

Health Consultation

FOREST VIEW PARCEL

ANTIOCH, DAVIDSON COUNTY, TENNESSEE

May 8, 2017

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This document was prepared by the Tennessee Department of Health's Environmental Epidemiology Program. This document has not been formally reviewed and cleared by ATSDR.

Foreword

This document summarizes an environmental public health investigation performed by the Environmental Epidemiology Program of the State of Tennessee Department of Health. Our work is conducted under a Cooperative Agreement with the federal Agency for Toxic Substances and Disease Registry. In order for the Health Department to answer an environmental public health question, several actions are performed:

Evaluate Exposure: Tennessee health assessors begin by reviewing available information about environmental conditions at a site. We interpret environmental data, review site reports, and talk with environmental officials. Usually, we do not collect our own environmental sampling data. We rely on information provided by the Tennessee Department of Environment and Conservation, U.S. Environmental Protection Agency, and other government agencies, businesses, or the general public. We work to understand how much contamination may be present, where it is located on a site, and how people might be exposed to it. We look for evidence that people may have been exposed to, are being exposed to, or in the future could be exposed to harmful substances.

Evaluate Health Effects: If people have the potential to be exposed to contamination, then health assessors take steps to determine if it could be harmful to human health. We base our health conclusions on exposure pathways, risk assessment, toxicology, clean-up actions, and the scientific literature.

Make Recommendations: Based on our conclusions, we will recommend that any potential health hazard posed by a site be reduced or eliminated. These actions will prevent possible harmful health effects. The role of the Environmental Epidemiology Program in dealing with hazardous waste sites is to be an advisor. Often, our recommendations will be action items for other agencies. However, if there is an urgent public health hazard, the Tennessee Department of Health can issue a public health advisory warning people of the danger, and will work with other agencies to resolve the problem.

If you have questions or comments about this report, we encourage you to contact us.

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Introduction

In November 2016, a concerned party sent a letter to the Tennessee Department of Health (TDH) asking about their community's health, safety, and welfare. Parcel 237 in the Forest View Park Planned Unit Development Overlay District of Metropolitan Nashville in Antioch, Davidson County 37103 was being redeveloped. The concerned party asked about contaminated soil and sinkholes. There was also concern that a safety plan was put into place for site workers without a safety plan for the community. Their letter included some site files as well as a letter to the Tennessee Department of Environment and Conservation (TDEC) with a Title VI complaint.

TDH's Environmental Epidemiology Program (EEP) works to keep people safe from harmful chemicals and to help them live in wholesome environments that promote healthy lifestyles. TDH EEP prepared this response to the questions about environmental pollution at the Forest View Parcel Site.

The Forest View Parcel Site measures 7.84 acres. The site is panhandle-shaped with the narrow portion in the northwest and the wider portion in the southeast (Figure 1). The site is located just east of the major thoroughfare Murfreesboro Road (US 41). It is bounded by Forest View Drive to the north, single and multiple family homes to the east, and an underground utility easement and apartment complex to the south. Although near suburban development, the site seems to have been wooded land for many decades.

The future redevelopment planned for the Forest View Parcel is an apartment complex. There will be four apartment buildings each housing 24 units plus a clubhouse. The site is to be graded to allow for construction of these five buildings as well as parking lots to support them. After construction, only a few perimeter trees and some green space will remain as in the past.

When TDH EEP's, David Borowski, drove by the site on January 16, 2017, much of the woods and undergrowth had been cleared (Figure 2). The site appeared to have been graded with piles of chipped material and top soil visible. An erosion control fence surrounded the worksite and created a boundary.

Previous Environmental Investigations

As the Forest View Parcel Site was being considered to become a multifamily housing complex, it had several due diligence environmental investigations. These reports were performed by various environmental consultants for the development corporation building the apartment complex. EEP typically works from available site files and does not collect our own data. EEP is not aware of additional sources of data beyond what was made available by the developer. EEP had no reason to question the reliability of data from previous environmental investigations.

