

REPORT TO CITY COUNCIL

City of Nevada City
317 Broad Street
Nevada City, CA 95959
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May 10, 2017

TITLE: Review of Nevada LAFCo Sphere of Influence Policies

RECOMMENDATION: Review and provide direction to the City Manager.

CONTACT: Mark Prestwich, City Manager

BACKGROUND / DISCUSSION: On February 22, 2017, the City of Nevada City confirmed submittal of a Sphere of Influence (SOI) recommendation to the Local Agency Formation Commission of Nevada County (LAFCo). The City recommended Nevada LAFCo reconfirm the existing SOI boundary and explained how the City's existing sphere is already consistent with State LAFCo law and local policies. However, Nevada LAFCo Executive Officer is recommending a 50% reduction of the City's sphere boundary.

LAFCo conducted an initial sphere workshop on February 23, 2017. Due to lack of time available for public comment and subsequent discussion, the workshop was continued to March 16, 2017. At the continued meeting, LAFCo Commissioners requested the City develop an annexation plan for the orderly growth of the City and provided six months to complete this plan. Additionally, the LAFCo Commissioners requested their Policy Committee meet to review Nevada LAFCo sphere and annexation policies. A key focus of the policy review is to identify strategies that will make it easier for annexations to occur in the future. The LAFCo Policy Committee will conduct a public meeting Thursday, May 11, 2017 at 9:30 a.m. in Providence Room A at the Nevada County Administrative Center at 950 Maidu Avenue.

City staff subsequently reviewed local Nevada LAFCo policies (attached) to identify possible modifications to facilitate annexation of SOI property as well as to identify general concerns/observations with existing policy language. Staff observations are noted below:

Comment 1: Current Nevada LAFCo policy requires an annexation to be consistent with internal SOI horizons (near-term and long-term), resulting in an overly complex annexation policy for parcels designated in the City's long-term sphere zone that delays annexations. This could be modified to allow any property in the SOI to annex if it is contiguous to the City. Furthermore, current Nevada LAFCo policy includes unnecessary complexity for property owners seeking annexation if they fall within the long-term horizon (annexation applications can only be considered if the application is submitted three or more years after the last sphere review or update, or is based upon a finding of need).

Rationale: *City staff reviewed the LAFCo Executive Officer's initial proposal to reduce the City's SOI and determined that it would eliminate the possibility of annexing approximately half of the parcels adjacent to City limits for at least five years unless a finding of need was made by LAFCo – simply because the parcels were designated in the long-term SOI planning horizon (see attached map with highlighted long-term areas). Allowing property in both short and long-term SOI properties to initiate annexation when they represent logical boundary expansion will simplify local rules and provide property owners seeking annexation a swifter path.*

Comment 2: Nevada LAFCo policies related to developing SOI boundaries could be strengthened with language encouraging LAFCo to give great weight to several unique characteristics that exist in Nevada County. It is recommended such characteristics be incorporated into SOI considerations **regardless of time horizon** given their importance. This includes taking into consideration the historic environmental damage related to Nevada City's mining past, the community's bowl-shaped topography, and the confluence of several creek watersheds. City view shed considerations may also be appropriate to give great weight to regardless of time horizon. No such language exists today.

Rationale: *State LAFCo law allows each local LAFCo to tailor their regulations to their local area and the area's distinctive characteristics. Nevada City's unique mining history has degraded soils, increasing the prospect of watershed degradation in Nevada City – particularly groundwater contamination due to poorly functioning septic systems. A 2015 study by Michigan State researcher Joan Rose (attached) found that septic systems are a significant source of human fecal contamination to surface water in studied watersheds. The study states, "The total number of people on septic tanks equates to the level of feces entering each watershed, and these levels are potentially dominated by failing septic systems contributing high concentrations of bacteria to nearby water systems" (e.g. Deer Creek Drainage Basin). Adding to this concern is a 1977 Environmental Protection Agency study that found, "...As many as one-half of all septic tank-soil absorption systems are not operating satisfactorily." Therefore, given the bowl shaped topography of the City's existing sphere, it would be appropriate for local SOI policies to give great weight to these considerations regardless of timing horizon. The EIR adopted for the County's General Plan recognized the poor soil conditions throughout the County and references proposed policies to address "greater reliance on community treatment facilities rather than septic systems." The EIR goes on to state "given the soil limitation for septic in the County, [the] increase in septic systems may result in groundwater degradation."*

Comment 3: Current Nevada LAFCo policy requires submittal of a formal development plan for sphere territory to be annexed with development potential (e.g. HEW building). Discontinuation of this practice will facilitate the City's ability to complete orderly annexations and ensure logical City boundaries.

Rationale: *Based on staff research, it is our understanding that other LAFCo agencies do not require the same level of detail from annexation applicants that is sought by Nevada LAFCo. While City staff has discussed with LAFCo staff options related to use of a programmatic environmental impact report, such an approach remains a potential hindrance on the pace of annexation for parcels that desire annexation but are not seeking to develop at this time (and would comply with California Environmental Quality Act requirements at the time a future project moves forward). This policy has prevented potential annexation in the past (e.g. HEW building).*

Comment 4: Nevada LAFCo policy appears to discourage annexation of properties that have been developed for residential use, utilizing private septic systems and wells (or are connected to Nevada Irrigation District's treated water system). Nevada LAFCo could modify this policy/practice finding that inclusion and annexation of residentially developed territory in the SOI is in the best interests of local government organization and structure in the area.

Rationale: *LAFCo policy appears to ignore the fact that Nevada City is a full-service agency providing a variety of municipal services and even properties that receive water from non-City providers (or have private septic systems) still benefit from being within the City to receive or be eligible to receive all municipal services (e.g. roads to serve their area, parks/recreation amenities, etc.), including being enfranchised to participate in municipal elections.*

Comment 5: The Area of Interest reference appears to be unique to Nevada LAFCo. Such a designation (currently proposed by the Nevada LAFCo Executive Officer for some existing Nevada City SOI territory) **would remove the City from decision making when a development proposal is submitted**, instead providing the City only with an opportunity to comment on the development.

Rationale: *Removal or grandfathering of the "Area of Interest" term will align Nevada LAFCo with the practices of other California LAFCo agencies and avoid the potentially adversarial environment it creates.*

Comment 6: Nevada LAFCo policy currently requires a "positive determination" that the City's sphere is consistent with historical growth rates. It appears this policy places too much emphasis on the past.

Rationale: *As was mentioned by one of the LAFCo Commissioners at the March 16, 2017 meeting, historical growth rates are not necessarily a reliable indicator of future growth. There are many factors that influence pace of annexation. The nation's recent deep recession, for example, placed a brake on development (and therefore annexations) for approximately a decade throughout the county.*

Comment 7: Nevada LAFCo policy **does not** consistently reference the SOI review direction provided by California Government Code Section 56425(g) which states, "On or

before January 1, 2008, and every five years thereafter, the commission shall, as necessary, review and update each sphere of influence.” For example, Nevada LAFCo policy on Page 23 [III (D)(2)] states “Sphere of Influence Plans shall be reviewed and updated if necessary every five years, **or more often if deemed necessary by the Commission.**”

Rationale: *Sphere of Influence reviews can be costly to Nevada LAFCo and the agencies under review. The City of Nevada City has already expended thousands of dollars in staff time and expenses participating in the current review of its sphere. Sphere reviews and updates frequently drive additional staff work and studies that do not appear to be necessary more frequently than every five years (e.g. vacant land inventory, analysis of vacant lands to determine their suitability for development, market study to determine the absorption rate of the usable vacant lands, etc.). State LAFCo law does not anticipate a review more frequently than five years and specifically states the commission “shall, as necessary, review and update each sphere of influence” suggesting this local policy could simply align itself with state law which anticipates existing spheres may continue well beyond five years in any given community. The State law’s implication is that spheres are to be reviewed **in order to increase** the City’s sphere as necessary over time. Nowhere does State policy give direction for the reduction of City spheres.*

Comment 8: Nevada LAFCo policy (page 31) states, “If an agency enters into a contract without LAFCo approval, the contract shall be null and void.” This local policy does not adequately identify the numerous exceptions to this policy noted in Government Code 56133(e).

Rationale: *State law provides several exceptions in Government Code 56133 that should be noted in local Nevada LAFCo policy.*

City staff recommends the City Council review the above comments and, if acceptable, authorize staff to convey them to the Nevada LAFCo Policy Committee. Furthermore, the City Council may desire to supplement staff resources with an experienced LAFCo consultant to assist the City in preparing appropriate responses to LAFCo SOI related requests and to represent the City in subsequent proceedings with Nevada LAFCo. It is estimated such assistance will cost approximately \$5,500.

ENVIRONMENTAL CONSIDERATIONS: Not applicable.

FISCAL IMPACT: Not applicable.

ATTACHMENTS:

- ✓ Local Agency Formation Commission of Nevada County Policies
- ✓ 2015 Michigan State Study – “Linking Fecal Bacteria in Rivers to Landscape, Geochemical, and Hydrologic Factors and Sources at the Basin Scale”
- ✓ LAFCo Recommended Sphere of Influence Map

**LOCAL AGENCY
FORMATION COMMISSION
OF NEVADA COUNTY
(LAFCo)**

POLICIES

Adopted April 28, 1994
Amended September 17, 2015

**LOCAL AGENCY FORMATION COMMISSION OF NEVADA COUNTY
POLICIES**

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**LOCAL AGENCY FORMATION COMMISSION OF NEVADA COUNTY
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**Local Agency Formation Commission (LAFCo)
of Nevada County**

POLICIES

I. PURPOSE, JURISDICTION, AUTHORITY, AND COMPOSITION

A. PURPOSE OF THESE POLICIES AND STANDARDS

LAFCo is charged with applying the policies and provisions of the Cortese-Knox Hertzberg Act to its decisions regarding annexations, incorporations, reorganizations, and other changes of government. LAFCo is required to adopt written policies and procedures and to exercise its powers in a manner consistent with those policies and procedures and with the policy directives of the Act. Specifically, the policies and standards set forth in this chapter are designed to:

1. Provide Information. Give applicants for changes of organization guidance as to the information LAFCo needs to make appropriate determinations concerning their applications and provide information and notice to elected officials, governmental staff, and members of the general public as to the standards and procedures that LAFCo will use in evaluating applications.
2. Set Criteria. Provide applicants for changes of organization with explicit guidance as to the criteria LAFCo will use in approving, disapproving, amending, or conditionally approving applications for changes of organization.
3. Ensure Greater Consistency in LAFCo's decision-making process.
4. Facilitate Communication among local agencies in the region.
5. Minimize Adverse Impacts of the social, economic and environmental results of growth.
6. Provide for Planned, Well-Ordered, and Efficient Urban Development Patterns with appropriate consideration of preserving open space lands within those patterns.

B. THE LEGISLATURE'S CREATION OF LAFCo

1. LAFCo is an intra-local agency that was created by state legislation to ensure that changes in governmental organization occur in a manner which provides efficient and quality services and preserves open space land resources.
2. The creation of LAFCo was a legislative response to actions by local jurisdictions in the 1940's and 1950's. These agencies incorporated or annexed large, irregular portions of land in a manner which resulted in irrational urban boundaries and isolated populations without efficient services or with no services at all. In 1963, the Legislature established a Local Agency Formation Commission in each county and delegated to them its regulatory authority over local agency boundary changes.

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3. Additional legislation in the 1960s extended LAFCo authority. In the 1970s the Legislature recognized the connection between decisions concerning governmental organization and the issues of urban sprawl and loss of prime agricultural land. In response to these concerns, LAFCos were charged with implementing changes in governmental organization in a manner which would preserve agricultural and open space land resources and provide for efficient delivery of services. Concerned that LAFCos were responding reactively without considering long-term regional issues, in 1972 the Legislature began requiring LAFCos to adopt a sphere of influence for each agency in their jurisdictions. The sphere defines the physical boundary and service area each local government agency is expected to serve, and each proposal the Commission considers must be consistent with the relevant sphere plan. The Legislature and the courts require LAFCos to implement the California Environmental Quality Act (CEQA) as it applies to LAFCo actions.
4. In 1985, the Cortese-Knox Local Government Reorganization Act consolidated all statutes relative to local government changes of organization. In 1997, the Legislature assembled a Commission on Local Governance in the 21st Century to examine governance issues with special attention to the Local Government Reorganization Act. "Growth Within Bounds" is the Commission's report, based on four major findings: (1) the future will be marked by continued phenomenal growth; (2) California lacks a plan to accommodate growth; (3) local government is plagued by fiscal insecurity; and (4) the public is not engaged.

The Commission made eight recommendations:

- (a) LAFCo policies and procedures should be streamlined and clarified.*
- (b) LAFCos must be neutral, independent, and balanced in representation of counties, cities, and special districts.*
- (c) LAFCo's powers must be strengthened to prevent sprawl and ensure the orderly extension of government services.*
- (d) The Legislature must strengthen LAFCos' policies to protect agricultural and open-space lands.*
- (e) The Legislature must comprehensively revise the state-local fiscal relationship.*
- (f) The Legislature must develop incentives to encourage coordination of local plans within each region.*
- (g) The Legislature must enhance communication, coordination, and procedures of LAFCos and local governments.*
- (h) The Legislature must increase opportunities for public involvement, active participation, and information regarding government decision-making.*

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These recommendations were incorporated into the Cortese-Knox-Hertzberg Act, which was adopted by the Legislature in 2000 and became effective in 2001.

C. THE LEGISLATURE'S POLICY DIRECTION TO LAFCO

The Legislature has charged LAFCo with carrying out changes in governmental organization to promote specified legislative policies now codified in the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000. The Cortese-Knox-Hertzberg Act commences with Section 56000 of the Government Code, and the reader is referred especially to Section 56001, 56300, 56301, 56375, 56377, and 56668. These sections contain the following major policy elements:

1. Orderly Growth. LAFCo is charged with encouraging orderly growth and development. Providing housing for persons and families of all incomes is an important factor in promoting orderly development.
2. Logical Boundaries. LAFCo is responsible for encouraging the logical formation and determination of boundaries.
3. Efficient Services. LAFCo must exercise its authority to ensure that affected populations receive adequate, efficient and effective governmental services.
4. Preserve Agricultural and Open Spaces. LAFCo is required to exercise its authority to guide development away from open space and prime agricultural land uses unless such actions would not promote planned, orderly, and efficient development.

