July 15, 2020

Anthony Dennis
Environmental Health Director
Florida Department of Health
Alachua County Health Department
224 SE 24th Street
Gainesville, Florida 32641

Re: Letter Health Consultation: Joseph A. Williams Elementary School [DEP FAC ID 8735777]

Dear Mr. Dennis:

The Florida Department of Health (FDOH), Public Health Toxicology Section is committed to ensuring that people at contaminated sites have the best information available to understand the chemicals and the health risks.

We understand that a community member is concerned that some activities, including the removal of underground storage tanks and cleanup of contaminated soil at the Joseph A. William Elementary School (site), could cause a potential health risk and/or is the cause of increased asthma cases in African-American children ages 5 to 9 residing in 32641. FDOH investigated these concerns to ensure the health and safety of the population of concern.

Based on the review of available environmental data (groundwater, soil and air) from the site, FDOH does not expect the occurrence of health risks associated with exposure to groundwater and soil. Chemicals in groundwater including naphthalene, 1-methylnaphthalene, and toluene did not exceed their respective health screening values[1], also called comparison values (CV) set by the Agency for Toxic Substances and Disease Registry (ATSDR). Concentrations of some polycyclic aromatic hydrocarbons (PAHs) presented as BaP – toxicity equivalency quotient (TEQ)[2] in surface and subsurface soil pre-mitigation and in confirmatory samples collected during soil mitigation efforts (excavation of contaminated soil) exceeded their respective ATSDR health risk values. In looking further at the potential human health risk for those chemicals on the site, the estimated daily dose[3] calculated did not exceed its respective

[1] **Screening levels** (also comparison values – CV) are estimates of chemical concentrations in the environment (water, soil, air, etc.) that a person can be exposed to without considerable health risk. Screening levels are health-based and set far below levels known to cause harmful effects.
[2] Most **PAHs** are suspected or known to cause cancer and act as mutagens, though, only a few information is available for most of them. When assessing the risk of exposure, many of the individual PAHs are considered to be of equivalent toxicity as BaP [Marty et al. 1994]. Studies have shown, that estimating the potential risk to a mixture of PAHs rather than individual ones using their toxic equivalency factors based on BaP seems to be more accurate [Collins et al. 1998, Clement 1988, Nisbet & LaGoy 1992]. The output is presented as BaP – Toxic equivalency factor (TEF) or **BaP – Toxic equivalency quotient (TEQ).**
[3] **Dose**: A quantity of a chemical taken in over a specific time.

ATSDR minimal risk level (MRL[4]), at which levels of PAHs in soil is unlikely to increase risk of adverse non-cancer health effects.

Possible health risk from exposure to contaminated indoor air cannot be evaluated for this site as data regarding indoor air quality are presently insufficient.

Site Description

The Joseph A. Williams Elementary School (site) is located at 1245 SE 7th Avenue in Gainesville, Alachua County, Florida 32641 (Figures 1 and 2).

Records from a tank registration form dated June 1, 1987 show that 4 underground storage tanks (USTs) were present and used to store fuel (heating) oil at various locations of the school. All four tanks were removed, and an analysis and sampling of groundwater and soil did not detect any petroleum contamination above Florida's Department of Environmental Protection (FDEP) Cleanup Target Levels (CTLs), promulgated in Chapter 62-780, Florida Administrative Code.

An additional assessment conducted in 2016 near the locations of the former USTs found benzo(a)pyrene equivalent (BaP-TEQ) levels in soil exceeding the respective Florida Soil CTL (SCTL). These findings warranted an urgent source removal of contaminated soil down to 4 feet below surface at two areas – one located to the north-east in front of School Building #1 and one located between School Building # 2 [Media] and #5 [Art and Music]. In 2018, more soil was removed from the north and west of School Building 1 [Administration] to protect students and faculty. Confirmatory soil sampling conducted during soil removal activities between 2017 and 2018 showed that BaP-TEQ, naphthalene and 1-methylnaphthalene levels still exceeded the FDEPs SCTL.

While toluene was found in 2018 groundwater sampling events exceeding its respective FDEPs Groundwater CTL (GCTL), no contaminant level was found exceeding its respective GCTL in 2019.

