Investigation of Mould Growth

Cabins 2-5, 7 and 8
1228 Grass Lake Road, Haliburton, Ontario

Prepared for:

Fleming College
599 Brealey Drive
Peterborough, Ontario, K9J 7B1

October 4, 2021

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1.0 INTRODUCTION AND SCOPE

1.1 Statement of Understanding

Pinchin Ltd. (Pinchin) was retained by Fleming College (Client) to conduct an investigation of potential mould growth at 1228 Grass Lake Road, Haliburton, Ontario. An investigation was competed in two cabins in August and they were found to be impacted. The Client has requested the remaining cabins on site be checked for mould for due diligence.

1.2 Scope of Work

Pinchin performed the investigation on September 9 and 10, 2021. The investigation addressed all accessible areas of the cabins.

The investigation involved the following activities within each cabin:

- Review of occupant and management concerns.
- Spot readings of moisture content of building materials.
- Walkthrough inspection for water damage or mould growth.
- Collection and analysis of eight spore trap mould air samples (including reference and field blanks).

2.0 METHODOLOGY

2.1 Interviews and Site Reviews

Pinchin interviewed building staff, to discuss the history of the cabins, maintenance practices, water damage and any indoor air quality complaints.

Pinchin performed a walkthrough site review for indications of suspect mould growth and/or water damage on accessible building materials, paying particular attention to areas where past water damage had been reported.

The investigator did not perform any destructive work to inspect concealed conditions inside wall and/or ceiling cavities.

The investigator used a moisture meter to test for elevated moisture levels in building materials.

This assessment does not provide sufficient detail for long term management of hazardous materials as required by Health and Safety regulations.

2.2 Test Methods and Criteria

The following table presents the parameters tested in this investigation, recommended limits or interpretation guides, the units of measurement, and the instruments and sampling/analytical methods employed.

Table I – Parameters Tested, Recommended Limits and Instruments or Methods Used

Parameter	Unit of Measurement	Recommended Limit or Guide to Interpretation	Instrumentation or Test Method
Temperature, T	°C	Consider the risk of condensation on cold surfaces to prevent mould growth	System Delmhorst® HT-3000
Relative Humidity, RH	%RH	Maintain long term below 80 %, to prevent mould growth[1]	
Moisture in building materials (Note: detects surface moisture only, may not detect deeper moisture)	% Moisture	Threshold for mould growth:[2] Drywall, 0.7% Wood materials, 17%	System Delmhorst® BD-2*100*
Airborne mould (spore trap method)	Spores per cubic metre of air	Compare test area to reference areas and outdoors[3] Consider water-damage indicator moulds Reference results of Pinchin Ambient Mould Index (PAMI)	Allergenco-D® sampler, laboratory analysis by Direct Microscope Examination

All air sampling pumps were calibrated before and after use.

2.3 Laboratory Analysis

The analysis for mould was performed at the Pinchin Environmental Microbiology Laboratory, Mississauga. The Pinchin laboratory is independently accredited to ISO/IEC 17025:2017 for mould and

1 O.A.G. Adan, R.A. Samson (Editors): *Fundamentals of Mold Growth in Indoor Environments and Strategies for Healthy Living*. Wageningen, The Netherlands: Wageningen Academic Publishers, 2011
2 Macher, J. (Ed): *Bioaerosols, Assessment and Control*. Cincinnati OH: American Conference of Governmental Industrial Hygienists, 1999.
3 Health Canada: *Fungal Contamination in Public Buildings: Health Effects and Investigation Methods*. Ottawa ON: Health Canada, 2004.

bacteria analysis, by the American Industrial Hygiene Association Laboratory Accreditation Program LLC (AIHA LAP LLC) (Lab ID 158835)[4] and the Quebec government (Lab ID 495).[5]

The spore trap mould air sample results include a report from the Pinchin Ambient Mould Index database (PAMI) ©. PAMI is a compilation of over 36,000 outdoor spore trap mould air samples analysed in the Pinchin laboratory, since 2006. The database has been analysed by month and region (18 regions across Canada) to report statistical data on means, medians, confidence intervals, etc. As a measure of the ranges in outdoor mould concentrations, the PAMI data can assist in the interpretation of indoor mould air sample results.

3.0 FINDINGS

3.1 Results of Interviews

Physical Resources Department reported the following:

- Cabins 7 and 8 have a crawl space below in which they know have dead mice that could be impacting indoor air quality of unit.
- Cabin 5 is not in use because the deck is rotting.
- Cabin 5 windows do not have any insulation factor to them, just a glass sliding panel.
- Cabin 4 has ice accumulation inside yearly by the door near the kitchenette.
- Cabin 2 is not weatherproofed, windows tend to ice up as there is no insulation factor to them.

3.2 Facility Description

Table II – Facility Description Cabin 2

Item	Details
Construction Date	~1980s
Number of Floors	Two Storeys
Area of Building	1,000 square feet
Structural Type	Wooden frame
Foundation Type	Concrete

4 Accredited by the American Industrial Hygiene Association Laboratory Accreditation Program LLC (AIHA LAP LLC) under the Environmental Microbiology Laboratory Accreditation Program (EMLAP), for Bulk, Surface and Air testing for moulds, Escherichia coli, Legionella by the ISO 11731 method and for Legionella pneumophila by qPCR ISO 12869 method (Lab ID 158835).
5 Accredited by the Quebec government under the Programme d'accreditation des laboratoires d'analyses (PALA) program for Air Microbiology – domains 601, 603, 604, 605, 606.

Table II – Facility Description Cabin 2

Item	Details
Exterior Cladding	Wood siding
HVAC	N/A
Roof	Not assessed – sloped asphalt shingled
Flooring	Carpet, wood, and linoleum
Interior Walls	Drywall
Ceilings	Drywall and 1’ x 1’ ceiling tiles
Pertinent Exterior Details	None.

Table III – Facility Description Cabin 3, 4 and 5

Item	Details
Construction Date	~1980s
Number of Floors	One Storey
Area of Building	750 square feet
Structural Type	Wooden frame
Foundation Type	Concrete
Exterior Cladding	Wood siding
HVAC	N/A
Roof	Not assessed – sloped asphalt shingled
Flooring	Carpet, wood, and linoleum
Interior Walls	Drywall and wood fibre panelling
Ceilings	1’ x 1’ glue on ceiling tile
Pertinent Exterior Details	Some of the wood siding appears to be rotting.

Table IV – Facility Description Cabin 7 and 8

Item	Details
Construction Date	~1980s
Number of Floors	One Storey
Area of Building	~500 square feet

Table IV – Facility Description Cabin 7 and 8

Item	Details
Structural Type	Wooden frame
Foundation Type	Concrete
Exterior Cladding	Wood siding
HVAC	N/A
Roof	Not assessed – sloped asphalt shingled
Flooring	Wood, vinyl
Interior Walls	Drywall, ceramic tiles and wood fibre panelling
Ceilings	Drywall
Pertinent Exterior Details	None.

All cabins were built at a time when asbestos containing building materials were commonly used.

3.3 Results of Site Reviews and Testing

This section presents the findings of the walkthrough investigation and any tests for mould. Appendix I presents the drawings. The analytical certificates for the mould tests are given in Appendix II.

Table V – Cabin 2

Temperature	17.8 °C	Extent of Mould Growth	0 ft²
Relative Humidity	67.2 %RH	Extent of Water Damage Including Mould Growth	20 ft²

Photo 1 - Cabin 2, 1225 Grass Lake Road.

Photo 2 - Faint water staining identified on ceiling tiles.

Table V – Cabin 2

Photo 3 - Previous water damage identified in washroom; drywall is dry.

Photo 4 - Typical cracking identified in bedrooms on second floor.

Moisture Measurements

Material/Location	Results	Material	Results
Drywall wall/ Kitchen	0.2% -- DRY	Drywall wall/ Kitchen	0.2% -- DRY
Drywall wall/ Kitchen	0.2% -- DRY	Drywall wall/ Living Area	0.4% -- DRY
Drywall wall/ Living Area	0.5% -- DRY	Drywall wall/ Living Area	0.5% -- DRY
Drywall wall/ Living Area	0.4% -- DRY	Drywall wall/ Washroom	0.5% -- DRY
Drywall wall/ Washroom	0.3% -- DRY	Drywall wall/ Bedroom 1	0.4% -- DRY
Drywall wall/ Bedroom 1	0.4% -- DRY	Drywall wall/ Bedroom 2	0.4% -- DRY
Drywall wall/ Bedroom 2	0.4% -- DRY	Drywall wall/ Bedroom 2	0.4% -- DRY
Drywall wall/ Bedroom 3	0.4% -- DRY	Drywall wall/ Bedroom 3	0.4% -- DRY
Drywall wall/ Bedroom 3	0.4% -- DRY		

Sample Log

Sample Type/ Location	Sample No.	Result
Airborne Mould Spore Trap/ Living Area	ST-06	Impacted

Observations and Comments

11 water damaged ceiling tiles were identified within the living area, staining is very faint. Water damage was observed by the toilet in the washroom on drywall and baseboard. Drywall in bedrooms 2 and 3 have cracks which could be due to building shifting or past water damage.