D. LAFCO JURISDICTION

1. Specific Authority. LAFCo has the specific authority to review and approve or disapprove:
 - a) Annexations to, or detachments from cities or districts.
 - b) Formation or dissolution of districts.
 - c) Incorporation or disincorporation of cities.
 - d) Consolidation or reorganization of cities or districts.
 - e) The establishment of a subsidiary district(s).
 - f) The development of, and amendments to, Spheres of Influence.
 - g) Extensions of service beyond an agency's jurisdictional boundaries.
 - h) Provision of new or different services by districts.
 - i) Pursuant to Section 56434, the Commission may review and approve proposals that extend service into previously unserved territory in unincorporated areas.
2. Limited Authority to Initiate Proposals. Under specific circumstances, LAFCo may initiate proposals resulting in consolidation of districts, dissolution, merger, or establishment of subsidiary districts, or reorganizations that include any of those changes of organization.

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3. Limitation of Authority Relating to Land Use Conditions. In order to carry out the legislative policies identified above, LAFCo has the power to approve or disapprove applications, or to impose reasonable conditions on approval. However, while LAFCo is charged with consideration of the impacts of land use in its determination, it is specifically prohibited from directing specific land use or zoning actions. LAFCo can deny an application where the land use that would result violates the statutory policies of Cortese-Knox-Herzberg.

The California Supreme Court has explained this unusual combination of power to deny coupled with no power to impose conditions to solve the same policy issue. It said the prohibition on imposing conditions regarding land use

"merely insures that final zoning decisions are made by the local agencies concerned. It certainly does nothing to detract from the power of a LAFCo to disapprove an annexation if it finds that it violates the detailed criteria which a LAFCo must consider."
Bozung v. LAFCo (1975) 13 Cal. 3d 263, 284.

Thus, for example, LAFCo may disapprove an application for an annexation to a city if it would create an area of urban development that is difficult to serve, or because it would cause the premature development of agricultural land. However, LAFCo could not carry out the same policies by requiring land to be rezoned from residential to agricultural use, or by other direct exercise of land use authority through the zoning or subdivision process.

E. LAFCO COMPOSITION AND LEGISLATIVE CHARGE

1. General Statutory Requirements. LAFCo is an independent, intra-local agency created by the Legislature to implement policies which the Legislature determined must be addressed with a regional perspective.
2. Independent Agency. LAFCo is, by statute, a separate public agency from the County, the cities and the districts which provide funding and appoint members to the Commission.
3. Intra-Local Representation. The legislative body of LAFCo is the Commission. The Legislature established the composition of the Commission to be representative of the local governmental agencies in the County by providing for city, county, special district, and public membership.
4. Public Interest. While the Commission is largely composed of members appointed by individual local agencies, the Legislature requires the Commissioners to exercise their independent judgment in carrying out the provisions of the Act and to make their decisions impartially, on behalf of the public as a whole. Decisions required of LAFCo relating to the most efficient form of local government and the preservation of agricultural and open space land inherently involve the balancing of potentially competing interests of cities, counties, and special districts. In addition, such determinations usually affect the public at large because of various options for the delivery of services.

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The legislative charge to LAFCo Commissioners is to bring their experience and perspectives to bear in a manner which carries out the best policy from the perspective of the public as a whole. Commissioners are not selected to represent or to cast the vote of their appointing agencies. While Commissioners' decisions may be informed by their experience at their agency, those decisions must not be dictated by the interests of that agency.

Since Commission members are appointed by law to impartially carry out objective policies concerning public policy issues, it is presumed that they will do so. It is for this reason that the Legislature determined that it is not an automatic conflict of interest for a Commissioner to vote on issues that may affect their appointing agency. Nevertheless, if a Commissioner feels that he or she is unable to act impartially, then the Commissioner should voluntarily disqualify himself or herself.

5. Commission Composition. Nevada LAFCo Commissioners are selected from the groups most affected by its decisions: the cities, the county, the public, and special districts. Nevada LAFCo is composed of seven members, each of whom serve four-year terms. These members are:
 - a) Two City Council members and one alternate who are appointed by a committee made up of the mayors of the incorporated cities within Nevada County.
 - b) Two Nevada County Supervisors and one alternate appointed by the Nevada County Board of Supervisors.
 - c) Two Special District Board Members and one alternate appointed by written ballot of the governing boards of special districts.
 - d) One Public Member and one alternate appointed by the Commission with at least one affirmative vote of a member from each of the other three categories.

F. INTER-LAFCO COOPERATION

1. Purpose

Nevada LAFCo recognizes that many special districts have territory in more than one county and that development patterns similarly do not always follow county boundaries. The Commission also realizes that decisions made in one county can have significant environmental, economic, or fiscal impacts on another county. Recognizing that sharing information, policies and perspectives with neighboring LAFCos can benefit the public by enhancing and expediting the decision-making process, Nevada LAFCo seeks to foster such sharing by formalizing its policy on cooperation with other LAFCos.

2. General

- a) In recognition that the Cortese-Knox-Hertzberg Act vests authority for jurisdictional changes and all other matters with the LAFCo of a district's Principal County, Nevada LAFCo affirms as policy that activities and decisions affecting independent special districts having territory in more

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than one county (“multi-county districts”) are the sole responsibility of the Principal County LAFCo. This policy applies to

- (1) Conduct and adoption of Municipal Service Reviews (“MSRs”);
- (2) Adoption, update and amendment of Sphere of Influence Plans (“SOIs”), including adjustments of sphere horizons and changes in the assignment of territory to particular horizons;
- (3) Changes of organization such as formation, dissolution, annexation, and detachment;
- (4) Actions affecting the provision of services, such as changes in service boundaries and provision of new services.

b) Notwithstanding the policy stated above, Nevada LAFCo will share information and engage in joint activities with neighboring LAFCos whenever doing so can reasonably be expected to reduce costs, improve efficiency in performance of LAFCo actions, or enhance the quality of LAFCo decisions and not conflict with provisions of applicable law. (Support for this policy can be found in the Guidelines for Municipal Service Reviews prepared by the Governor’s Office of Planning and Research: See, for example, Chapter 3.C., where the discussion of Key Decision Points, under “Multi-County Review,” suggests coordinating data collection with adjacent LAFCos; in Chapter 5.B., the analysis of Example 5—Using Multi-County Study Areas suggests the possibility of creating a Joint Powers Agreement for two LAFCos to jointly conduct a Municipal Service Review.)

3. Information Sharing

- a) The Executive Officer of Nevada LAFCo will inform neighboring LAFCo Executive Officers whenever Nevada LAFCo receives a proposal for or initiates action on an MSR, SOI, organizational change, or service change involving a multi-county district for which Nevada is the Principal County but has territory in the neighboring LAFCo’s county.
- b) Upon request by a neighboring LAFCo’s Executive Officer, Nevada LAFCo’s Executive Officer will make available information regarding such action (including data collected in the course of carrying out the action) to the extent that doing so does not interfere with normal operations of Nevada LAFCo.

4. Joint Planning/Conduct of Activities

- a) Nevada LAFCo’s Executive Officer will offer the neighboring LAFCo Executive Officer an opportunity to meet and engage in joint planning of projects such as MSRs and Sphere Plan updates involving multi-county districts. When the two (or more) Executive Officers concur that it would be mutually beneficial to engage in joint planning and/or joint conduct of activities (such as meetings with staff of other agencies), information-gathering activities (such as design and circulation of surveys), or public presentations (such as workshops), the Nevada LAFCo Executive Officer

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may participate in such activity to the extent he or she considers appropriate. The Nevada LAFCo Executive Officer shall inform the Nevada LAFCo Chairperson in a timely manner of any decision to engage in joint planning or joint conduct of activities with the neighboring LAFCo Executive Officer; the Chairperson and Executive Officer shall inform the Commission of such decisions in a timely manner.

- b) Whenever the Executive Officers consider it appropriate, they may request their respective Commissions to schedule a joint meeting for discussion of matters of mutual interest and/or coordination of activities. Such meetings are understood to have the purpose of mutually respectful communication of information and concerns and not to affect the formal discharge of either Commission's responsibilities under law.

5. Transfers of Jurisdiction

- a) The Commission has authority pursuant to the provisions of Section 56388 of the Government Code to transfer jurisdiction for certain district proposals to the LAFCo of the county in which the subject territory is wholly or partially located. Nevada LAFCo recognizes that such transfer of jurisdiction may benefit the public by expediting service or enhancing development of information regarding the subject territory. The Commission hereby delegates to its Executive Officer its authority to transfer jurisdiction for proposals involving a multi-county district and property located wholly outside Nevada County if those proposals are of minor significance and the transfer would be of benefit to the public.
 - (1) Proposals for formation or dissolution of agencies, modification of sphere plans, or activation of latent powers may not be transferred without Commission approval.
 - (2) Considerations involved in the determination whether a proposal is of minor significance include, but are not necessarily be limited to, the size of the area involved, the number of property owners, the assessed valuation, and the potential impact of the action on all affected service providers.
- b) The Nevada LAFCo Executive Officer shall make any such transfer of jurisdiction in writing (or subsequently prepare a written record for a transfer first approved orally or electronically) and promptly inform the Chair. The Chair and Executive Officer shall report such transfers to the Commission in a timely manner.

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II. LAFCO GENERAL POLICIES AND STANDARDS

The following are the general policies and substantive standards that will apply to LAFCo consideration of any type of proposal. In certain situations, the application of one policy may conflict with the application of another; in that case, LAFCo will exercise its discretion to balance policies in a manner consistent with the Cortese-Knox-Hertzberg Act and the standards contained in this document.

A. COMMUNICATION AMONG LOCAL AGENCIES

LAFCo considers that an important part of its role is to encourage communication and collaborative planning and studies among public agencies (such as the county, cities, and special districts), members of the public, and service-providing elements of the private sector.

B. URBAN DEVELOPMENT

LAFCo will encourage proposals that result in urban development to include annexation to a city wherever reasonably possible and will discourage proposals for urban development without annexation to a city. LAFCo will also encourage cities to annex lands that have been developed to urban levels, particularly areas that receive city services.

Urban development includes development that utilizes either public water or sewer and involves industrial or commercial use or residential use with density of at least one unit per 1.5 acres.

C. DISCOURAGING URBAN SPRAWL

LAFCo has been directed by the State Legislature to discourage urban sprawl, and the Commission will normally deny proposals that can reasonably be expected to result in sprawl. Sprawl is characterized by irregular, dispersed, and/or disorganized urban or suburban growth patterns occurring at a relatively low density and in a manner that precludes or hinders efficient delivery of municipal services, especially roads, public sewer and public water.

D. ENVIRONMENTAL CONSEQUENCES (CEQA)

LAFCo shall operate in accordance with the California Environmental Quality Act (CEQA), Public Resources Code Sections 21000. LAFCo shall assess the environmental consequences of its actions and decisions and take actions to avoid or minimize a project's adverse environmental impacts, if feasible, or may approve a project despite significant effects because it finds overriding considerations exist. To comply with CEQA, the Commission will operate in accordance with Nevada LAFCo CEQA Guidelines.

E. BALANCING JOBS AND HOUSING

LAFCo will normally encourage those applications which improve the regional balance between jobs and housing. LAFCo will consider the impact of a proposal on the regional supply of residential housing for all income levels. The agency that is the subject of the proposal must demonstrate to the Commission that any

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adverse impacts of the proposal on the regional affordable housing supply have been mitigated.

The Commission intends to adopt more specific standards on housing after consultation with interested parties.

F. COMPACT URBAN FORM AND INFILL DEVELOPMENT ENCOURAGED

When reviewing proposals that would result in urban development, LAFCo will consider whether the proposed development is timely, compact in form and contiguous to existing urbanized areas. LAFCo will favor development of vacant or under-utilized parcels already within a city or other urbanized area prior to annexation of new territory.

G. PUBLIC ACCESSIBILITY AND ACCOUNTABILITY

LAFCo recognizes that the public's ability to participate in the local governance process is improved when the government structure is simple and accessible and when decision-makers are accountable to those affected. The Commission will consider this principle when it evaluates proposals for change of organization or reorganization.

H. ADEQUATE SERVICES

LAFCo will consider the ability of an agency to deliver adequate, reliable and sustainable services and will not approve a proposal that has significant potential to diminish the level of service in the agency's current jurisdiction. The agency will be required to provide satisfactory documentation of capacity to provide service within a reasonable period of time.

I. EFFICIENT SERVICES

Community needs are normally met most efficiently and effectively by proposals that:

1. Utilize Existing Public Agencies rather than create new ones.
2. Consolidate the Activities and Services of public agencies in order to obtain economies from the provision of consolidated services.
3. Restructure Agency Boundaries and service areas to provide more logical, effective, and efficient local government services.

J. COMMUNITY IMPACTS

LAFCo will consider the impacts of a proposal and any alternative proposals on adjacent areas, on social and economic interests, and on the local government structure. The Commission may deny a proposal if adverse impacts are not mitigated to an acceptable level.

K. CONFORMANCE WITH GENERAL AND SPECIFIC PLANS

1. Consistency with General and Specific Plans. LAFCo will approve changes of organization or reorganization only if the proposal is consistent with the

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General Plan and relevant Specific Plans of the appropriate planning jurisdiction.

2. Planning Jurisdiction. The appropriate planning jurisdiction is as follows:
 - a) For areas within a city's sphere of influence, the city is the appropriate jurisdiction.
 - b) For areas outside a city's sphere of influence, the County is the appropriate planning jurisdiction.
3. Notification of Consistency. Prior to LAFCo's consideration of a proposal, the appropriate planning jurisdiction shall advise LAFCo in writing whether the proposal meets all applicable requirements of state law, including internal consistency. If the appropriate planning jurisdiction is also applying to LAFCo by Resolution of Application, such finding may be included in the Resolution. LAFCo shall retain discretion to independently determine consistency and may require additional information if necessary, particularly if the proposal involves an amendment to the General Plan of the appropriate planning jurisdiction.
4. Consistency Found Adequate. For purposes of this standard, the proposal shall be deemed consistent if the proposed use is consistent with the applicable General Plan designation and text, the applicable General Plan is legally adequate and internally consistent, and the anticipated types of services to be provided are appropriate to the land use designated for the area.
5. Prezoning or Planning. All territory proposed for annexation must be specifically planned and/or prezoned by the appropriate planning agency. The prezoning or zoning of the territory must be consistent with the applicable General Plan and sufficiently specific to determine the likely intended use of the property. Subsequent change to the zoning by a city is prohibited by state law for a period of two years under most circumstances.

L. BOUNDARIES

1. Definite Boundaries Required. LAFCo will not accept as complete any application for a proposal unless it includes boundaries that are definite, certain, and fully described.
2. Boundary Criteria. LAFCo will normally favor applications with boundaries that do the following:
 - a) Create logical boundaries within the affected agency's sphere of influence, and where possible, eliminate previously existing islands or other illogical boundaries.
 - b) Follow natural or man-made features and include logical service areas, where appropriate.
3. Boundary Adjustments. LAFCo will normally amend proposals with boundaries which:
 - a) Split neighborhoods or divide existing identifiable communities, commercial districts, or other areas having a social or economic identity.

