing on the Eversource Grant of Location

Dear Select Board,

First, I would like to thank Town Manager Hayes for putting forth the article for Town Meeting supporting continued litigation against Eversource. I am writing to you again in my capacity as a citizen of Sudbury with regards to the April 6th, 2021 Public Hearing on the Eversource Grant of Location. I again, ask that each of you stand by your commitment to Sudbury and take an unanimous position and vote no on Eversource.

Under no circumstances would I imagine our Select Board to grant Eversource the ability to essentially begin construction, causing harm to our environment and our community. There is nothing that I see worth it to cause such damage and long term harm to our community. In my opinion, there is nothing Eversource could give us, or conditions we should ever agree to, that would ever make this ok. I hope you, are our elected officials, representing the entire Town feel and do the same.

Thank you for your time and attention to this important matter.

Silvia Nerssessian

On Dec 14, 2020, at 3:55 PM, Silvia Nerssessian wrote:

Dear Board Members,

I am writing to you in my capacity as a citizen of Sudbury with regards to the December 15, 2020 Public Hearing on the Eversource Grant of Location. I ask that each of you stand by your commitment to Sudbury and unequivocally vote NO.

This project is 100% unnecessary and is detrimental to our Town and our community. It is my hope that you will do the right thing and continue to oppose the Eversource project - under all circumstances.

Many thanks,

Silvia Nerssessian

Railway transportation as a serious source of organic and inorganic pollution

B. Wiłkomirski,[✉] B. Sudnik-Wójcikowska, H. Galera, M. Wierzbicka, and M. Malawska

Institute of Botany, University of Warsaw, Al. Ujazdowskie 4, 00-478 Warsaw, Poland

B. Wiłkomirski, Phone: +48-22-5530555, Fax: +48-22-5530500, Email: bowi@biol.uw.edu.pl.

[✉]Corresponding author.

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Abstract

Polycyclic aromatic hydrocarbons and heavy metal (Pb, Cd, Cu, Zn, Hg, Fe, Co, Cr, Mo) contents were established in soil and plant samples collected in different areas of the railway junction Iława Główna, Poland. Soil and plant samples were collected in four functional parts of the junction, i.e. the loading ramp, main track within platform area, rolling stock cleaning bay and the railway siding. It was found that all the investigated areas were strongly contaminated with polycyclic aromatic hydrocarbons (PAHs). The PAH contamination of the soil was the highest in the railway siding and in the platform area (59,508 and 49,670 $\mu\text{g kg}^{-1}$, respectively). In the loading ramp and cleaning bay, the PAH concentration in soil was lower but still relatively very high (17,948 and 15,376 $\mu\text{g kg}^{-1}$, respectively). The contamination in the railway siding exceeded the average control level up to about 80 times. In the soil of all the investigated areas, four- and five-ring PAHs prevailed. The concentrations of PAHs were determined in four dominating species of plants found at the junction. The highest concentration was found in the aerial parts of *Taraxacum officinale* (22,492 $\mu\text{g kg}^{-1}$) growing in the cleaning bay. The comparison of the soil contamination with PAHs in the investigated railway junction showed a very significant increase of the PAHs level since 1995. It was found that the heavy metal contamination was also very high. Pb, Zn, Hg and Cd were established at the highest levels in the railway siding area, whereas Fe concentration was the highest in the platform area. A significant increase in mercury content was observed in the cleaning bay area. The investigations proved very significant increase of contamination with PAHs and similar heavy metals contamination in comparison with the concentration determined in the same areas 13 years ago.

Keywords: Railway, Soil, Plants, Contamination, Heavy metals, PAHs

Introduction

The railway is one of the most fundamental (apart from roads) means of transportation. In Poland, the rail has used some areas for more than 150 years. It has been commonly thought that rail transportation is much less harmful to the environment than road traffic. However, the specificity of rail causes some typical organic and inorganic contamination (Malawska and Wiłkomirski 1999, 2000, 2001; Lacey and Cole 2003; Liu et al. 2009), resulting mostly from used lubricate oils and condenser fluids, transportation of oil derivatives, metal ores, fertilizers and different chemicals, as well as from application of herbicides. The two most important types of pollutants connected with railway transport are polycyclic aromatic hydrocarbons (PAHs) and heavy metals. Besides high toxicity, significant stability and a cumulative effect in the environment PAHs have a peculiar feature, which is the carcinogenic and mutagenic effect on living organisms (IARC 1983). The main source of PAHs in railway areas derives from substances used for rolling stock exploitation such as machine grease, fuel oils and transformers oils. Another important source of PAHs is creosote, which is a common impregnation agent for outdoor wood structures, including railway ties (Brooks 2004; Moret et al. 2007; Thierfelder and Sandström 2008). Heavy metals are amongst the most frequently found and intensively studied chemical substances that contaminate the environment. Railway areas are thought to be sites of intensive heavy metal emission, and there are some interesting articles dealing with this problem (Chillrud et al. 2005; Bukowiecki et al. 2007; Liu et al. 2009). The rail rolling stock construction material abrasion, fuel combustion in diesel-electric locomotives, action of pantographs on trolley wires and cargo leakage emit particles containing heavy metals into the air and subsequently deposit them into the plant and soil through dry and wet deposition.

The first aim of this work is to present information concerning the pollution level of soil and plants with heavy metals (Pb, Cd, Cu, Zn, Hg, Fe, Co, Cr, Mo) and 17 PAHs in the area of four functional parts of the railway junction Iława Główna (Poland). Similar investigations were performed 13 years ago (Malawska and Wiłkomirski 2001); hence, the second aim is to compare the presents results with previous findings and to provide evidence that railway transport is the source of the above contamination.

Materials and methods

Study area

The investigations were carried out in the area of the railway junction Iława Główna located in northern Poland about 200 km north of Warsaw on the Warsaw–Gdańsk railway route in the western part of the Mazurian Lake Region. This region covered mostly by forests and lakes is relatively clean, since no heavy industry is concentrated there. The junction having such location is the relevant place to investigate the influence of railway transportation on environmental pollution. After World War II, the very old railway junction Iława Główna (built in 1870) became an important junction in Polish Railway Network. Very heavy passenger and goods traffic is concentrated in the area of the junction because Iława Główna is situated at the crossing of a few important railway routes. The railway junction covers an area of almost 2 km² within which the different functional parts are situated. Our investigations were carried out at four sites of the junction:

1. The railway siding (in tables and figures referred to as “siding”) which consists of many tracks where goods trains wait for unloading. The sampling area was situated in the most frequently used track of the railway siding (53°34'67.5" N; 19°34'34.0" E)
2. The loading station (referred to as “loading”) which is the track located close to the loading station (at present mostly coal) are reloaded from hopper wagons to heavy lorries (53°35'09.4" N; 19°34'59.7" E)
3. Track no. 7 (referred to as “platform”) which is located in the passenger part of the junction and focuses main stream of local and long distance trains (53°34'55.0" N; 19°34'26.1" E)
4. The rolling stock cleaning bay (referred to as “cleaning”) which is the separated and unsecured railway track with no facilities preventing the leakage (53°34'49.0" N; 19°34'20.1" E)

External link. Please review our [privacy policy](#).

Soil and plant sampling

At each of the four investigated sites, a surface covering a total of 120 m² was established. The surface consisted of two subsurfaces (60 m² each): the first covering a fragment of the tracks situated between the rails (rail gauge) and the second one located outside both rails up to the end of railway ties. This allowed us to find the potential differences between the level of contamination inside and outside rails. The diagram illustrating the method of soil sampling in each investigated area is presented in Fig. 1.

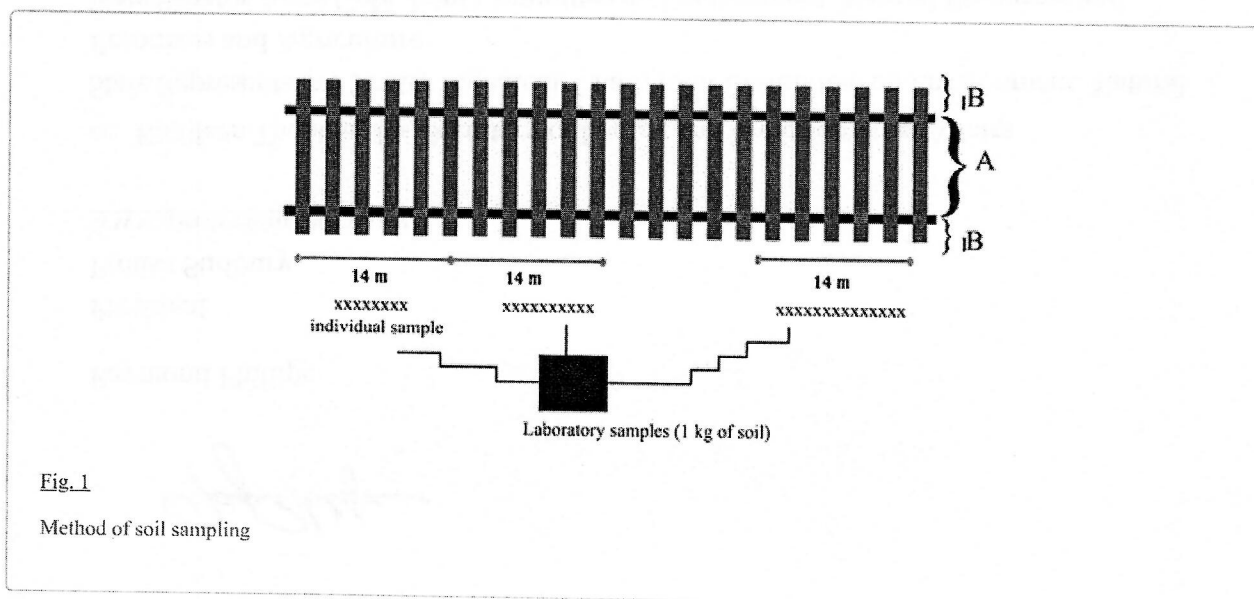


Fig. 1

Method of soil sampling

Soil samples were collected in predetermined investigation areas in September 2008. The railway basement soil collected from the depth of 0–20 cm was sieved (5 mm sieve) directly at the sampling area. Each time, 15–20 individual samples were taken thereby providing a mean mixed sample of about 1 kg of the soil representing ballast bed either from the subsurface located between the rails or outside rails. Dried soil samples were sieved (1 mm sieve) in the laboratory and used for further analysis.

The reference soil samples were collected at three points: (1) the vicinity of a small factory about 500 m southwest of the railway junction (53°34'44.6" N; 19°34'13.1" E), (2) hilly field about 500 m southeast of the railway junction (53°34'43.2" N; 19°34'33.4" E) and (3) field in the suburb town of Iława about 2 km east of the railway junction (53°34'52.4" N; 19°35'05.7" E).

Determination of PAHs and heavy metals

The extraction of plant and soil samples was performed with the use of dichloromethane. Further purification was carried out on Florisil. The PAH content analysis in plant and soil material was performed using a gas chromatograph equipped with a mass detector (GC/MSD Agilent Technologies 6890 N/5973) and a non-polar capillary column HP-5MS (length 50 m, diameter 0.2 mm, 0.3 μm diphenyl-95% dimethylpolysiloxane film). Temperature programming was applied: 70°C \pm 10°C min^{-1} to 200°C, \pm 2°C min^{-1} to 300°C (2 min). The detector temperature was 280°C. The temperature of injection port was 250°C. The quantitative analysis was performed using the external standard method where the certified PM-612 standard (Ultra Scientific Ltd) was applied for PAHs except benzo[e]pyrene and perylene for which certified standard 15 RM-612 (LGC Standard) was applied. The carrier gas was helium—flow rate 1 ml/min.

The following 17 PAHs were determined: acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[e]pyrene, benzo[a]pyrene, perylene, indeno[123-cd]pyrene, dibenzo[ah]anthracene and benzo[ghi]perylene.

The entire analytical procedure underwent quality control checks. Analyses of blanks were performed for every eight samples. PAH concentrations in all blank values were below the detection limit.

Heavy metal analyses were carried out after mineralization using nitric acid and microwaves for open system for soil samples. The mercury content was established by the total mercury assessment technique with an AMA-254 analyser. The other heavy metal contents (Pb, Cd, Cu, Zn, Fe, Co, Cr, Mo) were established by the inductively coupled plasma (ICP) mass spectroscopy technique for plants and ICP-optical emission spectrometry technique for soil samples. The quality assurance and quality control was performed by analyzing the standard samples of known composition. All the analyses (PAHs and heavy metals) were carried out in Central Chemical Laboratory of Polish Geological Institute which possesses accreditation certificate AB 283.

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Results and discussion

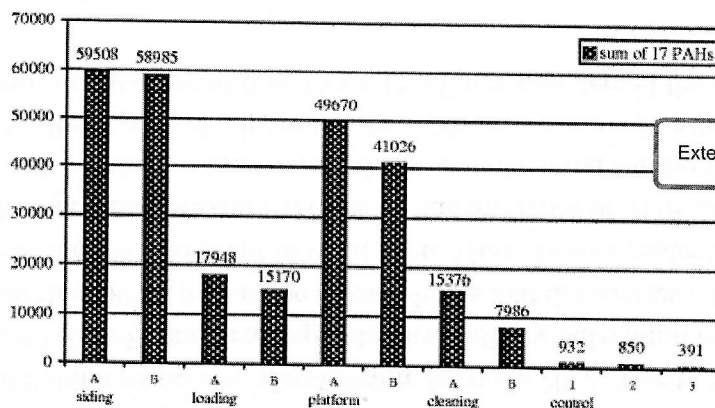
The levels of PAHs were determined in soil samples and selected plants. The PAH contents in the soil collected from the four functional parts of the junction, i.e. “siding”, “loading”, “platform” and “cleaning”, are presented in Table 1. The results obtained from each study area are represented by two values, i.e. *A* (between rails—rail gauge) and *B* (shoulder outside rails). Control values represented results obtained from the three described reference areas, respectively.

Table 1

Content of PAHs in soil samples taken from the railway junction Hława Główna depending on place (micrograms per kilogram)

Compounds	Siding		Loading		Platform		Cleaning		Control		
	<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	1	2	3
Acenaphthylene	240	352	106	65	333	172	125	92	2	4	2
Acenaphthene	443	347	53	51	480	326	65	27	1	2	2
Fluorene	396	349	86	76	455	418	69	43	1	3	2
Phenanthrene	5,000	4,500	1,318	1,186	5,700	4,300	1,149	666	39	64	35
Anthracene	1,584	1,558	427	287	1,023	866	530	289	7	6	3
Fluoranthene	8,900	7,400	2,650	2,450	8,100	6,800	2,380	1,188	135	133	69
Pyrene	7,600	6,200	2,640	2,180	6,700	5,700	2,170	1,189	114	101	54
Benzo[a]anthracene	4,900	5,300	1,275	1,142	3,300	2,970	1,047	511	60	48	24
Chrysene	4,400	4,700	1,359	1,183	3,500	2,860	1,181	565	70	73	32
Benzo[b]fluoranthene	5,900	6,300	2,160	1,626	4,700	3,700	1,719	791	92	83	35
Benzo[k]fluoranthene	2,650	2,900	871	715	1,976	1,630	686	341	49	42	18
Benzo[e]pyrene	2,290	2,510	841	659	1,939	1,484	668	361	75	64	28
Benzo[a]pyrene	5,300	5,800	1,348	1,192	3,500	3,200	1,085	537	85	59	28
Perylene	869	937	228	204	551	509	187	99	21	13	5
Indeno[123-cd]pyrene	4,300	4,700	1,265	1,061	3,400	2,850	1,026	562	83	73	25
Dibenzo[ah]anthracene	936	1,032	211	218	713	601	220	116	15	12	5
Benzo[ghi]perylene	3,800	4,100	1,110	940	3,300	2,640	1,069	609	83	70	24

Whilst analyzing the total PAHs found in soil in different parts of the railway junction Iława Główna, the highest concentrations of these substances were detected in the platform and railway siding areas reaching in siding 59,508 and 58,985 $\mu\text{g kg}^{-1}$ (*A* and *B*, respectively) and in platform 49,670 and 41,026 $\mu\text{g kg}^{-1}$ (*A* and *B*, respectively). The concentration of PAHs in the loading ramp was placed at the level 17,948 and 41,026 $\mu\text{g kg}^{-1}$ (*A* and *B*, respectively). Amongst the investigated functional parts of the junction, the lowest contamination was detected in the cleaning bay area, reaching 15,376 and 7,986 $\mu\text{g kg}^{-1}$ (*A* and *B*, respectively). Figure 2 presented the comparison of total PAHs content in rail gauge (*A*) and shoulder (*B*). In all the investigated areas, the total PAHs content is slightly higher in transect *A* than in transect *B*. All amounts are significantly higher than the amount of PAHs in control areas.



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Fig. 2

The comparison of total PAH content in soil of transect *A* and transect *B* depending on place (micrograms per kilogram)

The PAHs concentration in soil of the three reference areas varied from 391 to 932 $\mu\text{g kg}^{-1}$. In all the investigated areas, the level of PAHs in the rail gauge was slightly higher than in the shoulder. Such a pattern of PAH levels indicates that soil contamination is mostly created either by very intensive train movement (platform) or by rolling stock remaining in one place for a long time (siding). In the loading ramp and the cleaning bay where traffic is not heavy and rolling stock remains for a relatively short time, the PAH level is less increased compared with the formerly described parts of the junction. The same distribution of contamination was observed in the past (Malawska and Wilkomirski 2001), but currently the contamination level is much higher.

Figure 3 presented the percentage content of three-, four-, five- and six-ring PAHs in railway junction Iława Główna. It proved that the most abundant groups of hydrocarbons in soil of all the parts of the junction were four- and five-ring PAHs.

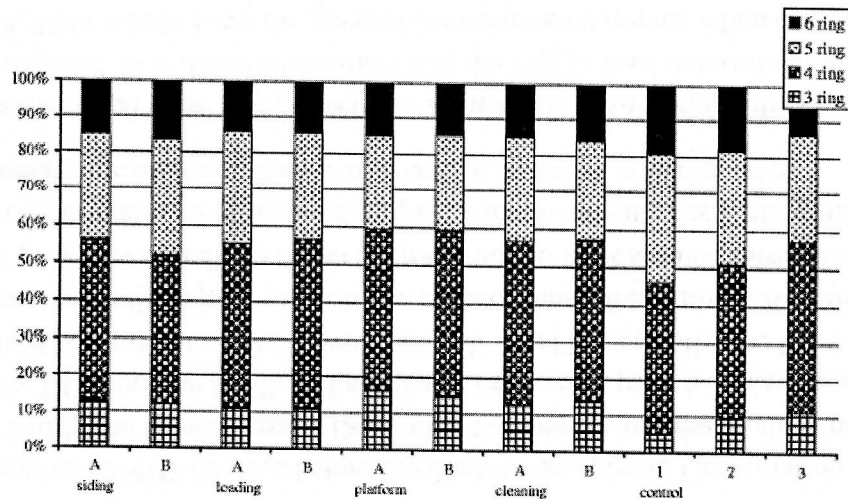


Fig. 3

The percentage content of three-, four-, five- and six-ring PAHs in railway junction Iława Główna depending on place

The tracks of all the investigated parts of the junction were covered by plants, although in different degree. The plant cover on track which is very heavily used within platform area was very poor. A slightly bigger plant cover was observed in the loading ramp, whereas in the railway siding and the cleaning bay, the plant cover was relatively more abundant but still rather scanty.

In all the investigated areas, 120 plant species were found (Galera et al., submitted for publication). However, the prevailing number of them was represented by one or a few specimens. Four species occurring in relatively higher abundance were selected for PAHs analysis, although in the loading ramp and platform areas only one species could be collected in the amount which makes chemical analysis possible. The selected species included three perennials (*Daucus carota*, *Pastinaca sativa* and *Taraxacum officinale*) and one annual plant (*Sonchus oleraceus*). All the collected plant specimens were divided into aerial parts and roots.

