



Livingston County Department of Public Health

Environmental Health Division

Hydrogeologic Investigation Requirements for Land Division Developments

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**Livingston County Department of Public Health
Division of Environmental Health**

**Hydrogeologic Investigation Requirements
For Land Division Developments**

These requirements are intended to assist developers in preparing hydrogeological studies to be submitted to the Livingston County Department of Public Health (LCDPH) for determination as to the suitability of conditions for an on-site water supply. These guidelines apply to any open space development consisting of single family units on one (1) acre or smaller lots, multiple land divisions for single family and multiple family housing that will be provided water using individual water supply wells, and parcels greater than one acre where groundwater concerns exist. All developments will consult with and must obtain LCDPH approval for an on-site water supply.

Hydrogeological investigations are intended to determine whether groundwater is present in adequate quantity and quality to provide the current and future needs of the planned development and ensure adequate protection of the drinking water aquifer(s). An investigation will demonstrate whether the presence of site conditions exist which are sufficient to support the development of an on-site water supply system. It is the responsibility of the developer to demonstrate to the LCDPH that conditions exist for an on-site water supply that will meet the requirements of this document.

PUBLIC WATER SUPPLY WELLS

If any part of the planned development is to be supplied by a public water supply system, then the hydrogeological report for that system will be governed by the rules and regulations of Public Act 399 of 1976, as amended. All public water supplies, including those that serve less than 15 units or 25 residents (Type III supplies) will be subject to the rules and regulations set forth by the Michigan Department of Environmental Quality (MDEQ) and/or the LCDPH Sanitary Code.

The developer shall submit to LCDPH copies of any hydrogeological reports prepared for submittal to the MDEQ. Where community water supplies are determined to be available and accessible, proposed developments shall be connected to them.

PRIVATE WATER SUPPLY WELLS

If the planned development is to be supplied with water from individual wells, then the hydrogeological report shall satisfy the LCDPH requirements for a hydrogeological investigation. The submission of hydrogeological investigations to the LCDPH for determination as to the suitability of an on-site water supply system is provided under the authority of Act 288 of the Public Acts of 1967, as amended, the Land Division Act; Act 59 of the Public Acts of 1978, as amended, the Condominium Act; and Act 368 of 1978, as amended; and any subsequent acts and/or amendments thereto. Before the LCDPH will issue an approval for the suitability of an on-site water supply, the developer must demonstrate to the LCDPH that a potable, adequate, reliable, and protected on-site water supply can be developed. A hydrogeological investigation

shall be conducted by a qualified hydrogeologist, a person that is a certified professional geologist (CPG) or a licensed professional engineer (PE) with sufficient hydrogeological investigation experience. The results and findings of the hydrogeological investigation shall be presented to the LCDPH in a written report. The report must be signed by the CPG and/or PE with the individual's credentials.

If in the CPG or PE's opinion, sufficient hydrogeological information is available from other hydrogeological investigations within ¼ mile, and these investigations have shown protected aquifers that meet drinking water standards with sufficient capacity, the developer may request in writing for a reduction of the requirements presented below. At the time of request, the CPG or PE is responsible for proposing an alternate scope of work, subject to LCDPH review and approval for completing the hydrogeological investigation.

The scope of the hydrogeological investigation and summary report shall include the following components:

(1)Introduction/Background Information

1.1) The report shall include the name and location of the proposed development, along with the names and addresses of the proprietor and CPG or PE submitting the report. A description of the project shall be included in the report, which states the intended use of the proposed development and the type of water system that is being proposed.

1.2) A description of the adjacent property and intended use of adjacent undeveloped land, if known, shall be included in the report. A site map shall be included to identify the location of existing facilities and structures, such as buildings, private sewage systems and water supply wells, and municipal sewer systems and water supplies. Specific mention shall be made as to the availability of municipal sewer and water for the proposed development. Adjacent to the proposed development, drainage flow direction, and discharge locations shall also be indicated on a site-map.

1.3) A map shall be included to identify all known or potential major sources of contamination within 800 feet of the development site. The map shall include, but not be limited to, large scale waste disposal sites, dump sites, sanitary landfills, land application of sanitary wastewater or sludges, chemical or waste chemical storage or disposal facilities, releases of hazardous substances (Part 201, Act 451, PA 1994 sites), and leaking underground storage tanks.

1.4) On or adjacent to sites of known environmental contamination, a work plan will be required that identifies: (1) How environmental impacts may potentially affect the development; and (2) How those impacts will be addressed within the development of the site. This work plan shall be submitted prior to the hydrogeological investigation.

