PRE-CONSTRUCTION INDOOR ENVIRONMENTAL QUALITY REPORT

PREPARED FOR:

Howard County Public School Systems

HARRIET TUBMAN BUILDING
8045 HARRIET TUBMAN LANE
COLUMBIA, MD 21044

REPORT PREPARED BY:

Soil and Land Use Technology, Inc.
1818 NEW YORK AVENUE, NE SUITE 231
WASHINGTON, DC 20002

October 19, 2017

1818 New York Ave. NE, Ste 231, Washington, DC 20002
Telephone: (301) 595-3783
www.salutinc.com

Table of Contents

Figures, Tables and Appendices

SaLUT
Soil and Land Use Technology, Inc.
1818 New York Ave. NE, Ste 231, Washington, DC 20002
Telephone: (301) 595-3783
www.salutinc.com

EXECUTIVE SUMMARY

Soil and Land Use Technology, Inc (SaLUT) was contracted by Howard County Public School System to conduct an Indoor Environmental Quality (IEQ) visual inspection and assessment for suspected mold growth matters, existence or the potential of water intrusion events, and odors at **Oakland Mills Middle School** building (Site) located at 9540 Kilimanjaro Road, Columbia, MD 21045. The inspection and assessment was conducted on August 14 and 15, 2017.

The Site was observed to be in good condition, no existing water intrusion were identified, but there were several areas of potential water intrusion observed on the roof within the roof insulation materials. Further evaluation is recommended by a licensed contractor (roofer) to assess the sealant around the roof penetration areas for the plumbing system, drain point, patch repair, flashing, and cracks and overlap sealant within the rubber roofing membrane components. Suspected mold growth was visible on the roof near the Heating, Ventilation, and Air Conditioning (HVAC) air intakes, Pipe Insulation (PI) in all the HVAC machine room located on the roof of the school, and top of the HVAC ceiling diffusers above the drop ceilings throughout the school building. There were moderate to heavy dust accumulations on above the ceilings. Occupants were not directly exposed to suspected mold growth areas or dust surfaces.

SaLUT observed collected water in some areas on the roof from the previous day rain. HVAC chiller located on the northeast side of the roof has a water leak to the roof.

ACRONYMS

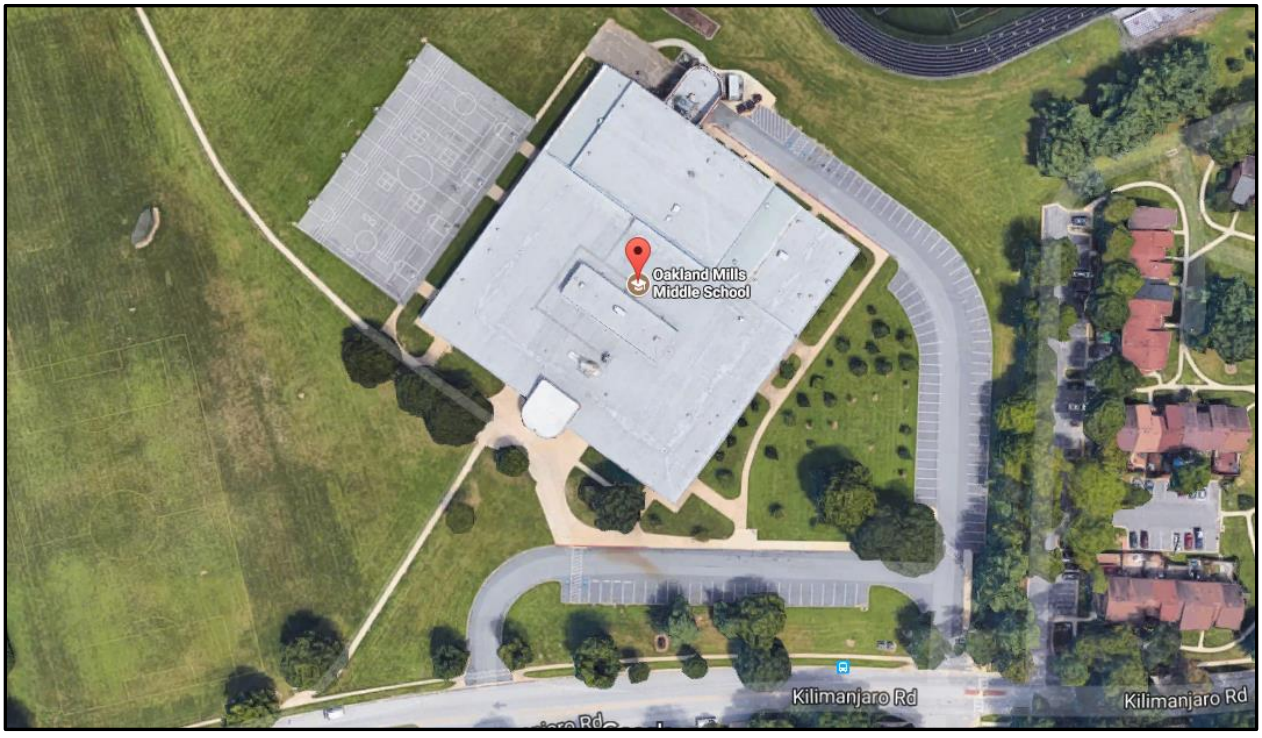
EPA	Environmental Protection Agency
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilation, and Air Conditioning
IEQ	Indoor Environmental Quality
IH	Industrial Hygienist
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety & Health Administration
PI	Pipe Insulation
TSI	Thermal System Insulation