The comparison of PAH total content in different plants in railway junction Ilawa Główna is presented in Fig. 4. The highest level of PAHs ($22,492 \mu\text{g kg}^{-1}$) was observed in *T. officinale* growing in the cleaning bay. The highest PAH accumulation in roots was observed in plants growing in railway siding area and reached 15,182, 15,461 and 14,896 $\mu\text{g kg}^{-1}$ in *D. carota*, *S. oleraceus* and *P. sativa*, respectively. Table 2 shows the PAH content in the aerial parts and roots of a selected plant in the investigated areas of the junction.

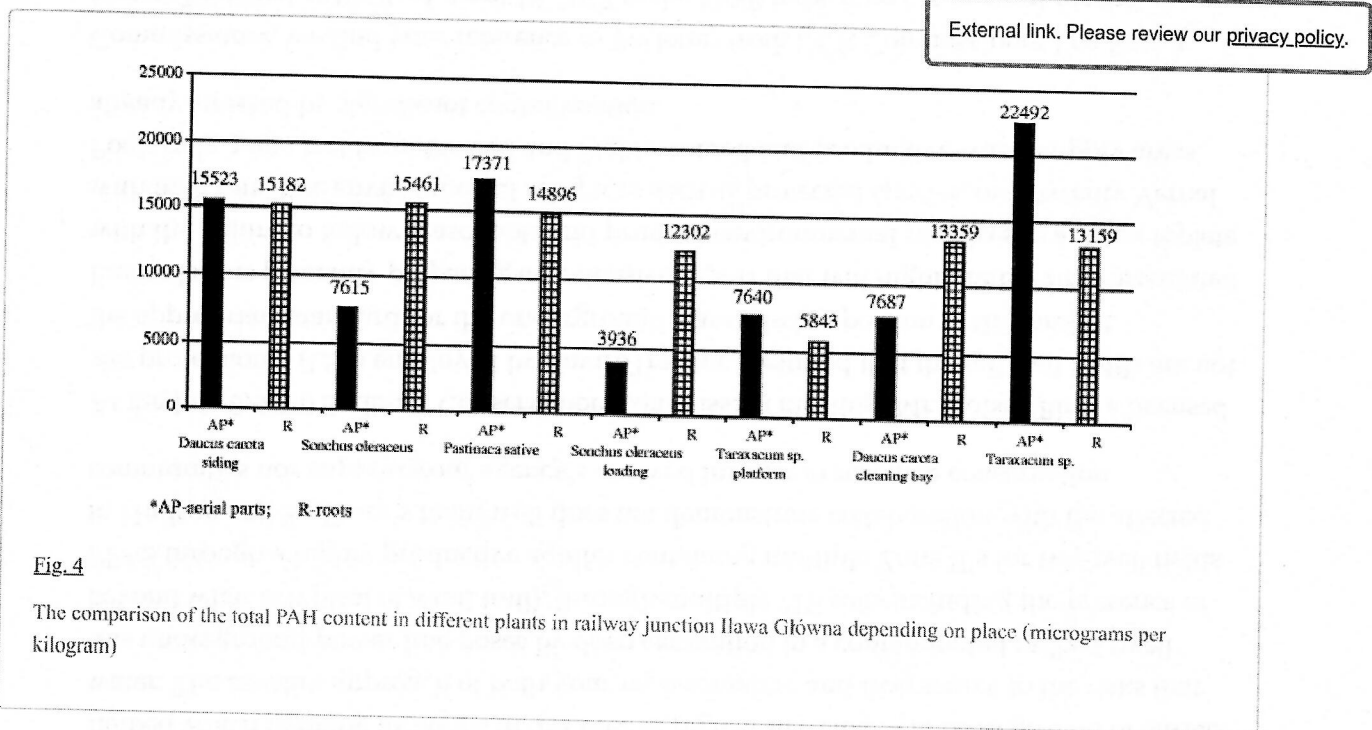


Fig. 4

The comparison of the total PAH content in different plants in railway junction Ilawa Główna depending on place (micrograms per kilogram)

Table 2

Content of PAHs in plant samples (aerial parts and roots) in railway junction Hawa Główna depending on place (micrograms per kilogram)

Compounds	Siding													
	Daucus carota		Sonchus oleraceus		Pastinaca sativa		Loading Sonchus oleraceus		Platform Taraxacum sp.		Cleaning bay			
	AP	R	AP	R	AP	R	AP	R	AP	R	AP	R	AP	R
Acenaphthylene	161	120	38	126	196	123	26	89	23	28	98	177	135	130
Acenaphthene	840	66	63	63	1,213	150	56	95	99	49	167	54	62	40
Fluorene	1,484	122	137	117	1,344	207	119	284	114	External link. Please review our privacy policy .				
Phenanthrene	5,600	1,225	1,363	1,238	1,000	1,685	936	2,170	1,125					
Anthracene	200	342	305	373	460	311	109	456	126	114	155	483	443	412
Fluoranthene	4,200	1,758	2,600	1,786	7,800	2,510	672	1,404	1,285	891	1,929	1,102	6,600	2,610
Pyrene	1,463	1,470	1,375	1,524	2,870	1,890	498	1,458	996	721	861	1,382	4,100	1,960
Benzo[a]anthracene	184	898	236	900	295	1,014	194	777	482	380	230	500	763	582
Chrysene	327	1,068	426	1,089	818	1,055	239	752	557	391	368	619	3,300	1,469
Benzo[b]fluoranthene	294	2,040	350	2,130	504	1,511	326	1,364	857	576	482	2,430	2,260	1,776
Benzo[k]fluoranthene	122	851	133	868	195	619	113	438	308	250	187	936	899	660
Benzo[e]pyrene	117	835	117	856	168	575	124	530	260	242	197	947	787	664
Benzo[a]pyrene	184	1,576	175	1,567	161	1,015	186	785	539	388	266	1,409	445	503
Perylene	30	304	26	300	30	179	27	128	84	68	45	260	73	97
Indeno[123-cd]pyrene	147	1,204	129	1,209	155	969	135	680	377	417	257	1,044	529	592
Dibenzo[ah]anthracene	34	250	31	248	29	203	36	146	70	64	53	236	98	101
Benzo[ghi]perylene	136	1,053	111	1,067	133	880	140	746	338	433	238	913	411	559

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AP aerial parts, R roots

The percentage content of PAHs possessing different numbers of rings in the molecule in aerial parts and roots of selected species growing in different parts of Hawa Główna junction was presented in Fig. 5. The most abundant group of PAHs present in plants in the investigated areas is represented by four-ring PAHs. Plants of three species growing in the railway siding differ from other investigated plants by a much smaller amount of five- and six-ring PAHs in aerial parts.

Fig. 5

The percentage content of three-, four-, five- and six-ring PAHs in aerial parts and roots of selected species growing in different parts of Hawa Główna junction

The present study was carried out in September 2008. Thirteen years ago in the same study area, the following 14 PAHs were determined: acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(123-cd)pyrene, dibenzoanthracene and benzo(ghi)perylene (Malawska and Wilkomirski 2001). The comparison of earlier findings with the results indicating the total level of the same 14 PAHs determined in the present study showed a very significant increase of PAHs content in all the functional parts of the railway junction Hawa Główna. At the same time, the PAH level in the control areas did not change. The comparison of the total level of 14 investigated PAHs in the soil of the different parts of the junction (in 1995 and 2008) is presented in Fig. 6.

Fig. 6

The comparison of 14 PAHs content in soil in four functional parts of the railway junction Iława Główna in 1995 and 2008 years (micrograms per kilogram)

According to the data obtained from Polish Rail Regional Head Office in Olsztyn, the different parts of the railway junction Iława Główna were renovated (including the replacement of ballast bed and railway ties): cleaning bay in 1978, track no. 7 in 1977, loading ramp in 1984 and railway siding in 1991. Between our former investigations and the present study, no other renovation was carried out. Hence, the 13 years of intensive railway use led to the substantial increase of the PAHs level in soil.

Similar analysis also indicated a remarkably high contamination of plants with PAHs compared with previous investigations. The control made for *T. officinale* did not show the increase of the contamination. These results are results are presented in Fig. 8 showing the proportion between PAHs possessing different number

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Fig. 7

The comparison of the 14 PAHs content in aerial parts of different plants from the area of Iława Główna railway junction in 1995 and 2008 (micrograms per kilogram)

Fig. 8

a The percentage content of three-, four-, five- and six-ring PAHs in soil collected in 1995 and 2008 depending on place. **b** The percentage content of three-, four-, five- and six-ring PAHs in plants collected in 1995 and 2008 depending on place

The significant percentage of five- and six-ring PAHs in the soil (ranging from about 25% to about 50%) is very characteristic. This percentage is different in the case of plants. The lack of five- and six-ring PAHs in plants growing in control areas and the small percentage of these compounds in plants growing within railway junction suggested that railway transport is a source of serious pollution with PAHs. It seems that the content of "heavy" PAHs in the soil is associated with the permanent and long cumulative deposit, whereas plants reflect rather current deposit connected with railway emission. This is in accordance with the observations concerning the different uptake pathways of contaminants into plants (Trapp 1995; Barber et al. 2004). The smaller percentage of the "light" PAHs could also be connected with their evaporation from the soil. Such tendencies were observed both in 1995 and 2008.

The levels of the investigated heavy metals were determined in soil samples and selected plants. The heavy metal contents in soil are presented in Table 3.

Table 3

Content of heavy metals in soil samples collected in the railway junction Ilawa Główna depending on place (milligrams per kilogram)

Heavy metals	Siding		Loading		Platform		Cleaning		Control		
	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
	A	B	A	B	A	B	A	B	1	2	3
Lead	448	494	75	84	193	177	134	204	8	11	6
Cadmium	5.4	5.1	7.4	0.8	2.5	1.3	1.3	1.9	n.d.	n.d.	n.d.
Copper	191	161	33	37	480	326	105	418	4	4	4
Zinc	1,264	1,223	206	228	1,438	897	357	563	23	23	18
Mercury	0.573	0.969	0.066	0.046	0.165	0.144	0.678	0.757	0.014	0.050	0.010
Iron	44,800	39,700	14,600	11,900	112,900	59,700	24,900	34,300	4,400	4,500	5,000
Cobalt	9	8	3	3	14	6	5	6	1	1	2
Chromium	67	58	14	11	208	62	23	33	5	6	8
Molybdenum	2	2	n.d.	n.d.	8	4	1	1	n.d.	n.d.	1

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The levels of nine heavy metals (Pb, Cd, Cu, Zn, Hg, Fe, Co, Cr, Mo) were established. The highest level of lead, which exceeded the control level approximately 50-fold, was determined in the siding area. In other parts of the junction, the lead level was lower and exceeded the control value by ca. tenfold, 22-fold and 20-fold, respectively. The cadmium level is rather low in all the investigated areas. However, in the area of siding and in railway gauge of the loading ramp, the level of cadmium is higher than in other parts of the junction. The highest concentration of copper was detected in the platform area, what is easy to understand due to the intensive action of pantographs on trolley wires (track 7 is intensively used by passenger trains and some of them do not stop at the station, passing through with a high velocity).

The whole area of the junction contains elevated concentration of zinc. The highest concentration of this metal was observed on the siding, exceeding the control level approximately 60-fold. A significant increase in mercury content was observed in the cleaning bay area and in the railway siding. In both areas, the average mercury concentration exceeded the control level about 30 times.

Cobalt and molybdenum concentrations in the soil of all the investigated areas were relatively low. Iron contamination of soil is high in all the functional parts of the junction, especially in the platform area where in the railway gauge its level reached ca. 11%, justifying the common name of the railway. Chromium contamination varied reaching the highest level in the rail gauge in the platform area. Generally, the contamination of soil with all the heavy metals, except mercury, was higher in the railway siding and platform area and lower in the loading ramp and cleaning bay.

With regard to the railway studies, Liu et al. (2009) reported the levels of heavy metals alongside mountain railway in China. These concentrations were comparable to our results. The heavy metal contents in roots and aerial parts of selected plants collected in different functional parts of the junction are presented in Table 4.

Table 4

Content of heavy metals in aerial parts and root of selected plants collected in railway junction Hawa Główna depending on place (milligrams per kilogram dry weight)

Heavy metals	Siding				Loading				Platform		Cleaning					
	<i>Daucus carota</i>		<i>Sonchus oleraceus</i>		<i>Pastinaca sativa</i>		<i>Sonchus oleraceus</i>		<i>Taraxacum sp.</i>		<i>Daucus carota</i>		<i>Taraxacum sp.</i>		<i>Taraxacum sp.</i>	
	Ap	R	Ap	R	Ap	R	Ap	R	Ap	R	Ap	R	Ap	R	Ap	R
Lead	13.39	68.42	11.69	74.81	7.49	80.75	13.41	55.26	19.44	29.98	11.29	32.91	14.97	43.69	14.97	43.69
Cadmium	0.73	1.5	0.73	1.32	0.32	1.43	1	1.23	0.85	0.85	1.18	1.62	1.00	1.11	1.00	1.11
Copper	22.12	62.26	22.94	85.9	18.92	44.83	29.04	39.82	123.19	154.43	46.89	7				
Zinc	100	243	122	260	85	248	224	153	102	120	192	13				
Mercury	0.03	0.16	0.03	0.1	0.03	0.090	0.026	0.048	0.033	0.040	0.046	0.107	0.118	0.406	0.118	0.406
Iron	4,695	11,644	3,528	15,062	2,985	8,590	2,075	5,199	18,819	20,361	5,119	9,178	5,274	12,405	5,274	12,405
Cobalt	0.89	2.57	0.64	3.3	0.55	2.33	0.69	2.38	2.65	2.77	0.81	1.65	0.91	2.36	0.91	2.36
Chromium	19	142	20	226	36	92	35	37	57	72	25	67	26	110	26	110
Molybdenum	2.25	1.8	2.14	2.38	2.07	1.06	0.97	1.1	2.01	3.92	1.61	1.6	4.53	2.12	4.53	2.12

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AP aerial parts, R roots

In nearly all the investigated plants, the contents of heavy metals were higher in roots than in aerial parts. A different tendency was demonstrated only in the case of molybdenum.

The concentration of PAHs in the area of railway junction significantly increased from 1995 to 2008. The heavy metal concentration did not change considerably during this period. We assumed that this was connected with the railway ballast permeability making the leaching of soluble contamination possible. The comparisons of heavy metal contents in 1995 and 2008 in soil and plants are presented in Tables 5 and 6, respectively.

Table 5

The comparison of heavy metal contents in the soil from the area of Hawa Główna railway junction in 1995 and 2008 depending on place (milligrams per kilogram dry weight)

Heavy metal	Siding		Loading		Platform		Cleaning		Control			
	1995	2008	1995	2008	1995	2008	1995	2008	1995	2008	1995	2008
Lead	506	494	62	84	55	177	273	204	22	11	6	8
Cadmium	5.2	5.1	0.7	0.8	nd	1.3	2.8	1.9	nd	n.d.	n.d.	nd
Copper	115	161	25	37	24	326	113	418	6	4	4	4
Zinc	704	1,223	95	228	84	897	1,244	563	45	23	18	23
Mercury	0.26	0.97	0.02	0.046	0.01	0.144	2.28	0.76	0.04	0.05	0.01	0.01
Iron	50,600	39,700	10,800	11,900	11,600	59,700	40,000	34,300	5,300	4,500	5,000	4,400
Cobalt	6	8	2	3	2	6	8	6	1	1	2	1
Chromium	81	58	10	11	14	62	32	33	5	6	8	5
Molybdenum	3	2	nd	n.d.	nd	4	2	1	nd	n.d.	1	nd

Table 6

The comparison of heavy metal content in aerial parts of different plants from the area of Iława Główna railway junction in 1995 and 2008 (milligrams per kilogram dry weight)

Heavy metal	Siding				Loading		Platform		Cleaning bay		
	1995	2008			1995	2008	1995	2008	1995	2008	
	<i>Taraxacum</i> sp.	<i>Daucus</i> <i>carota</i>	<i>Pastinaca</i> <i>sativa</i>	<i>Sonchus</i> <i>oleraceus</i>	<i>Taraxacum</i> <i>officinale</i>	<i>Sonchus</i> <i>oleraceus</i>	<i>Taraxacum</i> <i>officinale</i>	<i>Taraxacum</i> <i>officinale</i>	<i>Taraxacum</i> <i>officinale</i>	<i>Taraxacum</i> <i>officinale</i>	
Lead	43	13.39	7.49	11.69	22	13.41	28	19.44	56	14.97	1
Cadmium	1	0.73	0.32	0.73	1	1	1	0.85	1	1	1
Copper	49	22.12	18.92	22.94	55	29.04	98	123			
Zinc	255	100	85	122	190	224	162	102			
Mercury	0.06	0.03	0.03	0.03	0.07	0.03	0.07	0.03	1.94	0.12	0
Iron	380	4,695	29,885	3,528	290	2,075	320	18,819	430	5,274	5
Cobalt	3	0.89	0.55	0.64	3	0.69	4	2.65	3	0.91	0
Chromium	107	19	36	20	89	35	87	57	66	26	2
Molybdenum	1.8	2.25	2.07	2.14	1.5	0.97	2.5	2.01	1.5	4.53	1

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The statistical analysis showing the dependence between contents of contaminants in plants and soil is presented in Table 7. The obtained results show:

1. High positive dependence between Cu, Fe and Hg (lower) contents in soil and the amount of these metals in aerial parts of plants
2. High positive dependence between Pb, Cu, Fe and Hg (lower) contents in soil and the amount of these metals in roots of plants
3. High positive dependence between Cu, Hg and Fe contents in aerial parts and roots

Table 7

The correlation coefficient between heavy metals and PAH contents in aerial parts and roots of plants and soil ($P < 0.005$)

	Pb	Cd	Cu	Zn	Hg	Fe	The sum of PAHs
Soil vs AP	-0.5	-0.5	0.8	-0.9	0.5	0.9	0.3
Soil vs R	0.8	-0.2	0.8	0.4	0.6	0.9	-0.1
AP vs R	-0.7	0.8	0.9	-0.5	0.9	0.8	0.3

The described values indicate that these elements are absorbed by the root system from the soil and transported to leaves. The high dependence between Pb content in soil and roots and lack of such dependence between Pb content in soil and aerial parts indicate that lead is absorbed from the soil and deposited in roots. The dependences between Cd content in soil and roots as well as in soil and aerial parts are not observed, although the relationship between the content of this element in roots and aerial parts is highly positive which suggest mobility of cadmium. The content of each heavy metal in the soil of all the investigated parts of the railway junction exceeded the average amount of these elements in Poland's soils (Kabata-Pendias and Pendias 1999).

No relationship between the total content of PAHs in soil and plants was found, which indicates that these compounds are deposited from the atmosphere and are not absorbed by the root system. In Poland, the assessment of soil quality is carried out based on different classifications, i.e. National Research Institute (Institute of Soil Science and Plant Cultivation, ISSPC) system

(sum of 13 PAHs), Ministry Regulation (sum of nine PAHs) and Dutch List (sum of ten PAHs). Table 8 shows the comparison of PAHs content and soil assessment.

Table 8

Standard limiting PAH content in the soil surface layer (micrograms per kilogram)

Class	1	2	3	3	4	5
ISSPC (13 PAHs)	0–200 unpolluted (natural content)	200–600 unpolluted (increased content)	600–1,000 slightly polluted	1,000– 5,000 polluted	5,000–10,000 heavily polluted	up to >10,000 very heavily polluted
Ministry of Environment (9 PAHs)	<1,000 unpolluted	>1,000 polluted	>40,000			
Dutch List (10 PAHs)	<1,000 unpolluted	1,000–40,000 polluted	Heavily polluted			

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The Institute of Soil Science and Plant Cultivation in Pulawy proposed the classification of agricultural soil contaminated with PAHs, which is often used in Poland. According to this classification, PAH content in agricultural soil below $200 \mu\text{g kg}^{-1}$ can be considered as “background level”, whereas the range from 200 to $600 \mu\text{g kg}^{-1}$ is characteristic of unpolluted soil with slightly increased PAH content. The sum of PAHs ($600\text{--}10,000 \mu\text{g kg}^{-1}$) corresponds to the contaminated soil with different levels of contamination, and the content of these compounds exceeding $10,000 \mu\text{g kg}^{-1}$ corresponds to very heavily contaminated soils where reclamation is needed.