Environmental Data

For this health consultation evaluation, FDOH used groundwater data collected from 11 monitoring wells between 2016 to 2019.

Further, FDOH used the soil data collected during initial investigation [data assigned to ***AREA*** – Figure 1] as well as data collected from confirmatory sampling activities during excavation efforts between 2017 and 2018 [data assigned to ***ZONE*** – Figure 2]. Initial investigation efforts helped to delineate the extent of the soil contamination close to the UST while confirmatory soil sampling was conducted to determine the efficiency of the contaminated soil removal. All soil data were collected in 1-ft sampling intervals. It is important to note that the Excavation Zones are much smaller than the Investigation Areas but can cross multiple of these Areas:

[4] A **minimal risk level (MRL)** is developed to protect the most sensitive populations. An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified route and duration of exposure. To derive an MRL, the lowest chemical daily dose observed to cause the most sensitive health effect (for example a developmental effect) is identified. Then this chemical dose is lowered by applying one or more numbers called uncertainty factors. This way the MRL is set far below any daily dose known to cause the most sensitive effect known.

AREA of investigation from Figure 1	
Area 1	Front of Building #1, which contains concrete, grass and covered walkways
Area 2	Building #1 [Administrative] and #7 [Food Service] including the areas in front of these buildings
Area 3	Building #2 [Media] and #5 [Art and Music] including the areas around these buildings
Area 4	Part of Building #1 [Primary] and #3 [Primary] which contains grass and concrete

ZONE of excavation from Figure 2	
Zone 1	Courtyard between School Building #1 [Administrative] and #7 [Food Service]
Zone 2	Courtyard between School Building # 2 [Media] and #5 [Art and Music]
Zone 3 and 4	North/in front of School Building #1 [Administrative]
Zone 5	West of School Building #1 [Administrative]

Groundwater and soil data were provided by FDEP.

In addition, FDOH reviewed the 2019 and 2020 U.S. Environmental Protection Agency (EPA) air quality index report[5] for Alachua County to determine if the levels of particle pollution and ozone could contribute to a possible health risk in this area.

Risk Evaluation

Screening and Identifying Contaminants of Concerns

To evaluate the risk of harm to public health from site-related chemicals, FDOH determines the contaminated elements and the relative contamination levels. It screens the site-related data using comparison values (CVs) developed by the Agency for Toxic Substances and Disease Registry (ATSDR). Each CV is a concentration for a chemical in the environment (i.e. water or soil) below which FDOH does not expect harm to public health.

FDOH identifies contaminants higher than their respective ATSDR CVs or those that are considered carcinogenic for further evaluation. Naphthalene, 1-methylnaphthalene, and toluene are classified as non-carcinogenic, hence the ATSDRs recommended reference dose media evaluation guide [RMEG] and chronic environmental media exposure guide [EMEG] for children, respectively, were used as CVs to evaluate their possible risk to human health from soil exposure. Benzo(a)pyrene and BaP-TEQ[2] is considered carcinogenic and therefore automatically chosen as a contaminant of concern and compared to ATSDRs cancer risk evaluation guide (CREG).

Exposure Pathways

Once the first step of screening has been conducted, FDOH looks at ways people could be exposed to contaminated elements, called exposure pathways. Chemical contamination in the environment can harm the public's health but only if they have contact with those contaminants (exposure). Without contact or exposure, there is no harm to health. If there is contact or exposure, how much of the contaminants the public contact (concentration), how often they contact them (frequency), for how long they contact them (duration), and the hazard level of the contaminant (toxicity) all determine the risk of harm.

Exposures occur if a contamination source has all of the following:

- an environmental medium to hold or transport it; like air, soil or water
- an exposure point where people contact it

[5] EPA Air Quality Index Report: https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report

- an exposure route through which it enters the body
- an exposed population who contact it

The identification of an exposure pathway does not necessarily mean that harm to health will occur.

Health Risk Estimation
When exposure pathways and chemicals of potential concern have been selected for further evaluation, daily exposure doses are estimated to assess risk of health effects. A daily exposure dose is the amount of a chemical a person is exposed to in their ambient environment in a day. The exposure dose calculation uses site-specific input parameters (e.g., chemical concentrations) and population-specific input parameters (e.g., age, intake rates, age-specific body weight) (Table 4).