Table VI – Cabin 3

Temperature	18.3 °C	Extent of Mould Growth	5 ft²
Relative Humidity	65.6 %RH	Extent of Water Damage Including Mould Growth	15 ft²

Photo 5 - Cabin 3, 1225 Grass Lake Road.

Photo 6 - Wet drywall identified behind toilet in washroom.

Moisture Measurements

Material/ Location	Results	Material	Results
Drywall wall/ Living Area	0.6% -- DRY	Drywall wall/ Living Area	0.5% -- DRY
Drywall wall/ Living Area	0.5% -- DRY	Drywall wall/ Living Area	0.4% -- DRY
Drywall wall/ Living Area	0.5% -- DRY	Drywall wall/ Washroom	0.7% -- WET
Drywall wall/ Washroom	0.5% -- DRY	Drywall wall/ Bedroom 3	0.4% -- DRY
Drywall wall/ Bedroom 2	0.4% -- DRY	Drywall wall/ Bedroom 2	0.4% -- DRY
Drywall wall/ Bedroom 1	0.4% -- DRY	Drywall wall/ Bedroom 1	0.4% -- DRY

Sample Log

Sample Type/Location	Sample No.	Result
Airborne Mould Spore Trap/ Living Area	ST-05	Not impacted

Observations and Comments

Wet drywall was identified by the toilet in the washroom of cabin, and the baseboard appears to be growing mould.

Table VII – Cabin 4

Temperature	19.3 °C	Extent of Mould Growth	6 ft²
Relative Humidity	72.3 %RH	Extent of Water Damage Including Mould Growth	70 ft²

Photo 7 - Cabin 4, 1225 Grass Lake Road.

Photo 8 - Rotting wood panelling exterior of cabin.

Photo 9 - Typical water staining identified on 1' x 1' tiles in various locations throughout the cabin.

Photo 10 - Water damage to full height of drywall by kitchenette.

Photo 11 - Water damage identified behind radiator in washroom.

Photo 12 - Water staining identified in vapour barrier through access hatch.

Table VII – Cabin 4

Moisture Measurements			
Material/ Location	**Results**	**Material**	**Results**
Drywall wall/ Living Area	0.6% -- DRY	Drywall wall/ Living Area	0.6% -- DRY
Drywall wall/ Living Area	0.6% -- DRY	Drywall wall/ Living Area	0.6% -- DRY
Drywall wall/ Living Area	0.8% -- WET	Drywall wall/ Washroom	1.8% -- WET
Drywall wall/ Bedroom 3	0.6% -- DRY	Drywall wall/ Bedroom 2	0.5% -- DRY
Drywall wall/ Bedroom 2	0.6% -- DRY	Drywall wall/ Bedroom 1	0.5% -- DRY
Drywall wall/ Bedroom 1	0.6% -- DRY		
Sample Log			
Sample Type/Location		**Sample No.**	**Result**
Airborne Mould Spore Trap/ Living Area		ST-04	Not impacted
Observations and Comments			
Musty odour was observed upon entry. Twenty eight water damaged ceiling tiles were identified in various locations throughout the cabin. Wet drywall was identified in the washroom (~15 square feet on exterior wall) and ~6 square feet of mould growth identified in washroom by shower. The drywall in the living area is wet by the door to full height by kitchenette (~15 square feet). Wood panelling on cabin exterior appears o be rotting.			

Table VIII – Cabin 5

Temperature	16.3 °C	Extent of Mould Growth	6 ft²
Relative Humidity	68.0 %RH	Extent of Water Damage Including Mould Growth	75 ft²

Photo 13 - Cabin 5, 1225 Grass Lake Road.

Photo 14 - Typical water staining identified on 1' x 1' tiles in various locations throughout the cabin.

Table VIII – Cabin 5

Photo 15 - Mould growth identified on drywall in living area.

Photo 16 - Wet drywall identified in Living area.

Moisture Measurements

Material/ Location	Results	Material	Results
Drywall wall/ Living Area	0.4% -- DRY	Drywall wall/ Living Area	0.7% -- WET
Drywall wall/ Living Area	1.1% -- WET	Drywall wall/ Living Area	0.4% -- DRY
Drywall wall/ Living Area	1.3% -- WET	Drywall wall/ Living Area	0.7% -- WET
Drywall wall/ Washroom	0.9% -- WET	Drywall wall/ Washroom	0.7% -- WET
Drywall wall/ Bedroom 3	0.5% -- DRY	Drywall wall/ Bedroom 2	0.3% -- DRY
Drywall wall/ Bedroom 2	0.4% -- DRY	Drywall wall/ Bedroom 1	0.3% -- DRY
Drywall wall/ Bedroom 1	0.4% -- DRY		

Sample Log

Sample Type/Location	Sample No.	Result
Airborne Mould Spore Trap/ Living Area	ST-03	Impacted

Observations and Comments

Musty odour was observed upon entry. Twenty one water damaged ceiling tiles were identified in various locations throughout the cabin. Approximately 6 square feet of mould growth identified on drywall wall and ~25 square feet of wet drywall identified in living area. Approximately 20 square feet of wet drywall identified in washroom.

Table IX – Cabin 7

Temperature	17.9 °C	Extent of Mould Growth	0 ft²
Relative Humidity	64.2 %RH	Extent of Water Damage Including Mould Growth	0 ft²

Photo 17 - Cabin 7, 1225 Grass Lake Road.

Photo 18 - Organic growth on exterior wood siding below window.

Moisture Measurements

Material/ Location	Results	Material	Results
Drywall wall/ Living Area	0.5% -- DRY	Drywall wall/ Living Area	0.5% -- DRY
Drywall wall/ Living Area	0.5% -- DRY	Drywall wall/ Living Area	0.6% -- DRY
Drywall wall/ Bedroom 3	0.4% -- DRY	Drywall wall/ Bedroom 3	0.4% -- DRY
Drywall wall/ Washroom	0.4% -- DRY	Drywall wall/ Closet	0.4% -- DRY
Drywall wall/ Closet	0.5% -- DRY		

Sample Log

Sample Type/Location	Sample No.	Result
Airborne Mould Spore Trap/ Living Area	ST-02	Impacted

Observations and Comments

Organic growth on exterior of cabin, no mould or wet materials identified during inspection, intrusive inspection could help identify why spore count is elevated within.

Table X – Cabin 8

Temperature	19.6 °C	Extent of Mould Growth	5 ft²
Relative Humidity	61.6 %RH	Extent of Water Damage Including Mould Growth	55 ft²

Photo 19 - Cabin 8 at 1225 Grass Lake Road.

Photo 20 - Example of water staining coming through the drywall in various locations.

Photo 21 - Water staining on floor and mouse droppings in pump room.

Photo 22 - Organic growth and water staining on drywall in pump room connected to washroom.

Moisture Measurements

Material/ Location	Results	Material	Results
Drywall wall/ Living Area	0.5% -- DRY	Drywall wall/ Living Area	0.6% -- DRY
Drywall wall/ Living Area	0.6% -- DRY	Drywall wall/ Living Area	0.4% -- DRY
Drywall wall/ Bedroom 3	0.6% -- DRY	Drywall wall/ Bedroom 3	0.6% -- DRY
Drywall wall/ Bedroom 3	0.3% -- DRY	Drywall wall/ Pump Room	0.7% -- WET

Table X – Cabin 8

Sample Log		
Sample Type/Location	**Sample No.**	**Result**
Airborne Mould Spore Trap/ Living Area	ST-01	Impacted
Observations and Comments		
Musty odour was observed upon entry. Water staining present on drywall ceiling in the bedroom and living area. Pump room has water staining on the floor, mouse droppings and mould growth identified on the drywall wall connected to the washroom.		

Table XI – Outdoors

Temperature	17.9 °C	
Relative Humidity	73.4 %RH	
Sample Type/Location	**Sample No.**	
Mould Air Sample	ST-07	
Observations and Comments		
Day of spore trap sampling it was raining periodically.		

Photo 23 - 1255 Grass Lake Road.

3.4 Summary of Hazardous Materials

Based on our investigation, the following is a summary of the designated substances, limited to the materials impacted the water damage.

3.4.1 Asbestos

Drywall and joint compound should be tested for asbestos, otherwise presume it contains and follow Type 2 procedures.

Ceiling tiles are constructed of wood fibre and are non-asbestos.

3.4.2 Lead

Paint should be sampled for lead, paint is presumed to have elevated levels of lead until proven otherwise.