A *Limited Site Investigation* was performed by Terracon Consultants, Inc. This report dated November 24, 2015, represented site work done around October 2015. The report indicated historic dumping on the site appeared to be household waste (Figure 3). Ten test pits were excavated from one to five feet below ground surface to characterize the site as shown on the aerial image in Figure 1. Seventeen hand auger soil borings were also dug. No buried wastes

were found. Soil samples were collected. Terracon tested the soil samples for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, and metals. Most of the soil samples did not detect these chemicals. The soil sampling indicated the SVOC compounds benzo[a]pyrene and benzo[b]fluoranthene were present in a small area near test pit TP-10 (Figure 1). These chemicals are commonly called and grouped as polycyclic aromatic hydrocarbons (PAHs). The heavy metal lead was higher at TP-9 and TP-10 than the rest of site.

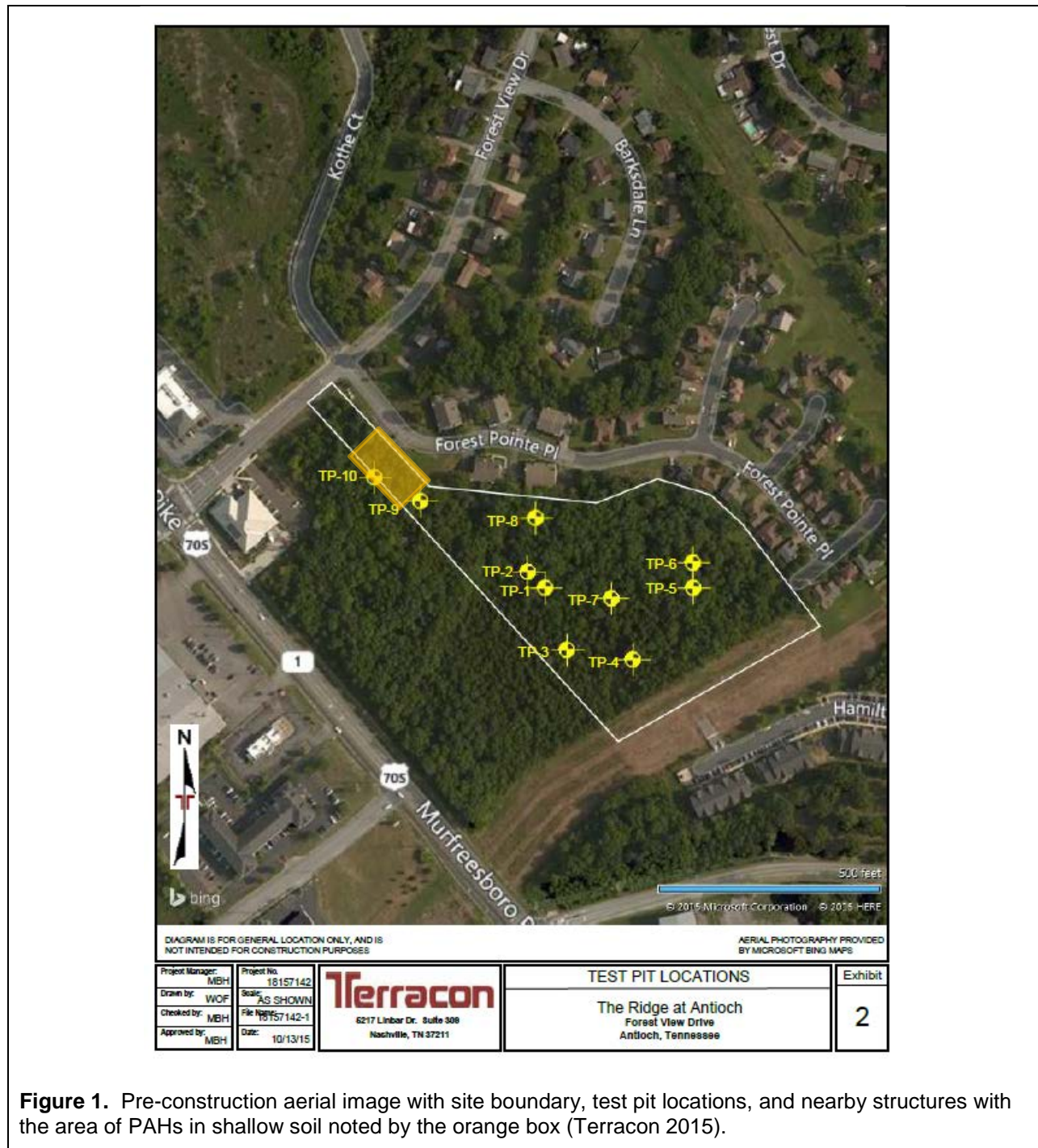


Figure 1. Pre-construction aerial image with site boundary, test pit locations, and nearby structures with the area of PAHs in shallow soil noted by the orange box (Terracon 2015).



Figure 2. TDH photograph of the site taken January 16, 2017, after initial construction that shows piles of chipped materials after much of the woods and undergrowth was removed. The photograph was taken from Forest Pointe Place dead end looking west to Murfreesboro Road in the distance.



Figure 3. Pre-construction “view of dumped waste materials” taken February 23, 2016, as depicted in the Phase I Environmental Assessment Update (Impact Environmental).

A *Site Management Plan* was completed by Terracon on January 19, 2016. This document guided construction excavation including what to do with environmentally impacted site soils. The plan described testing and proper disposal methods for various potential impacts in site soils. It recommended removal of impacted soils. The plan included a short paragraph about site worker health and safety. The report indicated the area around test pit TP-10, where PAHs in soils were detected, was further sampled and delineated (Figure 1).

A *Phase I Environmental Site Assessment Update* was performed by Impact Environmental, Inc. Dated March 1, 2016, it detailed site reconnaissance, historical research, and records search. The major finding was extensive dumping and sometimes burning of household type waste materials on the site dating as far back as the 1950s. The due diligence report stated there was no evidence of Recognized Environmental Conditions (REC). RECs are a term used to identify environmental liabilities in the first phase of Environmental Site Assessment methodology.

Discussion

Introduction to Chemical Exposure