(2)Area Information

2.1) Copies of water well records within one-quarter (1/4) mile of the location of the planned development, which are sufficient in their regional representation, shall be obtained from the State of Michigan or LCDPH. If water chemistry information is available for area wells, please include in the report. These records shall be included as an appendix to the hydrogeological

report and referenced to the findings of the on-site investigation. The location of adjacent wells shall be mapped as to their location to the proposed development and included within the hydrogeological report.

2.2) Topographical information for the planned site development shall be included with the report. It shall indicate existing and proposed five (5) foot or less ground surface contour intervals, locations of rivers, streams, creeks, county drains, lagoons, slips, waterways, bays, canals, artificial impoundments, surface water bodies, wetlands, and drainage ways should be noted to identify areas which may become flooded, or otherwise unsuitable for well locations.

(3)Field Investigations

In order to determine the suitability for an on-site water supply, the following aquifer testing activities will be required when conducting a hydrogeological investigation for submittal to the LCDPH.

(3.1)Test Wells

3.1.1) All test wells shall be drilled by a licensed Michigan well drilling contractor. A minimum of three (3) test wells shall be required for each proposed development of up to 25 lots. One (1) additional test well shall be required for each additional 25 lots in the development. A site plan indicating the proposed locations and permit applications for the test wells shall be submitted to and approved by the LCDPH prior to drilling. Test wells may be placed and constructed in a manner to allow for later conversion to a private supply well.

The number of test wells needed for each development is reviewed and assessed independently by the LCDPH. If adjacent well record data, current water sample results, and reliable hydrogeological information are available, a reduction in the minimum number of test wells may be allowed.

Please note, observation wells may be required for certain developments, refer to Section 3.3, Additional Aquifer Pumping Tests.

All test wells and observation wells not used as supply wells shall be identified in the report and properly abandoned by a licensed Michigan well drilling contractor in accordance with Part 127 of act 368 of 1978, as amended.

3.1.2) For each test well installed for the hydrogeological investigation, a stratigraphic log shall be prepared indicating geologic materials and water bearing formations. The logs shall be presented in the hydrogeological report and used to identify the depth and thickness of the aquifer as well as any confining layers or other notable geologic features. Normally, test wells should be drilled to allow fifty (50) feet of screen submergence (static water level to bottom of casing) and/or through a continuous clay layer of at least 10 feet in thickness which is below the first twenty five (25) feet from ground surface and of sufficient areal extent.

3.1.3) All test wells within the development shall be pumped using standard or accepted practices to determine pumping capacity as gallons per minute (gpm). Aquifer transmissivity and storage coefficients must also be included in the report. It is the CPG or PE's responsibility to define the equations used and to justify their methodology.

3.1.4) The hydrogeological investigation shall include a determination of groundwater flow direction and gradient. The horizontal locations of each test well used to conduct the hydrogeological investigation shall be established by survey and plotted on a scale map. In addition, the top-of-casing elevation for each test well shall be determined by survey. Static groundwater elevations shall be calculated by measuring the depth to groundwater in the well and subtracting this number from the casing elevation. Groundwater flow direction and gradient shall be determined using acceptable contouring techniques or, in the case of limited data, by triangulation.

(3.2) Test Well Pumping Tests

3.2.1) All of the test wells shall be pumped at a sustained pumping rate of not less than ten (10) gpm for a period of four (4) hours or until the aquifer has stabilized. A shorter period of time, but not less than two (2) hours, shall be accepted if the CPG or PE verify in the hydrogeological report that the aquifer stabilized and is suitable for an on-site supply.

3.2.2) The water levels in the pumping well and the observation wells (if applicable) will be measured to an accuracy of 0.01 feet and recorded according to the following schedule:

- Every 2 minutes for the first 20 minutes
- Every 5 minutes for minutes 20 to 60
- Every 15 minutes for minutes 60 to 180
- Every 30 minutes for minutes 180 to 240

3.2.3) At the conclusion of the test and after final water level measurements are recorded, the pump shall be turned off and the water levels in the pumping and observation wells measured and recorded per the schedule provided above. Recovering groundwater levels shall be recorded until all water levels have returned to within 95% of the original static water level.

(3.3) Additional Aquifer Pumping Tests

3.3.1) For developments consisting of ½ acre lots or smaller, additional aquifer pumping tests may be required by the LCDPH. For these developments consisting of 100 units or less, one (1) aquifer-pumping test will be conducted. One (1) additional pumping test will be required for each additional group of 100 lots or any portions thereof.

3.3.2) Additional aquifer pumping tests may also be required for any developments that experience capacity or production problems. For these developments, the aquifer-pumping test shall be conducted on the test well(s) closest to the center of the planned development or on the test well(s) that demonstrates capacity or production problems.