The soil from all the investigated parts of the railway junction Iława Główna is heavily polluted type (class 5°). The only exception is surface B (outside the rails) in the cleaning bay, where the level of PAH contamination places the soil in class 4°.

According to the Ministry Regulation, all the parts of the investigated railway junction are covered by the polluted soil. According to the Dutch List, the soil from the area of the railway siding and platform are too heavily polluted (class 3°) and the soil from the area of loading ramp and cleaning bay is polluted (class 2°)

Conclusions

In order to summarise the above results, it should be stated that railway transport may be an important threat to the natural environment. This concerns especially PAH contamination. Since the PAH level is much higher in the area of all the functional parts of the junction than in the surrounding areas, it seems necessary to monitor the level of contamination in all the intensively used railway infrastructure. The determination of extremely high level of contamination should be a signal for renovation including the change of ballast bed and railway wooden ties for concrete ones. This is especially important in the railway siding where trains remain in one place for a long time and in platform area where the train movement is very intensive. The heavy metal concentration in the area of railway junction is also high, although not so extreme as in the case of PAHs. The railway siding and the platform area are the places highly contaminated with heavy metals.

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Understanding Environmental Contaminants

**Lessons Learned and Guidance
to Keep Your Rail-Trail Project on Track**



PREPARED BY RAILS-TO-TRAILS CONSERVANCY

Understanding Environmental Contaminants —

*Lessons Learned and Guidance
to Keep Your Rail-Trail Project on Track*

September 24, 2004

TRAILDART
TRAIL DEVELOPMENT ASSISTANCE RESPONSE TEAM

A Service of Rails-to-Trails Conservancy

PROJECT TEAM MEMBERS

Jeffrey Ciabotti

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MISSION:

The purpose of Rails-to-Trails Conservancy is to enrich America's communities and countryside by creating a nationwide network of public trails from former rail lines and connecting corridors.

Special thanks to

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PREFACE

LETTER COMING

INTRODUCTION

Throughout Rails-to-Trails Conservancy's (RTC) 18 years of experience, contamination has generally not been an obstacle when developing rail-trails. Communities wishing to convert rail corridors into multi-use paths sometimes find themselves in the difficult position of dealing with known, potential or perceived contamination along a railbed. Questions arise during all phases of trail development, from land acquisition to management. Future trail users may ask about potential exposure at public meetings. Trail opponents may raise concerns about contamination as a means to impede or thwart trail development or property acquisition. Elected officials may fear contaminant clean-up could escalate project costs. Abutters may worry about dust kicked up during construction. Trail managers need answers to questions about contamination to keep projects on track, however no comprehensive source of information existed to aid trail developers in addressing these complex issues.

This report serves as a national resource guide to assist communities in utilizing new and existing brownfield programs to understand and address environmental clean-up issues that may inhibit the conversion of unused rail rights-of-way (ROW) into multi-use trails. RTC's objective was to address brownfield concerns by researching appropriate legal, funding and construction issues related to rail-to-trail conversions. The findings of this research will assist local communities to resolve potentially complex contamination occurrences by employing successful strategies outlined in this report.

To address this problem and provide guidance to communities struggling to convert rail corridors into multi-use trails, this report seeks to answer the following questions:

- ◆ What potential contamination may be encountered along rail-lines?
- ◆ What steps need to be taken when contamination is found?
- ◆ How have other communities effectively addressed the legal, funding and construction issues of a contaminated site?
- ◆ What are the federal and state resources available to assist communities as they deal with legal, funding, testing, remediation and construction issues?

To answer these questions, the research team conducted a survey of trail managers to report the incidence of contamination and any remediation efforts, and case studies were chosen to analyze how other communities have addressed these issues. In the following pages you will also find a review of legal issues, funding sources and other state and federal resources available to trail developers. Finally, guidelines have been provided to the trail developer who must tackle the issue of remediation on a rail corridor.

This national resource guide has been created to aid communities where a potential hazard has been identified. Each rail corridor is unique and contamination may not exist or varies depending on uses of the corridor. However based on the survey conducted for this report — Lexis search on media over the past 20 years and contact with trail managers — Rails-to-Trails Conservancy has found that, overall, potential contamination along a corridor has not hindered the creation of rail-trails.

RAIL-TRAILS – A BACKGROUND

HISTORY OF THE RAIL-TRAIL MOVEMENT

It began in the mid-1960s, quietly, gradually, hesitatingly. There wasn't much fanfare. It was primarily a Midwestern phenomenon, barely noticed in places like Los Angeles, New York or Washington, D.C. People didn't say, "Is that the latest fad?" They said, "That's a really *smart* idea!"

The idea was to convert unused or abandoned rail corridors into public trails. A simple concept, unlike the complex railroad system that was crumbling physically and financially. It didn't require or even claim an inventor. Once the tracks were removed, people naturally started walking along the grades, socializing, exploring, discovering old railroad relics, and marveling at old industrial facilities such as bridges, tunnels, abandoned mills, sidings and switches. In the snows of winter the unconventional outdoor enthusiast skied or snowshoed on the corridor. In the days before even running and all-terrain bicycling were common pastimes, the predominant activity was walking. Of course, none of the corridors were paved or even graded. They were simply abandoned stretches of land.

"Rails-to-Trails" is what people started calling the movement, and the name was catchy and descriptive enough to give the concept a tiny niche in the fledgling environmental movement that was gathering momentum and bracing for huge battles shaping over clean air and water. However, it was destined to move into the mainstream of the conservation and environmental protection. After all, it had all the ingredients: recycling, land conservation, wildlife habitat and historical preservation, non-motorized transportation, physical fitness, recreation access for wheelchair users and numerous other benefits.

In 1965 few Americans understood the national importance of rail-trails. Rails-to-trails was still a highly localized movement. But gradually a realization emerged that America desperately needed a national trails system and that abandoned rail corridors were the perfect backbone for that network. Today, more than 35 years later, rail-trails have begun to make a significant mark, with 12,585 miles of rail-trails and approximately 100 million users per year.

THE VALUE OF RAIL-TRAILS

Rail-trails provide places for cyclists, hikers, walkers, runners, inline skaters, cross-country skiers, equestrians and physically challenged individuals to exercise and experience the many natural and cultural wonders of the nation's urban, suburban and rural environments. Rail-trails not only serve as independent community amenities, they also enhance existing recreation resources by linking neighborhoods and schools to parks, waterfronts, recreation centers and other facilities.

Multiple Recreation Opportunities. Rail corridors are flat or have gentle grades, making them perfect for multiple users, including walkers, inline skaters, bicyclists and people with disabilities. Trails are multimodal and versatile passageways.

Economic Renewal and Growth. Trail users spend money on products and services related to recreational activities. Bicycle and inline skate shops, food stores, hotels and tourist locations report an increase in business as a result of trails. Trail-related businesses spring up in communities with trail, spurring economic growth in the area.

Increased Property Values. Studies have shown that properties on land adjacent to trails and greenways often increase in value. People are willing to pay more money to have a multi-use trail in their

neighborhood. Trails have become an important amenity that homebuyers seek when choosing where to live.

Healthy Living. The U.S. Surgeon General estimates that 60 percent of American adults are not regularly active and 25 percent are not active at all. In communities across the country, people do not have access to trails, parks or other recreation areas close to their homes. Trails and greenways provide safe, inexpensive avenues for regular exercise.

Environmental Protection. Trails and greenways help improve air and water quality. Communities with trails provide enjoyable and safe options for clean transportation, which reduces air pollution. By protecting land along rivers and streams, greenways prevent soil erosion and filter pollution caused by agricultural and road runoff.

Connecting People and Communities. Trails serve as utilitarian transportation corridors between neighborhoods and workplaces. They connect congested urban areas with open space. By bringing people to greenways for their daily commutes, trails unite people and their natural surroundings.

Regional Systems. Bringing trails together to form networks dramatically increases the positive impact trails can have on their communities by creating threads of green linkages within and between communities. Regional trail systems increase the value of the whole by connecting the parts, forming a more cohesive transportation system allowing people to travel to other communities or to work and combine trail use with other forms of transit.

NATIONAL PERSPECTIVE: RAIL-TRAIL CONVERSIONS AND ENVIRONMENTAL CONTAMINATION

LEGACY OF THE RAILROADS

By the beginning of the 20th century railroad transportation was synonymous with industry and success. Having a railroad in town was considered a great status symbol and communities often bid against one another to entice the railroad to come to town. In the United States, railroads reached a peak in total mileage around World War I with approximately 270,000 miles of track. The system has since shrunk to the current total of about 105,000 miles. The collapse of the railroad industry can be generally attributed to the loss of cargo traffic to trucks in the 1950s and loss of passenger traffic to increased automobile travel.

In the early 1980s the rapid abandonment of corridors by railroads and the dismantling of this valuable network set off alarms, and Congress passed an amendment to the National Trails System Act in 1983. This law allowed unneeded rail lines to be "railbanked," or set aside for use in the future as a transportation corridor, while being used as a trail in the interim.

The collapse of the railroad industry has left a network of linear transportation corridors, which if lost today would be difficult, if not impossible, to recreate. While no longer needed for rail use, these important corridors are being recycled and offer communities the opportunity to create multi-use trails. Today, in 2004, we are nearing 13,000 miles of open rail-trails that are used for a variety of purposes including physical activity, recreation and transportation.

RECYCLING RAILROAD CORRIDORS — CONTEXT AND ISSUES

In addition to leaving an intricate network of linear corridors, the railroad industry left contamination associated with its other activities. Discarded materials used by adjacent industries, contamination associated with regular railroad management and repair such as weed control, leaks from material transfers or accidents, loading practices and other instances of contamination may be found in varying degrees along rail corridors, depending on the railroad's management practices and type of industry along the corridor. The type and extent of contamination falls into two general categories, residual contamination that may be found along any stretch of corridor — urban, suburban or rural — and contamination associated with industrial uses along the corridor.

The most common contamination found along rail corridors is residual contamination from railroad operations. The most commonly reported contaminants along rail corridors include arsenic, which was used as an herbicide to control weeds, metals and constituents of oil or fuel (petroleum products), which likely dripped from the rail cars as they passed over the corridor. Other possible

THE GREENBUSH LINE CORRIDOR in Hingham, Mass., was tested for contamination in 2003 as part of a project to reconstruct and re-open this line for commuter rail use, which had previously operated for about 100 years, but was shut-down in 1959. The Massachusetts Bay Transportation Authority collected 622 soil samples along the corridor. A review of that data shows that 11 percent of the samples exceed the Massachusetts Department of Environmental Protection's standards that indicate the presence of an imminent hazard and that more than 20 percent exceed contaminant reporting levels for arsenic.

SOURCE: Massachusetts Department of Environmental Protection, "Best Management Practices for Controlling Exposure to Soil during the Development of Rail Trails."

contaminants include creosote used to preserve wood ties, coal ash from engines, and polynuclear aromatic hydrocarbons (PAHs) from diesel exhaust. Data collected in Massachusetts during the development of a commuter rail serves as one example of the results of extensive testing for residual contamination. Trail development can often serve as the most practical method to deal with risks posed by residual contamination.

Industrial activities either in railyards or adjoining the rail also contribute contaminants. These areas are often associated with switching and rail yards, where higher levels of petroleum, metals, pesticides and other substances associated with repairs and general maintenance can be found. In addition, higher contamination levels have been found on sidings or in areas adjacent to industries where contaminants have spread onto the rail bed. These areas may warrant targeted investigations to identify if elevated or more hazardous levels of contamination require specific clean-ups are present. (See Case Study 1: Manhan Rail Trail.)

NATIONAL SURVEYS

In order to assess the degree to which the issue of contamination impacted rail-to-trail conversions, Rails-to-Trails Conservancy (RTC) conducted a national review of what was done on current rail-trails as well as a survey of coverage of this issue in the media.

SUMMARY OF RAIL-TRAIL MANAGER SURVEY RESULTS

In an effort to assess the actual efforts of rail-trail developers around the country to uncover traces of contaminated residue from past railroad operations, and any subsequent effort to mitigate any such substances found in the corridor being developed for trail use, RTC developed a questionnaire designed to elicit any actions or discoveries of consequence (See appendix A for questionnaire.)

This survey was e-mailed to 715 trail contacts. Of these, 112 returned the survey filled out either in whole or in part and 81 were discovered to be defunct e-mail addresses. Of the active e-mails, the survey received an 18 percent response rate. A summary of the responses is below and an itemization of responses to key questions is reproduced in Appendix B.

As shown below in the Summary of Responses, the survey shows that most rail-trail developers and managers followed due diligence procedures (including Phase I assessment and visual inspection), surveying the corridor, to one degree or another, and finding nothing, continued with development plans.

SUMMARY OF RESPONSES	
Trails indicating Phase I Assessment	20
Trails indicating Phase II Assessment	3
Trails indicating visual inspection	16
Trails indicating soil samples	10
Trails finding toxic residue	10
Trails finding "no evidence" of contamination	15

In addition to surveying trail managers on the trail corridor, they were asked about railroad sidings and operations years. RTC was curious as to whether these parcels of land were more likely to be contaminated. Only two respondents remarked on this situation and concluded that they tested and found no contamination of concern.

SUMMARY OF LEXIS SEARCH — MEDIA

Project managers may be concerned that public attention could unduly focus on the contamination and detract from efforts to promote trail development. One way to gauge potential public concern about contamination on rail corridors is to look at the news articles reported in the media. Rails-to-Trails Conservancy conducted a search of newspaper articles on Lexis. Search criteria included major newspapers and were subject to Lexis search exclusions and rules. The search revealed that while there were more than 3,000 articles that mentioned rail-trails, few mentioned the most common residual contaminants; arsenic and creosote. Criteria for the search and exclusions can be found in Appendix D. The table below summarizes the number of articles found with each set of search criteria.

RESULTS OF LEXIS RESEARCH ON “RAIL TRAILS” AND “TOXINS”		
Terms	Hits	
	All News (English)	Major Newspapers
Rail trails	more than 3000	more than 3000
Rail trails, toxins	22	8
Rail trails, toxins, arsenic	4	0
Rail trails, toxins, arsenic, creosote	0	0
Rail trails, toxins, creosote	1	1
Rail trails, creosote	13	6
Rail trails, arsenic	19	3
Rail trails, arsenic, creosote	0	0

RISK MANAGEMENT STRATEGIES

When dealing with a corridor that may be contaminated, it is important that the trail developer employ a risk management strategy that includes planning, designing, constructing and maintaining the trail to reduce risks to construction workers, maintenance crews and trail users. This is also the best defense against liability. This section provides some steps that trail developers should take when building and managing a trail.

Why should a Trail Manager be concerned about hazardous materials in a rail corridor?

- ◆ Protect human health and the environment;
- ◆ Liability which may result in litigation;
- ◆ Funding sources or lending institutions may require investigation (due diligence);
- ◆ Regulatory requirements, and;
- ◆ Construction and maintenance considerations.

When should you be concerned about potential contamination?

PRE-PURCHASE

Prior to purchasing the corridor and after finalizing a preliminary agreement with the railroad representatives, the buyer should complete due diligence procedures and become familiar with federal and state regulations concerning liability. This process entails examining the state of the title, surveying the property, appraising the corridor's value, assessing the integrity of structures within the corridor and conducting an environmental assessment of the corridor. After these steps are complete, if the due diligence raises new issues or reveals contamination problems, the buyer should meet with the railroad representatives or landowner to renegotiate the terms of the agreement. Following this meeting, if the buyer is content with the new terms of the agreement then the acquisition of the corridor should be finalized.

POST-PURCHASE

For the following reasons, you will still want to be concerned about contamination even if you have acquired the property without following the ASTM requirements:

- ◆ People using the right-of-way prior to construction may be exposed to contaminants at unsafe levels;
- ◆ Construction contractors may need to test soil that looks contaminated in order to comply with Occupational Safety and Health Administration requirements for their workers;
- ◆ Any soil removed during construction may be subject to either federal and state hazardous waste disposal requirements;
- ◆ Identifying contaminated soil prior to construction allows you to properly manage and budget for handling of contaminants. You may even be able to relocate soils to other parts of your project area to avoid off-site disposal costs.

TYPICAL CONTAMINANTS — WHAT YOU MIGHT FIND

What constitutes a contaminant?

In general a contaminant is any physical, chemical, biological or radiological substance such as an element, compound, mixture, solution, etc. that can be found in any media (air, surface water, ground-water or soil) that may be harmful to human health or have adverse effects on the environment. In terms of federal regulations and statutes, a contaminant has been defined as a hazardous substance, hazardous waste or pollutant by various policies including the Comprehensive Environmental Response Compensation Liability Act (CERCLA), the Solid Waster Disposal Act, Clean Water Act and the Clean Air Act. In Section 40 CFR302 of the CERCLA, there are 717 substances listed as hazardous materials. CERCLA and state laws that were surveyed appear to exempt the normal applications of pesticide from clean-up laws. In some states this exemption also applies to herbicides and fertilizers.

What are the contaminants I should be aware of when acquiring a rail corridor?

- ◆ Railroad ties (wood-treating chemicals including creosote)
- ◆ Spilled or leaked liquids (oil, gasoline, diesel fuel, cleaning solvents and detergents)
- ◆ Herbicides
- ◆ Fossil fuel combustion products (PAHs)
- ◆ Roofing shingles (asbestos)
- ◆ Air Compressors (used in braking and for starting engines)
- ◆ Transformers and Capacitors (used in train controls and electric generation)
- ◆ Metals (arsenic — pesticides, wood preservatives, fossil fuel combustion; mercury — combustion products, leaking gauges)

DUE DILIGENCE

The term “due diligence” represents the process of evaluating the risks and value of a corridor that is to be purchased. To exercise due diligence a corridor buyer must implement a plan to identify possible hazards and carry out the appropriate corrective action to prevent acquisition of an environmentally contaminated area. Due diligence is important in legal matters as a buyer could face potential lawsuits pertaining to the health and safety of the corridor’s patrons.

The level of due diligence warranted will depend on the

BASIC PROCESS STEPS

- ◆ *Conduct due diligence, inventory potential hazards along the corridor;*
- ◆ *Analyze potential adverse health effects caused by hazardous substances released to human and ecological receptors;*
- ◆ *Determine what, if any, additional mitigation steps need to be taken;*
- ◆ *Examine both risks and benefits associated with various remedial alternatives;*
- ◆ *Provide information needed by regulators and the public;*
- ◆ *Design and locate the trail to avoid dangers. Warnings of potential hazards should be provided and hazards should be mitigated to the extent possible;*
- ◆ *Follow state and federal laws regarding construction in a contaminated area and removal of contaminated soils and other materials;*
- ◆ *Once the trail is open for use, a comprehensive management plan that includes risk management should be in place;*
- ◆ *A qualified person should regularly inspect the trail to identify potential hazards and maintenance problems, and;*
- ◆ *Signage and fencing should be posted to protect trail users when needed.*

situation and the state's regulations. As can be seen by the survey responses and the Lexis search, contamination has not been a hinderance to trail development. However starting with some basic due diligence will help the trail developer decide what levels of assessment are needed.

STATE REGULATIONS

Unless a rail-trail happens to run through a Federal National Priority List or "Superfund" site, the EPA will probably not have direct regulatory involvement in any clean-up actions. EPA policies and federal brownfield legislation often limit EPA regulatory involvement when a clean-up follows state requirements. Each state has different requirements. The American Society for Testing and Materials (ASTM) has developed inquiry standards that EPA has adopted, which may also be adopted by the state. The state's lead environmental agency will be the best place to find state contamination clean-up requirements. Most states now have a division that works on clean-up or remediation that is often found in the state environmental protection agency. A trail developer could also consult an environmental professional about what the state requires for levels of investigation.