When evaluating a possible, harmful non-cancer health risk, the estimated daily exposure doses are compared with ATSDR's MRLs[4]. An MRL is an estimated safe dose, which is considered unlikely to cause adverse effect in humans for a given exposure scenario. Thus, if an estimated exposure dose is lower than the MRL, harmful non-cancer health effects are considered unlikely. If an estimated exposure dose is equal to or exceeds the MRL, harmful non-cancer health effects could be possible. When estimated doses exceed the MRL, the potential non-cancer health risks are more carefully evaluated and communicated to the relevant community.

Results and Findings

Table 1 shows the range of chemical concentration measured for naphthalene, 1-methylnaphthalene, benzo(a)pyrene (BaP), and toluene in groundwater in comparison to its respective ATSDR's CV. Tables 2 and 3 shows the range of chemical concentration measured for naphthalene, 1-methylnaphthalene and benzo(a)pyrene equivalent in soil in comparison to its respective ATSDR's CV.

Groundwater
Concentration of naphthalene, 1-methylnaphthalene, and toluene found in groundwater collected at the Joseph A. Williams Elementary School did not exceed their respective ATSDR comparison value (CVs). The CV's are health-based estimates of chemical concentrations in the environment that are not considered to pose a health risk.

BaP concentrations exceeded their respective ATSDR CVs but with a laboratory identifier. The laboratory identifier highlights the laboratory detection limit. Meaning, the minimum concentration of a specific chemical in a sample a laboratory instrument can detect. Regardless, BaP is considered carcinogenic[6] and therefore would automatically be chosen as a COC requiring further evaluation. Though, ingestion of the groundwater is unlikely as water is municipally supplied. Therefore, groundwater ingestion is an eliminated exposure pathway.

Surface Soil
Neither of the chemicals found in surface soil collected at the Joseph A. Williams Elementary School exceeded their respective ATSDR CVs, except for BaP-TEQ. Therefore, FDOH concludes that exposure to naphthalene and 1-methylnaphthalene in surface soil at the site does not pose a health risk and these chemicals are not further evaluated as chemicals of concern (COC) for the site. BaP-TEQ in surface soil exceeded its respective ATSDR CV and must be further investigated using ATSDR's daily exposure dose[3] estimation equations.

[6] Carcinogenic – cancer causing

The risk evaluation (daily exposure dose calculation) for investigating possible health-risk associated with exposure to BaP-TEQ contaminated soil was conducted for the students only, as they present the most sensitive population at the school. All input parameters used are shown in Table 4.

The risk of possible health effects to students at the Joseph A. Williams Elementary School before 2016/2017 cannot be evaluated as data prior to this time are not available.

A maximum BaP-TEQ concentration of 12.7 mg/kg detected during the 2016/2017, preliminary investigations efforts in Area 2 was used for the health-risk evaluation. Maximum BaP-TEQ concentrations detected in the excavation zone were not utilized for health risk evaluation as the zone had limited access for students.

Further, BaP-TEQ contaminated soil was excavated in 2017/2018. Therefore, FDOH has evaluated a possible health risk from a combined exposure via dermal and ingestion exposure to BaP- TEQ contaminated surface soil for 2016/2017 only, less than one year of exposure assuming students visit the school 5 days a week for 36 weeks.

Based on the assumptions above, the site-specific combined dermal and ingestion daily exposure dose for exposure of less than one year to BaP-TEQ in surface soil of 12.7 mg/kg for children of age 6 to less than 11 years is 0.000085 mg/kg/day. This estimated dose does not exceed ATSDR MRL for BaP-TEQ long-term exposure of 0.0003 mg/kg/day .

Sub-Surface Soil

Neither of the chemicals found in sub-surface soil collected at the Joseph. A. Williams Elementary School exceeded their respective ATSDR CVs, except for BaP-TEQ. Therefore, FDOH concludes that exposure to naphthalene and 1-methylnaphthalene in surface soil at the site does not pose a health risk and these chemicals are not further evaluated as chemicals of concern (COC) for the site.