To determine whether persons have been or are likely to be exposed to chemicals, TDH EEP evaluates mechanisms that could lead to human exposure. Chemicals released into the environment have the potential to cause harmful health effects. Nevertheless, a release does not always result in exposure. People can only be exposed to a contaminant if they come into contact with it. If there is no contact with a contaminant, no exposure occurs. Therefore, no exposure-related health effects could occur. An exposure pathway contains five parts:

- a source of contamination,
- contaminant transport through an environmental medium,
- a point of exposure,
- a route of human exposure, and
- a receptor population.

An exposure pathway is considered complete if there is evidence that all five of these elements have been, are, or will be present at a site. An exposure pathway is considered incomplete if any of the five elements is missing.

The source of the contamination is the place where the chemical was released. For the Forest View Parcel, the potential source was the dumped and burned household wastes on the site. The environmental media (such as, soil, surface water, groundwater or air) transport the contaminants. The point of exposure is the place where persons come into contact with the contaminated media. The route of exposure (for example, ingestion, inhalation, or dermal contact) is the way the contaminant enters the body. For the Forest View Parcel, TDH EEP considered chemicals in surface soils that could be accidentally ingested, breathed in as a dust, or contacted with the skin.

Physical contact alone with a potentially harmful chemical in the environment by itself does not necessarily mean that a person will be harmed. A chemical's ability to affect health is controlled by a number of other factors, including:

- the amount of the chemical that a person is exposed to (dose),
- the length of time that a person is exposed to the chemical (duration),
- the number of times a person is exposed to the chemical (frequency),
- the person's age and health status, and
- the person's diet and nutritional habits.

Considering if people could have been exposed to chemicals at the Forest View Parcel, three groups of people were considered. The first group of people considered was trespassers onto the site over the many years it was undeveloped and wooded. Trespassers we often witness at sites include homeless people or children and teenagers roaming around outdoors. The second group of people considered was those residents whose homes were close enough to the site that fugitive dusts could have blown off the site during construction activities around January 2017 and into their yards. The third group of people considered was the future users of the site after its development into an apartment complex which included children playing outdoors.