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- b) Result in islands, corridors, or peninsulas of incorporated or unincorporated territory or otherwise cause or further the distortion of existing boundaries.
 - c) Are drawn for the primary purpose of encompassing revenue-producing territories.
 - d) Create areas where it is difficult to provide services.
4. Boundary Disapprovals. If LAFCo cannot suitably adjust the boundaries of a proposal to meet the criteria established in Section L-2, above, it will normally deny the proposal.

M. REVENUE NEUTRALITY

1. Revenue Neutrality Applicable to All Proposals. LAFCo will approve a proposal for a change of organization or reorganization only if the Commission finds that the proposal will result in a similar exchange of both revenues and service responsibilities among all affected agencies. A proposal is deemed to have met this standard if the amount of revenue that will be transferred from an agency or agencies currently providing service in the subject territory to the proposed service-providing agency is substantially equal to the expense the current service provider bears in providing the services to be transferred.
2. Adjustment to Create Revenue Neutrality. In the event the expense to the new service provider is substantially greater or less than the amount of revenue transferred from the current service provider, the current service provider and new service-providing agency must agree to revenue transfer provisions to compensate for the imbalance.

Such provisions may include, but are not limited to tax-sharing, lump-sum payments, and payments over a fixed period of time.
3. Failure to Achieve Revenue Neutrality. Where achieving substantial revenue neutrality is not possible because of the limitations of state law, the Commission shall impose all feasible conditions available to reduce any revenue imbalance, or it may deny the proposal. The Commission recognizes that strict compliance with the revenue neutrality standard may be infeasible for certain proposals and that the need for service may sometimes outweigh the requirement for complete revenue neutrality. Where the failure to achieve revenue neutrality is primarily due to disagreement of the affected agencies, the Commission shall normally deny the application.
4. Revenue Sharing Agreements. Paragraphs 1 and 2 of this section will be considered to be satisfied if:
 - a) The affected agencies have agreed to a specific revenue split for the proposal and have filed a copy of that agreement with the Executive Officer with a statement that the agreement adequately provides for revenue neutrality; or

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- b) A master tax exchange agreement or agreed-upon formulas are in effect between the affected agencies and the agencies confirm in writing that such agreement is applicable to this proposal and that it provides for a balanced exchange of service costs and revenues.

N. AGRICULTURAL AND OPEN SPACE LAND CONSERVATION

Among LAFCo's core purposes is preservation of open space and prime agricultural ("ag") lands. The Commission will exercise its powers to conserve prime agricultural land as defined in Section 56064 of the Government Code and open space land as defined in Section 65560 of the Government Code pursuant to the following standards. In order to more effectively carry out this mandate, the Commission may develop local standards to define and identify prime agricultural and open space lands.

1. Conditions for Approval of Prime Ag/Open Space Land Conversion. LAFCo will apply a heightened level of review when considering proposals for changes of organization or reorganization which are likely to result in the conversion of prime ag/open space land use to other uses and will approve such proposals only when the Commission finds that the proposal will lead to planned, orderly, and efficient development. For purposes of this standard, a proposal leads to planned, orderly, and efficient development only if all of the following criteria are met:
 - a) The land subject to the change of organization or reorganization is contiguous either to lands developed with an urban use or to lands which have received all discretionary approvals for urban development.
 - b) The proposed development of the subject lands is consistent with the Sphere of Influence Plan(s) of the affected agency or agencies, including the relevant Municipal Service Reviews, and the land subject to the change of organization is within the near-term sphere of influence boundary.
 - c) The land subject to the change of organization is likely to be developed within five years. For very large developments, annexation should be phased wherever feasible. If the Commission finds phasing infeasible for specific reasons, it may approve annexation if all or a substantial portion of the subject land is likely to develop within a reasonable period of time.
 - d) Insufficient vacant non-prime or open space land exists within the existing agency boundaries or applicable five- and ten-year sphere boundaries that is planned and developable for the same general type of use.
 - e) The proposal will have no significant adverse effect on the physical and economic integrity of other ag/open space lands.
2. Approved Sphere of Influence Plan Required. The Commission will not make the affirmative finding that the proposed development of the subject lands is consistent with the relevant sphere of influence in the absence of an approved Sphere of Influence Plan containing all of the elements required by Section III-B. below.

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3. Finding with Respect to Alternative Sites. The Commission will not make the affirmative finding that insufficient vacant non-prime or open space land exists within the sphere of influence unless the appropriate jurisdiction has:
 - a) Identified within its sphere of influence all "prime agricultural land" and "open space land."
 - b) Enacted measures to preserve prime ag/open space land identified within its sphere of influence for agricultural or open space use.
 - c) Adopted as part of its General Plan specific measures to facilitate and encourage in-fill development as an alternative to the development of prime ag/open space lands.
4. Determining Impact on Adjacent Ag/Open Space Lands. In making the determination whether conversion will adversely impact adjoining prime agricultural or open space lands, LAFCo will consider the following factors:
 - a) The prime ag/open space significance of the subject and adjacent areas relative to other ag/open space lands in the region.
 - b) The use of the subject and the adjacent areas.
 - c) Whether public facilities related to the proposal would be sized or situated so as to facilitate the conversion of adjacent or nearby prime ag/open space land or will be extended through or adjacent to any other prime ag/open space lands which lie between the project site and existing facilities.
 - d) Whether natural or man-made barriers serve to buffer adjacent or nearby prime ag/open space land from the effects of the proposed development.
 - e) Applicable provisions of the General Plan open space and land use elements, applicable growth-management policies, or other statutory provisions designed to protect agriculture or open space.
5. Comments on Prime Ag/Open Space Projects. Whenever feasible, LAFCo will comment upon Notices of Preparation for Environmental Impact Reports or projects which involve the development of large tracts of open space or agricultural land.

O. NEED FOR SERVICES

A need for the services that will be made available must be established. LAFCo will normally determine that a need for service exists if any of the following situations is present:

1. Public Health and Safety Threat. If the lack of the service creates a demonstrated threat to the public health and safety.
2. Community Needs. If a proposal includes the extension or provision of community services that are not considered growth-inducing, such as fire protection, recreation, road maintenance, etc., and the residents of the area have indicated a desire for the service. A positive indication from the residents may be established by a city or district being requested by residents to initiate annexation on their behalf.

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3. Five-Year Urbanization. If a proposal will result in the extension of services that may reasonably be expected to result in urbanization of the subject territory, area growth patterns must indicate that the subject area is likely to be developed for urban use within five years, if permitted, and local planning regulations provide:
 - a) It is designated for urban uses in the appropriate land use authority's General Plan;
 - b) If the proposal includes annexation to a city, the subject territory has been rezoned for urban uses; and
 - c) Development at the site is consistent with the policies of the relevant General Plan and the policies of Cortese-Knox-Hertzberg.

P. **DISADVANTAGED UNINCORPORATED COMMUNITIES**

The Commission will identify Disadvantaged Unincorporated Communities, as defined below, for the purpose of:

1. Municipal Service Reviews. Water, Wastewater, and Fire Protection Municipal Service Reviews will discuss and identify opportunities for the provision of those services to Disadvantaged Unincorporated Communities.
2. City and Town Annexations. Disadvantaged Unincorporated Communities that are located adjacent to areas proposed for annexation to a city or town shall normally be included in the annexation or reorganization proposal or be separately proposed for annexation, unless the Commission has determined that the disadvantaged community would not be benefited by annexation, or if at least 50% the registered voters have indicated opposition to annexation.
3. Definition of Disadvantaged Unincorporated Community. A Disadvantaged Unincorporated Community is defined as a developed area that has been identified as such by LAFCo, the County or applicable city, or one that meets all the following standards:
 - a) Substantially developed with primarily residential uses
 - b) Contains at least 25 parcels in close proximity that do not exceed 1.5 acres in size
 - c) Does not have reliable public water, sewer or structural fire protection service available
 - d) Contains at least 12 registered voters
 - e) Has a median household income level of 80% or less than the statewide median household income
4. Request for Determination. In addition to those Disadvantaged Unincorporated Communities identified by LAFCo or other agencies, residents or property owners may request that LAFCo determine whether a specific area meets the criteria listed in Item 3, to be treated as a Disadvantaged Unincorporated Community. Such request must be submitted by at least five area residents. The review shall be conducted by LAFCo staff and

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shall, if appropriate, be submitted for consideration and approval by the Commission.

Q. EXCEPTIONS

LAFCo may make exceptions to any of the standards in this Chapter if it determines that such exceptions can be justified upon one or more of the following grounds:

1. Uniqueness. The project has a unique physical constraint which is so unusual and inconsistent with other similar locations that granting an exception would not be a grant of a special privilege.
2. Conflicting Standards. Exceptions are required to resolve conflicts between standards of these policies.
3. Quality/Cost. The project will result in significantly improved quality or substantially lower cost of service available.
4. No Alternative. No feasible or logical alternative exists.

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III. SPHERES OF INFLUENCE

A. GENERAL POLICIES

LAFCo must adopt a sphere of influence for each city and each district in its jurisdiction, and must review and, if necessary, update each sphere of influence at least every five years. All LAFCo actions must be consistent with the relevant sphere plan. A sphere of influence is defined in Section 56425 of the Government Code as “a plan for the probable physical boundary and service area of a local agency or municipality as determined by the Commission.”

The establishment of Sphere of Influence Plans is perhaps the most important planning function given to LAFCo by the State Legislature. Spheres of influence are described by the Cortese-Knox-Hertzberg Act as an important tool for “planning and shaping the logical and orderly development and coordination of local governmental agencies so as to advantageously provide for the present and future needs of the county and its communities.” Sphere plans serve a function in LAFCo determinations similar to that served by General Plans for cities and counties. Consistency with the adopted sphere plan is mandatory and changes to the plan require careful review.

The Sphere of Influence Plan is a LAFCo responsibility, and the Commission is the sole authority as to the sufficiency of the documentation and the Plan’s consistency with law and LAFCo policy. LAFCo encourages the participation and cooperation of the subject agency. In determining the sphere of influence of each agency, LAFCo must consider and prepare a written statement of its determinations with respect to the following four factors, as stated in Section 56425(e) of the Cortese-Knox-Hertzberg Act:

- 1) *The present and planned land use in the area, including agricultural and open-space lands.*
- 2) *The present and probable need for public facilities and services in the area.*
- 3) *The present capacity of public facilities and adequacy of public services provided by the agency.*
- 4) *Any social or economic communities of interest in the area that the Commission determines are relevant to the agency.*

In order to prepare and update spheres of influence, LAFCo is required to conduct a review of the municipal services provided in the county, region, subregion, or other appropriate designated area. The standards, procedures, and policies Nevada LAFCo applies to service reviews are set forth in Section C below.

1. Consistency Requirement. Every Sphere of Influence Plan must be consistent with LAFCo’s policies and procedures, the State Legislature’s policy direction to LAFCo, the sphere plans of all other agencies in the area, the Commission’s statement of written determinations with respect to its review of municipal services in the area, and with the long-range planning goals for the area.

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2. Sphere Boundaries. When establishing the boundaries of a sphere of influence for an agency, LAFCo will consider the factors listed in Section 56425(e) of the Government Code as noted above.

With respect to Factor 2), above, LAFCo will not include lands that are unlikely to require the services provided by the agency—for example, lands not designated for development by the applicable General Plan, territory where development is constrained by topographical factors, or areas where the projected and historical growth rates do not indicate a need for service within the timeframe of the sphere plan.

With respect to Factor 3), above, LAFCo will not include areas in an agency's sphere of influence which cannot feasibly be served by the agency within a timeframe consistent with the sphere plan.

3. Areas of Interest. LAFCo may, at its discretion, designate a geographic area beyond the sphere of influence as an Area of Interest to any local agency.

a) An Area of Interest is a geographic area beyond the sphere of influence in which land use decisions or other governmental actions of one local agency (the "Acting Agency") impact directly or indirectly upon another local agency (the "Interested Agency"). For example, approval of a housing project developed to urban densities on septic tanks outside the city limits of a city and its sphere of influence may result in the city being forced subsequently to extend sewer services to the area to deal with septic failures and improve city roads that provide access to the development. The city in such a situation would be the Interested Agency with appropriate reason to request special consideration from the Acting Agency in considering projects adjacent to the city.

b) When LAFCo receives notice of a proposal from another agency relating to the Area of Interest, LAFCo will notify the Interested Agency and will give great weight to its comments.

c) LAFCo will encourage Acting and Interested Agencies to establish Joint Powers Agreements or other commitments as appropriate.

4. Zero and Minus Spheres. The Commission may adopt a “zero” sphere of influence (encompassing no territory) for an agency when the Commission has determined that the public service functions of the agency are either non-existent, no longer needed, or should be reallocated to some other agency of government. Adoption of a “zero” sphere indicates the agency should ultimately be dissolved. The Commission may initiate dissolution of an agency when it deems such action appropriate. The Commission may adopt a “minus” sphere (excluding territory currently within that agency's boundaries) when it has determined that territory within the agency's boundaries is not in need of the agency's services, or when the agency has no feasible plans to provide efficient and adequate service to the territory in question.

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B. CONTENTS OF THE SPHERE OF INFLUENCE PLAN

1. General Requirements. The Sphere of Influence Plan for each governmental agency within LAFCo jurisdiction shall contain:
 - a) A sphere map and phased plan for annexation of the depicted territory defining the probable boundary of the agency's service area 20 years hence (the long-term horizon) and identifying a near-term development horizon defining the agency's logical boundary for lands likely to be annexed prior to the next sphere review or update (typically within five years). The phased annexation plan may include specific conditions for particular areas that must be satisfied before annexations may occur.
 - b) Documentation to support the Commission's determinations regarding the factors stated in §56425(e). Generally this information will be provided in the applicable Municipal Service Review(s), supplemented and updated as necessary to assure the information and analysis satisfy LAFCo policy requirements and are complete, current, and accurate.
2. Specific Requirements for City Sphere Plans.
 - a) City/County Agreement. When required by G. C. §56425(b), a city and the county shall meet and confer regarding the boundaries of the city's sphere prior to the Commission's final determination. If a city and the county have reached agreement regarding the boundaries, development standards, and zoning requirements within a proposed city sphere, the Commission shall give great weight to the agreement in the Commission's final determination of the city's sphere.
 - b) Parcel Inventory and Absorption Study. The Commission must be able to make a positive determination that the city's sphere is consistent with its historical and expected growth rates, and that the territory within the sphere is likely to be annexed within the 20-year timeframe. The Commission's determination will be based on information provided by the city, including 1) a vacant land inventory, 2) an analysis of the vacant lands to determine their suitability for development, and 3) a market study to determine the absorption rate of the usable vacant lands. If the city is unable to supply such information, LAFCo will make a sphere determination after considering the city's historical growth rates for each land use designation, pertinent city land use and zoning regulations, and the physical characteristics of the property intended to be included in the sphere.
 - c) Spheres for New Cities. The Commission will adopt a Sphere of Influence Plan for a newly incorporated city within a year of the date of incorporation.
3. Specific Requirements for District Sphere Plans. A district's sphere plan must document that the territory within the district's sphere is likely to require the district's services and that the district has or will have the capacity to serve the area at the appropriate level.