Many state programs have similar steps but differ in how involved state officials will be in each step. Generally the steps in the clean-up process are as follows:

EVOLUTION OF CLEAN-UP LAWS

IN 1970 THE CLEAN AIR AND CLEAN WATER ACTS banned many pollution discharges into air and water. Companies initially complied by capturing pollutants and storing them in drums, lagoons or dumping them in landfills. By the late 1970s those wastes had seeped into soil and groundwater, and harmed or threatened to harm people, plants and wildlife. In reaction to major waste sites such as Love Canal in Upstate New York, in 1980 Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. CERCLA authorized the EPA to undertake clean-ups and then sue polluters and property owners for those costs.

CERCLA had an important prospective impact—polluters became much more aware of where any hazardous wastes were going and began to seek facilities to destroy the wastes rather than dump them. Many industrial and commercial property purchasers began inspecting and testing properties for the presence of contamination to protect themselves from legal liability and clean-up costs.

In the early 1980s, many states enacted laws similar to

CERCLA to spur waste site clean-up. Agencies hired staff to oversee each step of work. Although enacted in reaction to "Love Canal," EPA and state agencies began to find everyday practices of common businesses such as gas stations, repair shops, dry cleaners and manufacturers also resulted in releases of contamination. The list of locations that may have posed a risk to health and the environment grew at a rapid rate and quickly outstripped the federal and state government resources available to undertake clean-up or force polluters to do so.

New testing technologies allowed soil and water testing with accuracies in the parts per billion range. The accuracy of these tests stood in contrast to the knowledge of whether such levels of contamination posed a risk to either people's health or the environment. Faced with this uncertainty agencies took the position that contaminants must be reduced to nondetectable limits, or to limits that would protect any foreseeable use. Many less contaminated properties began to linger on the federal and state lists. Prospective buyers started to avoid acquiring these properties do avoid regulatory delays and clean-up costs that were often uncertain.

- ◆ An initial assessment (the due diligence report should suffice for this step);
- ◆ A follow-up assessment that includes sampling areas of concern identified in the Initial Assessment;
- ◆ Determination of existing risks and target clean-up levels;
- ◆ Development of a remedial plan to cost-effectively achieve the clean-up levels;
- ◆ Implementation of the remedial plan, and;
- ◆ Post clean-up close-out.

The level of a state's involvement determines the pace of clean-up and can also affect overall costs. Some states will review and approve each assessment report and clean-up plan before a developer can proceed to the next step. A clean-up agreement with the state may need to be signed requiring the trail developer to pay the costs of state review. More and more states have developed programs that allow private parties to proceed with assessments and clean-ups supervised by licensed environmental professionals. In Massachusetts, for instance, most clean-ups proceed entirely under the direction of private clean-up professionals and do not require any approval by the state.

Determining the level of clean-up for a corridor fundamentally determines how much mitigation is necessary. Several approaches have been developed on determining how much clean-up is necessary. Initially most states developed site-specific standards based on a methodology of extrapolating health risks from contaminant levels known as "risk assessment." Risk assessment methods contain many variables and assumptions. As a result the development of site-specific standards can be time-consuming. Some states have developed generic clean-up levels based on the current and expected use of the site. These generic levels greatly simplify the clean-up decision-making process and create a "bright finish line."

States using generic clean-up standards require developers to file deed notices if contaminant levels remaining on-site will not protect people in all situations. The deed notice may include the following information: (1) a plan indicating the location covered by the notice, (2) a description of the contaminants of concern, (3) a list of allowable and restricted uses, (4) a plan to maintain any cap or barrier and 5) steps that must be taken when contaminated soils need to be excavated.

Once clean-up levels have been established, clean-up alternatives are reviewed, costs and a clean-up plan are developed. Many states now allow asphalt and landscaping to serve as protective barriers for contaminated soils. An environmental consultant or state environmental agency should be able to recommend the thickness of asphalt and ground cover that has been found acceptable in other locations in the state. In some instances, half-a-foot to two feet of contaminated soil may need to be removed or treated. Any soil removed off-site must be transported to an appropriate location. For instance, Massachusetts prohibits contaminated soils from being transported to any location significantly less contaminated than the soil. This helps prevent circumstances where slightly contaminated soil ends up in the backyards of new residential developments.

The clean-up plan must be developed into a detailed scope of work to be included in the construction contract. The scope should be as detailed as possible and discuss how contamination will be addressed, including test protocols, quantities and types of contaminants to be cleaned-up.

Often the contractor that constructs the trail will also be responsible for removing railroad ties and contaminated soil. A contractor can make more money removing contaminated soil than clean soil.

HIRING AN ENVIRONMENTAL PROFESSIONAL

AN ENVIRONMENTAL PROFESSIONAL can quickly gather information from national and state databases and records sources, such as Sanborn Maps, speeding the understanding of what areas along the rail-trail are of most concern. Trail advocacy groups can assist with this effort by gathering historical information about industries along the line and property ownership.

Many states keep lists of environmental consultants, however, these lists will not provide much guidance on the right consultant for the project. Consult with staff within the trail organization or other government agencies that deal regularly with buying and redeveloping property, and who have hired environmental consultants in the past. Government agencies may also have to follow procurement requirements for hiring service professionals.

Here's a brief list of questions to ask any environmental professional:

- ◆ *Does the professional have licenses for and experience performing due diligence investigations for real estate transactions in the local area? Do they have experience with the American Society for Testing and Materials standards?*
- ◆ *Have they directed soil removal and other remedial actions, and understand the proper regulatory steps and costs for those actions?*
- ◆ *Is the firm familiar with sample collection of soil, ground water and surface water?*
- ◆ *Has the firm performed on-site testing of soil for pesticides and herbicides typically found on rail lines? Are they familiar with analytical requirements? What laboratory do they use for testing?*
- ◆ *Does the firm comply with Occupational Safety and Health Administration's Hazardous Waste Operations and Emergency Response Standard certification and safety training requirements?*

Depending on the procurement requirements discuss general needs and obtain fixed price quotes from several firms on the due diligence investigation.

An engineer or consultant independent of the construction contractor can confirm the quantities of material the construction contractor removes and that the correct testing procedures have been followed. The construction contract should require the construction company to make reasonable efforts to minimize unwanted off-site disposal of contaminated soil.

LEVELS OF INVESTIGATION

Is the corridor a brownfield?

According to the U.S. Environmental Protection Agency (EPA), the word "brownfield" is used to describe areas of abandoned or underused land that is perceived to be, or in fact is, environmentally contaminated due to past industrial or commercial use. Railroad corridors, or sections of corridors, can be considered brownfields. If a corridor or an adjacent property is suspected to be a brownfield, the state natural resources or environmental protection agency should be contacted to determine if the property has been identified as a brownfield. If this is not the case, a Phase I, and possibly a Phase II environmental site assessment may be necessary.

ENVIRONMENTAL ASSESSMENT

If there is a possibility that a trail corridor may be contaminated, an environmental expert should be enlisted to conduct an environmental assessment, especially before negotiations for or a purchase of the property. The nature of the assessment will depend on the property and the potential for contamination, but should include, at a minimum, the equivalent of a Phase I assessment.

A Phase I assessment combines research into the property's history with a visual inspection. Courthouse records, title abstracts, historic aerial photographs and newspaper accounts offering background on the past uses of the site might provide some insight into the

property's history. Interviews with local government representatives, adjacent landowners, and state and federal officials may also uncover historical events about which the current railroad knows nothing. Phase I assessments are not regulated by the federal government, but may be by the state. The scope of work for the Phase I may include:

- ◆ Investigate the rail line history and locate old stations, crossings, spurs and rail yards. The Valuation Plans and historical aerial photographs for the properties abutting the rail line can provide much of this information;
- ◆ Investigate site use, identify commercial and industrial stretches and conduct historical research of adjacent properties. The Valuation Plans and Sanborn Insurance maps can provide much of the information for the snapshot in time when they were developed. Local historical societies may have information on leading local industrialists and their businesses;
- ◆ Review the existing federal and state lists of known or suspected disposal sites to see if any are located along the right-of-way;
- ◆ Inquire with neighbors, fire department personnel or the local historical society for further information on train crashes, accidents and other incidents that may have released chemicals;
- ◆ Conduct a thorough, visual inspection of the right-of-way, looking for:
 - ❖ Contaminated soil as evidenced by discoloration, odors, differences in soil properties, pipes, or buried debris;
 - ❖ Signs of illegal dumping of waste from businesses or industry (not simply household trash);
 - ❖ Stressed vegetation or "dead zones";
 - ❖ Areas of soil run-off, both away from the right-of-way and toward the right-of-way;
 - ❖ Signs of wind erosion sufficient to create a dust inhalation exposure, and;
 - ❖ Signs of public use of the existing right-of-way (condoned or trespassing), such as dirt-bike trails, play forts, beverage cans and fire pits.
- ◆ Prepare a list of locations that warrant further investigation including sampling techniques, assessment costs and if possible at this stage an estimate of potential clean-up costs.

If the Phase I study identifies problem areas, a Phase II assessment may be required. The Phase II assessment can be avoided if the Phase I does not find an area of significant contamination and the corridor owner assumes responsibility for clean-up costs should problem areas need attention. A Phase II assessment involves more thorough testing of water, air and soil samples, as well as a more thorough investigation of the site. If contamination is found, a Phase III assessment will review clean-up alternatives, clean-up costs and recommend a remediation plan for clean-up.

While the techniques for identifying environmental contamination have become increasingly sophisticated, the cost and responsibility for cleanup and restoration are less clear. Federal law targets past and present owners, operators, transporters and generators of hazardous substances. Assigning responsibility and collecting money for clean-up is complicated by the history of contamination and the likelihood that the original contaminators may no longer be traceable, or if they still exist, do not have the finan-

cial capacity to pay for clean-up. Although the railroad has certain responsibilities as the property owner, do not be surprised if the railroad's representative wants to include cleanup costs as a negotiating point.

Overall, an environmental assessment can cost anywhere from a few thousand dollars to more than \$20,000 if extensive soil and water samples are taken over a broad area. The assessment and its results can quickly become a critical issue in negotiations to acquire the property. Before taking title to the property, make sure the purchase contract clearly states who will pay for any environmental problems that have been discovered. Seek warranties and representations from the railroad indicating there is no known contamination, or if that is not the case, disclosing the actual situation and plans for remediation.

REMEDICATION ALTERNATIVES

Once it is determined that remediation is needed, the environmental consultant should prepare an estimate of the approximate costs of alternatives to address the identified contaminants. This cost estimate may be used in negotiations to reduce acquisition costs. If the trail developer owns the land or will be accepting it for a nominal charge, they will want to include the clean-up plan in any construction contract for the project.

Railroad Ties

Generally, salvaging of track and ties prior to construction can be profitable, depending on the market. However, if high levels of contamination are found, this may not be the case. An environmental consultant can help identify licensed facilities that will accept old railroad ties for disposal. In order to avoid liability for illegal disposal, do not reuse the ties on existing properties or allow the public to take them away. On-site burial may be possible if your project includes a large area such as a parking lot. The Massachusetts Department of Conservation and Recreation disposed of ties and contaminated soil under a parking lot built while creating a park on a former municipal dump along the Neponset River near Boston. Ballast can be used to serve as a sub-base for the new trail.

Trail Construction

Communities can take several actions to address residual and industrial contamination on rail corridors. Taking care of remediation during trail construction can be the most effective means to address contamination. The following is a list of the most common methods for addressing residual contamination on a rail corridor. Combining these methods can be an effective way to address residual contamination and site-specific contamination associated with industry. The Massachusetts Department of Environmental Protection has developed Best Management Practices that promote capping in areas with residual contamination.

The most common methods for addressing residual contamination on a rail corridor include:

- ◆ **Cut and Fill** — Soil containing high contamination is removed, replaced by clean soil to fill the corridor. Regrading of the site may require fill to be placed in certain areas. See if the design engineer and construction company can use contaminated soil where fill is needed, or for another use such as roadway subgrade, or disposed of in an appropriate manner as outlined by the state's environmental laws. If your corridor is wide enough, you may be able to create vegetated berms on the edges of the trail to contain the contaminated soil. Contaminated soils should never be relocated to areas with high human contact, such as playgrounds, schools or residential yards. (See Case Study 3: Doyle Street Greenway.)

- ◆ Capping the Surface – Hard surfaces, such as asphalt and cement, may be used to “cap” or cover and isolate contaminated soil along the corridor. Likewise the use of crushed stone with appropriate depth may also be used. Your consultant or state agency should be able to provide you with guidance on these issues. (See Case Study 2: Betsie Valley Trail.)
- ◆ Exclusions – In cases where contamination is, or is perceived to be, higher due to due diligence research, a trail developer may choose to exclude a portion of the corridor from purchase and use a separate route alternative to avoid human contact with the contaminated site. This may also be employed as a temporary alternative until a contaminated site may be remediated. (See Case Study 1: Manhan Rail Trail.)
- ◆ Signage and Fencing – Signage and fencing are used to keep trail users on the trail and protect them from specific contaminated sites. (See Case Study 4: Trail of the Coeur d’Alenes.)
- ◆ Phytoremediation – The process of cleaning contaminated soil and water with plants. Phytoremediation is best used for contamination in the top layers of soil, where the roots of the plants reach. It may be employed in combination with other techniques.

RECOVERING CLEAN-UP COSTS FROM THE POLLUTER

If the organization involved in trail development and remediation did not cause the pollution, recovering the costs to clean-up the contamination may be an option if the polluter can be identified. Involve polluters as soon as possible so they can be involved and possibly fund investigations and clean-up planning. Document that the plan follows clean-up laws to ensure your organization can seek cost recovery. In order to do so any soil samples collected and tested must have a documented “chain-of-custody” and records must have been adequately kept on how samples were collected and handled.

Pursuing polluters can be cost prohibitive and time consuming. If the railroad is the major polluter the best way to handle these costs is during the negotiations of the land transfer. An agency or local environmental attorney can help negotiate conditions regarding environmental clean-up as part of the land transfer.

MANAGEMENT AND MAINTENANCE

Managing risks associated with a contaminated corridor does not stop after construction ends. If contaminated soil is removed, then the problem is eliminated. However if the area with elevated contamination was simply capped with a hard surface it will be important for the trail manager to stay on top of maintenance to ensure the trail user is sufficiently protected. Regular maintenance, as well as reconstruction of a trail surface at the end of its life – 15 years for asphalt and 10 years for crushed stone) will be important. In addition, if needed, trail signage and fencing should be maintained. (See Case Study 4: Trail of the Coeur d’Alenes.) More information about trail maintenance can be found in Rails-to-Trails Conservancy’s “Trails for the Twenty-First Century, Planning, Design, and Management Manual for Multi-Use Trails,” by Charles Flink, Kristina Olka and Robert Searns.

CASE STUDIES

SUMMARY

The case studies serve as examples of ways communities have addressed contamination. An environmental professional and agency contacts can help you evaluate the best approach to your situation. In an effort to gain a more thorough understanding of the impact of discovering contaminants on a corridor, we have selected four rail-trail projects which did encounter some level of contamination and developed in-depth case studies exploring the mitigation measures taken.

CASE STUDY I: MANHAN RAIL TRAIL, EASTHAMPTON, MASSACHUSETTS

BACKGROUND

The Manhan Rail Trail provides a good example of the barriers that communities must surmount in order to convert an old rail corridor into a multi-use community trail. When complete, this eight-mile trail will run from Easthampton to Northampton, Mass. Four of the five miles of the trail in Easthampton opened in June 2004. The remaining one-mile contaminated section of corridor in Easthampton is currently not open to the public.

Typical of many New England communities, Easthampton, Mass., was a manufacturing city serving the textile, chemical household cleaner and insulation industries. It was also served by a railroad that thrived until the mid-1970s when much of the industrial activity ceased. The Manhan Rail Trail follows the former New Haven Railroad's Canal Division corridor, which paralleled the Farmington canal running from New Haven, Conn. to Northampton, Mass.

By the late 1970s changes in the environmental laws and relocation of businesses to places like North and South Carolina, brought about a shift that made the mill buildings largely dormant. By 1991 the Pioneer Valley Railroad (PVRR) – which had taken over all the trackage in the city – instituted a freight surcharge because of poor track conditions. The surcharge drove the last customer using the railroad, the W.R. Grace & Co.'s Zonolite plant, to close. The railroad filed for abandonment of the approximately five miles of corridor in Easthampton in 1992.

The Friends of the Manhan Rail Trail formed in 1996 to advocate for the trail. The city of Easthampton approved the purchase of the corridor, and by 1999 the PVRR removed the track and the city acquired the corridor.

CONTAMINANTS AND REMEDIATION

The primary concern over contamination along the Manhan Rail Trail was at the site of the former W.R. Grace & Co plant, where raw materials (semi-processed vermiculite ore containing tremolite asbestos, a suspected carcinogen) were converted to insulation. The Massachusetts Department of Environmental Protection (MDEP) and the U.S. Environmental Protection Agency

(EPA) began testing the soil along the corridor in 2000. W.R. Grace & Co., agreed to conduct further testing, which showed asbestos contamination extending about 700 feet north and 200 feet south of Wemelco Way along the abandoned rail bed. At around this time, W.R. Grace & Co. entered into Chapter 11 bankruptcy because of the number of asbestos-related lawsuits filed against it.



The city of Easthampton hired Tighe & Bond, an environmental engineering company, to assess the degree of contamination and recommend a remediation treatment. Tighe & Bond estimated it would cost approximately \$260,000 primarily in disposal costs to clean up the contamination along nearly 1,000 feet (40 feet wide) of the planned bike path route.

The city of Easthampton is still waiting for funding to clean up the site. The proposed method of remediation is to replace one foot (deep) of contaminated material with clean soil and pave the trail. Simply paving the trail was discounted because the railroad ties are still in place and the city is interested in installing a parallel sewer line. The trail will be fenced and signed in order to keep the users on the trail.

FUNDING

Initial testing of the corridor was conducted as part of a larger project to test W.R. Grace sites by the MDEP and the EPA. Tighe & Bond, the environmental engineering company that assessed the degree of contamination and recommended clean-up, donated their time to the project, thus reducing costs to the city.

Identifying funding sources for remediation of the corridor was difficult. In 2003 and 2004 the City of Easthampton submitted grant applications to the EPA's Brownfields Clean Up program but did not receive funding. However, U.S. Representative John Olver (D-Mass.) announced the inclusion of \$750,000 in the new transportation bill to remediate the asbestos and construct the rail-trail, which is still pending.

Additionally, in early 2003, the city of Easthampton filed a claim against W.R. Grace & Co. for its failure to clean up asbestos-contaminated soils at the site of its former manufacturing plant on Wemelco Way. The case is still pending.

LESSONS LEARNED

The first hurdle was convincing the responsible parties that the asbestos should be cleaned up, rather than the alternative of not building a trail and thus not needing to clean the contaminated land.

The second major challenge with this project was finding a funding source for the cleanup. Project planners found that the EPA Brownfields Assessment and Cleanup program was a good potential source of funding. Instead, the project is being funded through the next transportation legislation before Congress at the time of this report.

The final lesson learned in this project was that better communication between the state agencies would have been beneficial, especially between the state highway and environmental protection departments.

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CASE STUDY 2: BETSIE VALLEY TRAIL, BENZIE, MICHIGAN

BACKGROUND

The 22-mile Betsie Valley Trail is located in Benzie County, Mich., along the shores of Lake Michigan between the communities of Thomasville and Frankfort. Rail use began on this line in the 1880's, first to bring wood to Elberta, Mich., to fire metal refining ovens and later to carry passengers between the Thompsonville depot and Frankfort. In the 1930's rail car ferry service began from Elberta, allowing rail cars to be shipped across Lake Michigan. In 1980 the Michigan Department of Transportation (MDOT) purchased the bankrupt Ann Arbor Railroad company. In 1982 the last rail car was transported by ferry and in 1985 the train made its last trip through Benzie County.