1.0 INTRODUCTION

On August 14 and August 15, 2017, SaLUT performed a Pre-Construction IEQ Inspection at **Oakland Mills Middle School** premises located in 9540 Kilimanjaro Rd, Columbia, MD 21045. The inspection performed for Howard County Public School System was intended to document suspected mold growth matters, existence or the potential of water intrusion events, and odors in the building assigned for inspection, in order to facilitate upcoming renovation work. This survey did not include the documentation of any ventilation concerns, environmental sampling, any electrical hazards and/or other potential hazardous materials that may be found in the building. This report documents the observations and findings related to suspected mold growth matters, existence or the potential of water intrusion events, and odors during the time of the assessment.

Figure 1 displays the building location. **Oakland Mills Middle School** consisted of approximately 95,000 square feet of one story building with no below grade level and a mechanical penthouse.

Figure 1: Oakland Mills Middle School Facility Location



2.0 Indoor Environmental Quality (IEQ) Inspection

All accessible areas of facility were inspected for the presence of suspected mold growth and water intrusion events. The results of this survey are presented in Section 2.2, Survey Findings. The IEQ survey was conducted under the direct guidance of a Certified Industrial Hygienist (CIH), Mr. Indika Jayathilake, and the project manager, Mr. Azzam Jawad, by Mr. Madhusha Sarathchandra, Mr. Chamal Hettigama, and Mr. Sameera Meegoda.

2.1 Survey Methodology

Inspection survey was divided into three distinct phases: pre-inspection planning, inspection for IEQ, and development of IEQ response action recommendations.

Pre-inspection planning consisted of a review of the history (both construction and utilization) of the building, planning an inspection strategy, and scheduling inspection work. It was determined that this survey should include all portions of the building likely to be impacted by planned renovations to ensure that intended renovations could be conducted in a safe manner.

The followed assessment methods represent the most current industry standards and practices. The following diagnostic tools were used in the survey:

- Thermal imaging cameras: FLIR 65 and FLIR MR176 was used to detect ongoing water intrusion events in the building.
- Borescope fiber optic device: was used to visually assess hard to reach areas or within wall and chases when applicable.