3.4.3 Silica

Crystalline silica is a presumed component of concrete, masonry, mortar, ceramic tiles, grout and plaster.

3.4.4 Mercury

Materials that could contain mercury are not impacted by the remediation work.

3.4.5 Polychlorinated Biphenyls

Materials that could contain PCBs are not impacted by the remediation work.

4.0 DISCUSSION

4.1 Discussion of Water Damage and Mould Growth

Water damaged materials were identified in Cabin 2, consisting of 11 faintly water damaged ceiling tiles and ~8 square feet of water staining on baseboard and drywall by toilet in the washroom. Cracking of drywall was identified in both bedrooms on upper level.

Wet materials and mould growth were identified in Cabin 3, consisting of ~15 square feet of wet drywall and ~5 square feet of mould growth in the washroom.

Water damage, mould growth and wet materials were identified in Cabin 4, consisting of 28 water damaged ceiling tiles, ~15 square feet of wet drywall in the washroom, ~15 square feet of wet drywall in the living area and ~6 square feet of mould in the washroom by the shower.

Water damage, mould growth and wet materials were identified in Cabin 5, consisting of 21 water damaged ceiling tiles, ~20 square feet of wet drywall in the washroom, ~25 square feet of wet drywall in the living area and ~6 square feet of mould in the living area.

Cabin 7 had organic growth/rotting identified on the exterior siding of the cabin.

Water damage, mould growth and wet materials were identified in Cabin 8, consisting of ~10 square feet of water stained ceiling within the unit, ~20 square feet of water staining on floor of pumproom, ~2 square feet of water staining on pump room wall with ~5 square feet of mould growth. Rodent feces were also identified in the pump room.

The mould air sampling in Cabins 2, 5, 7 and 8 indicated that the indoor air quality was being impacted by mould growth at the time of testing. The air sample results from Cabins 3 and 4 indicated no impact on air quality. The Client may want to consider an intrusive investigation of Cabin 7 as the air sample result indicated that air quality was impacted but no mould growth was found.

The water damage and mould growth and wet materials identified in this investigation was likely caused by running toilets, poor shower practices, building envelope issues and/or lack of insulation.

The spot measurements of relative humidity ranged from 61.6 to 72.3 %RH. The outdoor relative humidity averaged 73.4 %RH. Authorities recommend that long-term interior relative humidity be maintained below 80 %RH at all locations to avoid mould growth.

4.2 Mould Remediation and Site Reviews

Mould growth in buildings can be a risk factor for adverse health effects.[6] The mould growth found in this investigation should be remediated as soon as possible following currently accepted procedures. Pinchin recommends that mould remediation follow the procedures set by the Environmental Abatement Council of Canada (EACC).[7] The work should be performed by a contractor with appropriate training, experience and insurance coverage. Ensure that remaining building materials are dry prior to reinstating mould-susceptible finishes, to prevent future mould growth.

Pinchin would be pleased to provide project management services to develop a remediation work plan and retain a specialized environmental abatement contractor. Pinchin could conduct a competitive bidding process to achieve the lowest possible price for the work. Proceeding in this manner will relieve the Client from taking on regulatory responsibility for contractor health and safety, and will reduce the risk of poor contractor performance and possible cross-contamination. Pinchin recommends that the Client retain services for project management, as well as for inspection and testing of this project. Health Canada and other authorities recommend independent inspection of medium and large scale mould remediation, to protect the occupants and building from cross-contamination.

The presence of asbestos is possible based on age of construction. Asbestos precautions should be followed for the removal work recommended unless sampling determines that asbestos is not present in the materials to be remediated.

4.3 Communication and Interim Risk Management

The findings of this report should be communicated to the occupants as recommended by current mould guidelines, and in workplaces, as mandated by occupational health and safety legislation. The Client should consider any interim risk management actions that would be appropriate under the circumstances, until the mould growth can be remediated. Interim risk management might include isolating an area of the building, or relocating persons experiencing adverse health effects or with greater sensitivity to mould.

6 US Environmental Protection Agency: *Mold Remediation in Schools and Commercial Buildings*. US EPA. 2001.
7 Environmental Abatement Council of Canada: *Mould Abatement Guidelines*. Toronto, ON: EACC, 2021.

5.0 RECOMMENDATIONS

Pinchin offers the following recommendations to improve air quality in these buildings and address any mould growth or other microbial contamination found. Pinchin would be pleased to assist with further investigations indicated by this investigation, make recommendations for remediation contractors, and provide services for the planning and review of the recommended remediation work.

1. Communicate the findings of this report to the occupants, staff, joint health and safety committee, tenants.
2. Consider any necessary steps for interim risk management.
3. Arrange for the preparation of a detailed Scope of Work for the mould remediation including any required asbestos precautions and finalize a site review and oversight plan.
4. Sample suspect asbestos containing drywall joint compound prior to its removal.
5. For any cabins with water damage identified on ceiling tiles or drywall ceiling – inspect the roof and/or above ceiling to identify the cause of water damage and make any necessary repairs.
6. Consider intrusive investigation in Cabin 7 to determine source of airborne mould.
7. Arrange for the following mould remediation, following EACC Level 1 methods in conjunction with Ontario Regulation 278/05 Type 2 asbestos procedures and EACC Class 1 Lead procedures:
    a. Remove ~15 square feet of water damaged drywall ceiling in Cabin 8 where identified on drawing in Appendix I.
    b. Remove lower 2ft of wet drywall in Cabin 5 washroom (~15 square feet) where identified on drawing in Appendix I.
    c. Remove lower 4ft of wet drywall in Cabin 5 living area (~20 square feet) where identified on drawing in Appendix I.
    d. Remove lower 2ft of wet drywall in Cabin 4 living area (~15 square feet) where identified on drawing in Appendix I.
    e. Remove lower 4ft of wet drywall in Cabin 4 washroom (~15 square feet) where identified on drawing in Appendix I.
    f. Remove lower 2ft of water damaged drywall in Cabin 2 washroom (~8 square feet) where identified on drawing in Appendix I.
    g. Remove lower 3ft of mouldy drywall (~6ft) in Cabin 5 living area where identified on drawing in Appendix I.

h. Remove lower 3ft of mouldy drywall (~6ft) in Cabin 4 washroom where identified on drawing in Appendix I.

8. Arrange for the following mould remediation, following EACC Level 2 methods in conjunction with Ontario Regulation 278/05 Type 2 asbestos procedures and EACC Class 1 Lead procedures:
   a. Remove full height (~20 square feet) of water damaged and mouldy drywall in pump room of Cabin 8 where identified in drawing in Appendix I.
   b. Remove lower 4ft of wet drywall and mouldy baseboard in Cabin 3 washroom (~15 square feet) where identified on drawing in Appendix I.
9. Remove and dispose of water damaged ceiling tiles in all cabins where identified in drawings in Appendix I following EACC Level 1 methods.
10. Contact pest control to address possible issues with rodent activity in crawlspaces under Cabins 7 and 8.
11. Finalize a site review and testing plan to document the mould remediation. To confirm, Pinchin will perform site reviews at the following stages:
    a. Clean Site Preparation
    b. Post-Remediation Inspection and Air Sampling
12. Clean the floors, other building surfaces, furnishings and contents in areas immediately adjacent to the remediation work area(s), following normal custodial practices.
13. Implement drying procedures as necessary. Ensure all surfaces are dry before installation of new finishes.