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- a) Multi-service Districts. LAFCo shall adopt a sphere of influence plan for each distinct function or class of service provided by a district. These sphere plans may or may not be coterminous. Each sphere shall establish the nature, location, and extent of the functions or classes of services provided by the district.
- b) Spheres for New Districts. LAFCo will adopt a Sphere of Influence Plan for a newly formed district within two years of the completion of formation proceedings.

C. MUNICIPAL SERVICE REVIEWS

In order to establish an appropriate sphere for an agency, LAFCo must have adequate information on present and future service needs in the area and the capabilities of the agency to meet those needs. To this purpose, the Cortese-Knox-Hertzberg Act requires LAFCo to conduct service reviews prior to establishing or updating spheres of influence. A service review is a comprehensive review of provision of specified services within a designated geographic area. Its purpose is to evaluate the provision of services on a regional basis and to recommend actions, when necessary, to promote the efficient provision of those services. The service reviews are intended to help LAFCo, the public and other agencies better understand the public service structure and evaluate options for the provision of efficient and effective public services. LAFCo uses the information and analysis provided by the Municipal Service Review (MSR) to ascertain whether an agency can provide adequate and efficient services to the areas in the agency's sphere within the applicable time frame.

LAFCo will prepare or update the appropriate Municipal Service Reviews prior to or in conjunction with the adoption or update of an agency's sphere of influence plan. In general, LAFCo will conduct such reviews on a service-by-service basis for designated geographic areas. The Commission will periodically develop and implement a multi-year coordinated schedule for preparing MSRs and updating spheres of influence, in accordance with the legislature's direction to review each agency's sphere of influence every five years and update as necessary.

1. General Standards. LAFCo shall prepare Municipal Service Reviews in conformance with the provisions of Government Code §56430. A Municipal Service Review must provide information specific to each agency to support the Commission's written determinations with respect to the following:
 - a) Growth and population projections for the affected area.
 - b) The location and characteristics of any disadvantaged unincorporated communities, as set forth in Section II P. above, within or contiguous to the sphere of influence.
 - c) Present and planned capacity of public facilities, adequacy of public services, and infrastructure needs or deficiencies including needs or deficiencies related to sewers, municipal and industrial water, and

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structural fire protection in any disadvantaged unincorporated communities within or contiguous to the sphere of influence.

- d) Financial ability of agencies to provide service.
 - e) Status of, and opportunities for, shared facilities.
 - f) Accountability for community service needs, including governmental structure and operational efficiencies.
 - g) Any other matter related to effective or efficient service delivery.
2. Municipal Service Reviews Must Support Spheres of Influence. In addition to the requirements discussed above, Municipal Service Reviews shall contain information on which the Commission can base its determination of the appropriate sphere of influence for an agency, including:
- a) Identification of existing land uses and a reasonable projection of land uses which would occur if services were provided consistent with each agency's sphere of influence plan. This analysis should include maps and explanatory text detailing the following:
 - i) Present designated and actual land uses in the area, improved and unimproved properties, and agricultural and open space lands, as defined by G.C. Sections 56064 and 56059.
 - ii) Proposed future land uses in the area.
 - b) Discussion of present and probable future needs for public facilities and services in the sphere area. The discussion should include consideration of the need for all types of major facilities, not just those provided by the agency.
 - c) A determination of the present and future capacity of facilities and adequacy of services the agency provides or has plans to provide. The review must include specific information and analysis of how the agency will meet anticipated growth in demand within its current boundaries and within the area included in its sphere. This information will guide the Commission's designation of appropriate sphere horizons in the Sphere of Influence Plan. The required information should include the following:
 - i) Maps and explanatory text that indicate the location and capacity of existing and proposed facilities, including a plan for timing and location of new or expanded facilities.
 - ii) An estimate of projected revenue and expense over the sphere horizons, specifically identifying the cost of planned new facilities or services and projected source(s) of revenue to fund those new facilities or services.
 - iii) Actual and projected costs of services to consumers in current dollars. A statement of actual and projected allocations of the cost of services between existing and new residents shall be included.
 - d) Identification of any relevant social or economic communities of interest in the area. For example, an area which is completely within one subdivision governed by a single homeowner's association should be

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noted, in order to avoid unnecessary division of the territory between service agencies.

3. Uses of the Municipal Service Review. Upon approval of the Municipal Service Review, it will be utilized by LAFCo both in establishing the agency's sphere of influence and in the consideration of all proposals affecting that agency.

D. AMENDMENTS AND UPDATES OF SPHERES

1. Adoption and Revision. LAFCo will adopt, amend, or update a Sphere of Influence Plan after a public hearing and pursuant to the procedures set forth in Section 56427 of the Cortese-Knox-Hertzberg Act. Sphere actions are subject to the provisions of the California Environmental Quality Act. Sphere of Influence Plans shall be reviewed and updated if necessary every five years, or more often if deemed necessary by the Commission. Whenever possible, city sphere updates shall be scheduled to coincide with city General Plan updates.
2. Updates and Amendments Defined. Updates generally involve comprehensive review of the entire Sphere of Influence Plan, including the map and the information provided in the Municipal Service Review for the agency.
Amendments generally involve discrete changes to a Sphere of Influence Map or Plan that are proposed by an agency or individual to accommodate a specific proposal. An amendment may or may not involve changes to the Municipal Service Review information.
3. Amendments Required. An amendment to the Sphere of Influence Plan will be required in the following circumstances:
 - a) To modify a sphere by adding or removing territory.
 - b) To move territory from one development horizon to another.
 - c) When a district seeks to provide a new or different function or class of service.
 - d) When a significant change in an agency's plans for service makes the current sphere plan impractical.
4. Updates Required. LAFCo will review the adopted sphere plan of each agency at least every five years and will update it as the Commission deems necessary. In order to conduct a sphere review, LAFCo will request the agency to provide updated information for its Sphere of Influence Plan and Municipal Service Review. Such information is necessary to inform the Commission's determination of appropriate sphere horizon boundaries. In the absence of adequate information, the Commission will complete the sphere update by identifying the territories that currently receive the agency's services and excluding unserved territories from the sphere.
5. General Requirements. LAFCo will generally treat an update or a proposed amendment to an agency's sphere of influence similarly to an application for

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approval of a sphere of influence. Each of the following sets of policies apply to sphere of influence amendments and updates:

- a) General policies.
- b) Specific policies and standards for spheres of influence and for updates and amendments thereto.

LAFCo will not approve a sphere plan that would result in a sphere that is inconsistent with other LAFCo policies or standards.

6. Precedence of Amendments over Annexations. Sphere of influence amendments shall precede consideration of proposals for changes of organization or reorganization.
7. Demonstrated Need Required. An applicant for amendment to a sphere of influence must demonstrate a projected need or (in the case of reduction of the sphere) lack of need for service.
8. Open Space and Prime Agricultural Land. Amendment proposals involving sphere expansion to include open space or prime agricultural land will not be approved by LAFCo if there is sufficient alternative land available for annexation within the existing sphere of influence.

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IV. ANNEXATIONS AND DETACHMENTS

A. GENERAL STANDARDS FOR ANNEXATION AND DETACHMENT

These standards govern LAFCo determinations regarding annexations to and detachments from all agencies.

1. Consistency With LAFCo Policies. The annexation or detachment must be consistent with the General Policies set forth in these Policies.
2. Consistency with Spheres and Municipal Service Reviews.
 - a) An annexation or detachment must be consistent with the internal sphere of influence horizons. The land subject to annexation shall normally lie within the near-term sphere horizon. Land within the long-term horizon may be considered for annexation if the application is submitted three or more years after the last sphere review or update or is based on a finding of need.

The annexation must also be consistent with the applicable Municipal Service Review(s). An annexation or detachment shall be approved only if the Sphere of Influence Plan of each affected agency demonstrates that adequate services will be provided within the time they will be needed by the inhabitants of the annexed or detached area.
 - b) LAFCo generally will not allow spheres of influence to be amended concurrently with annexation proposals.
 - c) Except as provided in Section IV-A-2-a) above, proposed annexations of lands lying outside the current sphere horizon are presumed not to be consistent with the Sphere Plan. In such a case the agency or proponent must first request LAFCo to consider a sphere amendment pursuant to Section III-D above. If the amendment is approved, the agency or proponent may then proceed with the annexation proposal.
3. Plan for Services Required. Every proposal must include a Plan for Services that addresses the items identified in Section 56653 of the Government Code. This Plan for Services must be consistent with the Sphere Plan of the agency.
4. Contiguity. If required by statute, or if necessary to ensure efficient service provision, territory proposed to be annexed must normally be contiguous to the annexing city or district. Territory is not contiguous if its only connection is a strip of land more than 300 feet long and less than 200 feet wide. (Government Code Section 56031).
5. Piecemeal Annexation Prohibited. LAFCo requires annexations and detachments to be consistent with the schedule for annexation of sphere territory that is contained in an agency's Sphere of Influence Plan. LAFCo will modify small, piecemeal annexations to include additional territory in order to promote orderly annexation and logical boundaries.
6. Annexations to Eliminate Islands. Proposals to annex islands or to otherwise correct illogical distortion of boundaries will normally be approved unless they would violate another provision of these standards.

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7. Annexations that Create Islands. An annexation will not normally be approved if it will result in the creation of an island of incorporated or unincorporated territory or otherwise cause or further the distortion of existing boundaries. The Commission may nevertheless approve such an annexation where it finds that the annexation as proposed is necessary for orderly growth and that reasonable effort has been made to include the island in the annexation but that inclusion is not feasible at this time.
8. Service Requirements. An annexation shall not be approved merely to facilitate the delivery of one or a few services to the detriment of the delivery of a larger number of services or services more basic to public health and welfare.
9. Adverse Impact of Annexation on Other Agencies or Service Recipients. LAFCo will deny annexation proposals that would result in significant adverse effects upon other service recipients or other agencies serving the affected area unless the approval is conditioned to mitigate such impacts.
10. Action Options. LAFCo shall take one of the following three actions on an application for annexation or detachment:
 - a) Approve the proposal if it has found the change to result in the most efficient delivery of services for the affected population and to comply with other applicable standards.
 - b) Modify or conditionally approve the proposal to insure efficient service delivery and meet other policy objectives. Possible conditions include, but are not limited to:
 - i) Waiver of detachment from an existing service provider or, in the alternative, imposition of appropriate detachment fees.
 - ii) Requiring establishment of a Joint Powers Agreement with another service provider.
 - iii) Inclusion of additional territory or exclusion of territory in order to achieve more logical boundaries.
 - iv) Such other conditions as authorized by Section 56886 of Cortese-Knox-Hertzberg.
 - c) Deny the annexation. In the event of such a denial, LAFCo may, where appropriate, provide direction as to changes in the proposal that could cause the Commission to consider approving a revised application.

B. DETERMINATION OF THE MOST EFFICIENT SERVICE PROVIDER

LAFCo will normally approve an annexation or detachment only if the Commission determines that the annexing agency possesses the capability to provide the most efficient delivery of applicable services for the affected population.

1. Optimum Combination of Service and Cost. For purposes of this standard, the most efficient services are those which are provided at the optimum combination of service cost and service level. In the case of providers with similar service costs, the provider with higher service levels shall be deemed more

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efficient. In the case of providers of similar service levels, the provider at the lowest cost shall be deemed more efficient. In comparing the providers of adequate but low-cost services, with high-quality, high-cost services, the Commission shall retain discretion to determine the optimum efficiency based on compliance with the other provisions of the standards and the preferences of the affected population.

2. “Affected Population” Defined. For purposes of this standard, “affected population” means any of the following:
 - a) The population which inhabits or will inhabit the area to be annexed.
 - b) The population already being served by the annexing agency.
 - c) The population inhabiting the territory of existing or potential alternative service providers.
3. Factors to Be Considered. In evaluating the capability of an annexing agency (or of alternative agencies) to provide the required service, LAFCo shall utilize its written determinations pursuant to applicable municipal service reviews and the Master Services Elements of the proposed annexing entity, current service providers, and potential alternative service providers. In addition, LAFCo shall take into account all of the following factors:
 - a) Physical accessibility of the territory to the agency’s service provision resources—for example, is the provider of sewer service the agency whose plant can most easily gravity-feed from the subject territory?
 - b) The agency’s possession of or ability to acquire resources necessary to provide the needed service—for example, an agency may be judged unable to acquire water rights necessary to provide the water services needed by a territory proposed for annexation.
 - c) The agency’s historic service provision effectiveness and efficiency—for example, an agency may be judged an inefficient service provider if it has a previously documented history of service interruptions, accidents, safety hazards, excessive complaints, non-compliance with CEQA, illegal activities or excess costs/charges.
 - d) The appropriateness of the agency’s organizational structure to meet service needs—for example, LAFCo may question whether a dependent district of a city is an appropriate provider of services outside the city boundaries, where the population will have no ability to vote for the board of directors of that district.
 - e) The legislative policy established in Cortese-Knox-Hertzberg favoring consolidation of services in a single multi-service provider over allowing the proliferation of single-purpose service agencies.
 - f) The effect on alternative service providers and those who use their services.
4. LAFCo Responsibility for Determination. LAFCo shall determine the most efficient overall service provider or combination of providers, not the affected agencies.

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C. CITY ANNEXATIONS

1. Annexations of Streets. Annexations shall reflect logical allocation of streets and rights-of-way. Specifically:
 - a) LAFCo may require inclusion of additional territory within an annexation in order to assure that the city reasonably assumes the burden of providing adequate roads to the property to be annexed. LAFCo will require cities to annex streets where adjacent lands in the city will generate additional traffic or where the annexation will isolate sections of county road, but will not require annexation of roads that will create isolated sections of city maintained road.
 - b) LAFCo will favorably consider annexations with boundary lines located so that all streets and rights-of-way will be placed within the same jurisdiction as the properties which either abut thereon or use the streets and rights-of-way for access. Except in extraordinary circumstances, cities shall annex an entire roadway portion when 50% or more of the frontage on both sides of the street will be within the city after completion of the annexation.
2. Urban Boundaries. LAFCo will normally adjust annexation boundaries to include adjacent urbanized areas in order to maximize the amount of developed urban land inside a city and to minimize piecemeal annexation. As used herein, “urbanized areas” are areas that are developed for industrial use, commercial use, or residential use with a density of at least one unit per 1.5 acres and receive either public water or sewer service.
3. Rezoning Required. The Cortese-Knox-Hertzberg Act requires a city to prezone territory to be annexed and prohibits subsequent changes to its General Plan or rezoning designations for a period of two years after completion of the annexation, unless the council makes a finding at a public hearing consistent with the provisions of Government Code Section 56375(e). The city’s rezoning must take into account the likely intended development of the specific property.