Using previous experience, SaLUT planned to inspect the areas with current and previous water intrusion areas first (if any). Any areas with current or previous water intrusion areas were thoroughly inspected for any suspected mold growth. Areas which were access often such as boiler room were also thoroughly inspected for suspected mold. Areas above the ceiling also inspected, visually and using the thermal imaging cameras to observe any water intrusion events. Crew also conducted a room by room odor observations in the inspection for unusual odors. Exterior surfaces are examined for evidence of water damage or intrusion and potential for future problem areas. The location, odors, number of air vents, water stains, evidence of suspected mold growth and other special notes were recorded in the inspector's log and locations were marked on provided maps of the property.

2.1.1 Inaccessible and Limited Access Spaces

Every reasonable attempt was made to locate suspected mold growth and water intrusion in the areas surveyed. However, areas that were inaccessible could be addressed only through extrapolation of conditions in accessible building spaces and review of building plans, specifications, or other building documents provided to SaLUT. Areas that were inaccessible or

where the survey was limited to visual observation only are identified on building drawings and/or in report narrative. Such inaccessible areas might include but are not limited to:

- Within walls
- Within fire doors
- Enclosed pipe/duct chases
- Inside mechanical equipment/ductwork
- Above plaster ceilings
- Behind unopenable doors
- High areas beyond reach of provided 20-foot ladders
- Beneath materials stored in the building

SaLUT does not take responsibility for limitations.

2.2 Survey Findings and Observations

General observation throughout the building at Oakland Mills Middle School:

SaLUT crew observed suspected mold growth on the metal plates over the A/C diffusers above the ceilings throughout the building. 95% of the AC diffusers were affected with the suspected mold due to the coldness and the moisture generated with the cold air flow through the diffuser. Dust was also observed throughout the school in unreachable areas such as over the ceiling and boiler room. Ceiling tiles in the dropped ceiling throughout the school building showed general signs of sagging but were observed dry

Other observations located except the mentioned general observations were listed in Table 1.

Table 1: Observed Locations

Building material with mold growth	**Location and Material**	**Quantities (Approximate)**	**Response Options**
Fiberglass insulation	• HVAC unit Mechanical room- Pipe Insulation	3″to 5″ Pipe insulation and fittings- 225 LF* 6″to 8″ Pipe insulation and fittings- 60 LF	• Discard and replace.
Non-porous, hard surfaces (Plastics, metals)	• Throughout the building (Except Cafeteria and room 33) AC diffusers and duct insulation above the ceiling)	250 units	• Damp wipe with water a and mild detergent and allow to dry; scrub if necessary • High-efficiency particulate air(HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags
Roofing system (Appendix A)	• Exhaust fans- near HVAC intake (See photographs below) on asphalt embedded rolled roofing. • Roof drain strainers near air intakes on rolled roofing system (including perimeter channels)	600 SF**	• Damp wipe with water and mild detergent and allow to dry; scrub if necessary. • HEPA vacuum after the material has been thoroughly dried. • Dispose of the contents of the HEPA vacuum in well-sealed plastic bags • Configure strainer and channels grades to reduce stagnating water.

***LF- Linear Feet**
****SF- Square Feet**

2.3 Mold Abatement Specification

Remediation

The goal of remediation is to remove or clean mold-damaged materials using work practices that protect occupants by controlling the dispersion of mold from the work area and protect remediation workers from exposures to mold. The listed remediation methods were designed to achieve this goal; however, they are not meant to exclude other similarly effective methods and are not a substitute for a site-specific work plan. Since little scientific information exists that evaluates the effectiveness and best practices for mold remediation, these guidelines are based on principles used to remediate common indoor environmental hazards. These guidelines are not intended for use in critical care facilities such as intensive care units, transplant units, or surgical suites.

Prior to any remediation, consideration must be given to the potential presence of other environmental hazards, such as asbestos and lead. These guidelines are based on possible health risks from mold exposure and may be superseded by standard procedures for the remediation of other indoor environmental hazards.