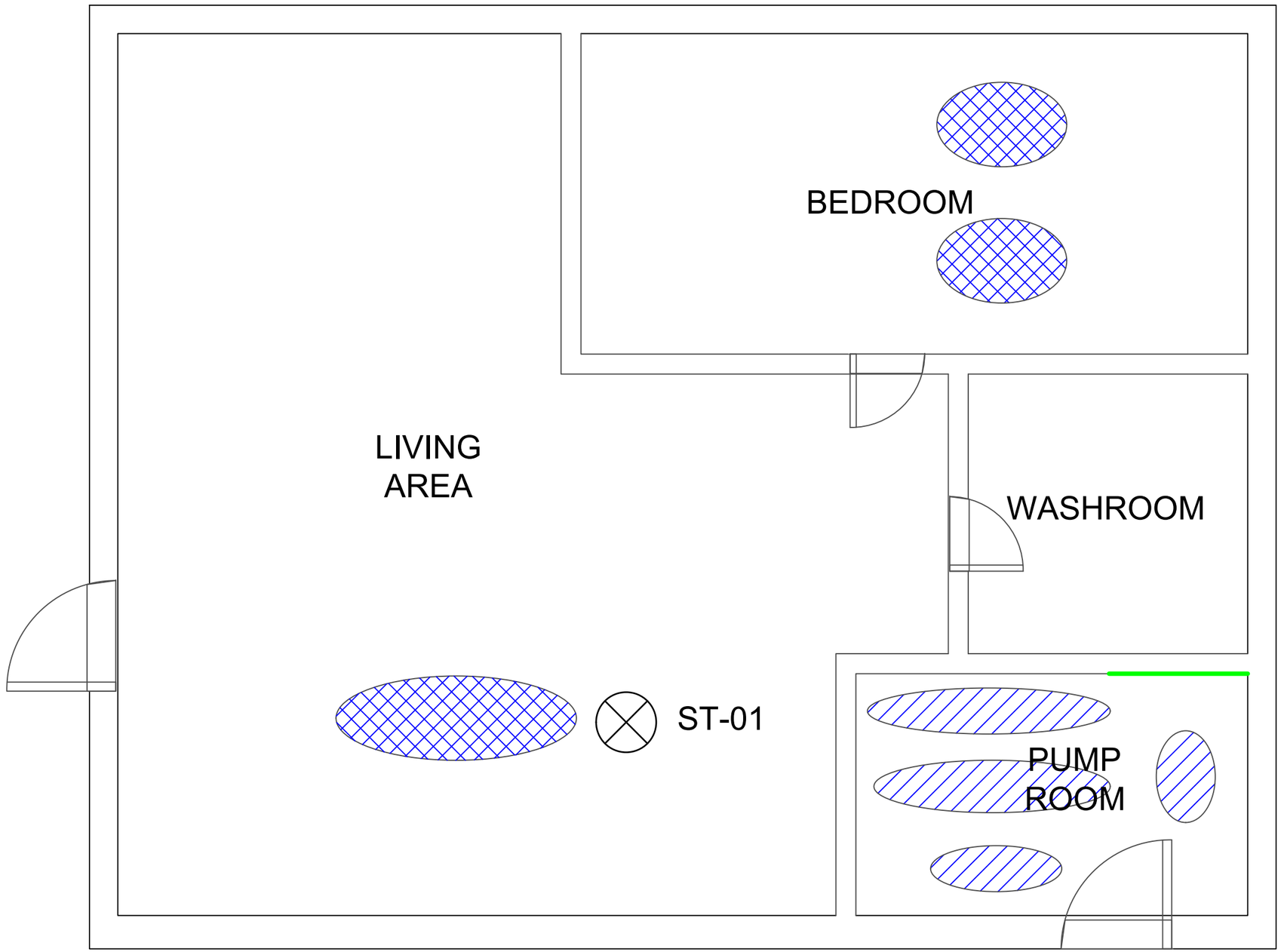
6.0 TERMS AND LIMITATIONS

This work was performed subject to the Terms and Limitations presented or referenced in the proposal for this project.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

APPENDIX I

Drawings



N

LEGEND

- WATER STAINED CEILING TILE
- MOULD GROWTH ON WALL
- WET WALL
- WATER DAMAGED MATERIALS ON WALL
- WATER STAINED FLOOR
- WATER STAINED CEILING
- SPORE TRAP MOULD AIR SAMPLE

NOT ALL KNOWN OR SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE ASBESTOS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS.

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PINCHIN

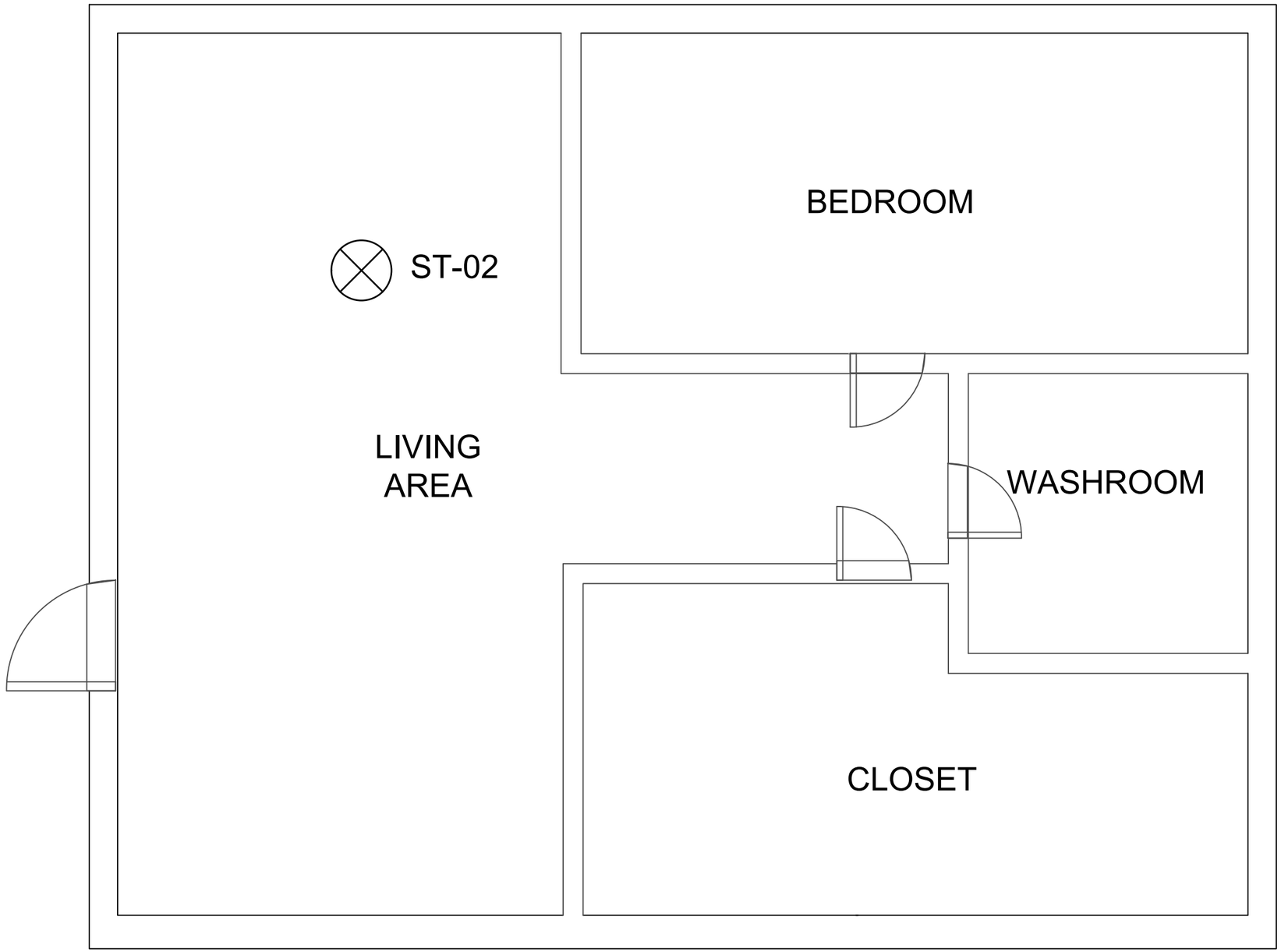
PROJECT NAME:
MOULD AND WATER DAMAGE INVESTIGATION

CLIENT NAME:
FLEMING COLLEGE

PROJECT LOCATION:
CABIN 8
1225 GRASS LAKE ROAD
HALIBURTON, ONTARIO

FIGURE NAME:
CABIN 8
GROUND FLOOR

PROJECT NUMBER:	SCALE:
296878	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
PINCHIN LTD.	PINCHIN LTD.
DATE:	FIGURE NUMBER:
SEPT 2021	1 OF 7