BaP-TEQ in soil exceeded its respective ATSDR CV, is classified as a carcinogen, and must be further investigated using ATSDR's health-risk dose[3] calculations. Chances for students and staff at the school to access the sub-surface soil were limited. Therefore, a possibility of exposure to contaminated sub-surface soil can be eliminated and no further evaluation of health risk to students and staff be conducted.

Vapor Intrusion and Air quality

Naphthalene, 1-methylnaphthalene, BaP and toluene are classified as a volatile organic compound (VOC). As such, these chemicals could migrate to indoor air from soil and/or groundwater.

BaP-TEQ found in surface soil samples from the excavation zones was the only compound detected exceeding its ATSDR CV and could still pose a possible health risk via vapor migration if not mitigated. Evaluation of such is not possible at the time as associated vapor air data are not available.

A review of the 2019 EPA air quality index report showed that out of 364 days for which air quality data were available, 329 days were determined as "good" and 35 days was determined to have "moderate" air quality. The current 2020 air quality index reported that that out of 91 days for which air quality data were available 84 days had "good" air quality, while the remaining 7 days were determined as "moderate".

Conclusion and Recommendations

For groundwater, FDOH does not expect a possible health risk to student exposed to naphthalene, 1-methylnaphthalene, BaP and toluene at the school between 2016 and 2019:

- Concentration of naphthalene, 1-methylnaphthalene, and toluene do not exceed their respective ATSDR health risk levels at which below no health risks are expected.

- Drinking water is municipally supplied and therefore direct exposure to groundwater at the site is eliminated to pose a risk via drinking.

For surface soil, FDOH does not expect a possible health risk to students exposed to maximum BaP-TEQ concentrations of 12.7 mg/kg collected during investigation efforts in 2017/2018:

- Concentration of naphthalene and 1-methylnaphthalene in surface soil did not exceed their respective ATSDR CV and therefore, no adverse non-cancer health effects are expected.
- The estimated daily exposure dose for combined dermal and ingestion exposure for students at the site, being exposed to contaminated surface soil 5 days a week for 36 weeks, are less than the respective ATSDR MRLs at or below which it is assumed to be safe when exposure occurs.

The estimated daily dose calculated for a combined dermal and ingestion exposure to surface soil was compared to an MRL typically used when evaluating chronic, long-term exposure as no MRL is available for short-term BaP-TEQ exposure. As the use of the chronic MRL assumes a lifetime exposure it presents an overestimate of the risk for exposure of less than one year. Therefore, using the chronic MRL for this evaluation is a protective approach and would not underestimate the risk.

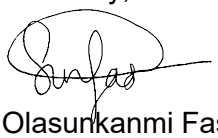
Investigation areas at the school are not used equally by students. Duration (time spent) and frequency of students when being exposed to contaminated surface soil in one area can be higher or less than in other areas. Therefore, the use of the maximum concentration found throughout all areas for the risk evaluation can be an overestimation of a possible health risk but is protective.

FDOH is currently not able to evaluate the possibility of vapor intrusion and possible associated health risk due to data limitations. FDOH recommends the assessment of indoor and outdoor air quality for the presence of at least BaP.

Air quality report data in the area indicate a good ambient air quality (Table 5). Therefore, no likelihood for any potential health risks due to ambient air is expected. Though, the air pollution levels as obtained from these reports cannot be generalized as they are only indicative of specific monitoring sites.

If you have any questions or comments concerning this letter, please contact the Health Risk Assessment Program at 877-798-2772 or at phtoxicology@flhealth.gov.

Sincerely,



Olasunkanmi Fasakin
Environmental Specialist III

OF/gal
Enclosure
cc: Kendra Goff, PhD, DABT, CPM, CEHP, Bureau Chief
Elke Ursin, PMP, CPM, Public Health Toxicology Administrator

References

Clement Associates. 1988. Comparative potency approach for estimating the cancer risk associated with exposure to mixtures of polycyclic aromatic hydrocarbons (Interim Final Report) - Prepared for EPA under Contract 68-02-4403. Fairfax, Virginia.