Chemicals of Potential Concern

Previous environmental investigations reported household materials dumped on the site. No other records or indications of historical activities on the site suggested other environmental impacts. Household wastes can contain a wide variety of materials that could impact the environment. The environmental testing of surface soils from ten test pits and seventeen hand auger locations indicated a few potential environmental concerns, most of which were identified near test pit TP-10 in the northwestern narrow, panhandle portion of the site. VOCs, SVOCs including polycyclic aromatic hydrocarbons, lead, and arsenic were mentioned in various reports.

Concern 1: chemicals

In the concerned party's letter, there were several questions asked. The first was about chemicals. To characterize the site, ten soil test pits were dug and sampled. Additional soil boring samples were also collected. Given the site is less than eight acres, this is a good number of sampling locations. If a major soil contamination problem was present at the site, ten samples would have likely detected the concern. What was detected was contamination in the area where past dumping of waste materials was witnessed. This is a reasonable observed outcome.

To evaluate exposure to a hazardous substance, health assessors often use health comparison values. If chemical concentrations are below comparison values, then health assessors can be reasonably certain no adverse health effects will occur in people who are exposed. If concentrations are above the comparison values for a chemical, then further evaluation is needed. The following health risk evaluation relied upon the soil sampling results presented in Terracon's Table 1. Summary of Detected Analytes (2015).

Arsenic was detected above EPA's (2017) Regional Screening Level (RSL) of 0.68 milligrams per kilogram (mg/kg) for residential sites. The range of arsenic measurements of <2.00-5.62 mg/kg were all below TDEC's guidance for naturally occurring background arsenic concentration in Tennessee soils of 10 mg/kg.

Lead was measured below the long-standing EPA RSL of 400 milligrams per kilogram (mg/kg) for residential sites in all ten samples. Test pits TP-9 and TP-10 had lead more than ten times higher than other places on the site, likely due to the past dumping and burning of the waste materials. The respective values of 244 mg/kg and 323 mg/kg were below 400 mg/kg RSL.

Polycyclic aromatic hydrocarbons are often formed by incomplete combustion and thus would be expected byproducts of burnt waste materials. Benzo[a]pyrene was only detected at TP-10. The 0.122 mg/kg is ten times higher than the EPA RSL of 0.016 mg/kg. It is much lower than ATSDR's chronic Reference Dose Media Evaluation Guideline (RMEG) of 17 mg/kg for children and 240 mg/kg for adults. It is the same as ATSDR's Cancer Risk Evaluation Guideline (CREG) for long-term exposure to possible carcinogens. Additional hand auger soil samples from TP-10 were analyzed for benzo[a]pyrene. These measurements ranged from 0.00621-0.271 mg/kg. All samples were flagged in the environmental investigation reports as the analytical detection level of 0.0330 mg/kg was about double the RSL value. The only sampling location where benzo[a]pyrene was measured above the analytical detection limit was TP-10.

Similarly, benzo[b]fluoranthene was detected at TP-9 and TP-10 in the panhandle area; not across the entire site. The TP-10 value of 0.213 mg/kg was above EPA's RSL of 0.16 mg/kg. TP-9 had 0.047 mg/kg less than the RSL of 0.16 mg/kg. In the other eight test pits benzo[b]fluoranthene was not detected above the analytical detection limit of 0.0330 mg/kg. Additional soil testing at TP-10 measured benzo[b]fluoranthene in a range from 0.017-0.322 mg/kg.

The presence of these PAHs alone does not create a health concern. To be a health concern there would need to be a frequent completed pathway for the contaminants to come into contact with people. Health comparison values are risk estimates using default parameters which for this site would over estimate frequency and duration of exposure. Therefore, none of the soil test results appears to be a health risk. Also, PAHs tend to stick to soil particles. It is likely the PAHs will remain near TP-9 and TP-10 in a small area in the panhandle portion of the site. This area is not planned for development and will likely grow back wild with underbrush. While it would have been best for the contaminated soils to have been excavated and properly disposed of, it is not unreasonable for the small amount of chemicals to be left in place. The removal of the potential physical hazard leftover from the old dumped waste materials was beneficial and protective.