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PROJECT LOCATION:
CABIN 7
1225 GRASS LAKE ROAD
HALIBURTON, ONTARIO

FIGURE NAME:
CABIN 7
GROUND FLOOR

PROJECT NUMBER:	SCALE:
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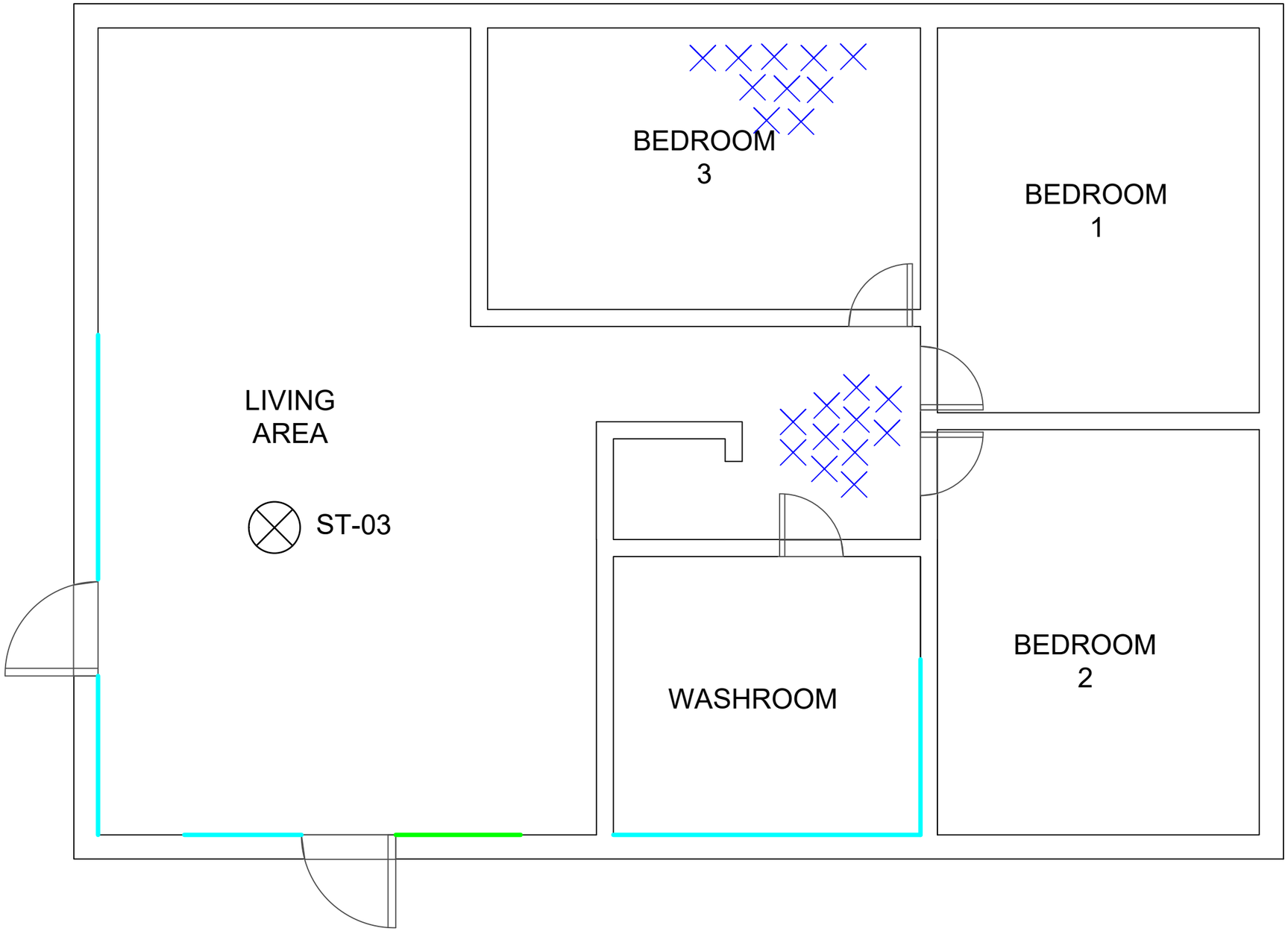
DATE: SEPT 2021	FIGURE NUMBER: 2 OF 7



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- WET WALL
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- SPORE TRAP MOULD AIR SAMPLE

NOT ALL KNOWN OR SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE ASBESTOS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS.

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

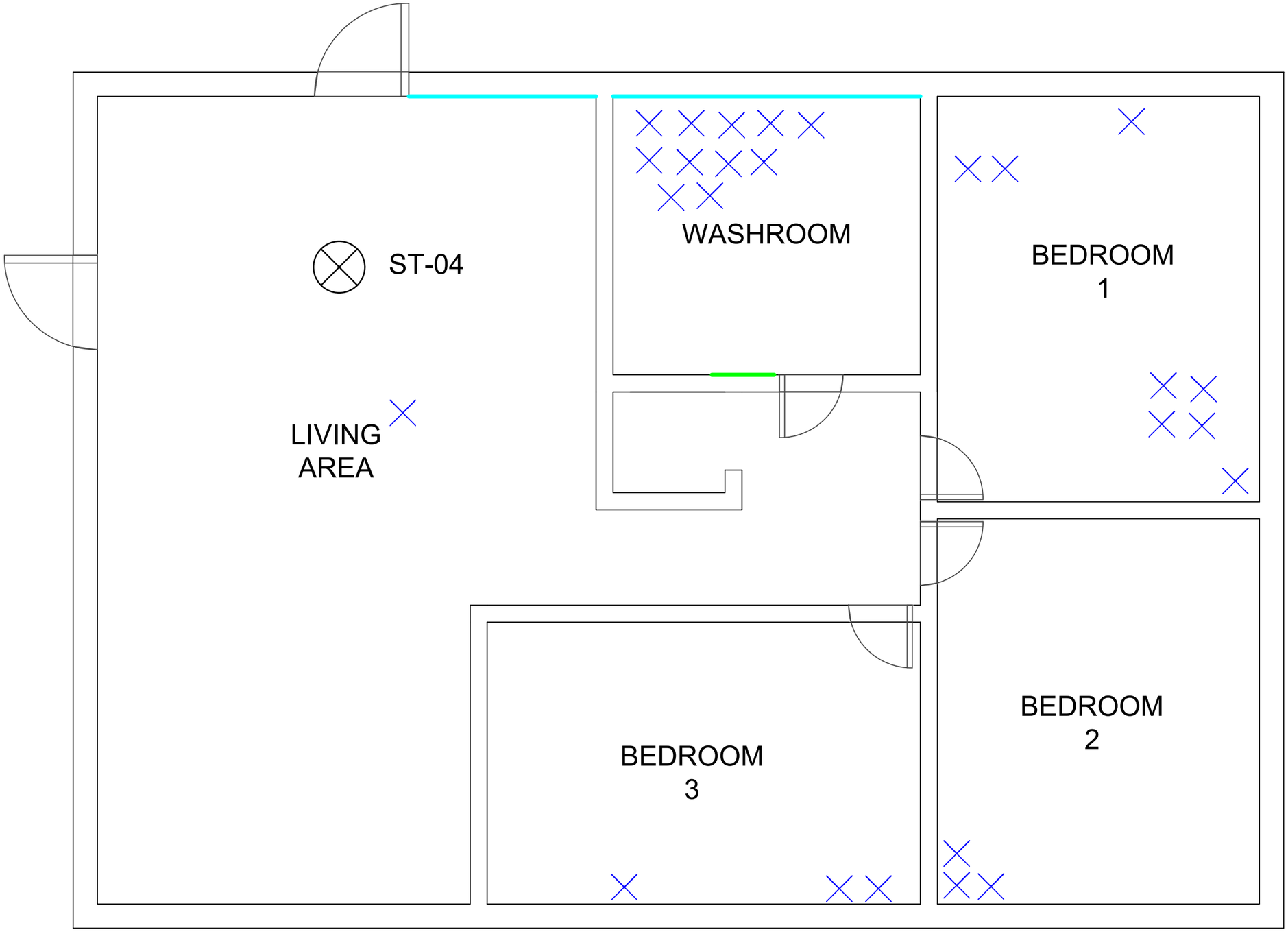
PROJECT NAME:
MOULD AND WATER DAMAGE INVESTIGATION

CLIENT NAME:
FLEMING COLLEGE

PROJECT LOCATION:
CABIN 5
1225 GRASS LAKE ROAD
HALIBURTON, ONTARIO

FIGURE NAME:
CABIN 5
GROUND FLOOR

PROJECT NUMBER:	SCALE:
296878	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
PINCHIN LTD.	PINCHIN LTD.
DATE:	FIGURE NUMBER:
SEPT 2021	3 OF 7



N

LEGEND

- WATER STAINED CEILING TILE
- MOULD GROWTH ON WALL
- WET WALL
- WATER DAMAGED MATERIALS ON WALL
- WATER STAINED FLOOR
- WATER STAINED CEILING
- SPORE TRAP MOULD AIR SAMPLE

NOT ALL KNOWN OR SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE ASBESTOS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS.