In instances where LAFCo amends a proposal to include additional territory, the Commission’s approval of the annexation will be conditioned upon completion of rezoning of the additional territory.

4. Disadvantaged Unincorporated Communities. Prior to submittal of a proposal for annexation of an area that includes ten or more acres, City staff and LAFCo staff will confer and review maps and development patterns of areas adjacent to the subject territory to determine whether any area contiguous to the proposed annexation meets the Commission’s definition of a Disadvantaged Unincorporated Community, as set forth in Section II P. above. Review may include use of a survey to determine whether the area meets the median household income criteria, and whether the registered voters of the area would support its annexation to the city. Areas that meet the listed criteria and that would benefit from annexation shall normally be included in the subject proposal, or proposed for annexation by separate application within a year.

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- a) The Commission will normally approve a proposal that includes annexation of a Disadvantaged Unincorporated Community to a city, unless the city has established that annexation of the area would impose a severe strain on city finances and services or that annexation would not benefit the Disadvantaged Unincorporated Community.
- b) If an application for annexation of the Disadvantaged Unincorporated Community has been filed within the previous five years, or if written documentation has been submitted to LAFCo indicating that at least 50% of the registered voters of the Disadvantaged Unincorporated Community are opposed to the annexation, the city will not be required to initiate annexation of the Disadvantaged Unincorporated Community.

D. DETACHMENTS FROM CITIES AND DISTRICTS

1. General Requirements. LAFCo shall normally disfavor the detachment of territory from a high-quality service provider unless the following can be demonstrated:
 - a) The detachment is necessary to ensure delivery of services essential to the public health and safety; or
 - b) The successor provider will be the most efficient services provider to the area as determined pursuant to Section IV-B above and the detachment will not significantly reduce the efficiency of service delivery to the remaining inhabitants of the current service provider's territory.
2. Service Plan Considerations. The service plans of special districts which lie within a city's sphere of influence should provide for orderly detachment of territory from the district or merger of the district as district territory is annexed to the city. However, LAFCo may determine during the updating of the spheres of the two agencies that the district should continue to provide service within certain areas even after their annexation to the city.
3. Bonded Indebtedness. Detachment from a city or special district shall not relieve the landowners within the detaching territory from existing obligations for bonded indebtedness or other indebtedness incurred previously by the city or district to provide service to the detaching property unless the following apply:
 - a) The relief from indebtedness is part of a revenue exchange agreement applying to the detachment.
 - b) The detaching agency is legally authorized to and agrees to assume the cost and spread it over the remaining property within the agency.

E. EXTENSION OF SERVICES BY CONTRACT

This section applies only to contracts to extend services beyond a local agency's jurisdictional boundaries as provided by Section 56133 of the Government Code.

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1. General Standards.

a) Applicable Policies

When considering requests to extend services by contract beyond an agency's jurisdiction boundaries, LAFCo will apply the same general substantive policies as for annexation requests. In addition, the application must be made in anticipation of annexation. As used in this section, the term "in anticipation of annexation" means that the area is within the current sphere horizon of the agency.

b) Subsequent Annexation Application Required

For all contract service extensions, the requesting agency must either:

i) File a concurrent application with LAFCo for annexation of the property, or

ii) Carry out both of the following:

- Place a condition in its contract with the property owner requiring submission of an annexation application within a period not to exceed two years; and
- Record a notice against title to the property specifying that in the event the agency does not initiate annexation, the property owner must make application to LAFCo for annexation of the territory within two years of LAFCo's approval of the request.

2. Review of Contracts. The LAFCo Executive Officer will conduct periodic reviews of contracts established since January 1, 1993, for compliance with the requirements of this section.

3. Unapproved Contracts Null and Void. If an agency enters into a contract without LAFCo approval, the contract shall be null and void. If the Executive Officer receives notice of a violation of these provisions, he or she shall place the item on the Commission's agenda for consideration of appropriate action.

4. Administrative Approvals. In a case which conforms to the standards set forth in this Section IV-E and also involves an imminent peril to public health and safety, applicants may submit an abbreviated application, along with the applicable deposit as specified in the LAFCo fee schedule, to be considered for temporary administrative approval by the Executive Officer. The Executive Officer shall present the matter to the Commission at the next available meeting for final consideration.

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V. INCORPORATIONS, FORMATIONS, PROVISION OF NEW SERVICES BY DISTRICTS, CONSOLIDATIONS, DISSOLUTIONS, AND DISINCORPORATIONS

A. INCORPORATION OF CITIES

1. Consistency with LAFCo Policies. A proposal for incorporation of a new city must be consistent with the General Policies set forth in these Policies (Section II) as well as the following specific policies for incorporations.
2. Need for Incorporation. LAFCo will normally favor a proposal for incorporation only if the Commission finds that there is a significant unmet need for urban services or need for improved urban services within the territory for which incorporation is proposed. In determining whether such a need for urban services exists, the Commission will base its determination on:
 - a) Current levels of service in the area to be incorporated.
 - b) Whether the area proposed for incorporation is already substantially urbanized or applicable General Plans, Specific Plans, or area plans and/or realistic population and growth projections demonstrate the need for urbanization of the affected area within the next five years.
 - c) The Sphere of Influence Plans for the jurisdictions currently providing services to the area.
 - d) The preferences of the community proposing to incorporate.
3. Efficiency Required. LAFCo shall approve a proposal for incorporation only if it finds that a new city will provide the most efficient and consolidated forms of urban services to the affected population.
4. Public Benefit Considered. LAFCo will consider whether the proposed incorporation will benefit the affected population as a whole or only a select group. Absent other considerations, LAFCo will not approve an incorporation proposal that amounts to a grant of governmental powers to a special interest group.
5. Balancing Adverse Impacts. In making its decision on the incorporation, LAFCo shall weigh the benefits of the incorporation against its adverse impacts on:
 - a) Particular communities or groups in the incorporating area or affected unincorporated area.
 - b) Other service providers within the area of the proposed incorporation, including the county.
 - c) Prime agricultural and open space lands and the prevention of urban sprawl.
6. Plan for Services Required. A proposal for incorporation must include a Plan for Services that addresses the items identified in Section 56653 of the Government Code.
7. Prime Agricultural and Open Space Land that is not designated for urbanization within the next five years of the date the application is received shall not be included within the boundaries of a proposed city unless the

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Commission determines that the proposal is structured to insure the long-term preservation of the open space or agricultural land.

8. Comprehensive Fiscal Analysis Required. Section 56800 of the Cortese-Knox-Hertzberg Act requires the Executive Officer to prepare or cause to be prepared a Comprehensive Fiscal Analysis (CFA) of the projected fiscal condition of the new city. Normally, LAFCo will contract with an independent consultant for such an analysis, and the charge for the study will be included with other project-related charges paid by the applicant. The CFA shall project income and expense for a period of seven years after incorporation. The Commission will approve the CFA after a public hearing.
9. Revenue Neutrality and Fiscal Solvency Required. LAFCo will only approve a proposal for an incorporation if the proposed city will be able to fund municipal services and remain financially solvent after making adjustments to attain revenue neutrality. As used herein, the term “revenue neutrality” shall mean an exchange of revenue and service delivery costs between the new city and the various affected agencies, as more specifically required by Section 56815 of the Cortese-Knox-Hertzberg Act. The determination whether the proposed incorporation meets this standard will be the objective of the Comprehensive Fiscal Analysis described above.
10. Financial Review Request. In accordance with the provisions outlined in Section 56801 of the Cortese-Knox-Hertzberg Act, any interested person or agency may request a review of the CFA by the Office of the State Controller within 30 days of the Commission’s approval of the document. The requesting party will be responsible for payment of the State Controller’s charges to conduct the review and is required to deposit the estimated cost before the review will be initiated. If the requesting party fails to deposit the estimated cost with LAFCo and execute a payment agreement for any additional cost within seven days of being notified of the amount, the request will be deemed withdrawn.
11. Competing Applications Relative to the Proposed Incorporation. Where LAFCo receives more than one application affecting an area proposed for incorporation, and such competing application(s) are received within sixty (60) days of the initial application for incorporation, the Commission shall consider such competing application(s) prior to approval of the incorporation proposal. (56657).

B. DISTRICT FORMATION

1. Consistency with LAFCo Policies. The formation of a special district must be consistent with the General Policies set forth in these Policies (Section II) as well as specific policies for district formations.
2. Need for a New District Required. LAFCo will only approve special district formations in areas that demonstrate a need for the proposed services and where no existing agency can adequately or efficiently provide such services in an accountable manner as required by Government Code Section 56886.5.

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3. Plan for Services Required. Every proposal for formation of a new special district must include a Plan for Services that addresses the items identified in Section 56653 of the Government Code.
4. LAFCo Will Establish Service Pattern. LAFCo's approval of a district formation will designate the nature, location, and extent of any functions or classes of services for the new district. These designations will be based on the Plan for Services. LAFCo will review subsequent district requests to provide different services pursuant to the provisions of Cortese-Knox-Hertzberg and Section V-C of these Policies.
5. Consistency Required. LAFCo will only approve district formation applications that accommodate development that is consistent with the General and Specific Plans of all affected land use authorities.
6. Conflicts Not Allowed. LAFCo will not approve a district formation proposal if the Plan for Services conflicts with the sphere plans of other agencies unless higher quality, more efficient service provision will occur as determined under Section IV-B above.
7. Public Benefit Considered. LAFCo will consider whether the proposed district formation will benefit the affected public as a whole or only a select group. Absent other considerations, LAFCo will not approve a district formation proposal that amounts to a grant of governmental powers to a special interest group.
8. Fiscal Solvency. LAFCo will prepare a fiscal analysis for the proposed district which projects services to be provided, costs to service recipients, and revenue and expenses for a period of at least five years. LAFCo will not approve an application for district formation unless the fiscal analysis demonstrates the district can provide the needed services and remain fiscally solvent. If the financing element of the Plan for Services (such as a special tax or benefit assessment) requires voter or landowner approval, LAFCo's approval of the proposal will require voter approval of the funding mechanism as a condition for completion of the formation.
9. County Service Areas. LAFCo may reduce or waive these district formation requirements in connection with the routine formation of county service areas.

C. PROVISION OF NEW SERVICES BY DISTRICTS

1. Policies Applicable to New Service Proposals. LAFCo will evaluate a proposal for a district to provide new services using the policies and standards applicable to the formation of a new district.
2. Plan for Services Required. A proposal for provision of new services must include a Plan for Services that addresses the matters identified in Section 56653 of the Government Code.
3. New Services not Subsidized. LAFCo will not approve a proposal for the provision of a new service if it is reasonably likely that existing ratepayers and/or taxpayers will have to subsidize the new service.

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D. CONSOLIDATIONS AND MERGERS OF DISTRICTS INTO CITIES

1. Policies Applicable to Consolidations and Mergers. As stated in General Policies Section II-I, LAFCo generally supports consolidation of agencies to obtain economies from the provision of consolidated services. For the purposes of LAFCo's policies and standards, a consolidation of cities or districts will be treated as an incorporation or a district formation. The merger of a district into a city will be treated as if it were an annexation of the district's territory combined with a detachment or dissolution.
2. General Requirements. Based upon the submitted Plan for Services and any other data provided, LAFCo will determine whether the city's and district's organizations and operations can feasibly be combined. LAFCo will give particular attention to the following:
 - a) Service plans and safeguards to ensure uniform and consistent service quality throughout the newly consolidated or merged jurisdiction.
 - b) Staffing levels, personnel costs, and employment contracts.
 - c) Potential for cost efficiencies and economies of scale.
 - d) Potential for improved governance and accountability.
 - e) Plans for restructuring agency debt.
 - f) Provisions for combining capital reserves and improvement plans.
 - g) Provisions for establishing zones of benefit, if necessary.
3. Special Consolidation Procedures. If two or more local agencies file an application to consolidate that meets the standards established in Government Code Section 56853, the Commission will either approve the proposal or require conditions that will insure the proposal is consistent with LAFCo policy. The Commission will notify the agencies of changes in the material proposed conditions in the application, in accordance with the provisions established in Section 56853.
4. Procedure for Formation of Subsidiary Districts. Proposals for the merger of a district into a city or establishment of the district as a subsidiary district of the city shall follow the special procedure set forth in Government Code Sections 56861-56863.

E. LAFCo-INITIATED CONSOLIDATIONS

1. General. LAFCo may initiate proceedings for consolidation of districts; dissolution, merger, or establishment of subsidiary districts; or reorganizations that include any of these changes of organization in accordance with all relevant provisions of the Cortese-Knox-Hertzberg Act. Such changes of organization shall hereinafter be referred to as LAFCo-initiated proposals for the purposes of this section.
2. Consistency with Consolidation Study Required. Initiation of a consolidation or reorganization proposal must be consistent with recommendations of a study prepared pursuant to Government Code Section 56378 (studies of governmental agencies), 56425 (Spheres of Influence), or 56430 (Municipal

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Service Reviews) which evaluates the factors listed in Sections V-D-2 above and V-E-4 below. The Commission will publicly consider a request from any interested person or agency for the conduct of such a study or may initiate one on its own.

3. Procedure for Initiation of Proposals by the Commission.

- a) The Commission may initiate a proposal for any combination of changes of organization or reorganization consistent with the recommendation of a study conducted pursuant to this section.
- b) The Commission shall adopt a resolution initiating the proposal at a public meeting. The resolution shall contain all the information normally included in a Resolution of Application. The Executive Officer shall provide each affected agency with notice of the meeting at least 21 days in advance.
- c) The Commission may decide to refer the matter to a reorganization committee constituted pursuant to Section 56826 of the Government Code.
- d) A proposal initiated by the Commission will be processed in accordance with all normal and specific procedural requirements of Cortese-Knox-Hertzberg and these Policies.

4. Policy Considerations. The Commission's General Policies and applicable specific policies and standards will be used to evaluate LAFCo-initiated proposals. Additionally, the Commission must make the following specific determinations pursuant to Government Code Section 56881 if it approves a LAFCo-initiated proposal:

- a) Public service costs of the proposal are likely to be less than or substantially similar to the costs of alternative means of providing the service.
- b) The change of organization or reorganization promotes public access and accountability for community service needs and financial resources.