Collins J, Brown J, Alexeeff G, Salmon A. 1998. Potency equivalency factors for some polycyclic aromatic hydrocarbons and polycyclic aromatic hydrocarbon derivatives. Regul. Toxicol. Pharmacol. 28:45–54. Marty MA, Alexeeff GV, Collins JF, Blaisdell RJ, Rosenbaum J, Lee L. 1994. The Emissions Inventory: Perception and Reality Proceedings of an International Specialty Conference. Air & Waste Management Association; Pittsburgh, PA, USA: . Airborne emissions from industrial point sources and associated cancer risks of selected carcinogens in California; pp. 1086–1097.

Nisbet I, LaGoy P. 1992. Toxic equivalency factors (TEFs) for polycyclic aromatic hydrocarbons (PAHs). Regul. Toxicol. Pharmacol. RTP 16:290–300.

Table 1: Minimum and maximum concentration of naphthalene, 1-methylnaphthalene, benzo(a)pyrene, and toluene found in groundwater collected at the Joseph A. Williams Elementary School Site, as well as their respective ATSDR comparison values (CV)[1].

Letter Preparation

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Table 1: Minimum and maximum concentration of naphthalene, 1-methylnaphthalene, benzo(a)pyrene, and toluene found in groundwater collected at the Joseph A. Williams Elementary School Site, as well as their respective ATSDR comparison values (CV)[1].

	Naphthalene	1-methylnaphthalene	Benzo(a)pyrene	Toluene
Minimum (µg/L)	0.00370 U	0.0250 U	0.0310 U	0.12 U
Maximum (µg/L)	0.084 IV	0.0040 U	0.0422 U	390
ATSDR CV (µg/L)	**140**	**490**	**0.012**	**560**

ATSDR = Agency for Toxic Substances and Disease Registry
CV = Comparison value
µg/L = Micrograms per liter
I = Laboratory Report Identifier – The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit
U = Laboratory Report Identifier – The compound was analyzed for but not detected
V = Laboratory Report Identifier – The compound was detected in both the sample and the associated method blank

Table 2: Minimum and maximum concentration of naphthalene, 1-methylnaphthalene, and benzo(a)pyrene-TEQ found in confirmatory surface and sub-surface soil samples collected at the Joseph A. Williams Elementary School investigation areas [AREA], as well as their respective ATSDR comparison values (CV)[1].

			Naphthalene	1-methylnaphthalene	Benzo(a)pyrene-TEQ
Area 1					
	Surface Soil	Minimum (mg/kg)	0.00329 U	0.00287 U	0.1
		Maximum (mg/kg)			
Area 2					
	Surface Soil	Minimum (mg/kg)	0.00312 U	0.00389	0
		Maximum (mg/kg)	0.00790	0.178	**12.7**
	Subsurface Soil	Minimum (mg/kg)	0.00113	0.00488	0
		Maximum (mg/kg)	0.0954	0.0900	**5.6**
Area 3					
	Surface Soil	Minimum (mg/kg)	0.00436	0.00404	0
		Maximum (mg/kg)	0.216	0.0587	**7.2**
	Subsurface Soil	Minimum (mg/kg)	0.00312 U	0.00272 U	0
		Maximum (mg/kg)	0.00790	0.00538 U	**0.5**
Area 4					
	Surface Soil	Minimum (mg/kg)	0.00310 U	0.00270 U	0
		Maximum (mg/kg)	0.00744 U	0.00648 U	
ATSDR CV (mg/kg)			**1,000**	**3,600**	**0.11**

ATSDR = Agency for Toxic Substances and Disease Registry
CV = Comparison value
mg/kg = Milligrams per kilogram
TEQ = Toxicity equivalency quotient
U = Laboratory Report Identifier – The compound was analyzed for but not detected

Table 3: Minimum and maximum concentration of naphthalene, methylnaphthalene, and benzo(a)pyrene-TEQ found in surface and sub-surface soil collected at the Joseph A. Williams Elementary School excavation zones [ZONE], as well as their respective ATSDR comparison values (CV)[1].