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

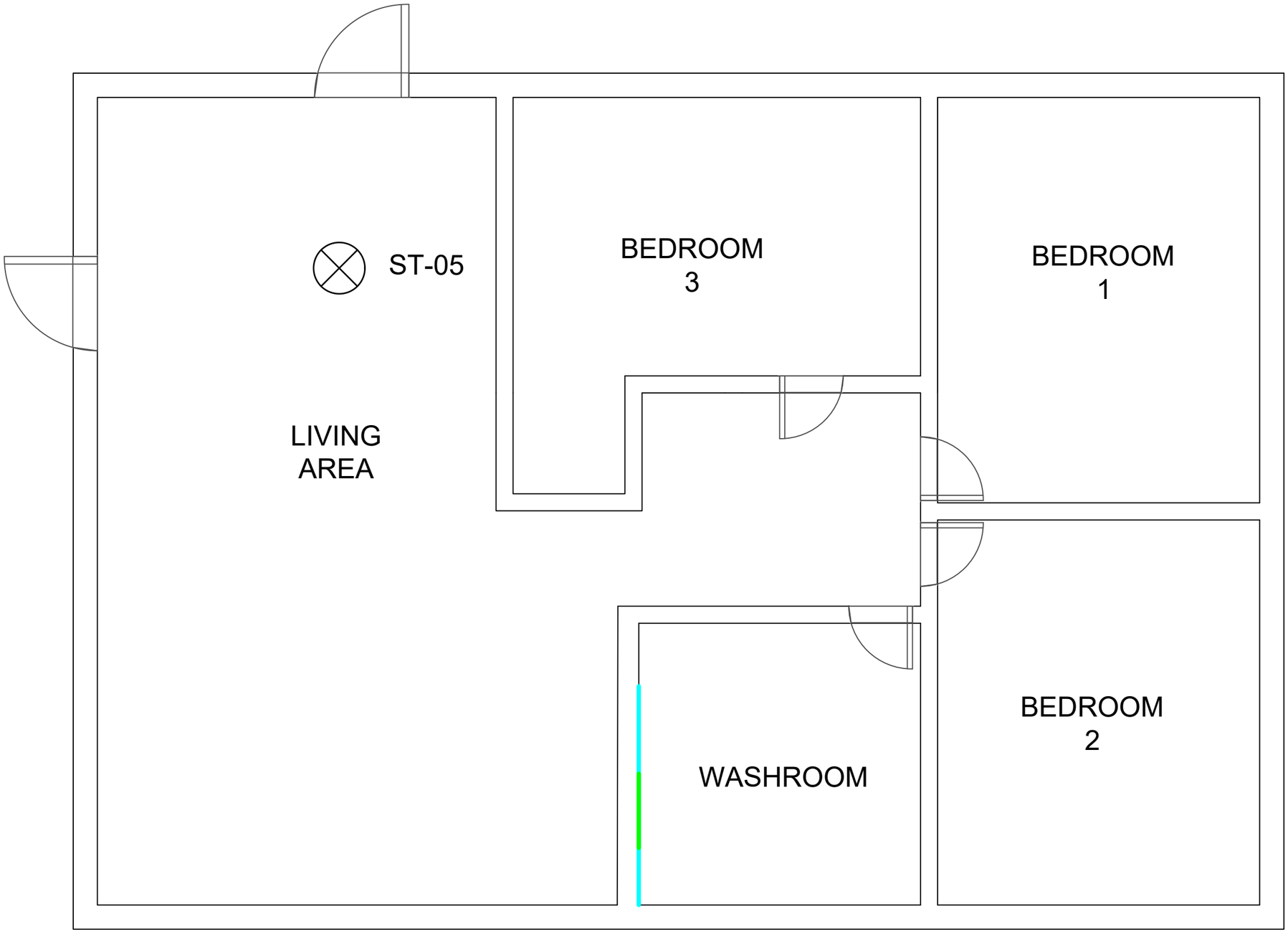
PROJECT NAME:
MOULD AND WATER DAMAGE INVESTIGATION

CLIENT NAME:
FLEMING COLLEGE

PROJECT LOCATION:
CABIN 4
1225 GRASS LAKE ROAD
HALIBURTON, ONTARIO

FIGURE NAME:
CABIN 4
GROUND FLOOR

PROJECT NUMBER:	SCALE:
296878	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
PINCHIN LTD.	PINCHIN LTD.
DATE:	FIGURE NUMBER:
SEPT 2021	4 OF 7



N

LEGEND

- WATER STAINED CEILING TILE
- MOULD GROWTH ON WALL
- WET WALL
- WATER DAMAGED MATERIALS ON WALL
- WATER STAINED FLOOR
- WATER STAINED CEILING
- SPORE TRAP MOULD AIR SAMPLE

NOT ALL KNOWN OR SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE ASBESTOS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS.

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PINCHIN

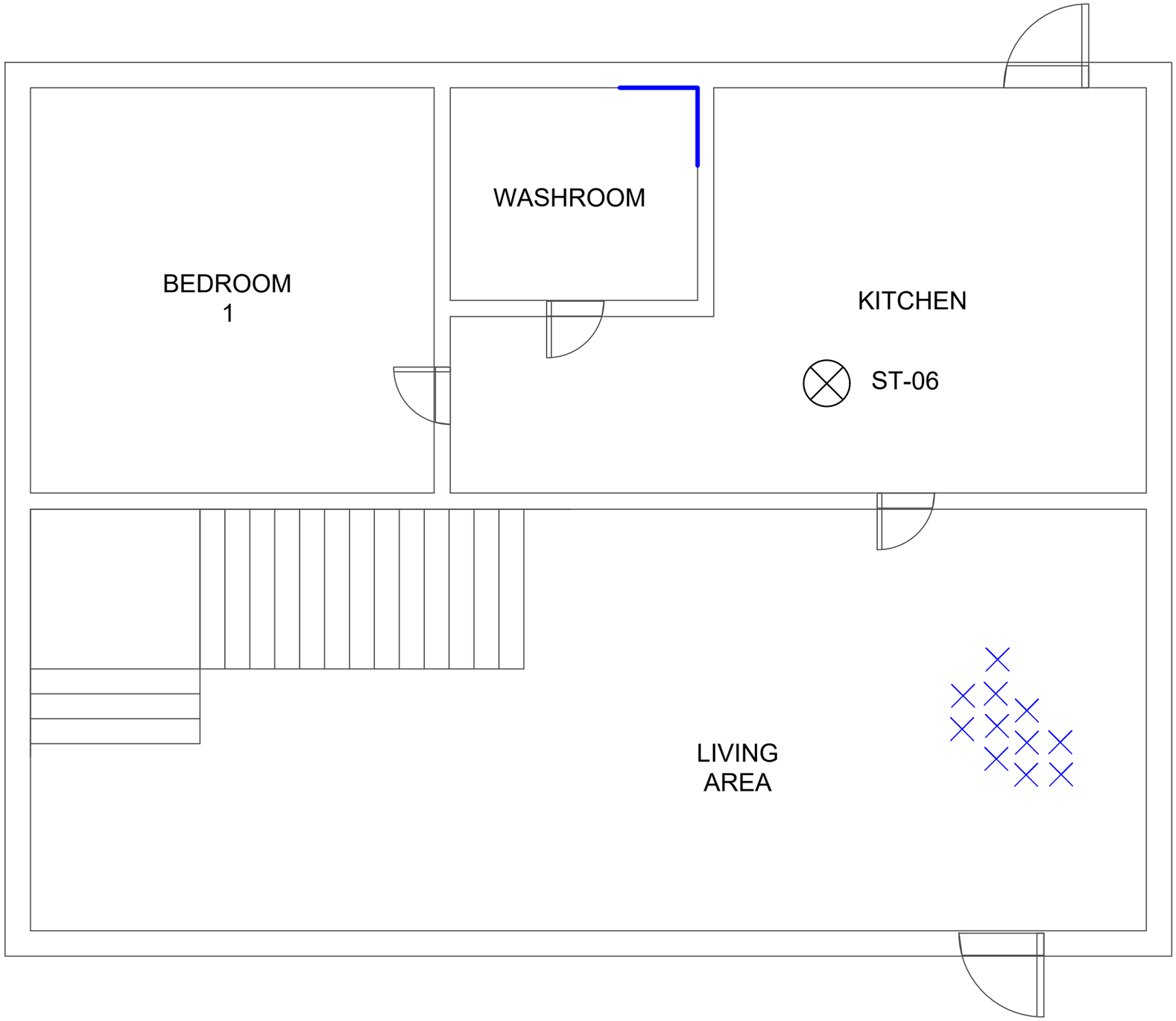
PROJECT NAME:
MOULD AND WATER DAMAGE INVESTIGATION

CLIENT NAME:
FLEMING COLLEGE

PROJECT LOCATION:
CABIN 3
1225 GRASS LAKE ROAD
HALIBURTON, ONTARIO

FIGURE NAME:
CABIN 3
GROUND FLOOR

PROJECT NUMBER:	SCALE:
296878	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
PINCHIN LTD.	PINCHIN LTD.
DATE:	FIGURE NUMBER:
SEPT 2021	5 OF 7



N

LEGEND

- WATER STAINED CEILING TILE
- MOULD GROWTH ON WALL
- WET WALL
- WATER DAMAGED MATERIALS ON WALL
- WATER STAINED FLOOR
- WATER STAINED CEILING
- SPORE TRAP MOULD AIR SAMPLE

NOT ALL KNOWN OR SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE ASBESTOS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS.