F. DISINCORPORATIONS AND DISTRICT DISSOLUTIONS

1. Grounds for Disincorporation and District Dissolutions. LAFCo will approve a proposal for disincorporation/dissolution only if it determines that:

- a) the services offered or authorized are no longer necessary; or
- b) the services can be provided more efficiently by another agency or provider and that agency agrees to provide the services; or
- c) the agency is insolvent and unable to provide the services.

2. Bonded Indebtedness. Where possible, LAFCo shall condition any dissolution to provide for the repayment of any bonded indebtedness or other obligations of the dissolved agency.

3. Disposition of Remaining Funds. A disincorporated city must turn its treasury over to the County Treasurer within thirty (30) days of disincorporation. A dissolved district shall turn over its funds to its successor as determined under Government Code Section 57451.

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G. REORGANIZATIONS

1. Evaluation Process. LAFCo will independently evaluate each component organizational change of a reorganization proposal following the standards of this chapter applicable to that component of the reorganization. LAFCo will then balance the overall benefits against the costs and adverse impacts, in deciding on the reorganization as a whole.
2. Mitigation Requirements. The quality, efficiency, and effectiveness of service available prior to reorganization shall constitute a benchmark for determining significant adverse effects upon an interested party. LAFCo will approve a proposal for reorganization which results in significant adverse effects only if effective mitigating measures are included in the proposal.

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VI. GENERAL PROCEDURES

A. FEES AUTHORIZED

A fee shall be charged to a project applicant for the processing of any application in accordance with the standard approved LAFCo fee schedule. A project application shall not be approved by the Commission nor processing completed after approval until fees are paid.

B. NOTICE AND PUBLIC PARTICIPATION

1. Public Participation Encouraged. LAFCo encourages participation in its decision-making process. The Cortese-Knox-Hertzberg Act provides for a wide dissemination of notice. LAFCo shall not necessarily be limited to the minimums required by law and policy. The Commission will provide opportunity for the public to be heard at LAFCo meetings in accordance with the procedures set forth in its Bylaws.
2. Unnecessary Public Hearings Eliminated. Where LAFCo is authorized by Cortese-Knox-Hertzberg to consider a proposal without public hearing, the proposal will be considered by the Commission without a public hearing, unless the Executive Officer or the Commission determines that the matter is of sufficient public interest or controversy to warrant a public hearing.

C. APPLICATION BY RESOLUTION OF APPLICATION PREFERRED

While Cortese-Knox-Hertzberg permits initiation of applications to LAFCo either by resolution of an affected agency or by direct landowner/voter petition, LAFCo prefers that the resolution procedure be utilized wherever feasible. Use of the resolution of application procedure is preferred because (1) it involves the affected public agency early in the process to assure that the agency's concerns are considered and (2) it better integrates CEQA processing by the affected public agency as Lead Agency. Each applicant shall be advised of this policy at the earliest possible time. Applications initiated by petition (other than for sphere updates, district formations, and city incorporations) must also include evidence of efforts to obtain the sponsorship of the affected public agency.

D. APPLICATION REQUIREMENTS

Applications to the Commission must contain all the information and materials required by the Cortese-Knox-Hertzberg Act (Sections 56652 and 56653) as well as the applicable fees or deposit toward fees as specified by the LAFCo Fee Schedule. Except when the Commission is the Lead Agency pursuant to the California Environmental Quality Act (as defined in Section 21067 of the Public Resources Code), an application must also contain complete documentation of the Lead Agency's environmental determination. No application for a change of organization or reorganization will be deemed complete and scheduled for hearing unless Revenue and Taxation Code (Section 99) requirements for tax apportionment agreements have been satisfied.

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E. RECONSIDERATION OF LAFCO DECISIONS

1. Request and Fees. A request for reconsideration shall be made consistent with the provisions of Section 56895 of the Cortese-Knox-Hertzberg Act within 30 days of the Commission's determination and shall be accompanied by the appropriate reconsideration fee deposit as established in the LAFCo Fee Schedule. If the request does not specify the required grounds for reconsideration or does not otherwise comply with statutory requirements, the Executive Officer shall return the incomplete request to the requesting party, along with a statement of the deficiency. A request will be placed on the Commission's agenda only if the requesting party supplies the missing information before the end of the 30 day reconsideration period.
2. Grounds for Reconsideration. LAFCo will normally change its previous determination only under one or more of the following circumstances:
 - a) Compelling new evidence about the proposal, which was previously unavailable and might alter the Commission decision, is brought to the Commission's attention.
 - b) Factors significant to the Commission decision were overlooked or have changed, such as a change in an applicable federal, state, or local law that might alter the Commission's decision.
 - c) A significant, prejudicial error in procedure is found.

F. CONDUCTING AUTHORITY PROCEEDINGS

1. Waiver of Conducting Authority Proceedings. The Commission may waive final Conducting Authority proceedings and authorize the Executive Officer to file a Certificate of Completion upon approval of a change of organization or reorganization pursuant to Cortese-Knox-Hertzberg Section 56663.
2. Setting the Matter for Hearing. The Commission shall establish the period, not less than 21 nor more than 60 days, to be allowed for the collection and filing of written protests. Within 35 days of final LAFCo action, the Executive Officer shall set the matter for hearing according to the schedule stipulated by the Commission and cause a notice thereof to be published in compliance with Government Code Section 56160 *et seq.*
3. Delegation of Authority to Conduct Protest Hearing. The Commission shall normally delegate to the Executive Officer the authority to conduct a protest hearing. If the Commission chooses to retain such authority, this decision shall be stated in the terms and conditions for approval of the subject proposal. The Executive Officer shall have the authority to issue the appropriate order upon completion of the protest proceedings.

G. DISCLOSURE OF POLITICAL EXPENDITURES REGARDING LAFCO PROCEEDINGS

Pursuant to Government Code Sections 56700.1 and 57009, effective January 1, 2008, expenditures for political purposes related to a proposal for a change of organization or reorganization and contributions in support of or in opposition to

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any proposal at the conducting authority stage of the LAFCo process are subject to reporting and disclosure to the same extent as required for local initiative measures under the Political Reform Act, Government Code Section 81000 *et seq.*, and the regulations of the Fair Political Practices Commission implementing that law.

Nevada LAFCo has adopted the following specific reporting and disclosure requirements to implement Government Code Sections 56700.1 and 57009:

1. Definitions

- a) “Contribution” as used herein shall have the same definition as provided in Government Code Section 82015, as amended.
- b) “Expenditure” as used herein shall have the same definition as provided in Government Code Section 82025, as amended.
- c) “Independent expenditure” as used herein shall have the same definition as provided in Government Code Section 82031, as amended, except that the term “measure” as used in Section 82031 shall be replaced with the term “proposal for organization or reorganization.”
- d) “Political Purposes” as used herein shall mean the purpose(s) of:
 - i) influencing public opinion;
 - ii) lobbying public officials; and/or
 - iii) influencing legislative or administrative action as defined in Government Code § 82032.

It shall not include the purpose(s) of complying with legal requirements and LAFCo rules for the processing of a proposal, including, but not limited to and by way of example only, preparation of a comprehensive fiscal analysis for an incorporation (Government Code Section 56800) or documents necessary to comply with the California Environmental Quality Act, Public Resources Code Section 21000 *et seq.*, such as a mitigated negative declaration or environmental impact report.

2. Disclosure Requirements for Proposals for Organization or Reorganization

- a) Any person or combination of persons who directly or indirectly makes an expenditure or independent expenditure of \$1,000 or more for political purposes in support of, or in opposition to, a change of organization or reorganization submitted to the Commission to which Government Code Section 56700.1 applies shall comply with the reporting and disclosure requirements of the Political Reform Act (Government Code § 81000 *et seq.*) to the same extent and subject to the same requirements as for local initiative measures. Such reporting and disclosure requirements, except as otherwise excluded herein, extend to those required by the Fair Political Practices Commission Regulations regarding such disclosures and shall include disclosure of contributions, expenditures and independent expenditures.

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- a) Disclosures made pursuant to this Section shall be filed as directed in Section 5 below.
 - b) For purposes of determining the deadlines by which such reports and disclosures must be filed, the term “election” as used in the Political Reform Act for determining such deadlines shall mean the date of the originally scheduled Commission hearing on a proposal for organization or reorganization. If no hearing date has been scheduled at the time a person becomes subject to disclosure under this policy, he or she shall request that the Executive Officer establish a date to serve as the “election” date for this purpose. The Executive Officer shall establish a date, such as, but not necessarily, the date which is six months after the first filing with the Commission regarding the proposal and inform the requestor of that date in writing.
 - c) In the event the originally scheduled hearing date for the proposal for organization or reorganization is rescheduled or continued to a later date, the obligation to file continues and reports shall be filed on or before the tenth day of each month following the original hearing date with respect to contributions and expenditures received in the previous calendar month up to and including the third calendar month following final action by the Commission on the proposal.
3. Disclosure Requirements for Conducting Authority Proceedings
- a) Any person or combination of persons who directly or indirectly makes an expenditure of \$1,000 or more for political purposes related to conducting authority proceedings for a change of organization or reorganization to which Government Code Section 57009 applies, or in support of or in opposition to those conducting authority proceedings, shall comply with the reporting and disclosure requirements of the Political Reform Act (Government Code § 81000 *et seq.*) to the same extent and subject to the same requirements as for local initiative measures. Such reporting and disclosure requirements, except as otherwise excluded herein, extend to those required by the Fair Political Practices Commission Regulations regarding such disclosures and shall include disclosure of contributions, expenditures and independent expenditures.
 - b) Disclosures made pursuant to this Section shall be filed as directed in Section 5 below.
 - c) For purposes of determining the deadlines by which such reports and disclosures must be filed, the term “election” as used in the Political Reform Act for determining such deadlines shall mean the date of the originally scheduled conducting authority hearing on the proposal for organization or reorganization. If no hearing date has been scheduled at the time a person becomes subject to disclosure under this policy, he or she shall request that the executive officer establish a date to serve as the “election” date for this purpose. The executive officer shall establish a date, such as, but not necessarily, the date which is six months after the

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first filing with the Commission regarding the proposal and inform the requestor of that date in writing.

- d) In the event the originally scheduled conducting authority hearing date for a proposal for organization or reorganization is rescheduled or continued to a later date, the obligation to file continues and reports shall be filed on or before the tenth day of each month following the original hearing date with respect to contributions and expenditures received in the previous calendar month up to and including the third calendar month following final action by the Commission on the proposal.

4. Certain Reports and Disclosures Excluded

This policy also requires that the persons subject to it comply with the regulations regarding the names of campaign committees, disclosures of the sources of mass mailings, and disclosures of the source of automated telephone calls under Government Code § 84501 *et seq.* and the regulations of the Fair Political Practices Commission implementing those sections.

5. Where to File

All reports and disclosures required hereunder shall be filed with the Nevada County elections official, whom Nevada LAFCo hereby designates as a Deputy Executive Officer of Nevada LAFCo for purposes of receiving and filing such reports.

6. Reporting Requirements are Non-exclusive

The disclosure and reporting requirements set forth herein are in addition to any other requirements that may be otherwise applicable under provisions of the Political Reform Act or by local ordinance.

7. Sunset Provision

This policy is intended to implement Government Code Sections 56700.1 and 57009 and shall be of no further force or effect upon the effective date of legislation repealing or amending those sections to transfer responsibility for enforcing disclosure of expenditures for political purposes affecting Commission proceedings to the Fair Political Practices Commission or otherwise terminating the responsibility of this Commission to adopt and implement this policy.

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VII. ADOPTION AND AMENDMENT

A. REGULAR AMENDMENTS

Regular Amendments to these Policies shall be made as follows:

1. The full text of any proposed amendment shall be sent to all members in the same manner as agenda packets, as specified in the LAFCo Bylaws, Section 5.3.c).
2. At the meeting, the proposed amendment shall be read aloud in its entirety by the Chair, unless such reading is waived by the Commission. Discussion may occur and modifications be made to the proposed amendment, but it may not be approved at that first reading.
3. The proposed amendment to the Policies, with any Commission modifications, shall then be circulated to the following entities for their review and comment prior to adoption:

City of Grass Valley
City of Nevada City
Town of Truckee
County of Nevada
Special Districts

4. The proposed amendment, with any modifications, shall be agendized and read a second time at the next regular meeting of the Commission, unless such reading is waived by the Commission. Any comments received from local agencies shall be presented. Further discussion and modifications may be made to the proposed amendment and it may be adopted at this second reading.

B. FILING OF POLICIES

Upon approval of these Policies, and any amendments thereto, a copy shall be posted on the LAFCo website.

C. HISTORY

These policies were passed and adopted by the Local Agency Formation Commission of Nevada County April 28, 1994.

**LOCAL AGENCY FORMATION COMMISSION OF NEVADA COUNTY
POLICIES**

Amended February 15, 1996

Amended May 17, 2001

Amended February 21, 2002

Amended October 17, 2002

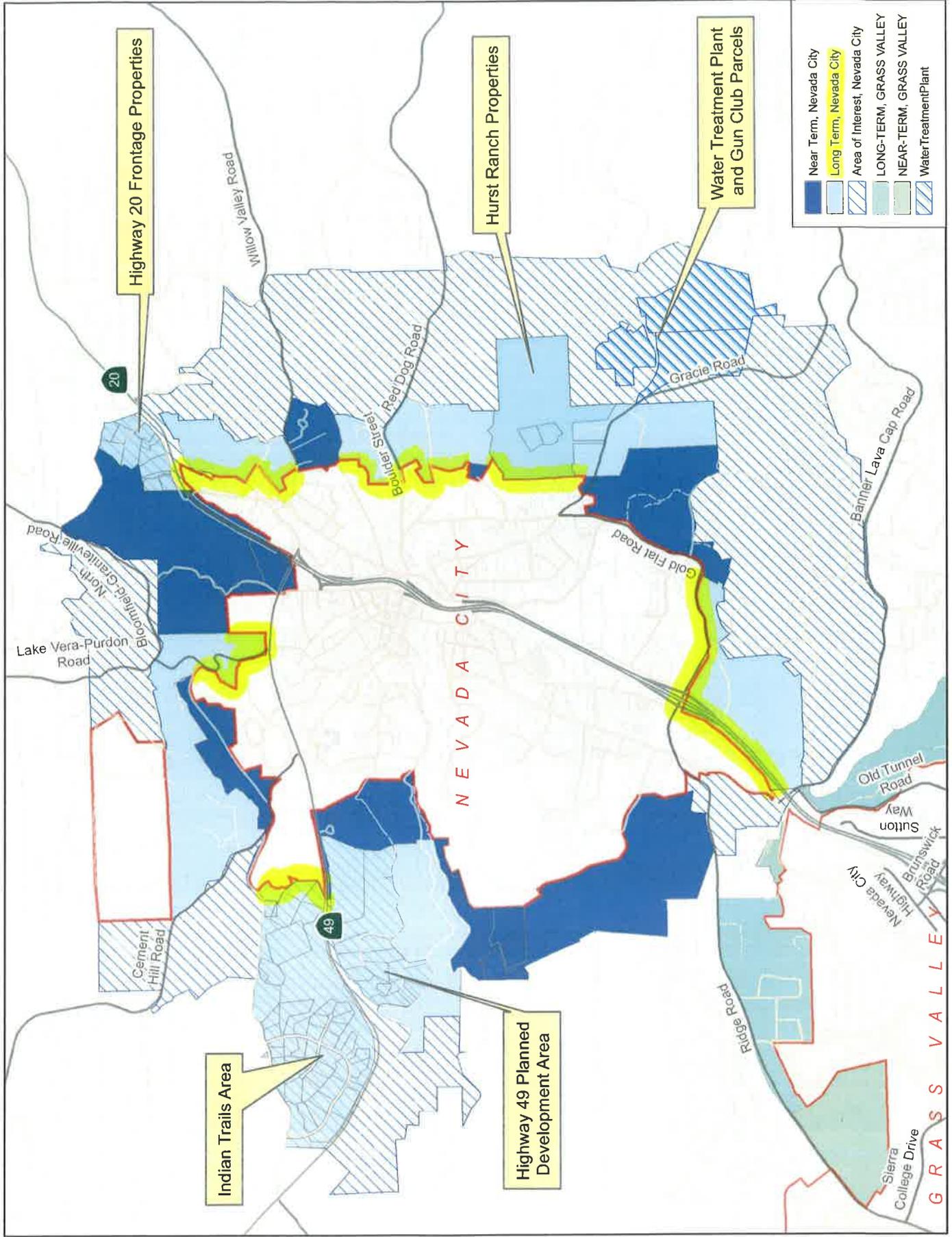
Amended October 16, 2003

Amended March 20, 2008, Resolution 08-07

Amended August 28, 2008, Resolution 08-12

Amended January 16, 2014, Resolution 14-11

Amended September 17, 2015, Resolution 15-09



Linking fecal bacteria in rivers to landscape, geochemical, and hydrologic factors and sources at the basin scale