Moisture Control and Building Repair

In all situations, the underlying moisture problem must be corrected to prevent recurring mold growth. Indoor moisture can result from numerous causes, such as: façade and roof leaks; plumbing leaks; floods; condensation; and high relative humidity. An appropriate building expert may be needed to identify and repair building problems. An immediate response and thorough cleaning, drying, and/or removal of water-damaged materials will prevent or limit microbial growth.

Relative humidity should generally be maintained at levels below 65% to inhibit mold growth. Short-term periods of higher humidity would not be expected to result in mold growth. However, condensation on cold surfaces could result in water accumulation at much lower relative humidity levels. Relative humidity should be kept low enough to prevent condensation on windows and other surfaces.

Emphasis should be placed on ensuring proper repairs of the building infrastructure so that water intrusion and moisture accumulation is stopped and does not recur.

Worker Training

Proper training of workers is critical in successfully and safely remediating mold growth. Training topics that should be addressed include:

- Causes of moisture intrusion and mold growth
- Health concerns related to mold exposure
- The use of appropriate personal protective equipment
- Mold remediation work practices, procedures, and methods

For additional information, the National Institute of Environmental Health Sciences' publication, "Guidelines for the Protection and Training of Workers Engaged in Maintenance and Remediation Work Associated with Mold" lists minimum training criteria for building maintenance and mold remediation workers that should be completed before addressing indoor mold growth.

Trained building maintenance staff can address limited and occasional mold growth. For larger jobs, more extensively trained mold remediation workers may be needed.

Cleaning Methods

Non-porous materials (*e.g.* metals, glass, and hard plastics) can almost always be cleaned. Semi-porous and porous structural materials, such as wood and concrete can be cleaned if they are structurally sound. Porous materials, such as ceiling tiles and insulation, and wallboards (with more than a small area of mold growth) should be removed and discarded. Wallboard should be cleaned or removed at least six inches beyond visually assessed mold growth (including hidden areas, see ***Visual Inspection***) or wet or water-damaged areas. A professional restoration consultant should be contacted to restore valuable items that have been damaged.

Cleaning should be done using a soap or detergent solution. Use the gentlest cleaning method that effectively removes the mold to limit dust generation. All materials to be reused should be dry and visibly free from mold. Consideration should also be given to cleaning surfaces and materials adjacent to areas of mold growth for settled spores and fungal fragments. A vacuum equipped with a High-Efficiency Particulate Air (HEPA) filter could also be used to clean these adjacent areas.

Disinfectants are seldom needed to perform an effective remediation because removal of fungal growth remains the most effective way to prevent exposure. Disinfectant use is recommended when addressing certain specific concerns such as mold growth resulting from sewage waters. If disinfectants are considered necessary, additional measures to protect workers and occupants may also be required. Disinfectants must be registered for use by the United States Environmental Protection Agency (EPA). Any antimicrobial products used in a HVAC system must be EPA-registered specifically for that use.

The use of gaseous, vapor-phase, or aerosolized (*e.g.* fogging) biocides for remedial purposes is **not** recommended. Using biocides in this manner can pose health concerns for people in occupied spaces of the building and for people returning to the treated space. Furthermore, the effectiveness of these treatments is unproven and does not address the possible health concerns from the presence of the remaining non-viable mold.

Quality Assurance Indicators

Measures to ensure the quality and effectiveness of remediation should be undertaken regardless of the project size. Evaluations *during* as well as *after* remediation should be conducted to confirm the effectiveness of remedial work, particularly for large-scale remediation. At minimum, these quality assurance indicators should be followed and documented:

- The underlying moisture problem was identified and eliminated
- Isolation of the work area was appropriate and effective
- Mold removal and worksite cleanup was performed according to the site-specific plan
- Any additional moisture or mold damage discovered during remediation was properly addressed
- Upon completion of remediation, surfaces are free from visible dust and debris.
- If environmental sampling was performed, the results of such sampling were evaluated by a trained building or environmental health professional.