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PINCHIN

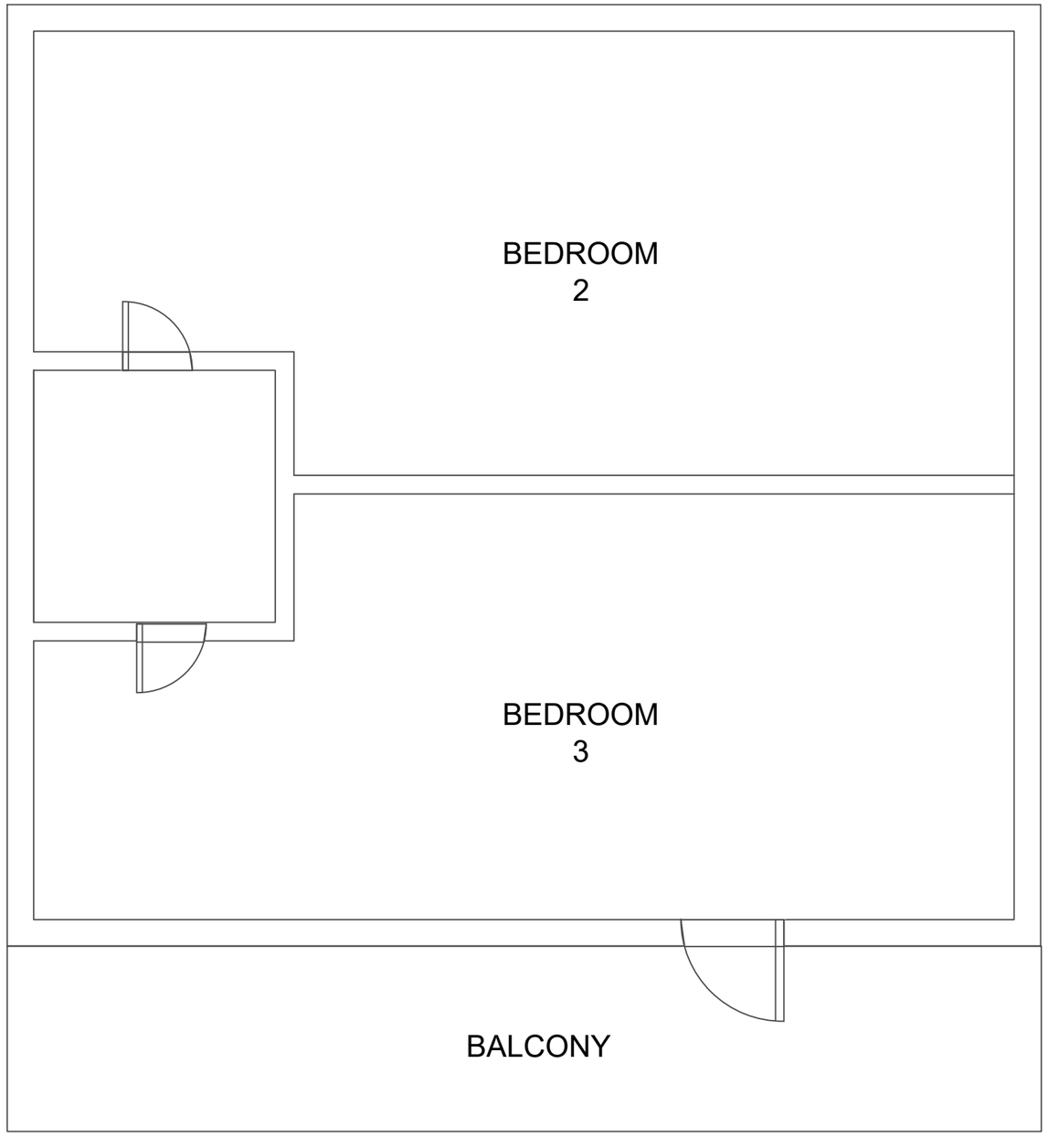
PROJECT NAME:
MOULD AND WATER DAMAGE INVESTIGATION

CLIENT NAME:
FLEMING COLLEGE

PROJECT LOCATION:
CABIN 2
1225 GRASS LAKE ROAD
HALIBURTON, ONTARIO

FIGURE NAME:
CABIN 2
GROUND FLOOR

PROJECT NUMBER:	SCALE:
296878	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
PINCHIN LTD.	PINCHIN LTD.
DATE:	FIGURE NUMBER:
SEPT 2021	6 OF 7



N

LEGEND

- WATER STAINED CEILING TILE
- MOULD GROWTH ON WALL
- WET WALL
- WATER DAMAGED MATERIALS ON WALL
- WATER STAINED FLOOR
- WATER STAINED CEILING
- SPORE TRAP MOULD AIR SAMPLE

NOT ALL KNOWN OR SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS MAY BE DEPICTED ON THE DRAWING. REFER TO THE ASBESTOS ASSESSMENT REPORT FOR A COMPLETE LIST OF KNOWN AND SUSPECTED ASBESTOS-CONTAINING BUILDING MATERIALS.

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
MOULD AND WATER DAMAGE INVESTIGATION

CLIENT NAME:
FLEMING COLLEGE

PROJECT LOCATION:
CABIN 2
1225 GRASS LAKE ROAD
HALIBURTON, ONTARIO

FIGURE NAME:
CABIN 2
SECOND FLOOR

PROJECT NUMBER:	SCALE:
296878	NOT TO SCALE
DRAWN BY:	REVIEWED BY:
PINCHIN LTD.	PINCHIN LTD.
DATE:	FIGURE NUMBER:
SEPT 2021	7 OF 7

APPENDIX II

Results of Mould Samples

PINCHIN
2470 Milltower Court
Mississauga, ON L5N 7W5
Tel: (905) 363-0678
Fax: (905) 363-0681

Certificate of Analysis

Pinchin Environmental Microbiology Laboratory

Laboratoire d'analyse accrédité par le gouvernement du Québec
Lab ID# 495
Lab ID # 156835

CUSTOMER: Meaghan Dunn
COMPANY: Pinchin Ltd.
ADDRESS: 191 Bloor St E
Oshawa, ON L1H 3M3

PROJECT NAME:
TYPE OF SAMPLES: AllergencoD
NO. OF SAMPLES: 8
DATE COLLECTED: September 9, 2021
DATE RECEIVED: September 10, 2021
DATE ANALYSED: September 17, 2021
DATE REPORTED: September 17, 2021

PROJECT NO: 296878
LAB REFERENCE NO: m258428
ANALYST: Lubov Beliakov, CMS (PhD)
Environmental Microbiologist
REVIEWER: Rafic Dulymamode, PhD
Laboratory Manager

CONDITION OF SAMPLES ON RECEIPT: Acceptable

Method of Analysis: Analysis of Air Samples for Fungal Spores (SOP: DME-SPT, Rev. 13, December 18, 2019)

This SOP is based on the method described in the AIHA's "Field Guide for the Determination of Biological Contaminants in the Environmental Samples" and also partially on the ASTM method D7391-09. The cassette slide with the trace (area impacted with air) facing upwards is fixed on a clean microscope slide. It is stained with lactophenol cotton blue or lactofuschin, and then scanned under low power magnification to locate the trace and to give the analyst an idea of the diversity of the spores. The final analysis is performed at X600 magnification by counting the different spores along a number of traverses or fields of view to cover at least 25% of the sample. A lower percentage of the sample is counted if it is overloaded. Raw counts are converted to spores/m^3 of air. Counts of fungal fragments and pollens are not computed in the total. Spores lacking unique characteristics for identification are reported as "Unidentified spores". Spores showing features of specific groups are recorded under the respective groups such as "Unidentified Basidiospores or Unidentified Ascospores". Spores occurring in chains are counted individually. Spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium*, *Paecilomyces*) are indistinguishable.

A scale of 0 to 5 is used to rate abundance of non-fungal material, with 5 indicating the largest amount. Large amounts of non-fungal material may obscure small spores. Therefore, counts from samples with 4-5 non-fungal material may be treated as undercounts. Except for blanks, samples with no detected spores are recorded as "less than the analytical sensitivity " (AS). Results are not corrected for blanks. Estimation of the measurement of uncertainty is available upon request.

Comments/Observations (if any):

Notes:
1. The laboratory is not responsible for sample collection.
2. The report applies to the samples submitted to the laboratory and, the result(s) relate only to sample(s) tested.
3. The report shall not be reproduced except in full, without written approval of the laboratory.
4. Services are subject to Pinchin Ltd. Standard Terms and Conditions for Laboratory Services.