Perhaps the most important concern to people who live adjacent to the Forest View Parcel would be dust control. If contaminated soils were disturbed with poor dust control, then fugitive dusts could leave the site and deposit in nearby yards. While this would be real concern, it appears that it would have only been a concern for a small number of days when the site was initially cleared. As can be seen in Figures 4, 5, or 6 there appears to be no obvious transport of soils, chipped material, or fugitive dusts in the area of the site boundary silt fences. Furthermore, most of the site-related contaminants were detected in the northwestern panhandle portion of the site which was cleaned of dumped waste materials and then mostly left alone as the construction was

planned elsewhere on the parcel. While TDH EEP did not visit the site during clearing activities and do not have any air data, it appears the duration and frequency of times when fugitive dust could have been a concern would have been minimal and short-term.

Concern 2: sinkholes

In the concerned party's letter, there was a second question about sinkholes. Much of middle Tennessee's bedrock is limestone. Over time, limestone can be dissolved by water. The dissolution of limestone can lead to Karst geology. Karst is a type of topography or geology that is prone to caves, sinkholes, enlarged fractures, and other associated underground features. Karst geology is widespread. If there were visible Karst geologic features present at the Forest View Parcel, then it would be prudent to consider what to do about them especially if there were sinkholes on the property. According to the hydrology section of the *Phase I Environmental Site Assessment Update* (Impact 2016), no springs, settling ponds, lagoons, surface impoundments, wetlands or natural catchbasins were observed at the property. Without indication of geologic instability on a single, small parcel of land, any potential risk due to geology can be considered localized. In other words, the risk from unseen underground geology would be about the same for the entirety of the local area. There does not appear to be a difference in the geology underlying the property and that of the nearby developed parcels with homes or other structures.

About the same could be said for radon, a naturally-occurring radioactive gas emitted from certain rock types. Based on the rocks present in Middle Tennessee there is radon risk. Therefore, in Middle Tennessee radon-resistant construction is encouraged. This was noted in the *Phase I Environmental Site Assessment Update* (Impact 2016). The radon risk on the Forest View Parcel would be about the same as the rest of the local area.

Concern 3: worker safety without community safety

The Tennessee Occupational Safety and Health Administration (TOSHA) is the state agency that regulates and protects the health, safety, and rights of workers. The Tennessee Department of Health's Environmental Epidemiology Program does, from time-to-time, make recommendations to protect workers from environmental hazards. In Terracon's *Site Management Plan* (2016), there is a short paragraph about health and safety requirements to protect site workers. The text presented appeared to be fairly standard liability prevention messaging. Worker health and safety is taken into account because of workplace regulations and is included in work plans even when on-site risks have been characterized and perceived to be low. The inclusion of worker health and safety in an environmental investigation does not necessarily mean there are off-site concerns for the general public. It should be noted that the same general pathways considered in this document for possible exposure to public health were included for workers.

Two ways impacted soils could migrate off the site are as soil or as fugitive dust. The developer used and has since appeared to maintain an erosion control fence around the perimeter of the site to prevent soil from leaving the site. Figures 4 and 5 show the eastern boundary of the site near a neighborhood with typical winter season vegetative cover. Figure 6 shows the western boundary with the grassy, underground utility easement and existing apartment complex in the background. There was no indication of soils leaving the site going to nearby residential yards.



Figure 4. TDH photograph of the general wooded boundary of the existing neighborhood and the new development showing the appearance of some backyards during the initial construction and land clearing. The photo was taken by TDH on January 16, 2017, from the mailbox area of the Forest View neighborhood on Forest Pointe Place looking east southeast. The tree and brush on the right-hand side is near test pit TP-10 and representative of the ground cover that remains undeveloped in that area.