Restoring Treated Spaces

After completing mold remediation and correcting moisture problems, building materials that were removed should be replaced and brought to an intact and finished condition. The use of new building materials that do not promote mold growth should be considered. Anti-microbial paints are usually unnecessary after proper mold remediation. They should not be used in lieu of mold removal and proper moisture control, but may be useful in areas that are reasonably expected to be subject to moisture.

Remediation Procedures

Three different sizes of remediation and the remediation of heating, ventilation, and air-conditioning (HVAC) systems are described below. Currently, existing research does not relate the amount of mold growth to the frequency or severity of health effects. However, as the presence of moldy materials increases, so does the potential for exposure and the need to limit the spread of mold-containing dusts and worker exposures. As such, the size of the area impacted by mold growth as well as practical considerations were used to help define remedial procedures.

Since the following areas were arbitrarily selected, site-specific conditions must be considered in choosing adequate remediation procedures. For more information on the unique characteristics of building types and occupancies that may influence remediation procedures refer to the American Industrial Hygiene Association's publication, "Recognition, Evaluation, and Control of Indoor Mold.

Small Isolated Areas (less than 10 square feet) – *e.g.* ceiling tiles, small areas on walls

(a) Remediation can be conducted by trained building maintenance staff. Such persons should receive training on proper cleaning methods, personal protection, and potential health hazards associated with mold exposure. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

(b) Respiratory protection (e.g., N-95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should also be worn.

(c) The work area should be unoccupied.

(d) If work may impact difficult-to-clean surfaces or items (e.g. carpeting, electronic equipment), the floor of the work area, egress pathways, and other identified materials/belongings should be removed or covered with plastic sheeting and sealed with tape before remediation.

(e) Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or using a vacuum equipped with a HEPA filter at the point of dust generation. Work practices that create excessive dust should be avoided.

(f) Moldy materials that can be cleaned should be cleaned using a soap or detergent solution. Materials that cannot be cleaned should be removed from the building in a sealed plastic bag(s). Plastic sheeting should be discarded after use. There are no special requirements for the disposal of moldy materials.

(g) The work area and areas used by workers for egress should be HEPA-vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) or cleaned with a damp cloth and/or mop and a soap or detergent solution.

(h) All areas should be left dry and visibly free from mold, dust, and debris. Check that other quality assurance indicators (see ***Quality Insurance Indicators***) have also been met.

Medium-Sized Isolated Areas (10 – 100 square feet)

(a) Remediation can be conducted by trained building maintenance staff. Such persons should receive training on proper cleaning methods, personal protection, and potential health hazards associated with mold exposure. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

(b) Respiratory protection (e.g., N-95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should also be worn.

(c) The work area should be unoccupied.

(d) Cover the floor, egress pathways, and items left in the work area with plastic sheeting and seal with tape before remediation.

(e) Seal ventilation ducts/grills and other openings in the work area with plastic sheeting. The HVAC system servicing this area may need to be shut down to properly seal vents.

(f) Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or

using a vacuum equipped with a HEPA filter at the point of dust generation. Work practices that create excessive dust should be avoided.

(g) Moldy materials that can be cleaned should be cleaned using a soap or detergent solution. Materials that cannot be cleaned should be removed from the building in sealed plastic bags. Plastic sheeting should be discarded after use. There are no special requirements for disposal of moldy materials.

(h) The work area and areas used by workers for egress should be HEPA-vacuumed and cleaned with a damp cloth and/or mop and a soap or detergent solution.

(i) All areas should be left dry and visibly free from mold, dust, and debris. Check that other quality assurance indicators (see ***Quality Insurance Indicators***) have also been met.

Large Areas (greater than 100 square feet in a contiguous area) – *e.g.* on separate walls in a single room.