		Naphthalene	1-methylnaphthalene	Benzo(a)pyrene-TEQ
Zone 1				
Surface Soil	Minimum (mg/kg)	0.00711 U	0.00323 U	0
	Maximum (mg/kg)	11.1	4.220	**213.2**
Subsurface Soil	Minimum (mg/kg)	0.00357 U	0.00323 U	0
	Maximum (mg/kg)	0.286	0.135	**9.6**
Zone 2				
Surface Soil	Minimum (mg/kg)	0.00513	0.0286	0
	Maximum (mg/kg)	0.0382		**0.3**
Zone 3				
Surface Soil	Minimum (mg/kg)	0.0159	0.00518	**0.2**
	Maximum (mg/kg)			**0.6**
Subsurface Soil	Minimum (mg/kg)	0.019	0.00596	**0.1**
	Maximum (mg/kg)			
Zone 4				
Surface Soil	Minimum (mg/kg)	0.00330 U	0.00288 U	0
	Maximum (mg/kg)	0.00401 U	0.00349 U	0.1
Subsurface Soil	Minimum (mg/kg)	0.00371 U	0.00323 U	0
	Maximum (mg/kg)	0.00373 U	0.00325U	
Zone 5				
Surface Soil	Minimum (mg/kg)	0.14	0.048	0
	Maximum (mg/kg)	0.22	0.26	**12.0**
Subsurface Soil	Minimum (mg/kg)	0.048	0.017	0
	Maximum (mg/kg)	0.56	0.23	
ATSDR CV (mg/kg)		**1,000**	**3,600**	**0.11**

ATSDR = Agency for Toxic Substances and Disease Registry
CV = Comparison value
mg/kg = Milligram per kilogram
TEQ = Toxicity equivalency quotient
U = Laboratory Report Identifier – The compound was analyzed for but not detected

Table 4: Daily exposure dose risk evaluation input parameters for a contaminated dermal and ingestion exposure to surface soil at Joseph A. Williams Elementary School.

Contaminant	Entered Concentration (mg/kg)	Dermal Absorption Fraction	GI Absorption Factor (ABS_{GI})	Bioavailability Factor
Benzo(a)pyrene	12.7	0.13	1	1

Exposure Group		Body Weight (kg)	Age-Specific Exposure Duration *Intermediate (less than one year)*	Intake Rate (mg/day)	Adherence Factor to Skin (mg/cm^2/event)	Combined Skin Surface Area (cm^2)
Student	**6 to < 11 years**	31.8	NA	200	0.2	3,824

Exposure Group	Duration	Days	Weeks	Years	Non-Cancer Exposure Factor	**EF dermal:** The dermal absorbed dose equation includes a 1 event/day EF parameter.
Student	**Intermediate (less than one year)**	5	36	NA	0.71	

ABS = Absorption factor
cm^2 = Square centimeters
EF = Exposure factor
GI = Gastrointestinal
kg = Kilograms
mg/cm^2/event = Milligrams per square centimeter per event
mg/day = Milligrams per day
mg/kg = Milligrams per kilogram
NA = Not applicable
< = less than

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Table 5: Air Quality Index Report – Alachua County, FL, 2019 and 2020.

Year	Days with AQI	Number of days when Air Quality was….		AQI Statistics			Numbers of days when AQI pollutant was…	
		Good	Moderate	Maximum	90th percentile	Median	O_3	PM2.5
2019	364	329	35	80	50	35	364	100
2020	91	84	7	62	48	39	52	39

[Source: U.S. EPA, https://www.epa.gov/outdoor-air-quality-data/air-data-daily-air-quality-tracker, generated May 14, 2020]

AQI = Air Quality Index
O_3 = Ozone
PM2.5 = Particulate matter with diameter less than 2.5 micrometers

Get detailed information about this report, including column descriptions at:
https://www.epa.gov/outdoor-air-quality-data/about-air-data-reports#aqi

AirData reports are produced from a direct query of the AQS Data Mart. The data represent the best and most recent information available to EPA from state agencies. However, some values may be absent due to incomplete reporting, and some values may change due to quality assurance activities. The AQS database is updated by state, local, and tribal organizations who own and submit the data.

Readers are cautioned not to rank order geographic areas based on AirData reports. Air pollution levels measured at a monitoring site are not necessarily representative of the air quality for an entire county or urban area.