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Edited* by Rita R. Colwell, University of Maryland, College Park, MD, and approved June 29, 2015 (received for review August 15, 2014)

Linking fecal indicator bacteria concentrations in large mixed-use watersheds back to diffuse human sources, such as septic systems, has met limited success. In this study, 64 rivers that drain 84% of Michigan's Lower Peninsula were sampled under baseflow conditions for *Escherichia coli*, *Bacteroides thetaiotaomicron* (a human source-tracking marker), landscape characteristics, and geochemical and hydrologic variables. *E. coli* and *B. thetaiotaomicron* were routinely detected in sampled rivers and an *E. coli* reference level was defined (1.4 log₁₀ most probable number·100 mL⁻¹). Using classification and regression tree analysis and demographic estimates of wastewater treatments per watershed, septic systems seem to be the primary driver of fecal bacteria levels. In particular, watersheds with more than 1,621 septic systems exhibited significantly higher concentrations of *B. thetaiotaomicron*. This information is vital for evaluating water quality and health implications, determining the impacts of septic systems on watersheds, and improving management decisions for locating, constructing, and maintaining on-site wastewater treatment systems.

Escherichia coli | *Bacteroides thetaiotaomicron* | baseflow | reference conditions | septic system

Water quality degradation influenced by diffuse sources at large watershed scales has been difficult to describe. Human modifications of natural landscapes can permanently alter hydrologic cycles and affect water quality (1, 2). Deforestation (3) and increased impervious surface area (4) have been linked with decreased infiltration and thus increased surface runoff. Overland flows concentrate pollutants and rapidly transport them down gradient where they eventually enter surface water systems and affect water quality (5, 6). A number of models have been developed to calculate overland and surface water flows (7, 8) and nutrient/chemical transport (9), but few studies have focused on microbial movement from land to water, particularly nontraditional fecal indicator bacteria that can be used to track human sources of pollution.

Microbial contamination poses one of the greatest health risks to swimming areas, drinking water intakes, and fishing/shellfish harvesting zones where human exposures are highest (10–12). These highly visible areas often receive more attention than sources of contamination because identifying the origin of pollution in complex watersheds requires costly comprehensive investigation of environmental and hydrologic conditions across temporal and spatial scales (13). Grayson et al. (14) suggest using a “snapshot” approach that captures water quality characteristics at a single point in time across broad areas to provide information frequently missed during routine monitoring. Compared with long-term comprehensive investigations, the snapshot approach reduces the number of samples, cost, and personnel required to examine pollution sources.

Escherichia coli concentrations are commonly used to describe the relative human health risk during water quality monitoring in lieu of pathogen detection. Studies attempting to trace pollution in water back to a specific land use with *E. coli* have rarely produced

definitive conclusions (15, 16). Using molecular approaches, specific source targets can be isolated in complex systems and have recently been used to investigate land use and water quality impairments (17). Furtula et al. (18) demonstrated ruminant, pig, and dog fecal contamination in an agriculturally dominated watershed (Canada) using *Bacteroides* markers. The *Bacteroides thetaiotaomicron* α -1–6 mannanase (*B. theta*) gene has a high human specificity (19–22), but no studies to date have linked its presence to land use patterns.

Reference conditions have been established for minimally disturbed environments based on measurements of macroinvertebrates, fish, and diatoms (23–25), but microbial reference conditions have not been adequately explored or defined. Based on 15 unimpaired California streams, microbial reference conditions for *E. coli* [1.0 log₁₀ most probable number (MPN)·100 mL⁻¹] and enterococci (1.2 log₁₀ MPN·100 mL⁻¹) were defined as being below state water quality thresholds (26). In the Great Lakes, a human health threshold of 2.37 log₁₀ *E. coli* MPN·100 mL⁻¹ (27), or a level equally protective of human health, has been adopted by all state governments. However, this health-associated reference level was derived from epidemiological studies undertaken at beaches throughout the United States (28, 29) with limited knowledge of local implications.

In response to water quality degradation from human stressors and the poorly understood microbial conditions in large-scale fresh water systems such as the Great Lakes basin, this paper aims to (i) examine the spatial distribution of *E. coli* and a human specific source marker (*B. theta*) in 64 river systems that drain most of the state's Lower Peninsula under baseflow conditions, (ii) identify baseflow reference levels of fecal contamination in rivers, and (iii) determine how key chemical, physical,

Significance

New microbial source-tracking tools can be used to elucidate important nonpoint sources of water quality degradation and potential human health risks at large scales. Pollution arising from septic system discharges is likely more important than previously realized. Identifying these sources and providing reference levels for water quality provides a basis to assess water quality trends and ultimately remediate degraded areas.

Author contributions: M.P.V., S.L.M., A.D.K., and D.W.H. designed research; M.P.V., S.L.M., and A.D.K. performed research; M.P.V. and A.D.K. contributed new reagents/analytic tools; M.P.V., S.L.M., and A.D.K. analyzed data; and M.P.V., S.L.M., A.D.K., D.W.H., and J.B.R. wrote the paper.

The authors declare no conflict of interest.

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environmental, hydrologic, and land use variables are linked to river water quality at large scales.

Results and Discussion

To address microbial water quality impairment, this study examined fecal bacteria source tracking across a large spatial scale with classification and regression tree (CART) statistical method to link fecal contamination in rivers to landscape, geochemical, and hydrologic factors as well as potential human fecal sources such as septic systems and sewage effluent at the basin scale. The *B. theta* results suggest human fecal contamination was affecting 100% of the studied river systems. These results have significant implications for water and environmental quality managers. Further details on hydrologic, geochemical, and land use characteristics, as well as a CART analysis of the reduced dataset, are described in *SI Materials and Methods*.

Microbial Water Quality and Reference Conditions. This project measured *E. coli* and *B. theta* concentrations in 64 rivers under baseflow conditions. Across all sites, *E. coli* concentrations ranged from 0.3 to 3.0 \log_{10} MPN·100 mL⁻¹ (geometric mean of 1.4 \log_{10} MPN·100 mL⁻¹) and *B. theta* ranged from 4.2 to 5.9 \log_{10} cell equivalents (CE)·100 mL⁻¹ (geometric mean of 5.1 \log_{10} CE·100 mL⁻¹). *E. coli* levels were below the detection limit (<1 MPN·100 mL⁻¹) in four rivers, whereas *B. theta* was detected in all samples (Fig. 1 and Table S1). Nine rivers (14% of sites) exceeded the US Environmental Protection Agency (USEPA) suggested *E. coli* criterion for safe contact (2.37 \log_{10} MPN·100 mL⁻¹), ranging in concentrations from 2.4 to 3.0 \log_{10} MPN·100 mL⁻¹. In these same nine rivers, *B. theta* concentrations ranged from 4.6 to 5.6 \log_{10} CE·100 mL⁻¹. These nine *E. coli* values were significantly different ($P < 0.001$) from those of the other 55 sites, which had a geometric mean of 1.3 \log_{10} MPN·100 mL⁻¹. In contrast, there was no statistically significant difference ($P = 0.433$) between *B. theta* concentrations from these two sets of sites.

E. coli concentrations (geometric mean of 1.4 \log_{10} MPN·100 mL⁻¹) were generally below USEPA recreational water quality criteria and consistent with previously measured ranges in Great Lakes tributary rivers (30–32). A comprehensive review (33) found that *E. coli* levels in freshwater below 2.23 \log_{10} MPN·100 mL⁻¹ were associated with low relative risks of gastrointestinal illness for swimmers compared with nonswimmers. Because the *E. coli* geometric mean concentration observed in this study was below the safety level reported by Wade et al. (33), we suggest a reference condition for *E. coli* of 1.4 \log_{10} MPN·100 mL⁻¹ for

Michigan's Lower Peninsula rivers under baseflow conditions in the absence of recent storm runoff. Wade et al. (28) reported positive associations between occurrence of illness and molecularly detected *Bacteroides* at one Great Lakes beach with a geometric mean concentration of 3.08 \log_{10} CE·100 mL⁻¹, while noting that the associations were statistically weak ($P < 0.1$). Yampara-Iquise et al. (19) reported *B. theta* levels ranged from 5.8 to 9.8 \log_{10} copies·100 mL⁻¹ in multiple urban, agricultural, and small-town creek systems that represented various levels of human impact. In the current study, *B. theta* concentrations (range = 4.2–5.9 \log_{10} CE·100 mL⁻¹; geometric mean = 5.1 \log_{10} CE·100 mL⁻¹) averaged 1.6 times higher than levels reported by Wade et al. (28) but slightly lower than those reported by Yampara-Iquise et al. (19). Establishing *B. theta* reference conditions for Michigan rivers under other flow conditions would require additional sample analysis and a greater understanding of the bacterial distributions because comparative *B. theta* datasets are relatively small relative to available *E. coli* data, a key aspect to defining reference levels (34). Reference levels are important for establishing acceptable levels of disturbances, defining long-term water quality changes, and supporting management decisions (34). Although the concept of a reference condition lies in the notion of minimal impact, it is recognized that few streams or rivers are truly unimpacted because most receive treated sewage effluent, and the current study supports this premise.

CART Analysis of Microbial Water Quality. A primary goal of this study was to address diffuse pollution sources, historically a significant challenge in managing water quality. Major sources of nutrient loads from point and nonpoint sources of contamination were previously examined for Michigan's Lower Peninsula and shown to vary significantly between watersheds (35). The current study examines these drivers under baseflow conditions, where groundwater inputs dominate flows and wastewater effluent generally provides only a small fraction of total river discharges (Table S1). Effects of wastewater treatment plant (WWTP) effluent on microbial water quality were examined using multiple approaches (see *Supporting Information* for details), and it was ultimately determined that WWTP were not a driving factor of microbial water quality in the studied watersheds. Future analysis of the seasonal efficacy of WWTP could improve the understanding of wastewater impact on water quality by quantifying effluent discharge contributions in key urban areas.

The initial hypothesis of this research was that land use would best explain fecal bacterial concentrations in water. Instead, we found that land use characteristics such as septic systems and nutrients were the primary explanatory factors of microbial water quality. The influence of septic systems on microbial water quality, measured by *E. coli*, at a smaller watershed scale has also been reported in other regions (36, 37). In the current study, *E. coli* concentrations were linked primarily to total phosphorus and potassium. *B. theta* concentrations were primarily associated with the total number of septic systems in the watershed and within a 60-m buffer. Because WWTPs were not a driving factor of microbial water quality in the studied watersheds, these results indicate that under low flow conditions septic systems are a significant source of human fecal contamination to surface water in the studied watersheds.

CART analysis was used to evaluate the influence of the independent variables on *E. coli* and *B. theta*. Results from CART analyses for *E. coli* and *B. theta* concentrations at the full and reduced watersheds are summarized in Fig. 2 and Fig. S1, respectively. The CART outputs indicated complex causes of river water quality variability under baseflow conditions. For instance, *E. coli* concentrations at the full watershed scale were mainly related to total phosphorus (TP) concentrations, which is consistent with results by Carrillo et al. (38). TP concentrations accounted for 48% of *E. coli* variance with a threshold of 19.0 $\mu\text{g}\cdot\text{L}^{-1}$.

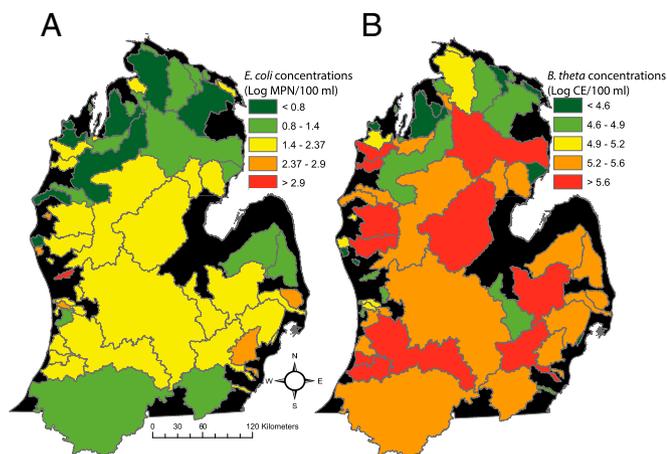


Fig. 1. (A) *E. coli* (\log_{10} MPN·100 mL⁻¹) and (B) *B. theta* (\log_{10} CE·100 mL⁻¹) concentrations measured in 64 rivers under baseflow conditions. Areas in black were not represented with samples.