Properly trained and equipped mold remediation workers should conduct the remediation. The presence of a trained building or environmental health professional (see ***Environmental Assessment***) to provide oversight during remediation may be helpful to ensure quality work and compliance with the work plan. The following procedures are recommended:

(a) Personnel trained in the handling of mold-damaged materials equipped with:

i. A minimum of half-face elastomeric respirators with P-100 filters used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134)
ii. Full body coveralls with head and foot coverings
iii. Gloves and eye protection

(b) Containment of the affected area:

i. The HVAC system servicing this area should be shut down during remediation.
ii. Isolation of the work area using plastic sheeting sealed with duct tape. Furnishings should be removed from the area. Ventilation ducts/grills, any other openings, and remaining fixtures/furnishings should be covered with plastic sheeting sealed with duct tape.
iii. Consider using an exhaust fan equipped with a HEPA filter to generate negative pressurization.
iv. Consider using airlocks and a clean changing room.
v. Egress pathways should also be covered if a clean changing room is not used.

(c) The work area should be unoccupied.

(d) Efforts should be made to reduce dust generation. Dust suppression methods particularly during any cutting or resurfacing of materials are highly recommended. Methods to consider include: cleaning or gently misting surfaces with a dilute soap or detergent solution prior to removal; the use of High-Efficiency Particulate Air (HEPA) vacuum-shrouded tools; or

using a vacuum equipped with a HEPA filter at the point of dust generation. Work practices that create excessive dust should be avoided.

(e) Moldy materials, that can be cleaned, should be cleaned using a soap or detergent solution. Materials that cannot be cleaned should be removed from the building in sealed plastic bags. The outside of the bags should be cleaned with a damp cloth and a soap or detergent solution or HEPA-vacuumed in the work area (or clean changing room) prior to their transport to unaffected areas of the building. There are no special requirements for the disposal of moldy materials.

(f) Before leaving isolated areas, workers should remove disposable clothing to prevent the tracking of mold-containing dusts outside of the work area.

(g) The work area and egress pathways (and clean changing room if present) should be HEPA-vacuumed and cleaned with a damp cloth and/or mop with a soap or detergent solution and be visibly clean prior to the removal of isolation barriers. Plastic sheeting should be discarded after use.

(h) All areas should be left dry and visibly free from mold, dust, and debris. Check that other quality assurance indicators (see ***Quality Insurance Indicators***) have also been met.