Twenty-two miles of the Betsie Valley Trail are open for use and another mile is still under development and slated to be complete by the end of 2004. The Michigan Department of Natural Resources (MDNR) owns the majority of the line and the last two half-mile sections are owned by the Village Alberta and the City of Frankfort. However, the trail is maintained and operated by Benzie County. Seven miles of the Betsie Valley Trail are surfaced with asphalt, three with crushed limestone (in the Crystal Lake Area), and an additional 12 miles are currently unimproved and are open to snowmobiles.

Concerns over arsenic contamination in the soils of the rail corridor were raised by adjacent property owners opposed to trail development. Beginning in 1988 and ending with a settlement in 1996, adjacent property owners sued MDOT for ownership of the rail corridor along a three-mile stretch of beach front on Crystal Lake. The settlement allowed for adjacent owners to purchase the beach/rail property adjacent to their homes provided they agreed to a lifetime rail, utility and trail easement. The trail location could be relocated provided that 1) it was at the property owner's expense; 2) it would be continuous; 3) have safe curve radius; and 4) have sight distances and meet general safe trail design standards. Once the relocation was approved by the MDNR, a land survey was taken to create the easement language for each property deed. This is being completed now.

CONTAMINANTS AND REMEDIATION

In May 1999 six soil samples were collected from the middle of the railroad corridor, approximately four to six inches below grade. Analysis of the samples showed levels of arsenic ranging from 8.4 parts per million (ppm) to 72 ppm. This is elevated above Michigan Department of Environmental Quality's (MDEQ) standards for residential direct contact. In June 1999 additional samples were taken from the shallow ground water beneath the





railroad bed. Results showed that contaminants were not leaching into the groundwater. Soil sample results showed contaminants decreased rapidly as you moved out from the center of the tracks.

Additional testing was performed in July 2001 and May 2002. This testing revealed arsenic (8.4–72 ppm) and benzopyrene (0–9ppm) (a Poly Aromatic Hydrocarbon or PAH). The conclusion from these tests was that the three miles along Crystal Lake were

contaminated, though there is reason to believe that the entire 22-mile corridor in Benzie County is contaminated at a similar level.

Seven miles of the corridor is capped by the trail surface. In the Crystal Lake area, the contaminants were removed and a crushed limestone surface laid. This eliminated direct contact and was cost effective. These sections of trail did not require additional time to complete construction. The contractor was required to follow guidelines on working with contaminated soil, such as ensuring soils did not become airborne during construction.

Along the Crystal Lake segment of the trail, contaminated soil was removed in varying amounts. This was done because of the proximity of the contaminants to homes in this section. Homeowners in this section were insistent that the state clean the contaminants out. Excavation of the contaminated soil began in October 2002 and was completed in June 2003 by MacKenzie Environmental. Construction of the corridor has not been completed.

For removal of contaminated soils in the Crystal Lake segment, the involved agencies were MDEQ, MDNR, Michigan Department of Community Health, MDOT, Crystal Lake Property Rights Association and MacKenzie Environmental.

The surface work in other sections of the trail to cap the contaminants involved MDNR, MDEQ, Betsie Valley Trail Management Council (Benzie County), Johnson Hill Land Ethics (landscape architect), Gourdie Fraser and Assoc., (engineering firm), Elmer's Crane and Dozer, and Kramer Contracting.



FUNDING

The total cost for clean up, engineering and trail surface (crushed stone) for the 3.3-mile section along Crystal Lake was \$750,000. MDEQ, MDNR, and MDOT contributed funding to the project.

Construction cost for the capped section of trail did not involve additional expenses because of the contaminants. The cost and process to surface the trail is essentially the same with or without contaminants. Funding consisted of state and federal grants and foundation and local funds were used to match the grants.

LESSONS LEARNED

Due to the court settlement for the Crystal Lake segment, adjacent property owners were allowed to relocate the trail. Many property owners did this by moving the railroad ballast stones off the corridor and onto a new location. This spread the contaminants over a much greater area. This required more testing, additional on-site monitoring of the soil removal process, and more costs. The other sections of the trail created no major challenges.

Because of the potential health impacts adjacent landowners can be particularly concerned about contamination near their homes. Efforts to educate people in the communities with the facts will be time well spent. Most people will read the information and realize the best course of action is to cap the contaminated earth. The public agency is then responsible for developing and presenting a plan to cap the contaminated soil.

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A CASE STUDY 3: DOYLE STREET GREENWAY, ALAMEDA, CALIFORNIA

BACKGROUND

The Doyle Street Greenway is located in Emeryville, Calif., a small community of less than 10,000 people across the bay from the San Francisco. The trail project is part of a larger city-wide renaissance to transform itself from an old industrial landscape with many brownfield projects to a livable community with vibrant high tech and commercial industries. The 0.4-mile rail-trail follows a Santa Fe Railroad spur line that once serviced Emeryville, Calif., and Berkeley, Calif. It will be extended by an additional 0.4 miles in order to connect it to other trails.



CONTAMINANTS AND REMEDIATION

Testing of the corridor began before the city of Emeryville purchased the rail corridor from Union Pacific. Both soil and groundwater testing were undertaken to determine the nature and extent of contamination. The soil sample tests showed higher levels of arsenic (up to 689 mg/kg), lead (up to 3,227 mg/kg), and petroleum hydrocarbons (TPH as diesel at concentrations up to 11,300 mg/kg). It was determined that the entire 2,200-foot rail-trail was contaminated.

To clean up the site, approximately 2.5 feet across the entire site of contaminated soil was excavated and disposed of, off-site. It was replaced by a layer of clean fill and a combination of hard-surface and greenscape was chosen as the surface material. This method was chosen because it offered the most thorough level of protection of the public's health and minimized long-term maintenance and liability issues.

The remediation process involved the cooperation of the city of Emeryville, the U.S. Environmental Protection Agency's (EPA) Department of Toxic Substances Control, the California Environmental Protection Agency's Regional Water Quality Control Board and Union Pacific Railroad.

FUNDING

The project cost approximately \$1 million and was funded in part by EPA's Brownfields Assessment Demonstration Pilot Program as well as by the city of Emeryville, California State Park and Bicycle Bond Funds, Union Pacific Railroad and Pulte Homes, which paid for improvements adjacent to their developments.



LESSONS LEARNED

A major challenge to this project was developing accurate cost estimates for use in negotiations with the railroad. Estimates are difficult to nail down because there are so many different components to such a project that impact the costs, such as acquisition and sampling schedule, and shifting costs of improvements to the private sector through development and design negotiations.



In putting the project together, staff from the city of Emeryville found it useful to engage the various regulatory agencies early in the process in order to avoid surprises during negotiations or after property had been purchased. Much to their advantage, the city of Emeryville can serve as a regulatory agency for less complicated projects, such as this one. The city is very familiar with the redevelopment of railroad spurs because of the large number of them within the city, and therefore is familiar with the special issues surrounding these projects.

Project staff also found it useful to have sufficient funding for the project, allowing them to work through various problems that developed during the course of the project. For example, it is difficult to completely characterize the contaminants in the soil and so having flexibility as the project progressed permitting project managers to react to new information as it became available.

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U.S. EPA Region 9 Brownfields Team
Telephone: 415-744-2237
www.epa.gov/region09/waste/brown/index.html
www.epa.gov/brownfields/

CASE STUDY 4: TRAIL OF THE COEUR D'ALENES, KOOTENAI, SHOSHONE, AND BENEWAYCOUNTIES, IDAHO

BACKGROUND

The Trail of the Coeur d'Alenes is a 10-foot-wide, 73-mile-long asphalt trail. It stretches west from the mountain mining town of Mullen, Idaho on the Montana border, along the Coeur d'Alene River in Idaho's Silver Valley to Plummer, Idaho in the prairie lands near the Washington border. As a former Superfund site, this rail-trail presents an extreme case of contamination.

Construction for the rail corridor began in 1886 when silver was discovered and the railroad was used to transport ore and other concentrates. Mine waste was used as fill material in constructing the corridor and further contamination occurred when flooding carried mine waste from non-railroad source points to other parts of the railroad corridor. Union Pacific (UP) proposed abandoning the corridor in the 1990s and the State of Idaho and the Coeur d'Alenes tribe jointly filed for railbanking. In 1996, the Justice Department filed a lawsuit against UP, in which the railroad agreed to pay \$30 million to clean up the contaminated corridor. Construction took place between 2001 and 2004.

CONTAMINANTS AND REMEDIATION

A level 1, complete human health risk assessment, was conducted to determine if trail contamination would cause health risks. Hundreds of sample cores at various depths along the entire length of the right-of-way were taken. Contaminants such as lead, arsenic and other heavy metals were found all along the corridor. Contamination levels varied but tests indicated contamination greater than 30,000 part per million in some places.

According to the Environmental Protection Agency (EPA), an engineering evaluation/cost analysis determined that the best option for remediation of the heavy metal contamination was to remove and dispose of some contaminated material, lay vegetative barriers and cap the corridor with asphalt. Contaminated soil was removed and replaced by noncontaminated materials on the section of the corridor near Chatcolet Lake on the Coeur d'Alene Tribe Reservation. A total of 175,000 cubic yards of contaminated materials were removed and remediated, approximately 200,000 cubic yards of barrier material were utilized, and 65 miles of 10-foot-wide asphalt capped the surface.

Ties were removed, decontaminated and salvaged, and tie dump areas from the railroad operations were cleaned up. Lastly, vegetative, asphalt and gravel barriers were used to control trail user exposure to lead.

Trail signage and outreach materials are in use to educate and protect the trail user. A brochure can be found at each trail head recommending removing dirt from clothes, toys, pets, shoes and equipment before leaving the area.



The brochure also warns not to let children play near shore lines or off the trail, and for trail users to carry water for drinking and washing.

The agencies involved in the mitigation process included: Idaho Department of Parks and Recreation, Coeur d' Alenes Tribe, Department of Justice, EPA, Idaho Department of Environmental Quality, U.S. Fish and Wildlife Service, Panhandle Health, Army Corp of Engineers, Union Pacific Railroad, counties and cities, Idaho Attorney General's Office and the Idaho Dept of Transportation.

FUNDING

The entire trail, except for one short section of trail between Mullan and Kellogg which was paved with a \$1 million Transportation Enhancements grant, was funded and built by UP under a consent decree that UP entered into with the federal government, the State of Idaho and the Coeur d'Alene Tribe. UP's estimated costs are \$30 to \$40 million dollars.



UP is still responsible for long-term flood damage to the trail, soil and asphalt barriers and bridges. They keep track of these costs so in the future the government and UP can negotiate a trust fund to cover these long-term costs.

LESSONS LEARNED

Trail advocates, including government agencies, faced a long process with many barriers to build a multi-use trail through a superfund site. At the time there were no similar examples to refer to, which would have made the process easier. There were many opponents to the project and it was difficult to coordinate the many agencies and entities involved in negotiating the deal with Union Pacific.

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www.idahoparks.org/pdf/TrailCDAweb.pdf

FUNDING AND OTHER RESOURCES

This section provides additional resources for federal and state assistance and funding sources.

FEDERAL AND STATE RESOURCES

ENVIRONMENTAL PROTECTION AGENCY (EPA)

The EPA maintains an extensive Web site on Superfund information. Pertinent information includes the section on "Laws, Policies & Guidelines" and the section on "Human Health & Ecological Risk." The "Exposure to contaminants" heading under "Human Health & Ecological Risk" is extremely useful.

www.epa.gov/superfund/index.htm

The EPA also maintains information on brownfields. www.epa.gov/brownfields/ and www.epa.gov/brownfields/liab.htm

SAMPLE STATE PROGRAMS:

COMMONWEALTH OF MASSACHUSETTS, DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF WASTE SITE CLEANUP

The bureau has developed detailed "Best Management Practices for Rail Trail Conversion." www.mass.gov/dep/bwsc/files/railtrail.doc

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION: BROWNFIELD INFORMATION

The Web site offers information about brownfields in New York with links to the Brownfield Cleanup Program, the Environmental Restoration Program and State Superfund Program.

www.dec.state.ny.us/website/der/bfield/

TEXAS BROWNFIELDS REDEVELOPMENT INITIATIVE

In close partnership with EPA and other federal, state and local redevelopment agencies, and stakeholders, Texas is facilitating clean-up, transferability, and revitalization of brownfields. The Web site provides in-depth information about federal tax incentives and property tax incentives.

www.tnrcc.state.tx.us/permitting/remed/vcp/brownfields.html

WISCONSIN DEPARTMENT OF NATURAL RESOURCES (DNR): BROWNFIELD INFORMATION

The DNR's Web site provides a wide range of information on financial and liability tools in order to assist local governments, businesses, lenders and others to clean up and redevelop brownfields in Wisconsin.

dnr.wi.gov/org/aw/rr/rbrownfields/

WASHINGTON STATE DEPARTMENT OF ECOLOGY: TOXICS CLEANUP PROGRAM

This is a good example of what states are doing to promote environmental remedial actions.

The Web site provides specific information regarding statewide policies on toxic substances.

www.ecy.wa.gov/programs/tcp/cleanup.html

FUNDING SOURCES

ENVIRONMENTAL PROTECTION AGENCY (EPA)

BROWNFIELDS ASSESSMENT GRANTS

These grants fund activities to inventory, characterize, assess and conduct planning and community involvement related to brownfield sites. The performance period is two years. Different levels of funding are available for assessment related to various contaminants, with a total application cap of \$700,000. For more information see www.epa.gov/brownfields/pilot.htm.

REVOLVING LOAN FUND GRANTS (RLF)

These grants provide funding for grant recipients to capitalize a revolving loan fund and provide subgrants to carry out cleanup activities at brownfield sites. Revolving loan funds generally are used to provide no- or low-interest loans for brownfields cleanup. Grants are available up to \$1 million and require a 20 percent match by the applicant. Performance period for these grants is five years. For more information see www.epa.gov/brownfields/pilot.htm.

CLEAN-UP GRANTS

These grants fund actual clean-up activities at brownfields sites. Funds are available up to \$200,000 per site, with a limit of five sites per applicant. It requires a 20 percent match by applicant, and the applicant must own property that will be cleaned. A minimum of a Phase I site assessment must be completed prior to a proposal submission. The performance period for these grants is two years. For more information see www.epa.gov/brownfields/pilot.htm.

HEALTHY URBAN COMMUNITIES GRANT PROGRAM (NEW ENGLAND ONLY)

The 2003 grants program integrated nine New England programs dealing with toxics, schools, urban environment and more. Projects funded targeted communities at risk, sensitive populations (i.e. elderly and children), assessed and understood environmental and human health risks, increased collaboration through community-based projects, built institutional and community capacity to understand and solve environmental and health problems, and achieved measurable benefits. Green and open space projects have been funded, but no grants were awarded in 2003 for testing or remediation along rail corridors being converted to rail-trails. The grants program may change for 2004.

Check the Web site for details at www.epa.gov/region01/eco/uep/grants.html.

U.S. DEPARTMENT OF TRANSPORTATION

TRANSPORTATION ENHANCEMENTS (TE)

Environmental testing and remediation along a rail corridor may be eligible for TE funds if the project qualifies under the TE category of "Conversion of Abandoned Railway Corridors to Trails." However not every state utilizes TE money for these purposes and the project sponsor should check with the state TE coordinator first. Visit www.enhancements.org for more information about TE and state contact information.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG)

CDBG grants may be used for a wide variety of projects that improve communities. Assessment and clean up of rail corridors that are being converted into multi-use community trails may qualify under these funds. U.S. Housing and Urban Development administers these grants for designated entitlement communities. Each state administers the funds for nonentitlement communities. For more information about these funds see www.hud.gov/offices/cpd/communitydevelopment/programs/index.cfm.

MASSACHUSETTS STATE AND LOCAL FUNDING SOURCES

COMMUNITY PRESERVATION ACT FUNDS (CPA)

CPA allows towns and cities to approve a referendum allowing them to levy a community-wide property tax surcharge of up to three percent for the purpose of creating a local Community Preservation Fund and qualifying for state matching funds. Funds raised through the CPA may be used for acquisition, creation, preservation, rehabilitation and restoration of open space. Testing and remediation would qualify for funding under this program. For more information, contact the Trust for Public Land at www.tpl.org.

MASSACHUSETTS BROWNFIELDS REDEVELOPMENT FUNDS

These grants fund testing and remediation on brownfield sites, but are currently restricted to redevelopment for economic development (housing, business, etc.). Though cleaning open space does improve communities, thus increasing the property values and inspiring local investment and business, these activities do not currently qualify for this funding. However this funding could potentially be used for testing and remediation of former railroad yards for redevelopment.

APPENDIX A: SURVEY FORM TO TRAIL MANAGERS — ATTEMPT 1 AND ATTEMPT 2

Name of trail:

Open for use or still under development, or both:

If open, surface type:

Miles of open trail:

Miles of trail under development:

County(ies) and state:

Please answer the following questions in as much detail as possible:

- ◆ A brief history of rail use on the corridor and when it stopped.
- ◆ Any other background that may be useful, relevant, or interesting.
- ◆ Type of testing done.
- ◆ Type of toxin(s) found and levels.
- ◆ Length of trail contaminated.
- ◆ Method of mitigation and why that method was chosen.
- ◆ Who was involved in mitigation process (list all government and private entities).
- ◆ Cost of mitigation.
- ◆ How long did the mitigation process take.
- ◆ Funding sources (various local, state, federal assistance programs, and any private monies used).
- ◆ Major challenges to remediation project.
- ◆ Suggestions to others to others in same situation / words of advice.
- ◆ Having gone through this, what would have made this process easier for you, resources that would have made the project easier (more, bigger, easier access to funding sources, clearer regulations, information).
- ◆ Impact of past contamination and remediation on ongoing maintenance (cost and otherwise).
- ◆ Contact information (name, organization, address, phone, e-mail, web site).
- ◆ Please send photos if you have them (before, during clean up, after).

APPENDIX B: TRAIL MANAGER SURVEY RESPONSES

TRAIL MANAGER SURVEY

CHIEF LADIGA TRAIL, AL

Extent of testing: Phase I.

Test results: Found no contaminants.

Comments: Ties taken up by railroad.

OLD RAIL ROAD BED, AL

Extent of testing: Unknown, railroad went into bankruptcy in late 1880s.

Test results: NA

Comments: NA

TBD, AL

Extent of testing: Trail still under development but not concerned as railroad was used to haul lumber. Inspection will probably happen during engineering yet to come.

Test results: NA

Comments: NA

TBD, AR

Extent of testing: Trail still under development and no testing has been done as of yet.

Test results: NA

Comments: NA

MOHAVE AND MILLTOWN RAILROAD TRAIL, AZ

Extent of testing: Did not survey or test because 1) not aware that it could be a problem because 2) the railroad was in service only a short time and the ties were removed 50 years ago.

Test results: NA

Comments: NA

OHLONE GREENWAY BICYCLE TRAIL, CA

Extent of testing: Not aware of any testing, but all city staff who were involved in project are gone.

Test results: NA

Comments: City recently purchased a siding from the railroad for a park next to the trail. The city did soil testing but no contamination was found.

UNION PACIFIC TRAIL, CA

Extent of testing: Phase II test.

Test results: NA

Comments: NA

UPPER TAMPA TRAIL, FL

Extent of testing: No testing done as part of trail project, but land was acquired five years prior and some testing may have been done then.

Test results: NA

Comments: NA

ARABIA MOUNTAIN TRAIL, GA

Extent of testing: Level 1 test.

Test results: NA

Comments: Corridor abandoned in 1936, not concerned.

NW ATLANTA GREENWAY TRAIL, GA

Extent of testing: No testing.

Test results: NA

Comments: Ties removed by salvage company for resale.

SILVER COMET TRAIL, GA

Extent of testing: No testing.

Test results: NA

Comments: Ties removed by salvage company for resale.