Figure 5. TDH photograph of a survey flag at the concrete curb of the dead end of Forest Pointe Place showing conditions of the cleared site, erosion control fencing, and backyard areas of several homes along the southwest side of Forest Pointe Place taken January 16, 2017. Survey flag was assumed to be the eastern property line that runs southeast to northwest.



Figure 6. TDH photograph of the site boundary on the south side with the erosional control fence, grassy utility easement, and the Hamilton Creek Apartments taken January 16, 2017. The photo was taken from the dead end of Forest Pointe Place looking south.

Most of the dust generated from the site was likely the result of chipping the trees and undergrowth. The impacted soil area was only a small portion of the overall site as determined by widespread sampling points over the whole site. Therefore, only when heavy machinery was excavating and grading in the impacted soil area would fugitive dusts that might have contained small amounts of chemicals possibly have been generated. As the depth of the surface soil to bedrock was generally shallow and the area of impacted soils small, the duration and frequency of potential fugitive dusts would have been minimal. Thus, fugitive dusts with chemical contaminants would not pose a health risk.

It would be possible for fugitive dusts from wood chipping or site grading to be an airborne nuisance if the wind was blowing strongly toward a residential area during a day when heavy machinery was operating. Given the size of the parcel, the site work probably did not require too many days of excavation that could have generated dust.

As the far as the narrow, panhandle portion of the site, the area where small amounts of benzo[a]pyrene and benzo[b]flouranthene were found in soil was to be left undeveloped. The physical hazard of the dumped household waste materials (Figure 3) has been removed. While it may have been ideal to permanently remove these soils from the site, the area of former trash dumping was small. Leaving this small area wooded with trees and brush provides vegetative cover to both hold soils in place and act as a barrier to people coming in contact with the soils. Perhaps more importantly the small area is disconnected from the proposed apartment complex (Figure 7). Considering the proposed site plan, after construction of the buildings, pavement, and landscaping the places where people are likely to be are different from the small area near TP-10. People would not be expected to wander through the wooded area on a frequent basis making any residual chemical concerns in the small area of very low health risk.