PINCHIN
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Mississauga, ON L5N 7W5
Tel: (905) 363-0678
Fax: (905) 363-0681

Certificate of Analysis

Pinchin Environmental Microbiology Laboratory

Laboratoire d'analyse accrédité par le gouvernement du Québec
Lab ID# 495

DATE ANALYSED: September 17, 2021 **ANALYST:** Lubov Beliakov, CMS (PhD)

PROJECT NO: 296878
LAB REFERENCE NO: m258428

Customer Sample No:	ST-01			ST-02			ST-03			ST-04			ST-05			ST-06			ST-07		
Lab Sample ID:	m258428-1			m258428-2			m258428-3			m258428-4			m258428-5			m258428-6			m258428-7		
Description	Cabin 8			Cabin 7			Cabin 5			Cabin 4			Cabin 3			Cabin 2			Outdoor		
Total Air Volume (L)	150			150			150			150			150			150			150		
% of Sample Counted	4.6			18.5			18.5			25.4			13.9			25.4			4.6		
Fungal spores identified	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³
Alternaria																					
Ascospores non- specified	9	2	1300	10	2	360	11	2	400	7	7	180	28	5	1300	11	2	290	139	21	20000
Aspergillus/ Penicillium-like	400	78	58000	448	70	16000	427	84	15000	39	36	1000	25	5	1200	382	70	10000			
Basidiospores non- specified	91	18	13000	134	21	4800	59	12	2100	52	49	1400	410	80	20000	108	20	2800	488	74	70000
Botrytis																					
Chaetomium																					
Cladosporium	7	1	1000	40	6	1400	7	1	250	2	2	52	6	1	290	34	6	890			
Coprinus				2	0	72	1	0	36	2	2	52	2	0	96	1	0	26	6	1	870
Drechslera/Bipolaris Group																					
Epicoccum													1	0	48						
Fusarium																					
Ganoderma	3	1	430	3	0	110	1	0	36	3	3	79	38	7	1800	12	2	310	23	3	3300
Helicospores													1	0	48						
Non-specified spores																1	0	26			
Oidium																					
Periconia /Myxomycetes				1	0	36	1	0	36	2	2	52							6	1	870
Pithomyces																					
Polythrincium																					
Rusts																					
Stachybotrys																					
Ulocladium																					
Pollens																					
Fungal fragments							1		36				1		48	2		52			
Non-fungal material	2			1			1			2			2			2			1		
Spores/sample	510			638			507			107			511			549			662		
TOTAL SPORES/M³			74000			23000			18000			2800			25000			14000			95000
A.S. (SPORES/M³)			144			36			36			26			48			26			144

Note: 1. Samples analysed at 630X or 600X magnification. 2. A.S. = Analytical Sensitivity
3. Total spores/m³ and counts/m³ reported to two significant figures where applicable

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Fax: (905) 363-0681

Certificate of Analysis

Pinchin Environmental Microbiology Laboratory

Laboratoire d'analyse accrédité par le gouvernement du Québec
Lab ID# 495

DATE ANALYSED: September 17, 2021 **ANALYST:** Lubov Beliakov, CMS (PhD)

PROJECT NO: 296878
LAB REFERENCE NO: m258428

Customer Sample No:	ST-08																				
Lab Sample ID:	m258428-8																				
Description	Blank																				
Total Air Volume (L)	N/A																				
% of Sample Counted	25.4																				
Fungal spores identified	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³	raw ct.	%	ct./m³
Alternaria																					
Ascospores non- specified																					
Aspergillus/ Penicillium-like																					
Basidiospores non- specified																					
Botrytis																					
Chaetomium																					
Cladosporium																					
Coprinus																					
Drechslera/Bipolaris Group																					
Epicoccum																					
Fusarium																					
Ganoderma																					
Helicospores																					
Non-specified spores																					
Oidium																					
Periconia /Myxomycetes																					
Pithomyces																					
Polythrincium																					
Rusts																					
Stachybotrys																					
Ulocladium																					
Pollens																					
Fungal fragments																					
Non-fungal material																					
Spores/sample																					
TOTAL SPORES/M³	No fungal spores																				
A.S. (SPORES/M³)																					

Note: 1. Samples analysed at 630X or 600X magnification. 2. A.S. = Analytical Sensitivity
3. Total spores/m³ and counts/m³ reported to two significant figures where applicable

m258428

PINCHIN

2470 Milltower Court
Mississauga, ON L5N 7W5
tel: 905.363.0678 fax: 905.363.0681
1.855.PINCHIN www.pinchin.com

Environmental Microbiology Laboratory
Chain of Custody Form

REPORT RESULTS TO				
Contact: Meaghan Dunn			Dept: IEQ	
Company: Pinchin Ltd.			Tel: 289.404.8184	Fax:
Mailing Address: 191 Boor Street East			Email: mdunn@pinchin.com; mhorobin@pinchin.com	
City: Oshawa	Prov: Ontario	Postal Code: L1H 3M3	Customer Job / P.O. #:	
Special Instructions:			Project: 296878	
Report Language: English ☒ French ☐		No. Samples Submitted: 8	Invoice To:	

ANALYSIS TYPES	
1. Total Fungal Particulate (Spore count and Identification)	5. Bacteria (Quantification/Gram staining)
2. Direct Microscope Examination (Fungal)	6. Heterotrophic Plate Counts (HPC)
3. Direct Microscope Examination (Particulate): a. Quantitative b. Qualitative	7. E.coli/Total Coliforms
4. Fungal Quantification & Identification (Anderson/RCS)	8. Other: _____

Sample#	Description	Analysis Requested (e.g. 3a)	Date Sampled	Vol (L) or Area (cm^2)	TAT REG.	TAT RUSH	FOR LAB USE ONLY LAB #
ST-01	Cabin 8	1	09/09/2021	150	X		m258428-1
ST-02	Cabin 7	1	09/09/2021	150	X		-2
ST-03	Cabin 5	1	09/09/2021	150	X		-3
ST-04	Cabin 4	1	09/09/2021	150	X		-4
ST-05	Cabin 3	1	09/09/2021	150	X		-5
ST-06	Cabin 2	1	09/09/2021	150	X		-6
ST-07	Outdoor	1	09/09/2021	150	X		-7
ST-08	Blank	1	09/09/2021	N/A	X		-8

CHAIN OF CUSTODY				
Collected by: MMD			FOR LAB USE ONLY:	
Relinquished by: MMD	Date/Time: Sept 9, 2021		Received by:	Date/Time: 09/10/21 12:58 pm
Method of Shipment: Courier			Sample Condition Upon Receipt:	Acceptable ☑ Other (explain) ☐

Dal 10/21.

Authorized by: _____ **Date:** _____

Customer Signature MUST Accompany Request. Customer accepts Pinchin Ltd. Standard Terms and Conditions for Laboratory Services (see over)

Distribution: White = Laboratory, Yellow = Customer Copy

Pinchin Ambient Mould Index (PAMI) ©

Region:	Greater Toronto Area
Month:	September
# Samples:	778
Period:	2006 – 2018

Mould/Groups Recorded	Frequency of detects (%)	Min (spores/m^3)	5th percentile (spores/m^3)	50th percentile (spores/m^3)	95th percentile (spores/m^3)	Max (spores/m^3)
Basidiospores non-specified	99.74	26	1334	7989	38014	136800
Ascospores non-specified	99.36	26	211	1029	5665	32114
Cladosporium	97.94	26	130	1371	13000	45864
Ganoderma	96.92	26	52	343	1714	7657
Aspergillus/Penicillium-like	89.72	26	26	340	2512	9800
Coprinus	85.60	26	26	130	547	1886
Non-specified spores	68.38	26	26	158	1489	28286
Alternaria	55.01	26	26	79	457	1500
Periconia/Myxomycetes/Smuts	47.04	26	26	69	474	4510
Rusts	30.98	26	26	53	210	600
Epicoccum	29.95	26	26	52	242	1286
Cercospora	19.79	26	26	53	498	870
Polythrincium	19.54	26	26	37	210	857
Pithomyces	17.22	26	26	26	162	830
Oidium	10.80	26	26	44	169	343
Botrytis	7.46	26	26	37	169	21873
Arthrinium	6.43	26	26	26	206	514
Torula	5.91	26	26	47	199	340
Helicospores	5.01	26	26	49	128	889
Nigrospora	3.34	26	26	26	275	350
Fusicladium	3.21	26	26	26	76	110
Curvularia	2.44	26	26	36	172	185
Drechslera/Bipolaris group	2.31	26	26	26	128	209
Fusarium	1.80	26	26	88	172	230
Stemphylium	1.67	26	26	26	185	290
Peronospora	1.29	26	26	26	97	130
Chaetomium	0.64	26	26	26	31	33
Ulocladium	0.64	26	26	34	352	400
Rhizopus	0.39	34	35	44	121	130
Exosporiella	0.26	26	27	30	34	34
Spegazzinia	0.13	57	57	57	57	57
Scopulariopsis	0.13	52	52	52	52	52
Zygophiala	0.13	52	52	52	52	52

Based on detection limit of 26 spores per cubic metre of air.

The Pinchin Ambient Mould Index (PAMI) ©, is a measure of "typical" outdoor mould air quality, and can assist in the interpretation of indoor mould air samples. PAMI is derived from over 30,000 outdoor mould spore trap air samples analysed in the Pinchin Environmental Microbiology Laboratory over the period shown above. This data is analysed on a monthly basis for 18 regions across Canada, based on a minimum of 30 samples per region per month.