TRAIL OF THE COEUR D'ALENES, ID

Extent of testing: Extensive soil testing every few feet and Comprehensive Environmental Response, Compensation and Liability Act. The entire 72-mile trail was built on a contaminated area.

Test results: Heavy metal contamination found along entire corridor. Soil was removed and corridor was capped. Process cost \$20 million to \$30 million. Union Pacific paid all expenses. Took four to six years.

Comments: NA

TUNNEL HILL STATE TRAIL, IL

Extent of testing: One area tested for fuel contamination.

Test results: Contamination found. Earth removed and monitoring well installed using funds from Leaking Underground Storage Tank program. Cost was approximately \$87,000.

Comments: NA

HASKELL RAIL TRAIL, KS

Extent of testing: Visual inspection did not prompt concern.

Test results: NA

Comments: Ties removed by salvage company.

PATUXENT BRANCH TRAIL, MD

Extent of testing: No testing was done. Train ceased operation in 1928 and had served a granite quarry.

Test results: NA

Comments: NA

THREE NOTCH TRAIL, MD

Extent of testing: NA

Test results: NA

Comments: Twenty-eight-mile trail appears to be informally open. Respondent indicated that no contamination issues are expected as they move forward with development but no reason given as to why not except that the railroad took up the ties when they abandoned the line.

FIND NAME, ME

Extent of testing: No testing.

Test results: There was some concern, but no indication of contaminants have been found.

Comments: Railroad stopped operation in 1952. Ties were removed at that time. Sounds as though trail is not open yet (perhaps that is why it has no name).

FRED MEIJER HEARTLAND TRAIL, MI

Extent of testing: Checked county records for corridor use. Visual inspection conducted during acquisition stage.

Test results: NA

Comments: NA

SKEGEMOG SWAMP PATHWAY, MI

Extent of testing: No testing, were not concerned.

Test results: NA

Comments: NA

CENTRAL LAKES TRAIL, MN

Extent of testing: Did not test. Trailside vegetation indicates that contamination is not a problem.

Test results: NA

Comments: NA

LAKE WOBEGONE TRAIL, MN

Extent of testing: Did a field survey and contacted the Minnesota Pollution Control Agency for a listing of any known contamination on the corridor.

Test results: No contamination found.

Comments: NA

FRISCO HIGHLINE TRAIL, MO

Extent of testing: Phase 1, concerned about spills from derailments.

Test results: Investigation found two underground fuel tanks which were removed. Results were reported to board (this trail is under private management). Remediation cost was \$15,000 and was split by Burlington, Northern, Santa Fe and Ozark Greenways. Delayed project 11 months.

Comments: NA

GRANT'S TRAIL, MO

Extent of testing: Phase 1.

Test results: Asbestos tiles from old building or from dumping were found. Results reported to railroad and they had them removed. No delay in trail project, no increase in cost of liability insurance.

Comments: NA

LONGLEAF TRACE TRAIL, MS

Extent of testing: Visual inspection and local knowledge.

Test results: No remediation required.

Comments: Ties removed by railroad prior to transfer of corridor.

SOMERS TRAIL, MT

Extent of testing: Some sort of testing, apparently.

Test results: Mostly creosote. Environmental Protection Agency cleaned up.

Comments: NA

AMERICAN TOBACCO TRAIL, NC

Extent of testing: No testing, not an issue.

Test results: NA

Comments: Ties removed by railroad.

HOMESTEAD, NE

Extent of testing: Phase 1.

Test results: Results: no indication of contamination. No delay of project.

Comments: Ties removed prior to acquisition.

MOPAC EAST, NE

Extent of testing: Visual inspection.

Test results: NA

Comments: Ties salvaged prior to National Resources District taking ownership.

OAK CREEK TRAIL, NE

Extent of testing: Visual inspection and checked spill records.

Test results: NA

Comments: Ties salvaged before National Resources District took ownership. National Resources District feels trail users have little to no exposure to any contaminants that may be there.

PAULINSKILL VALLEY TRAIL, NJ

Extent of testing: New Jersey Green Acres surveys all property before acquisition.

Test results: No contamination was found.

Comments: NA

SUSSEX BRANCH TRAIL, NJ

Extent of testing: New Jersey Green Acres surveys all property for hazardous waste prior to acquisition.

Test results: No contamination was found.

Comments: NA

ASSABET RIVER RAIL TRAIL, NY

Extent of testing: Level 1.

Test results: Old oil drums had been dumped, but not necessarily by railroad.

Comments: Put \$200,000 in development fund to cover cost of any needed remediation. Felt that with asphalt surface, a capping would protect against any potential contamination. Did not do any soil testing.

CAYUGA-SENECA CANALWAY TRAIL, NY

Extent of testing: Not started State Environmental Quality Review Act yet.

Test results: NA

Comments: NA

CLARKE RAIL TRAIL, NY

Extent of testing: Phase 1 at time of acquisition.

Test results: No major problems found.

Comments: Corridor had been abandoned for decades and tracks and ties were removed.

GENESEE VALLEY GREENWAY TRAIL, NY

Extent of testing: Literature search.

Test results: Not concerned because railroad abandoned operations 25 years ago.

Comments: Ties gone when Department of Environmental Conservation bought corridor from a utility.

GROVELAND SECONDARY TRAIL, NY

Extent of testing: Don't know.

Test results: NA

Comments: NA

LAKE PLACID TO SARANAC LAKE RECREATION PATHWAY, NY

Extent of testing: Trail still under development, design stage, no testing as of yet.

Test results: NA

Comments: NA

REMSEN TO LAKE PLACID TRAVEL CORRIDOR, NY

Extent of testing: Soil and water samples. Creosote was considered non-mobile and bound to soil immediately adjacent to ties and therefore not in contact with trail user.

Test results: No herbicide residue found. No delays.

Comments: NA

ADENA RECREATION TRAIL, OH

Extent of testing: No need to investigate; Ohio Environmental Protection Agency tracks toxic spills and none were found in corridor.

Test results: NA

Comments: NA

BLACKHAND TRAIL, OH

Extent of testing: Not known. Trail opened in 1980 and records concerning acquisition and development are no longer available.

Test results: NA

Comments: NA

HUFFMAN PRAIRIE OVERLOOK TRAIL, OH

Extent of testing: Visual examination.

Test results: Little, if any, contamination, remediation not required.

Comments: This is a rail-with-trail and trail is a good distance from active rail line so no contamination was expected.

LOWER SCIOTO TRAIL, OH

Extent of testing: No environmental issues.

Test results: NA

Comments: Rails and ties removed long before they took possession, perhaps 35 years ago.

SPRINGFIELD BRANCH TRAIL, OH

Extent of testing: Trail just getting to planning stage. An environmental assessment will be conducted by the design consultant and will be reviewed by Ohio Department of Transportation.

Test results: NA

Comments: Railroad removed ties before abandoning corridor.

WRIGHT BROTHERS HUFFMAN PRAIRIE BIKEWAY (KAUFFMAN AVENUE BIKEWAY), OH

Extent of testing: Visual inspection and soil samples.

Test results: Finding of no significant impact.

Comments: Investigation took about three months. This is a rail-with-trail and the trail is 20 to 30 yards from active line.

SPRINGWATER ON THE WILLAMETTE, OR

Extent of testing: Phase 1 conducted before purchase.

Test results: Result: No cause for concern, capping would provide any needed protection.

Comments: NA

ALLEGHENY RIVER TRAIL, PA

Extent of testing: Site issued Categorical Exclusion by Pennsylvania Department of Transportation.

Test results: No contamination found.

Comments: Railroad history provided no reason to be concern.

CLARION-LITTLE TOBY RAIL TRAIL, PA

Extent of testing: Not aware of testing, issue not raised.

Test results: NA

Comments: NA

ERNST TRAIL, PA

Extent of testing: Did not test. Issues were discussed but were not a concern. No obvious problems.

Test results: NA

Comments: Railroad abandoned about 30 years ago.

GREATER HAZLETON RAILS TO TRAILS, PA

Extent of testing: Trail not open yet. Phase 1 test. Were concerned because area is a superfund site.

Test results: No major toxics found. Capping, berming, phytoremediation, soil recycling, soil disposal all used on broader site. It cost \$15 million to clean up entire site but trail is only very small portion and not actually in the superfund area.

Comments: NA

MONTOUR TRAIL, PA

Extent of testing: Soil testing.

Test results: No sign of contamination found.

Comments: Most ties were gone when they took possession of corridor. Those that were left were put into landfills, some were recycled, a few were burned until they learned that they should not do that.

SANDY CREEK TRAIL, PA

Extent of testing: Site was issued a categorical exclusion by Pennsylvania Department of Transportation because there was no reason to believe that contaminants were present in any significant amount.

Test results: NA

Comments: Railroad hauled coal from 1906 until 1980's. No evidence of dumping or contamination other than occasional coal car accident.

HISTORIC UNION PACIFIC RAIL TRAIL STATE PARK, UT

Extent of testing: Tested air, soil and water for the first 3.5 miles out of Park City of the 28-mile trail.

Test results: Specific findings considered privileged, but generally found traces of heavy metals from mining and processing of ore.

Comments: Remediation effort was capping of trail. Delayed project 1.5 to two years. Findings did not impact liability insurance.

W&OD TRAIL, VA

Extent of testing: Soil testing for arsenic. Photo shows spraying.

Test results: No trace of arsenic found.

Comments: NA

D&H RAIL TRAIL, VT

Extent of testing: No testing. Plant growth on corridor was robust.

Test results: NA

Comments: Issue was of no concern to developing agency until eight years after trail was built when a citizen asked about the issue of contamination. Vermont Agency of Transportation was no concerned, no investigation.

TBD, WA

Extent of testing: Corridor in city ownership for at least 11 years. Respondent unsure of history, as far as she knows, no testing was conducted.

Test results: NA

Comments: NA

400 STATE TRAIL, WI

Extent of testing: Phase 1.

Test results: NA

Comments: Ties sold for salvage.

BADGER STATE TRAIL, WI

Extent of testing: No testing; no sign of contamination.

Test results: NA

Comments: Ties removed by contractor and resold.

ELROY-SPARTA TRAIL, WI

Extent of testing: Phase 1

Test results: NA

Comments: Ties sold for salvage.

LA CROSSE RIVER STATE TRAIL, WI

Extent of testing: Phase 1.

Test results: NA

Comments: Some ties were sold, some buried, some left on site.

SOUTHWEST BIKE PATH, WI

Extent of testing: Phase 1 and Phase 2.

Test results: Found arsenic and chromium above regulatory limits in all 10 borings, plus lead in one boring. Results reported to Wisconsin Department of Natural Resources and Wisconsin Department of Transportation. No material was removed from site, rather all soil would be covered with either asphalt or topsoil and vegetation. This solution added little, if any, extra cost. Fees were covered by a Transportation Enhancements grant that was awarded to build the trail. This process of testing and remediation did not result in any project delay because these findings were foreseen and thus the time to deal with them were included in the original project schedule.

Comments: Ties were disposed of at licensed landfill.

SUGAR RIVER STATE PARK TRAIL, WI

Extent of testing: No testing, trail developed in 1973.

Test results: NA

Comments: Ties were piled and rotted.

TBD, WI

Extent of testing: No contamination encountered.

Test results: NA

Comments: NA

MEDICINE BOW TRAIL, WY

Extent of testing: Environmental assessment ongoing.

Test results: NA

Comments: NA

APPENDIX C: CASE STUDY SURVEY FORM

Name of trail:

Open for use or still under development, or both:

If open, surface type:

Miles of open trail:

Miles of trail under development:

County(ies) and state:

Please answer the following questions in as much detail as possible:

- ◆ A brief history of rail use on the corridor and when it stopped.
- ◆ Any other background that may be useful, relevant, or interesting.
- ◆ Type of testing done.
- ◆ Type of toxin(s) found and levels.
- ◆ Length of trail contaminated.
- ◆ Method of mitigation and why that method was chosen.
- ◆ Who was involved in mitigation process (list all government and private entities).
- ◆ Cost of mitigation.
- ◆ How long did the mitigation process take.
- ◆ Funding sources (various local, state, federal assistance programs, and any private monies used).
- ◆ Major challenges to remediation project.
- ◆ Suggestions to others to others in same situation/words of advice.
- ◆ Having gone through this, what would have made this process easier for you, resources that would have made the project easier (more, bigger, easier access to funding sources, clearer regulations, information).
- ◆ Impact of past contamination and remediation on ongoing maintenance (cost and otherwise).
- ◆ Contact information (name, organization, address, phone, e-mail, web site).
- ◆ Please send photos if you have them (before, during clean up, after).

APPENDIX D

LEXIS SEARCH CRITERIA AND EXCLUSIONS

Access to certain freelance articles and other features within this publication (i.e. photographs, classifieds, etc...) may not be available. U.S. newspapers must be listed in the top 50 circulation in Editor & Publisher Year Book. Newspapers published outside the United States must be in English language and listed as a national newspaper in Benn's World Media Directory or one of the top 5 percent in circulation for the country.

EXCLUSIONS

EIU publications are excluded from all subscriptions.

DPA (English language file) (file: DPA)

The Straits Times (file: STRAIT)

Business Times Singapore (file: BUSTMS)

Business Monitor News (file: BMINWS)

Due to vendor restrictions the following sources have been excluded from group files in web products.

Aerometric Information Reporting System; AIRS

Annals of Neurology; ANN

Annals of Plastic Surgery; ANPS

Comprehensive Env. Response Compensation & Liability Info. System; CERCLS

Dimensions in Health Care; DHC

DM News; DMNEWS

Emergency Response Notification System; ERNS

EPA Civil Enforcement Docket; EPADKT

Facility Index System; FINDS

FIFRA & TSCA Tracking System; FTTS

Hospitals and Health Networks; HOSP

IDD Merger and Acquisition Reports – Archival;

IDDMA

IDD Mergers and Acquisition Database –

Canada – Archival; IDDCAN

IDD Mergers and Acquisition Database – Euro-

pean Reports – Archival; IDDEUR

IDD Mergers and Acquisition Database – US

Reports – Archival; IDUS

IDD Mergers and Acquisitions Database – UK

Reports – Archival; IDDUK

Institutional Investor Publications; IIALL

Leaking Underground Storage Tanks (LUST) Site Records; LUST

National Pollutant Discharge Elimination System Facility Information; NPDESF

National Priority List Descriptions of Hazardous Waste Sites; NPLIST

National Priority List of Hazardous Waste Sites; NPLDSC

No Further Remedial Action Planned; NFRAP

Potentially Responsible Parties (PRP) Superfund Enforcement Tracking System; PRP

RCRA Corrective Action Record; CORACT

Resource Conservation & Recovery Information System; RCRIS

Solid Waste Site Records; SWS

State Priority Lists; SPL

Surgery, Gynecology and Obstetrics; SGO

Toxic Chemical Release Inventory; TRIS

Underground/Aboveground Storage Tank Site

Records; USTAST

World Financial Markets; WLDFIN

TRAILDART

TRAIL DEVELOPMENT ASSISTANCE RESPONSE TEAM

A Service of Rails-to-Trails Conservancy



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Tel: 202-331-9696 • Fax: 202-331-9680 • www.railtrails.org

LICENSE

KNOW ALL PERSONS BY THESE PRESENTS, that THE CONNECTICUT LIGHT AND POWER COMPANY d/b/a Eversource Energy, a specially-chartered Connecticut corporation having a principal place of business in the Town of Berlin, County of Hartford, and State of Connecticut (hereinafter "Licensor"), for a valuable consideration, receipt of which is hereby acknowledged, does hereby grant to the TOWN OF RIDGEFIELD, CONNECTICUT, a municipal corporation located in the Town of Ridgefield, County of Fairfield and State of Connecticut (hereinafter "Licensee"), without representation or warranty of any kind and until the occurrence of a termination hereunder (including, without limitation, those certain Terminating Events (as hereinafter defined)), the following non-exclusive and non-perpetual license and right to use the LICENSED AREA only for the listed purposes, as such licenses, rights and purposes are more particularly described below (collectively, "License"), subject to and/or granted in accordance with all of the following additional terms and conditions:

1. Licensor grants the right to develop, construct, locate, maintain, inspect, manage, improve, repair, replace and remove a certain unpaved walking and biking trail primarily ten feet (10') wide (except for a certain few locations therein in which railings will be designed and installed by the Licensee to provide added safety to bicyclists (the "Bicycle Path Accommodations"); – in those few locations which are subject to the Licensor's prior approval, the width of the trail may not exceed eighteen feet (18')) (the "LICENSED AREA"). The LICENSED AREA is located within that certain tract of land owned by the Licensor located in Ridgefield, Connecticut (the "PROPERTY") as such PROPERTY and the LICENSED AREA are more particularly identified on Exhibit A which is attached hereto, incorporated herein by reference, and made part hereof. Licensor further grants to the Licensee, pursuant to the other terms of this License Agreement, the right to use the LICENSED AREA with such use limited solely for the purposes of recreational walking and bicycling and for no other use or purpose. If the Licensor so determines that any particular use does not conform to the purposes delineated herein then such use shall be immediately discontinued. Notwithstanding the foregoing but subject to the other provisions of this License (including, without limitation, the Licensor's right of prior consent to all improvements made by the Licensee to the LICENSED AREA), Licensor agrees that in making such determination it shall provide reasonable accommodations at Licensee's sole expense in order for Licensee to comply with any applicable provisions of the Americans with Disabilities Act as amended.
2. a. The parties hereto acknowledge and assume that the License granted hereunder does not, under applicable law, require the prior approval of any governmental agency of applicable and competent authority such as, without limitation, the Connecticut Public Utilities Regulatory Authority under Connecticut General Statutes ("CGS") Section 16-43 (CGS § 16-43). In the event that the Licensor later determines, in its reasonable judgment, that such approval and/or permit is so required then each such permit and approval shall constitute a condition to the grant (and/or to the continuation of said grant) of the License contained herein — anything to the contrary contained in this License Agreement notwithstanding. Any such approval and/or permit and any terms and conditions thereunder must be acceptable to the Licensor in its sole and absolute discretion.

b. Licensee further acknowledges and agrees that it has not paid or agreed to pay any "charge", "fee", "rent" or "other commercial service" (as those terms are defined or referenced in CGS Sec. 52-557f et seq, as amended) to Licensor in return for any rights or privileges provided by this License Agreement. Moreover, nothing in this License Agreement including the foregoing sentence, shall abrogate, waive or modify in any way the Licensor's rights under the law including, without limitation, said CGS Sec. 52-557f et seq.