2.4 Conclusions and Recommendations

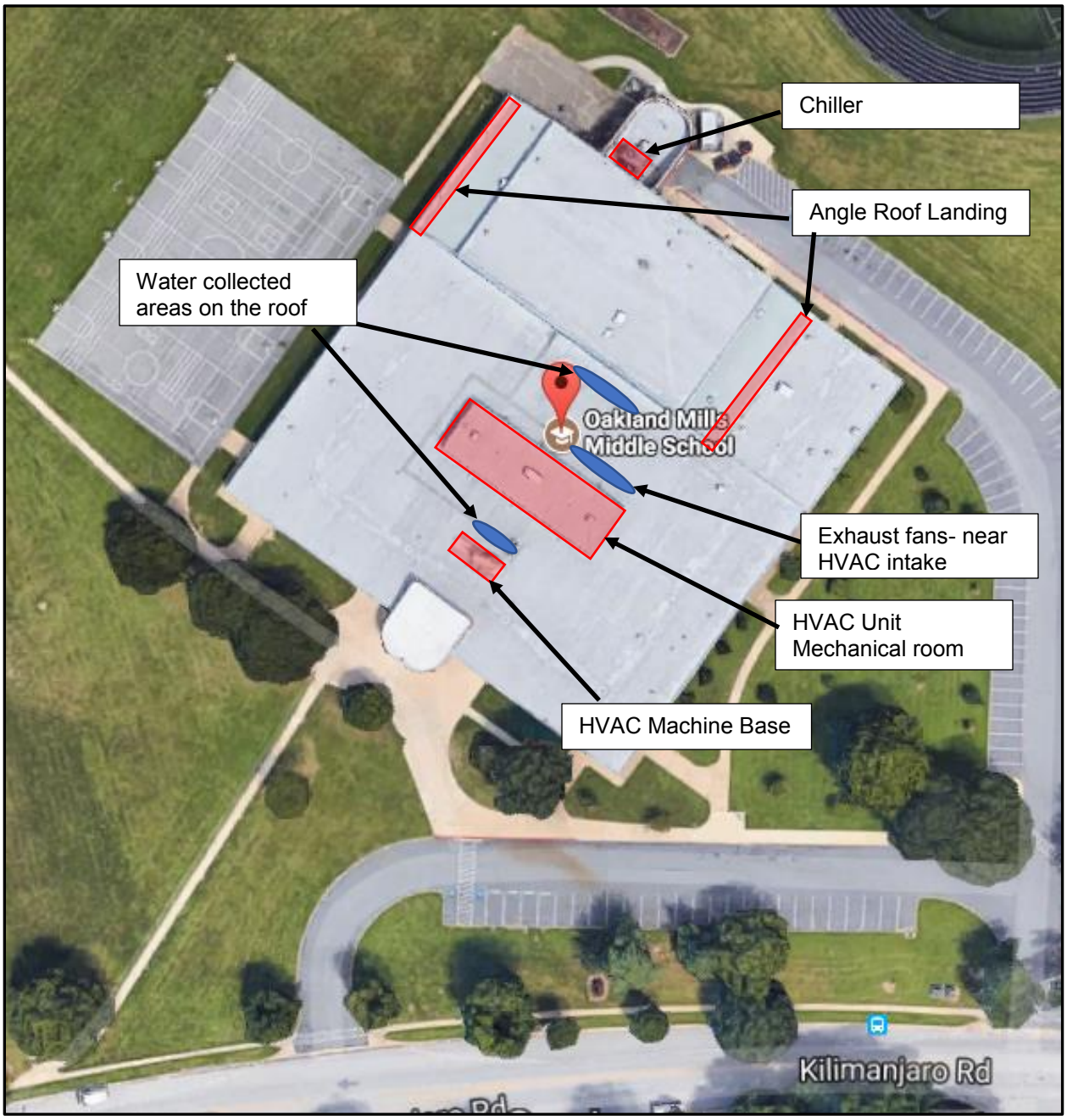
Based on observations and information received from the school officials, suspected mold growth and water intrusion events are minimum. All the locations with suspected mold growth has been determined the result of elevated relative humidity and a result of collected water for long time period.

The following are recommended and considered good indoor environmental quality practices that may prevent, reduce and/or improve indoor environmental concerns in general.

1. Cleanup on suspected mold growth areas following specifications described in section 2.3.

2. Mechanical engineer(s) are evaluating the HVAC systems serving the school to ensure operation will control summer humidity levels within ASHRAE guidelines.

Appendix A: Affected Area Locations on the Roof


Chiller
Angle Roof Landing
Water collected areas on the roof
Oakland Mills Middle School
Exhaust fans- near HVAC intake
HVAC Unit Mechanical room
HVAC Machine Base
Kilimanjaro Rd

Appendix B: Photos Catalog

Photo 1: AC diffuser from inside a room

Photo 2: AC diffuser from above the ceiling

Photo 3: Suspected mold growth on AC diffuser

Photo 4: Suspected mold growth on Pipe insulations in HVAC machine room

Photo 5: Suspected mold growth on Pipe insulations in HVAC machine room

Photo 6: Suspected mold growth on HVAC machine base area

Photo 7: Suspected mold growth on Pipe insulations in HVAC machine room

Photo 8: Suspected mold growth on Pipe insulations in HVAC machine room

Photo 9: Suspected mold growth on pipe insulations in HVAC machine room

Photo 10: Suspected mold growth on pipe insulations in HVAC machine room

Photo 11: Suspected mold growth on the roof

Photo 12: Suspected mold growth on the roof

Photo 13: Suspected mold growth on the roof

Photo 14: Suspected mold growth on angle roof landing area

Photo 15: Suspected mold growth on HVAC machine base area

Photo 16: Representative location for roof flashing joint cracks

Photo 17: Cracked sealant at the roof penetration point area

Photo 18: Roof penetration point where signs of water intrusion