3.3.3) Each additional aquifer-pumping test will consist of at least three (3) wells: One (1) test well to be used as the pumping well and two (2) observation wells. Using triangulation techniques, the two observation wells shall be placed at right angles to each other on two adjacent lots from the pumping well. If the proposed lot design prohibits the placement of observation wells on adjacent lots then the placement of observation wells will require mutual

approval between the LCDPH and developer during the preliminary review process. The CPG/PE should also be prepared to propose to the LCDPH parameters for conducting the test as to simulate peak water usage within the proposed development.

3.3.4) Prior to beginning the aquifer test, static water level measurements shall be taken from the pumping well and observation wells. These measurements should be taken over a period of time equal to at least one-quarter (1/4) the anticipated length of the aquifer test. The results shall be recorded for inclusion within the hydrogeologic report.

(4)Water Quality Testing

4.1) Groundwater samples shall be collected to conduct bacteriological tests and chemical analyses from each test well. The samples shall be submitted to a laboratory certified by the MDEQ for drinking water analyses, and the results included in an appendix of the hydrogeological report. Analyses shall be performed in accordance with the U.S. EPA approved methods under 40 CFR parts 141-143. Analyses shall be performed for the following parameters on each test well within the development.

Partial Chemistry

- Chloride
- Fluoride
- Hardness
- Iron
- Nitrate
- Nitrite
- Sodium
- Sulfate

Complete Metals Scan

- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Lead
- Manganese
- Mercury
- Selenium
- Zinc

Coliform Bacteria

Volatile Organic Compounds (VOC)

(EPA Method 502.2 or 524.2)

In addition to being safe and palatable, the water shall not be excessively corrosive nor contain substances which would make it unfit for domestic uses unless such substances can be satisfactorily and economically removed. The LCDPH may require additional sampling or allow

a reduction in sampling for specific parameters, based on local site conditions or other pertinent factors.

(5) Maximum Contaminant (MCL) Levels

5.1) Proposed developments shall be rejected by the LCDPH if the water sample analysis detects a contaminant in a concentration that is equal to or exceeds the Primary Maximum Contaminant Level (PMCL) as established for each parameter, unless otherwise specified by MDEQ. The proposed development shall be rejected if the water sample analysis detects a contaminant in a concentration that is in excess of 50% of the PMCL and if other factors indicate that the concentration of the contaminant is likely to exceed the PMCL in the future. In addition, groundwater quality may warrant additional restrictions and/or limitations on the development.

5.1.1) Additional groundwater quality testing may be required if less than 50% of the PMCL when VOCs are detected. If VOCs are detected in test wells and it is reasonably assumed to be from gluing compounds and/or chlorine byproducts, the well casing shall be scrubbed, the well purged, and then re-tested for VOCs to determine compliance. It is suggested that the well drilling contractor use drilling water that has the minimal required amount of chlorine residual (10 ppm) and use certa-lock casing (to eliminate the need for glues).

5.2) If the proposed development's water sample analysis from a test well or on-site water supply well detects a contaminant in concentration that exceeds the Secondary Maximum Contaminant Level (SMCL), the developer shall address treatment options for the high SMCL within the hydrogeological report.

(6) Reporting

6.1) Upon completion of the hydrogeological investigation, all data, findings, and conclusions on suitability shall be summarized and presented to the LCDPH in a hydrogeological report. Four (4) copies of the hydrogeological report shall be submitted to the LCDPH for review. Upon approval by the LCDPH, copies of the investigation report will be forwarded to the Michigan Department of Environmental Quality, the Township Engineer, and the Township.

6.2) A professional recommendation shall be provided by the CPG or PE as to the suitability of the proposed site as related to on-site well development.

6.3) It is suggested that the following outline be used when preparing a hydrogeologic study for submittal to the LCDPH:

Contents

1. Introduction/Project Description
2. Project Location
3. Water Supply Needs
4. General Land Use & Topography

5. General Geology/Hydrogeology
6. Test Well Data & Location Map
7. Pumping Test Results/Capacity
8. Groundwater Flow Direction & Gradient
9. Water Quality Analysis
10. Summary of Area Wells with Map
11. Conclusions & Recommendations
12. Signature of CPG/PE Certification/Licensing Organization Number

Appendices

1. Site Location Map
2. Map Detailing Locations of Area Water Wells with Reference to Site Development
3. Area Well Logs
4. Test Well Logs
5. Pumping Test Results
6. Analyses of Pumping Tests
7. Water Quality Laboratory Test Results