3. The Licensee acknowledges that portions of the PROPERTY (including, without limitation, the LICENSED AREA) may be designated by the Licensor from time to time as being closed to the Licensee and to any person or entity acting thereunder (including the general public), in order to accommodate the needs or requirements of the Licensor.
4. The License shall commence upon the date of execution hereof by both the Licensor and Licensee and shall continue from year to year, unless sooner terminated by either party in accordance with the applicable terms of this License Agreement.
5. The License is subject to the following additional conditions:
 - a. The Bicycle Path Accommodations and all other aspects of the trail shall be constructed by Licensee to conform to all minimum vertical and horizontal clearances required by law and applicable codes and by Northeast Utilities' Design and Application Standards (e.g., its sections covering "Minimum Clearances for Services 0-300 Volts to Ground" and "Minimum Horizontal Pole Clearances"), including the following clearance requirement:

Minimum Clearance for Electric Distribution Lines - Sixteen Feet (16 ft.)

b. Licensor shall have no responsibility whatsoever for maintenance or repair of the LICENSED AREA, including maintenance, repair and/or replacement of any structure or improvement contained therein (including, without limitation, the Bicycle Path Accommodations or any bridge), or for any damage to the surface of the LICENSED AREA which may occur as a result of the Licensor's needs or actions including, but not limited to, the Licensor's need hereby reserved (i) to access the PROPERTY for all reasonable purposes (including, without limitation, flood control relating to adjacent or nearby bodies of water) and (ii) to operate, maintain, inspect, replace, install, reconstruct or otherwise attend to its electric distribution and/or transmission facilities including the system, structures and appurtenances, existing or future, contained on, within or over the PROPERTY, except as otherwise provided in the Fuss and O'Neill Maintenance Plan (the "Maintenance Plan") prepared for Eversource (the Licensee agrees however that the Licensor is not obligated to follow or comply with the Maintenance Plan). Subject however to the foregoing, Licensor shall exercise reasonable care to avoid damaging any improvements made by Licensee in accordance with this License Agreement.

c. Licensee shall have the sole responsibility to construct and maintain (including, without limitation, snow removal) the LICENSED AREA (including the trail therein) in a manner and condition appropriate for the anticipated recreational uses stated above and/or otherwise in accordance with the terms of this License Agreement.

d. Licensee shall have the responsibility to control unauthorized use of the LICENSED

AREA, especially by unauthorized motorized vehicles, including, but not limited to, motorcycles, snowmobiles and all-terrain vehicles.

e. Physical barriers to motorized vehicles shall be designed and installed by the Licensee in designated areas within the LICENSED AREA, approved in advance by the Licensor. Such barriers shall be easily unlocked and opened or removed and replaced by the Licensor or Licensee to allow unimpeded access to the PROPERTY by the Licensor's construction, maintenance, and/or patrol vehicles, which may include all-terrain vehicles. Any expense incurred to maintain and/or allow such unimpeded access shall be borne entirely by the Licensee. The Licensor's personnel shall be supplied by Licensee with keys to all gates, barriers, and barricades installed by or on behalf of the Licensee. In designing and installing all such barriers, the Licensee shall comply with all applicable laws including the Americans with Disabilities Act and, as a result, any such design or installation shall not interfere with any applicable rights of a disabled person to access and use the LICENSED AREA.

f. The Licensee agrees to comply with all of the additional conditions and requirements found in Exhibit B which is attached hereto and is incorporated herein by reference. In the event of any conflict between the provisions of the main body of this License Agreement and its Exhibit B, the provisions of the main body of this License Agreement shall prevail.

g. All work by the Licensee hereunder and/or within the LICENSED AREA must conform to the guidelines entitled: "Northeast Utilities Overhead Transmission Standards - Operation of Equipment Under and Adjacent to NU Rights-of-Way OTRM 222 (Rev. 3 01/24/2012)" which is included and made part of the License Agreement as Exhibit C.

h. At no time shall any part of the LICENSED AREA (including, without limitation, the Bicycle Path Accommodations) contact the Licensor's existing or replacement poles or other electric facilities.

i. Licensee shall present a specific detailed plan for any contemplated parking area within the LICENSED AREA, subject to the review and approval of the Licensor, in its sole and absolute discretion, prior to construction of said parking area. This License Agreement does not confer any permission to the Licensee to construct parking on the property of the Licensor (including the PROPERTY), unless and until a detailed drawing showing the parking plans is approved, in writing, by the Licensor in advance and thereby made a part of this License Agreement.

j. Subject to the other provisions contained in this License Agreement, including, without limitation, those found in subsection 5.k. below and Paragraph 7 of Exhibit B, the Licensee may install kiosks, benches and other amenities and also plantings and other types of low-growth decorative landscaping within the LICENSED AREA.

k. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED IN THIS LICENSE AGREEMENT, ALL DESIGNS, PLANS AND SPECIFICATIONS (IN ADDITION TO THOSE ALREADY LISTED IN THIS LICENSE AGREEMENT) RELATING TO THE LICENSEE'S PLANNED CONSTRUCTION OF THE BICYCLE PATH ACCOMODATIONS WITHIN AND USE OF THE LICENSED AREA AND ALL ASPECTS OF SUCH PLANNED CONSTRUCTION AND USE MUST FIRST BE APPROVED BY THE LICENSOR BEFORE ANY WORK IMPLEMENTING SAME

AND/OR BEFORE ANY SUCH USE BY THE LICENSEE ON, OR AT, THE LICENSED AREA MAY COMMENCE OR CONTINUE. ANY SUCH APPROVAL BY THE LICENSOR SHALL NOT BE UNREASONABLY WITHHELD, DELAYED OR DENIED.

6. This License Agreement and the License granted to the Licensee herein shall terminate:
 - a. Upon an election by the Licensor under Section 19 hereof;
 - b. As of the date of a taking or exercise of eminent domain by any governmental authority of competent jurisdiction, to the extent any portion of the PROPERTY is condemned or taken in any manner for any public or quasi-public use;
 - c. Upon any termination under Section 12 of Exhibit B;
 - d. Upon the date this License Agreement or any notice hereof is recorded by or on behalf of the Licensee on the Ridgefield Land Records or any similar registry without the prior written consent of the Licensor (which may be withheld in Licensor's sole and absolute discretion);
 - e. upon ten (10) days prior written notice by either party hereto;
 - f. if the Licensee breaches any material condition or term of this License Agreement.

Unless otherwise provided for in this License Agreement, any such termination under the provisions of this Section 6 shall be effective upon notice and shall not affect the Licensee's obligations under or in connection with this License Agreement or under the License including any obligations or liabilities resulting from a breach of this License Agreement and any obligation arising on or before the effective date of termination, including, but not limited to, obligations of indemnity and reimbursement, and obligations under Section 15 and/or Section 19, respectively.

Notwithstanding anything to the contrary contained in this Section 6 above, the Licensor and Licensee acknowledge and agree that during the first three (3) years of this License Agreement, the Licensor's right to terminate under subsection 6.a or 6.e shall be limited to the following: (i) in the event the Connecticut Public Utilities Regulatory Authority (successor to the Connecticut Department of Public Utility Control) or some other governmental agency of applicable and competent jurisdiction orders or directs (or takes some other action or makes some other ruling that, in the Licensor's reasonable judgment, would require) that the Licensor terminate this License Agreement and the License granted hereunder; and/or (ii) in the event that such termination is reasonably necessary in order for the Licensor to fulfill its public service obligation or obligations. It is acknowledged and agreed by the parties hereto that nothing in this paragraph shall prevent the Licensor from terminating this License Agreement under subsections 6.b, 6.c, 6.d, or 6.f even during the first three (3) years of the term of this License Agreement.

7. The Licensee acknowledges that it has inspected the PROPERTY, and unconditionally accepts the LICENSED AREA (including any and all structures and improvements contained therein or thereon) "AS-IS"/"WHERE-IS" and has determined the LICENSED AREA to be suitable for Licensee's use. IN ADDITION AND AS REFERENCED ABOVE, THE LICENSEE HEREBY ACKNOWLEDGES AND AGREES THAT THE LICENSOR GRANTS THE LICENSE HEREBY WITHOUT REPRESENTATION (EXCEPT AS SPECIFICALLY PROVIDED FOR

BELOW IN THIS SECTION 7) OR WARRANTY OF ANY KIND INCLUDING ANY WARRANTY OF TITLE OR FITNESS FOR A PARTICULAR PURPOSE. The Licensee agrees that it is not relying on any oral or written representations of the Licensor concerning the PROPERTY and/or the LICENSED AREA (including, but not limited to, representations relating to dimensions, soil conditions, environmental conditions, municipal restrictions, ownership or authority, or uses by adjoining or third parties).

The Licensee does however hereby acknowledge that the Licensor has disclosed to it the following: (i) that portions of the PROPERTY (including the LICENSED AREA) have been the subject of environmental remediation by the Licensor wherein Licensor, among other things, had removed, transported away, remediated, disposed of and/or encapsulated certain soils containing, among other things, arsenic pursuant to a remediation plan approved by and/or filed with the Connecticut Department of Energy and Environmental; as part of that plan, the Licensor installed a certain impervious geotechnical membrane designed to serve as a cap over a certain area of environmentally-sensitive soils that remain within the LICENSED AREA (the "Cap"); and (ii) that, in general, portions of the PROPERTY (including the LICENSED AREA) were used for railroad purposes by Licensor's predecessors in title; the Licensee therefore acknowledges the fact that historically some "rail beds" and other railroad uses have been associated with the potential for the presence of certain toxic or hazardous chemicals, materials, pollutants and/or substances; if such chemicals, materials, pollutants and/or substances do exist and/or remain within or at the PROPERTY, the Licensor hereby represents that it would not have been the cause thereof; and accordingly and notwithstanding anything to the contrary contained in this License Agreement, the Licensee, at its sole expense, agrees as follows:

(a) that in its uses and planned uses of the LICENSED AREA (including, without limitation, the Bicycle Path Accommodations) the Licensee shall develop and implement a Soil Management Plan (e.g., plans to adequately protect workers from any potential exposure and plans for soil management, storage, transportation, reuse, treatment and/or disposal) using an environmental professional licensed in Connecticut (i.e., an LEP) before engaging in any such soil disturbance or related work and that such Soil Management Plan, soil disturbance, and related work shall comply with all applicable law; (b) that, without limiting any of Licensor's rights including those under the law, the Licensee hereby releases the Licensor, its parent and affiliates and its and their respective trustees, directors, officers, employees, contractors and agents from any liability and/or claim whatsoever by or on behalf of Licensee relating to the presence of any hazardous or toxic chemical, substance, material and/or pollutant (including arsenic) (collectively, "Hazardous Materials") on, at, within and/or under the Affected Areas (as defined below) and/or any release therefrom — in each instance to the extent any such Hazardous Materials are not brought onto the Affected Areas by Licensor or by any of its employees, officials, contractors, agents and/or invitees on or after the effective date of this License; and (c) that the Licensee shall be fully liable for (i) any release of any Hazardous Materials located on, at, within and/or under the Affected Areas (the term "Affected Areas" comprises the LICENSED AREA and any other part of the PROPERTY that is or was subjected to, disturbed by and/or otherwise directly affected by the actions (including, without limitation, Licensee's design and installation of the Bicycle Path Accommodations) of the Licensee or by any of its employees, officials, contractors, subcontractors, agents and/or invitees) caused by or otherwise relating to or arising from the activities (including, without limitation, Licensee's design and installation of the Bicycle Path Accommodations) of the Licensee or its officers, officials, employees, contractors, subcontractors, agents and/or invitees — those releases referenced in (b) and (c) hereinabove may include, without limitation, those

that occur or originate within the Affected Areas and then migrate therefrom; and/or (ii) any exacerbation of conditions with respect to Hazardous Materials located on, at, within and/or under the Affected Areas caused by or otherwise relating to or arising from the activities (including, without limitation, Licensee's design and installation of the Bicycle Path Accommodations) of the Licensee or its officers, officials, employees, contractors, subcontractors, agents and/or invitees; and/or (iii) any related characterization, treatment, removal, storage, monitoring, disposal and/or remediation of Hazardous Materials within the Affected Areas and within any other areas affected by any of the aforesaid releases of Hazardous Materials; (iv) any damage to the Cap as referenced above caused by or otherwise relating to or arising from the activities (including, without limitation, Licensee's design and installation of the Bicycle Path Accommodations) of the Licensee or its officers, officials, employees, contractors, subcontractors, agents and/or invitees; and (v) all costs relating to items (i), (ii), (iii) and/or (iv) together with all costs (including but not limited to attorneys', consultants' engineers' and expert fees and costs, remediation costs, damages, fines and/or awards) arising from or incurred in connection with any judicial, regulatory, administrative or other governmental action relating to the presence (see (d) herein below) and/or the aforesaid release, exacerbation of conditions and/or related characterization, treatment, removal, storage, monitoring, disposal and/or remediation; and (d) that the Licensee shall be fully liable for all costs relating to the presence of any Hazardous Materials on, at, within and/or under any or all of the PROPERTY (including the Affected Area) brought onto the PROPERTY by the Licensee or by its officers, officials, employees, contractors, subcontractors, agents and/or invitees.

In addition to the Licensee's indemnification obligations arising under other provisions of this License (including those found in Section 12 below) but subject to the exception found in Section 23 below, the Licensee shall indemnify, defend and hold Licensor, its parent and affiliates and its and their respective trustees, directors, officers, employees and agents (collectively, the "Indemnified Parties") harmless from any and all Losses imposed upon, incurred by and/or asserted against any of the Indemnified Parties directly or indirectly arising out of or in any way relating to (1) (i) any release or exacerbation of conditions described above in the preceding paragraph caused by or otherwise related to or arising from the activities (including, without limitation, Licensee's design and installation of the Bicycle Path Accommodations) of Licensee and/or any of its officers, officials, employees, contractors, subcontractors, agents or invitees (collectively, the "Licensee Parties"); and/or (ii) any related characterization, treatment, removal, storage, monitoring, disposal and/or remediation of Hazardous Materials within the Affected Areas and within any other areas affected by any of the aforesaid releases or exacerbations of Hazardous Materials; and (iii) all costs relating to items 1(i) and 1(ii) together with all costs (including but not limited to attorneys', consultants', engineers' and expert fees remediation costs, damages, fines and/or awards) arising from or incurred in connection with any judicial, regulatory, administrative or other governmental action relating to said items 1(i) and 1(ii) above; and/or (2) (i) the presence; (ii) any release or exacerbation of conditions; and/or (iii) related characterization, treatment, removal, storage, monitoring, disposal and/or remediation, of any Hazardous Materials on, at, within and/or under the PROPERTY brought onto the PROPERTY by or on behalf of the Licensee.

For the purpose of further clarification, the Licensor and Licensee acknowledge and agree that, notwithstanding anything to the contrary contained in this License Agreement (subject to the limited exception found in Section 23), the Licensee shall not be liable under the provisions of this Section 7 for (1) any Hazardous Materials that are brought onto the PROPERTY by

Licensor and/or by any of officers, officials, employees, contractors, agents or invitees (not including Licensee) on or after the effective date of this License; (2) any Hazardous Materials that existed on the PROPERTY prior to said effective date that were not released, exacerbated, disturbed and/or in any other way affected by activities (including, without limitation, Licensee's design and installation of the Bicycle Path Accommodations) of Licensee or by any of the Licensee Parties; or (3) any release or exacerbation of conditions by Licensor or by any of its officers, officials, employees, contractors, agents or invitees (not including Licensee) of any Hazardous Materials on the PROPERTY occurring on or after the effective date of this License.

For the purposes herein, "Losses" shall mean any losses, damages, costs, fees, expenses, claims, suits, judgments, awards, liabilities (including, without limitation, strict liabilities), obligations, debts, diminutions in value, fines, penalties, charges, costs of remediation (whether or not performed voluntarily), settlement amounts, foreseeable and unforeseeable consequential damages, claims of adjoining property owners and other third parties, litigation costs, attorneys' fees and costs, engineers' and expert fees and costs, environmental consultants' fees and costs, and investigation costs (including, without limitation, costs for sampling, testing and analysis of soil, water, air, and other substances whether solid, liquid or gas), of whatever kind or nature, and whether or not incurred in connection with any judicial, regulatory or other administrative proceedings, actions, claims, suits, judgments, fines, penalties, interest or other awards.

8. Until it has received Licensor's prior written approval (including any approvals under Section 5) (which approval shall not be unreasonably withheld, delayed or denied), Licensee shall not undertake or permit (i) any excavation, grading or filling on the PROPERTY, (ii) construction of any structure or improvement on the PROPERTY, (iii) the removal of timber from the PROPERTY, or (iv) parking or storage, even temporarily, of vehicles, materials or equipment on the PROPERTY. The Licensor shall have the right to impose conditions upon any work conducted by the Licensee within the LICENSED AREA necessary to assure the safety of Licensor's facilities which are presently or may in the future be located within or on or in the vicinity of the PROPERTY.
9. Subject to the exception below, the Licensee shall not at any time use, handle, transport, store or dispose of any pollutant or toxic or hazardous material within the PROPERTY, and shall at all times maintain the PROPERTY in a safe and lawful condition. Notwithstanding the foregoing, the Licensor recognizes that some materials necessary for the construction or maintenance of the LICENSED AREA (including, without limitation, the Bicycle Path Accommodations) may be classified as a pollutant or as a toxic or hazardous material. In connection with any such proposed use, handling, transportation, disposal or storage thereof, the Licensee must first receive the Licensor's prior written approval. Each approval is within the Licensor's sole and absolute discretion. Any use, handling, transportation, storage or disposal of any such pollutant or toxic or hazardous material approved by the Licensor in accordance with this paragraph shall be conducted in full compliance with all applicable laws and the policies of the Licensor, including those relating to use, handling, transportation, storage and/or disposal of pollutants and toxic or hazardous materials and waste.
10. Licensee shall, at its sole cost, and in cooperation with the Licensor, obtain any and all required consents or permits for conduct of any and all work associated with execution of the provisions of this License Agreement. Prior to the submission of any and all documents proposed to be submitted in the pursuit of any and all required consents or permits for any and all work associated with execution of the provisions of this License Agreement, Licensee shall submit to

the Licensor, and obtain the Licensor's written approval of the aforementioned documents which approval shall not be unreasonably withheld, delayed or denied. Upon Licensor's request, Licensee shall provide evidence reasonably satisfactory to Licensor that all required consents or permits are in force and effect for Licensee's use of the PROPERTY.

11. The Licensor, in its sole discretion, shall have the right, at any time and without liability to itself or compensation to the Licensee, to use the PROPERTY (which includes the LICENSED AREA) to install, use, repair, maintain, replace, upgrade, relocate, or remove any of its facilities, equipment, structures and other PROPERTY that presently exist or may in the future be located within and/or adjacent to the PROPERTY in connection with the conduct of the Licensor's business. However, Licensor and Licensee shall cooperate with each other insofar as is practical to avoid or mitigate against any inconveniences to each other and/or the public who may be making use of the LICENSED AREA. Subject to the other provisions of this License, any upgrade performed by or on behalf of the Licensor under this Section 11 that was not necessitated by an act or omission of the Licensee shall be at the Licensor's sole cost and expense.
12. In addition to the other indemnification obligations of the Licensee under this License Agreement, the Licensee shall indemnify, defend and hold the Indemnified Parties harmless from any cost, liability, damage, loss, claim, action or proceeding whatsoever for injury to persons (including death) or damage to property (including any environmental damage or environmental liability except to the extent covered specifically by the indemnity provisions contained in Section 7) which may arise from or be claimed to have arisen from the exercise by the Licensee or any Licensee Party of the rights and/or permissions granted in or any acts taken in connection with or omission relating to this License Agreement including use of the LICENSED AREA by the general public. The Licensee hereby releases Licensor from any liability whatsoever for Licensor's damage to Licensee's improvements to the LICENSED AREA that result from the Licensor's reasonable requirements to install, construct, repair, maintain, replace and/or remove its facilities, equipment, structures or other property during emergency conditions or any other actions reasonably taken in connection with its rights under this License Agreement or otherwise in connection with its duties or status as a public service company. Moreover, the Licensee hereby releases the Licensor from any liability whatsoever for damage to improvements made by the Licensee pursuant to this License Agreement which may occur due to the existing conditions of the PROPERTY, the Licensor's reasonable exercise of its rights to install, construct, repair, maintain, replace and/or remove its future facilities, equipment, structures or other property or any other actions reasonably taken by the Licensor in connection with its rights under this License Agreement or otherwise as a public service company, the Licensor's work during emergency conditions, or any right of the Licensor hereunder to remove improvements, grading or other work installed within the PROPERTY by or on behalf of the Licensee including those installed without the Licensor's approval.
13. Throughout the term of the License and as a condition to entering the PROPERTY, the Licensee shall provide evidence to the Licensor of the following insurance coverage, or its equivalent:

General (including Public) Liability Insurance with limits of at least \$1,000,000 per occurrence/~~\$5,000,000~~ per aggregate for bodily injury, and \$1,000,000 per occurrence/~~\$5,000,000~~ per aggregate for property damage.

All policies shall be endorsed to (i) name the Licensor, its parent and affiliates and its and their respective trustees, directors, officers, employees and agents as "additional insureds" with respect to liability arising out of the Licensee's operations or use of the LICENSED AREA or any use of same by third parties, and, to the extent practicable, (ii) to require that at least thirty (30) days written notice be given to the Licensor prior to any cancellation or material change in the policy. Certificates of insurance incorporating these requirements shall be provided to the Licensor on or before the execution of this License Agreement and said certificates shall be acceptable to the Licensor in all respects. Failure to maintain said insurance coverages and/or to provide said certificates shall constitute a default by the Licensee under this License Agreement.