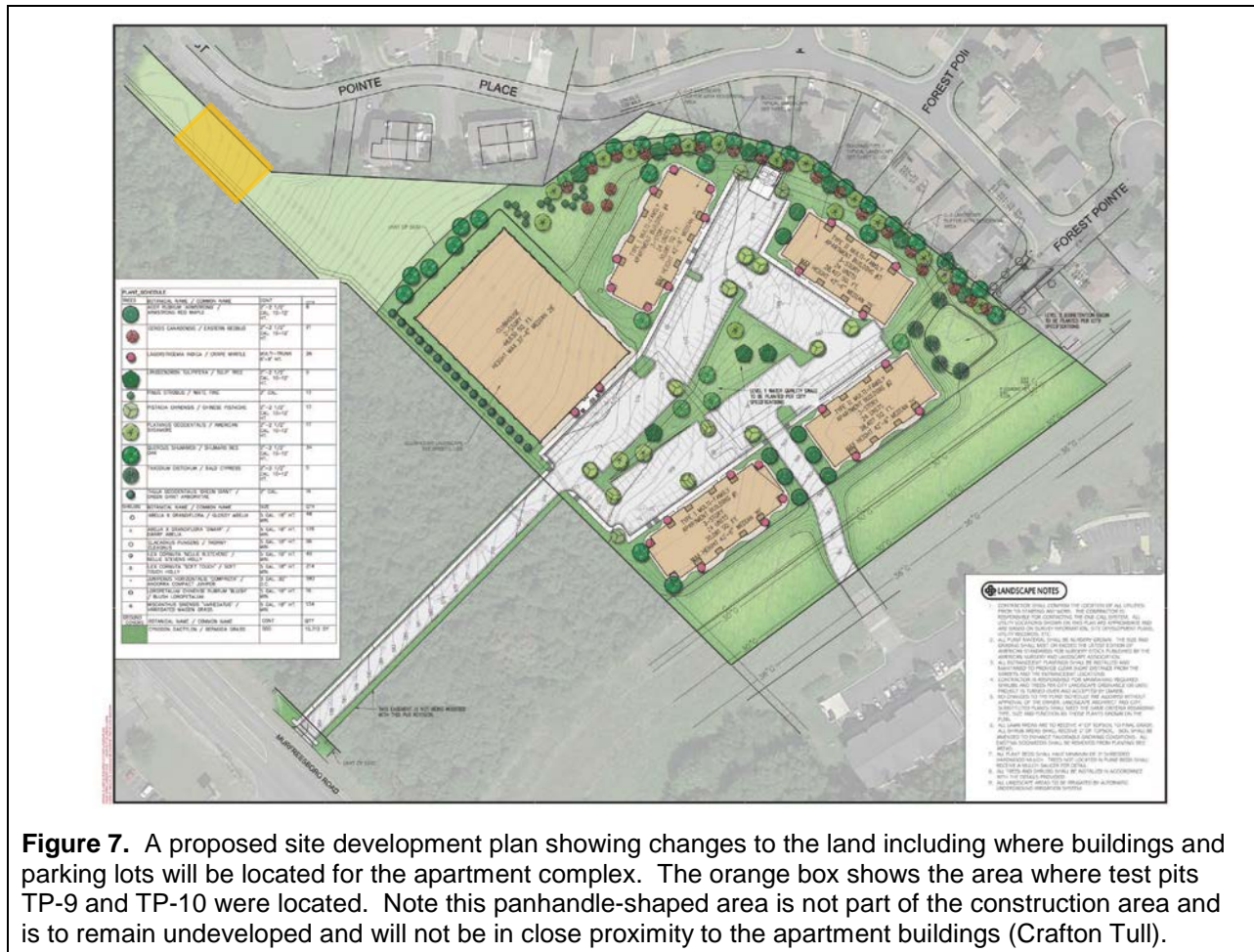


Figure 7. A proposed site development plan showing changes to the land including where buildings and parking lots will be located for the apartment complex. The orange box shows the area where test pits TP-9 and TP-10 were located. Note this panhandle-shaped area is not part of the construction area and is to remain undeveloped and will not be in close proximity to the apartment buildings (Crafton Tull).

Conclusions

With the dumped household materials removed and after the parcel is developed into the apartment complex, the Tennessee Department of Health's Environmental Epidemiology Program concludes there will be no completed exposure pathways and thus no risk to people's health on or adjacent to the Forest View Parcel.

Recommendations

None at this time.

Public Health Action Plan

This public health action plan for the Forest View Parcel contains a list of actions that have been or will be taken by TDH EEP and other agencies. The purpose of the public health action plan is to ensure that this health consultation identifies public health concerns and offers a plan of action designed to mitigate and prevent harmful health effects that could result from breathing, eating, drinking, or touching hazardous substances in the environment. Included is a commitment on the part of EEP to follow up on this plan to ensure that it is implemented.

Public health actions that have been completed include:

- TDH EEP reviewed a letter of concern and enclosures.
- TDH EEP reviewed site files and reports.
- TDH EEP conferred with TDEC and Metro Health.
- TDH EEP visited the area of the site twice.
- TDH EEP prepared this health consultation.

Public health actions that will be completed in the future include:

- TDH EEP will provide a copy of this health consultation to the concerned party.
- TDH EEP will provide a copy of this health consultation to the property developer.
- TDH EEP will provide copies of this health consultation to state and federal government agencies interested in the site.
- TDH EEP will maintain dialogue with interested stakeholders to safeguard public health.
- TDH EEP staff will be available to answer questions about the interpretation presented in our health consultation and to review additional environmental data, as requested.

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Certification

This Public Health Consultation: *Forest View Parcel, Antioch, Davidson County, Tennessee*, was prepared by the Tennessee Department of Health's Environmental Epidemiology Program. It was prepared in accordance with the approved methodology and procedures that existed at the time the health consultation was prepared.



Director, Environmental Epidemiology Program
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