Figure 1: Joseph A. Williams Elementary School, Gainesville, Alachua County – Investigation Areas

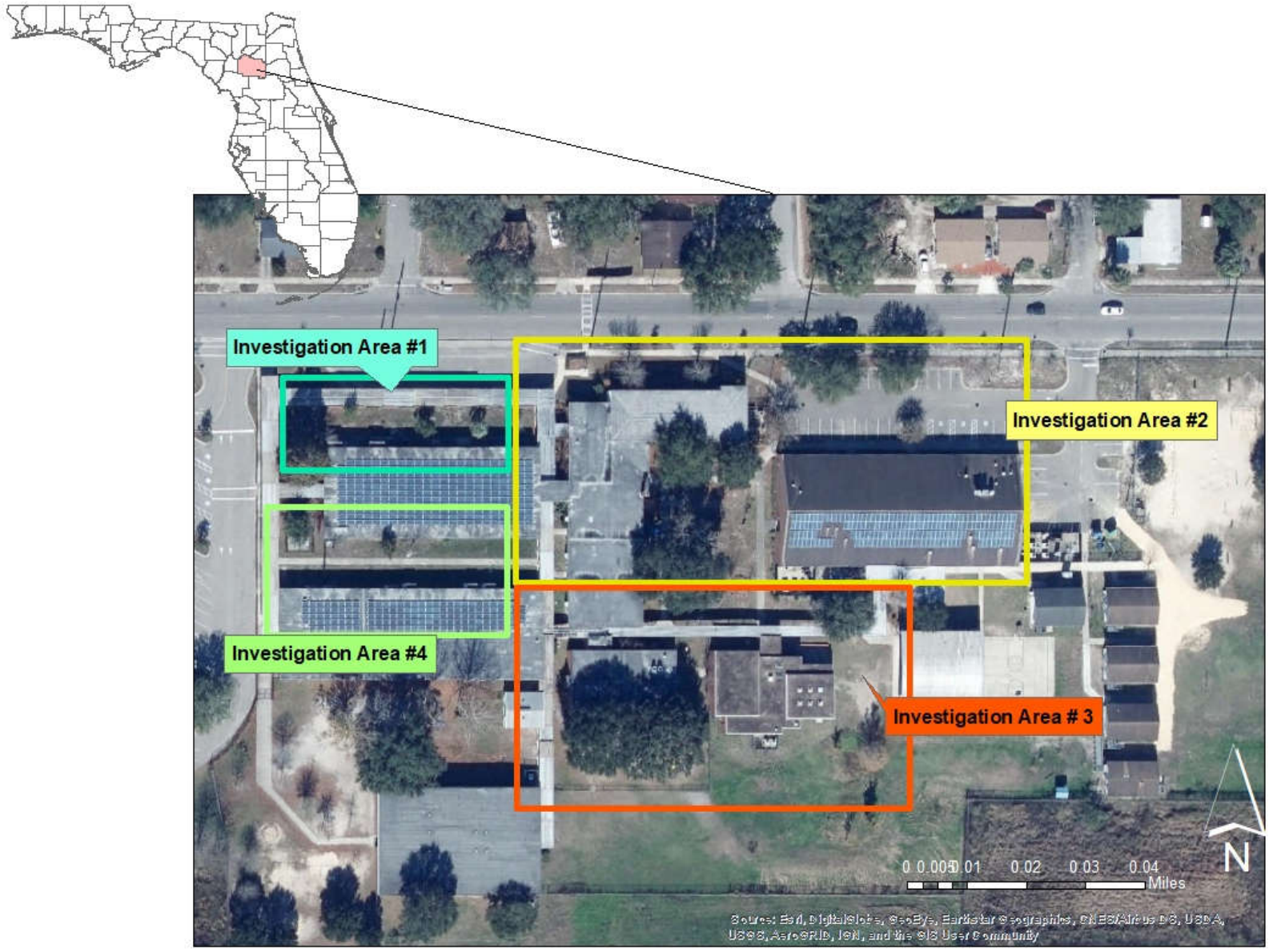

Figure 2: Joseph A. Williams Elementary School, Gainesville, Alachua County – Excavation Zones