The Licensee will provide the Licensor with immediate notice (but in no event later than one business day) of Licensee's receipt of any notification from any of its insurers of (i) said insurer's cancellation or planned cancellation of or (ii) any material change or planned material change in any insurance policy or coverage required under this License Agreement. Any failure by the Licensee to provide such notice to the Licensor within said time period shall constitute a default under this License Agreement.

14. Licensee shall be liable for any additional assessments or taxes imposed upon the PROPERTY by reason of its use or improvement of the LICENSED AREA. If such assessment or tax is paid by the Licensor, Licensee shall fully reimburse the Licensor within thirty (30) days from the submittal of an invoice by the Licensor.
15. On and before the Termination Date (as defined in Section 19) or upon a termination under Section 6, all improvements made by or on behalf of the Licensee to the LICENSED AREA shall be removed at the Licensee's sole cost and risk. Any such improvements remaining on the PROPERTY (including the LICENSED AREA and the Bicycle Path Accommodations) following termination shall, at the sole option of the Licensor either (i) be deemed to be the property of the Licensor, and Licensee shall execute any appropriate documents of transfer (and pay any costs relating to said transfer), or (ii) may be removed by the Licensor and all costs for such removal and related disposal and/or storage costs shall be paid by the Licensee. Licensee shall restore, at its sole expense, the LICENSED AREA to substantially the same condition as existed immediately prior to the effective date of this License Agreement.
16. Notices permitted or required under this License Agreement shall be deemed received upon personal delivery, or three (3) business days following mailing of a notice by certified mail, postage prepaid, return receipt requested to:

Licensor: Eversource Energy Service Company
Real Estate Department
P. O. Box 270
Hartford, Connecticut 06141-0270
Attention: S. Giuliano
Manager, Corporate Property Management

With a copy to: Robert J. Bourne, Esq.
Eversource Energy — Legal Department
107 Selden Street
Berlin, CT 06037

Licensee: Town of Ridgefield, Connecticut
400 Main Street
Ridgefield, CT 06877
Attention: First Selectman

With a copy to: David L. Grogins, Esq. City Attorney
Cohen and Wolf, P.C.
158 Deer Hill Avenue
Danbury, CT 06810

17. This License Agreement, together with Exhibits A, B, C and D, constitutes the entire agreement between the Licensors and the Licensee with respect to the License and the LICENSED AREA and no oral statements, promises, express or implied warranties or other understandings except those expressly set forth in this License Agreement shall be valid unless reduced to writing and signed by both parties on or after the date of this License Agreement.
18. THE LICENSEE HEREBY IRREVOCABLY WAIVES ANY SOVEREIGN IMMUNITY RIGHTS AND/OR PRIVILEGES IT MAY HAVE AND ANY DEFENSE BASED THEREON WITH RESPECT TO THIS LICENSE AGREEMENT OR ANY SUIT, ACTION OR PROCEEDING WHICH MAY BE BROUGHT BY OR ON BEHALF OF THE LICENSOR TO ENFORCE, INTERPRET, OR COLLECT ON THIS LICENSE AGREEMENT, OR ANY AGREEMENTS HEREIN OR ANY AMENDMENTS HERETO, OR ANY OBLIGATION ARISING OUT OF SAID AGREEMENT AND/OR AMENDMENT INCLUDING THOSE RELATING TO ANY OBLIGATION OR AGREEMENT TO INDEMNIFY HEREUNDER.
19. Notwithstanding anything to the contrary contained in this License Agreement other than any applicable provisions found in the last paragraph of Section 6, the Licensee acknowledges and agrees that the Licensor has the right to terminate this License Agreement upon written notice to the Licensee ("Section 19 Notice") if the Licensor, in its sole judgment and discretion, has determined that it will use all or any portion of the LICENSED AREA for, or in connection with, any proposed installation, erection, repair, relocation, modification and/or extension of wires, conduits, cables, poles, towers, cross-arms, guys, foundations, anchors, braces, ducts, transformers, transformer pads, pedestals, meters, facilities, fixtures and/or other appurtenances useful in connection with the transmission and/or distribution of electricity and/or communication signals (a "Terminating Event"). Upon the Licensee's receipt of a Section 19 Notice, (i) all of the rights and licenses granted to the Licensee in this License Agreement shall terminate six (6) months after said receipt (the "Termination Date") and (ii) on or before the Termination Date or the date of termination under Section 6, Licensee shall, in addition to its other obligations under this License Agreement including those found under Section 15 hereof, remove, at Licensee's sole cost and expense and at the election and direction of the Licensor, any and all improvements constructed or installed by Licensee in the LICENSED AREA ("Licensee' Facilities") and restore the LICENSED AREA to substantially the same condition as existed prior to the installation of Licensee's Facilities.
20. No assignment of this License Agreement or of the License, or any other right or obligation hereunder, shall be made by the Licensee without prior written notice to, and the prior written consent of, the Licensor (which shall be within the sole and absolute discretion of the

Licensor). Any assignment or transfer (or attempt thereof) by the Licensee in violation of the terms of this License Agreement, including those contained in the preceding sentence, shall be null and void and shall also constitute a default. Upon the occurrence of such default, the Licensor shall be entitled to all rights and remedies under this License Agreement including, without limitation, termination of this License Agreement.

21. The Licensee shall perform, throughout the term of the License and at its sole expense, all vegetation management within the LICENSED AREA that is reasonably required by the Licensor in connection with the Licensor's electric facilities located on or in the vicinity of the PROPERTY. All plans and methods involved in said management by the Licensee shall be in accordance with the Licensor's vegetation management practices and shall be subject to the Licensor's prior written approval which shall not be unreasonably withheld, delayed or denied.
22. This License Agreement shall not be construed as creating or vesting in the Licensee any estate in the PROPERTY, but only the limited right of use described and granted under this License Agreement.
23. Notwithstanding anything to the contrary contained in this License Agreement including in Sections 7 and/or 12 above, the Licensee shall have no obligation under this License Agreement to indemnify the Licensor or its parent and affiliates or any of its or their respective trustees, directors, officers, employees, contractors and agents for claims of injury to persons (including death) or of damage to property (i) brought solely by non-users of the LICENSED AREA (e.g., an abutter to the LICENSED AREA or the PROPERTY whose claim is limited solely as a result of being an abutter and not as a result of being a user of the LICENSED AREA); and (ii) where any such claim for injury or for damage by any such non-user of the LICENSED AREA is limited to only claims that are solely and directly caused by the presence of any Hazardous Materials existing on the LICENSED AREA prior to the date of this License Agreement or brought onto the LICENSED AREA by Licensor or by any of its employees, officials, contractors, agents and/or invitees after the effective date hereof and where any such Hazardous Materials were not in any way released, disturbed, exacerbated or otherwise affected by the activities (including, without limitation, Licensee's design and installation of Bicycle Path Accommodations) of the Licensee or any of its officers, officials employees, contractors, subcontractors, agents or invitees.
24. Notwithstanding anything to the contrary contained in this License including, without limitation, any references herein to improvements and/or installations by Licensee or others on its behalf, the parties hereto acknowledge and agree that the Licensee shall not make or install any improvement or conduct any construction activity in connection with or relating to this License or the LICENSED AREA other than the Bicycle Path Accommodations.
25. Licensor and Licensee each hereby acknowledges and agrees that it and its legal counsel have been given an equal opportunity to negotiate the terms and conditions of this License Agreement, and that any rule of construction that ambiguities are to be resolved against the drafting party, or any similar rule operating against the drafter, does not apply to the construction of this License Agreement and is therefore hereby waived.

TO HAVE AND TO HOLD, effective as of this ___ day of _____, 201___, the provisions hereof shall be binding upon and inure to the benefit of the parties hereto and their respective successors and permitted assigns according to the terms of said provisions.

Witnessed by:

The Connecticut Light and Power Company
d/b/a Eversource Energy

By

Its
Duly Authorized
Date Signed _____

Witnessed by:

Town of Ridgefield, Connecticut

By

Its
Duly Authorized
Date Signed _____

Exhibit A

Final Plan

That certain map entitled “_____”, which is incorporated herein by reference and made part of this License Agreement. The full text of this exhibit is on file in the respective offices of the Licensor and the Licensee.

Exhibit B

1. When reasonable grounds for insecurity exist or arise in connection with the Licensee's ability or willingness to satisfy or comply with any of its payment or other performance obligations under this License (including those relating to the Licensee's development, installation, maintenance, repair, replacement and eventual removal of the Bicycle Path Accommodations), then the Licensor may demand adequate assurance of payment and performance from the Licensee. Such adequate assurance shall mean sufficient security in a form, amount and term reasonably specified by the Licensor. Accordingly, within five (5) days from such demand by the Licensor, the Licensee shall provide and deliver to the Licensor a performance/completion bond or a letter of credit or establish escrow funds insuring, in the Licensor's reasonable opinion, that adequate and liquid funds will be available to cover the full amount of said performance and payment obligations.
2. At Licensee's sole expense, Licensee shall provide proper and adequate written advance notification to all owners of properties located immediately adjacent to the PROPERTY and the LICENSED AREA of the Licensee's development plans relating to the Bicycle Path Accommodations. Licensee will be responsible for determining who holds title to those properties (collectively, the "Abutters").
3. Licensee must obtain Licensor's prior written consent for all improvements made to the LICENSED AREA which consent shall not be unreasonably withheld, delayed or denied. Additionally, Licensee, at its sole cost and expense, is responsible for obtaining all necessary city, county, state and federal permits necessary for the development, operation and maintenance of the LICENSED AREA.
4. LICENSED AREA and any improvements therein or on including the Bicycle Path Accommodations must be located a suitable distance, as determined solely by the Licensor's engineers on a case by case basis, from any existing or future utility poles, guy wires, towers, other utility structures and/or other facilities of the Licensor.
5. Subject to the provisions of this License Agreement including, without limitation, Section 5.k of the main body of this License Agreement, Licensee shall provide all necessary signage in connection with the LICENSED AREA, at its sole cost and expense. Licensee shall use reasonable efforts to employ the use of signage that is constructed mostly of durable, non-metal material. All of said signage must be reviewed and approved in writing by the Licensor which approval shall not be unreasonably withheld, delayed or denied. Licensee shall be required to post signage indicating rules governing use of the LICENSED AREA, the publicly accessible hours of the LICENSED AREA, and any other information required by the Licensor to be posted. Such signage shall be placed at access points to the LICENSED AREA, and as appropriate along the LICENSED AREA, as required by the Licensor. In addition to the above, the Licensee has offered to construct and install additional signage which would acknowledge this grant by the Licensor, Eversource Energy, of this license to the Town of Ridgefield. Said signage shall be in substantial conformance to the model shown on Exhibit D and shall be placed in a location within the LICENSED AREA agreed to by the parties hereto. The Licensee also agrees that the Licensor may install additional signage within or near the LICENSED AREA to acknowledge said grant. The Licensor shall consult with the Licensee on the form and

substance of said additional signage prior to installation.

6. Licensee must submit for review/approval three (3) sets of site drawings prepared by a licensed engineer or surveyor identifying the proposed location of the LICENSED AREA and the Bicycle Path Accommodations, including the width and length of the LICENSED AREA, changes in grade distances to edges of the LICENSED AREA, property lines, stone walls, and utility infrastructure and any signage, kiosks and the like otherwise permitted hereunder. Once approved, any changes to the LICENSED AREA (including, without limitation, the Bicycle Path Accommodations) and Licensee's design will require the additional review and prior written approval of the Licensor.
7. Except for the landscaping of LICENSED AREA and paths identified on the submitted drawings, no other landscaping will be permitted within the LICENSED AREA. Moreover, no planting of trees will be permitted.
8. The installation of any outdoor lights proposed along the LICENSED AREA must be reviewed and approved in advance in writing by the Licensor with such approval to be within the sole and absolute discretion of the Licensor. The use of lighting must be explained to the Abutters in the notice required under Paragraph 2 above. Licensee shall be responsible for the cost to install and maintain any outdoor lights as well as for the cost of energy usage.
9. Licensee must abide by and fully comply with all applicable local, state and federal laws including those regarding building codes, planning and zoning, wetlands, protected species and stream/waterway buffer protection and the ADA (Americans with Disabilities Act), and any amendments thereto. Licensee is responsible for installation and maintenance of the LICENSED AREA using environmental best management practices to ensure proper erosion control.
10. At no time shall the LICENSED AREA, the Bicycle Path Accommodations or use of the LICENSED AREA inhibit Licensor's access to the PROPERTY, the Licensor's licenses and rights of way or any of its structures or facilities. (This includes, without limitation, the time period during the installation of the Bicycle Path Accommodations and installation of any signs and lighting allowed under this license).
11. Licensee shall be responsible for monitoring of the LICENSED AREA (including police and other public safety patrols) and routine removal of trash and debris, illegally dumped material, and for maintenance of landscaping along the LICENSED AREA.
12. In addition to any other termination rights of the Licensor under the License Agreement, the Licensor shall have the right, upon written notice, to terminate the License and any of the Licensee's rights under the License and/or License Agreement if:
 - a. the Bicycle Path Accommodations are not, as determined by the Licensor in its reasonable judgment, substantially constructed by the Licensee within two (2) years following the execution of the License Agreement and such failure to achieve substantial construction, also as determined by Licensor in its reasonable judgment, was not caused by a force majeure or similar material event beyond the control of (and without fault or negligence by) the Licensee (collectively, "Force Majeure Event");
 - b. the LICENSED AREA is not maintained in a condition reasonably acceptable to the

Licensor;

- c. the LICENSED AREA is utilized by the Licensee, its officials, agents, representatives, employees, contractors and/or invitees, for purposes outside the scope of the License Agreement; or
- d. the Licensee fails or refuses to fully comply with any of the other terms of the License Agreement.

Without diminishing in any way any other rights of the Licensor under this License to terminate this License, the Licensee shall have a reasonable period to cure (not to exceed 30 days from notice) any default under subsection 12.b., 12.c. or 12.d hereinabove. Moreover, as to subsection 12.a, in the event that the Licensor determines thereunder that a Force Majeure Event had occurred which prevented substantial construction of the Bicycle Path Accommodations within the two year deadline, the Licensee will then be granted any necessary extension to said deadline however, in no event shall that extension exceed six (6) months (i.e., maximum substantial construction deadline no greater than thirty (30) months from the execution of this License Agreement).

13. Use of the Licensor's property (including, without limitation, the LICENSED AREA and the PROPERTY) by Licensee, its officials, employees, agents, contractors and invitees (collectively, the "Licensee Representatives") shall be at Licensee's sole risk and expense. Licensor, its parent, subsidiaries and its and their respective affiliates shall be entitled to the fullest extent legally permissible to the liability protections available to it under all laws protecting from liability landowners who or that allow recreational use of their properties (including the PROPERTY and the LICENSED AREA). The Licensee shall use best efforts to preserve for the benefit of the Licensor any such available protections under the law.
14. Notwithstanding the grant of the License, the Licensor hereby retains all of its rights including those granted through existing deeds or licenses or received through operation of law including through prescriptive rights.
15. Licensee and Licensor shall meet on an annual basis (more frequently if deemed necessary by the Licensor) at a mutually-convenient time and place to assess/review the condition of the LICENSED AREA, and evaluate adherence by the Licensee to the terms of this License Agreement.

The above provisions are incorporated into the attached License Agreement and are made a part thereof.

Exhibit C

Northeast Utilities - Overhead Transmission Standards

Exhibit D

Signage

Licensor and Licensee hereby agree that any signage of the Licensee in connection with this License must first be acceptable to both Licensor and Licensee before the Licensee would be permitted to install any such signage within the PROPERTY including the LICENSED AREA.



CONNECTICUT

Subject Property
Town of:

RIDGEFIELD

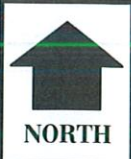
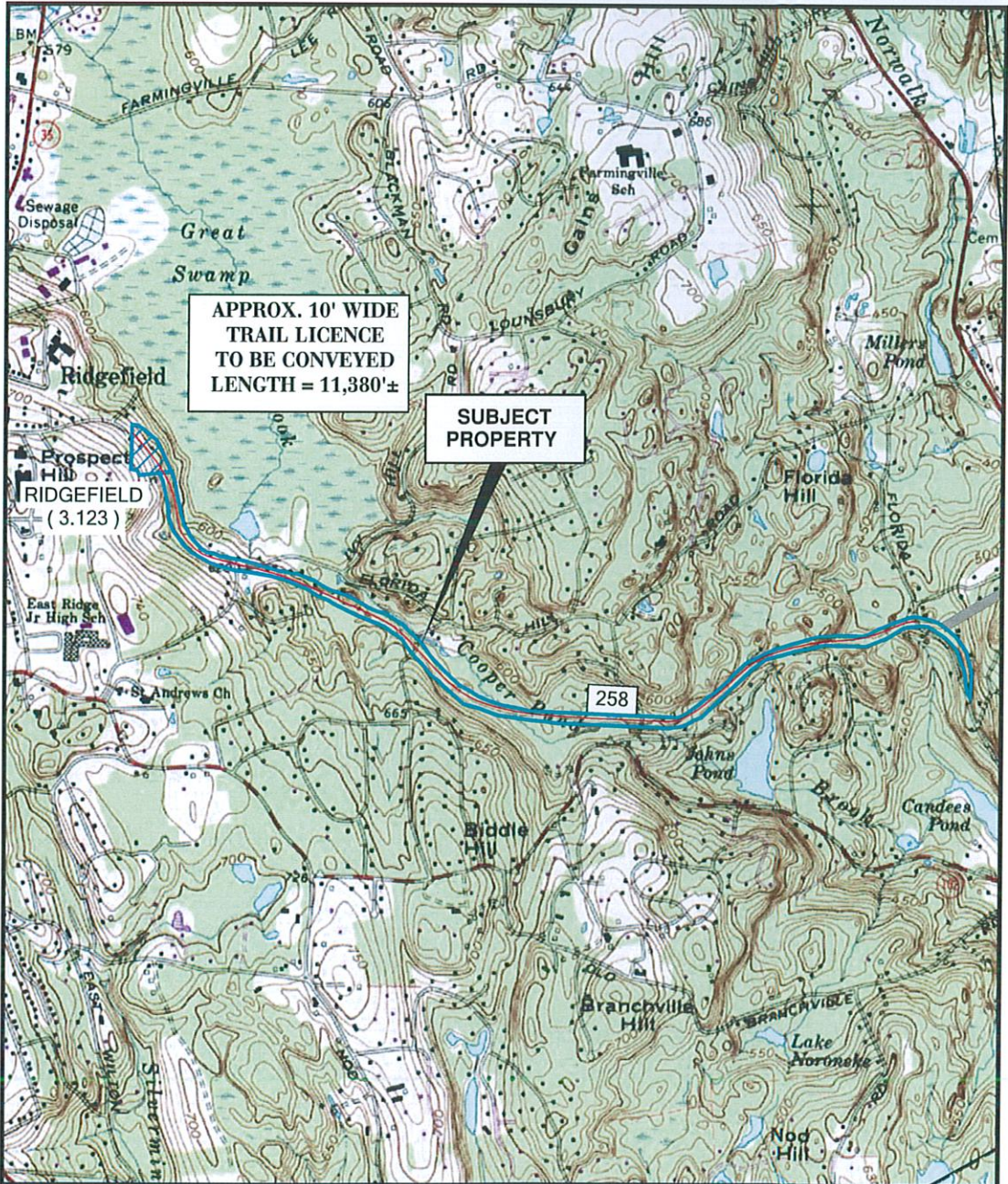
KEY MAP

Not To Scale



EVERSOURCE
ENERGY

EXHIBIT "A"



PROPERTY OWNERSHIP CL & P YANKEE GAS N.G.C. ROCKY RIVER REALTY