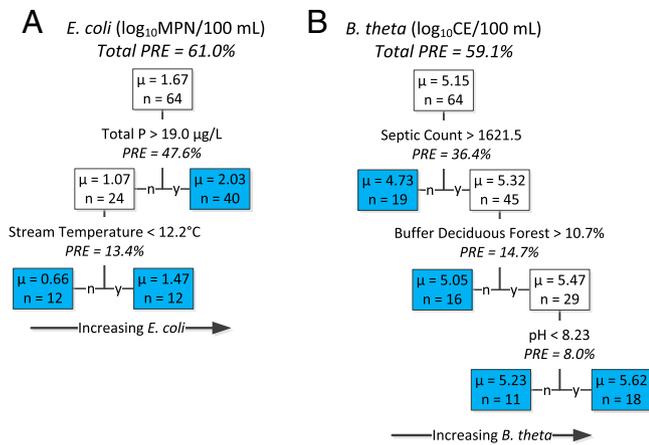


Fig. 2. CART analyses for (A) *E. coli* and (B) *B. theta* concentrations as dependent variables and land use, nutrient, chemical, hydrologic, and environmental parameters as independent variables in watersheds. PRE, proportion of reduction in error.

Although TP is essential for bacterial growth, the authors acknowledge that treated wastewater effluent includes high levels of both *E. coli* and TP. However, as stated above, WWTPs were not a driving factor of microbial water quality in the studied watersheds. Phosphorus, like *E. coli*, may be derived from sediments in the rivers, soil, plants, animal wastes, or manure and thus, unlike the *B. theta*, is not exclusive to fecal pollution.

The full watershed CART outputs and correlation analysis indicated *B. theta* concentrations were strongly associated with total numbers of septic systems in the watershed ($r = 0.364$, $P = 0.002$) and in the 60-m buffer ($r = 0.357$, $P = 0.004$). *B. theta* concentrations were not correlated with septic system density in the watershed ($P = 0.361$) or in the 60-m buffer ($P = 0.520$). Interestingly, the total number of septic systems in the watershed accounted for 36% of the *B. theta* concentration variance with a threshold count of 1,622 systems per watershed, as shown in Figs. 2B and 3. The snapshot sampling strategy used in this study focused on a spatial composite of the watersheds near the drainage point toward the Great lakes. Thus, the total number of people on septic tanks equates to the level of feces entering each watershed, and these levels are potentially dominated by failing septic systems contributing high concentrations of bacteria to nearby water systems. A Michigan health department reported a 26% on-site wastewater failure rate during time of sale or transfer inspections that discharged an estimated 65,000 gallons of untreated fecal waste each year to nearby water bodies (39). Future watershed-based studies should include analysis of total septic systems in the watershed and septic density, because it would be possible to overlook failing septic systems if the sample size were small or the focus were only on septic density. Additional efforts aimed at the condition of septic systems, their ability to remove bacteria, and microbial transport to nearby surface waters are required.

The direct and significant correlation between estimated number of septic systems and the human-specific marker *B. theta* in water (Fig. 3) illustrates a major issue for water quality of Michigan's streams and rivers, with an estimated 1.4 million on-site septic systems statewide (35, 40). In this study, the overall *B. theta* geometric mean was one \log_{10} unit higher than secondary treated sewage effluent, whereas the highest measured concentrations were 1.5 logs higher than biologically treated septage effluent (20). Interestingly, when the CART analysis considered the entire upstream drainage area, including lakes, 2.5 times fewer septic systems were required to produce *B. theta* levels similar to when these drainage areas were restricted to downstream of the nearest lake, potentially indicating increased failure rates of septic

systems surrounding lakes compared with rivers (see *Supporting Information* for details). Habteselassie et al. (41) identified that surface water and groundwater near failing on-site wastewater treatment systems contained higher concentrations of *E. coli* and enterococci than water surrounding properly functioning on-site wastewater treatment systems ($P < 0.001$). Combined, these results illustrate the importance and need for responsible development and septic system maintenance along lake and river riparian zones to protect water quality. Future analysis should include incremental spatial assessment of *B. theta* with respect to septic systems in watersheds to assess the fate and transport of bacteria from septic systems and define their acute/chronic impacts on water quality.

E. coli and *B. theta* Z-scores [(observed – mean)/SD] were compared using CART, as shown in Fig. 4, to identify the characteristics that could differentiate between *E. coli* and *B. theta* concentrations. Positive values of the Z-score differences occur when *E. coli* concentrations are higher, relative to their population mean, than *B. theta* concentrations. Negative values imply the opposite, with relatively higher *B. theta* concentrations. In catchments with discharge $< 0.66 \text{ m}^3 \cdot \text{s}^{-1}$ and with fewer than 294 septic systems in the 60-m buffer, *E. coli* concentrations were much higher than those of *B. theta*. In contrast, *B. theta* concentrations were much higher than those of *E. coli* in rivers with discharge $> 0.66 \text{ m}^3 \cdot \text{s}^{-1}$, particularly in catchments with dissolved organic carbon $> 5.4 \mu\text{g} \cdot \text{L}^{-1}$. *E. coli*, which occurs in the feces of all warm-blooded mammals and birds, has been shown to persist and regrow in the environment under some conditions and has been associated with suspended particles that have low settling rates (42–45). Therefore, in watersheds with low discharge it is possible that *E. coli* can attach to particles and persist longer than *B. theta*, which is an anaerobic organism with a faster decay rate in rivers (46).

We compared the concentrations and loads of *E. coli* and *B. theta* across all sites (Fig. S2). No statistically significant relationship was identified between *E. coli* and *B. theta* concentrations ($r = 0.18$; $P = 0.16$). Bacterial entry to rivers during baseflow seems to be occurring from some of the same diffuse sources, including septic systems. The comparison of *E. coli* versus *B. theta* concentrations illustrated that each of these microorganisms was entering rivers from similar sources (i.e., diffuse sources such as septic systems) (Fig. 2). However, each organism was influenced by different environmental parameters as identified by the Z-score CART analysis (Fig. 4). *E. coli* was ubiquitous in most rivers and concentrations were primarily associated with TP and K levels. This study indicates that *B. theta* can be used as a source-tracking marker to investigate diffuse sources of human-derived contaminants from septic systems under baseflow hydrologic conditions at watershed scales.

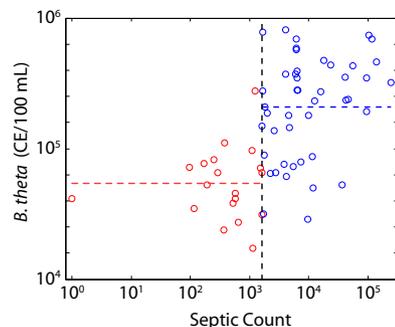


Fig. 3. *B. theta* versus septic systems illustrating the CART output from the first split of Fig. 2B.

E. coli - *B. theta* Z-scores, log-transformed

Total PRE = 68.4%

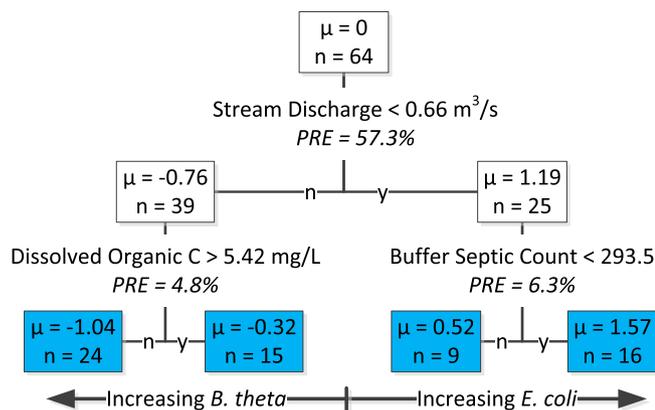


Fig. 4. CART of *E. coli* and *B. theta* Z-scores illustrating conditions associated with different concentrations between these two microbes. PRE, proportion of reduction in error.

Conclusions

To address impaired waters and restore them to designated uses, the process for total maximum daily loads (TMDLs) has been developed under the Clean Water Act. According to Stiles (47) there are currently 65,000 TMDLs and 43,000 listings that need to be addressed. Many stretches of water systems are impaired due to fecal pollution and *E. coli*, but there have been no established approaches or tools to identify nonpoint sources. This study provides a path forward to assess and ultimately improve water quality at large scales. More importantly, this study provides reference conditions for a large number of watersheds that, in the event of major landscape disturbance, could be used to measure remediation progress. Using a synoptic sampling approach for regional water quality assessment, this study found that human fecal contamination was prevalent under baseflow conditions. Baseflow in the study watersheds was generally dominated by groundwater and not by wastewater treatment effluent. Results suggest a regional *E. coli* reference condition below the current USEPA freshwater recreational criterion could be established. However, identifying specific sources of fecal contamination in rivers cannot be achieved using ubiquitous bacteria, such as *E. coli*. Assessing water quality using solely *E. coli* may mislead water quality managers and severely limit the ability to remediate impaired waterways. However, microbial source-tracking markers, such as the human-specific *B. theta* marker, can provide a more refined tool to identify the impacts of nonpoint sources of human fecal pollution, which could help prioritize restoration activities that should be implemented at watershed scales. The high variability of water quality measurements illustrates complex relationships between bacteria and landscape, geochemical, and hydrologic properties. The influence of septic systems in riparian zones also indicates that additional localized control measures, including septic system maintenance and construction, should be implemented to protect water quality and human health.

Materials and Methods

Study Area. This study investigated 64 watersheds draining Michigan's Lower Peninsula to the Great Lakes (Fig. S3). Watersheds were selected using the following criteria: (i) the 30 largest watersheds that represent >80% of Michigan's Lower Peninsula land area and (ii) 34 smaller watersheds randomly selected across the state from locations near their outlet to the lake. All sampling sites were located at bridge crossings and selected on the criteria that each was reasonably accessible, had adequate flow, river water dominated discharge, and the maximum amount of upstream land use was captured while meeting the above criteria.

Water Sample Collection. A synoptic sampling scheme was used to capture water quality characteristics under a single flow condition (i.e., baseflow) across broad spatial areas (14). Compared with long-term comprehensive investigations, this approach reduces the number of samples, cost, and personnel resources required to address pollution sources while providing essential information missed during routine monitoring.

Grab samples were collected from each river sampling site between October 1–13, 2010, which was chosen as a groundwater-dominated baseflow period based on historical hydrographs and antecedent precipitation. Groundwater-driven baseflow is critical to the preservation of water quality and quantity in the Great Lakes and provides year-round support for aquatic habitats. Before sampling each watershed, meteorological conditions were monitored to ensure that no significant precipitation had occurred within several days and hydrographs from nearby US Geological Survey (USGS) stream gauges were inspected to check that sampled rivers were at baseflow. October was chosen for the sampling period because the late growing season baseflow period is least likely to have large variability in water quality because flows are dominated by groundwater in the region. There is variability in water quality between baseflow periods (i.e., fall versus summer), but this variability is small relative to the variability between baseflow and other periods due to overland flow and dilution effects (48, 49). Water temperature (degrees Celsius), specific conductance (microsiemens per centimeter), and dissolved oxygen (milligrams per liter) were measured on-site using YSI 600R Sonde (YSI Incorporated). Field samples were placed on ice in coolers and transported to Michigan State University for other analyses, including bacterial testing (described below) within 24 h.

Water Analysis. Each sample was assayed for water chemistry as summarized in Table S2. The methods for assaying chemicals and nutrients are described in Table S3. *E. coli* analyses were performed within 24 h of collection using IDEXX Colilert Quanti-Tray 2000. Following incubation at 35 °C (± 0.5 °C) for 24 h (± 2 h), fluorescent wells were reported positive for *E. coli*, and reported as MPN per 100 mL. *E. coli* C-3000 (American Type Culture Collection 15597) was used as positive control for verification of media integrity. Sterile water was used for negative controls to verify method integrity. *E. coli* measurements below detection limits ($1.0 \text{ MPN} \cdot 100 \text{ mL}^{-1}$) were assigned the value of the detection limit.

Samples were analyzed for the human-specific marker *B. theta*, which has been shown to have a high sensitivity comparable to other human-associated markers in a multilaboratory evaluation (50). Compared with *B. theta*, HF183 and other source markers had greater false positive rates in animal feces collected in the same region as our study area (21). BacHum exhibited an even greater false positive rate than HF183 (51). Laboratories associated with our team and others have demonstrated that *B. theta* is a suitable human-specific marker and is related to human health outcomes (19–21, 52).

Analysis of the human-specific marker *B. theta* α -1–6 mannanase (5'CATC-GTTCGTAGCAGTAACA3'; 5'CCAAGAAAAGGGACAGTGG3') was performed according to Yampara-Iquise et al. (19), specifically by filtering 900 mL of water through a 0.45- μm hydrophilic mixed cellulose esters filter. Each filter was placed into a 50-mL centrifuge tube containing 20 mL of sterile phosphate-buffered water, vortexed, and centrifuged (30 min; $4,000 \times g$; 21 °C). Eighteen milliliters were decanted from the tube and the remaining eluent and pellet were stored at -80 °C. DNA was extracted from 200 μL of the thawed pellet via QIAamp DNA mini kit protocol. Quantitative PCR (qPCR) was performed on extracted DNA following Yampara-Iquise et al. (19) with a probe modification (20) using a Roche Light-Cycler 2.0 Instrument (Roche Applied Sciences). Each *B. theta* assay was carried out with 10 μL of LightCycler 480 Probe Mastermix (Roche Applied Sciences), 0.4 μL forward and reverse primers, 0.2 μL probe 62 (6FAM-ACCTGCTG-NFQ; Roche Applied Sciences Universal Probe Library), 1.0 μL BSA, 3.0 μL nuclease-free water, and 5.0 μL of extracted DNA and processed in triplicate. The qPCR analyses included a 15-min, 95 °C preincubation cycle, followed by 50 amplification cycles, and a 0.5-min 40 °C cooling cycle. A diluted plasmid standard was included during each qPCR run as a positive control and molecular-grade water was used in place of DNA template for negative controls. One copy of the targeted *B. theta* gene is assumed present per cell, and thus one gene copy number corresponded to one equivalent cell (19, 20). *B. theta* gene copies were converted to CE and reported as qPCR CE:100 mL $^{-1}$.

Climate and Hydrology. Hourly precipitation data were extracted from the Grand Rapids, Gaylord, and Detroit (Michigan) Next Generation Radar (NEXRAD) stations through the National Climate Data Center (www.ncdc.noaa.gov/nexradinv), with a base reflectivity of 0.50°, an elevation range of 124 nautical miles, and 16-km 2 cells. Hourly precipitation averages across each watershed were used to calculate total rainfall weighted by the

proportion of each NEXRAD cell within the sampled watershed. Precipitation was categorized into cumulative hourly totals (millimeters) before sample collection at intervals of 6, 12, 18, and 24 h and 2, 3, 4, 6, and 8 d, reported as millimeters per time before sample collection.

Real-time river discharge was measured at each site during sample collection using an Acoustic Doppler Current Profiler (53), colocated USGS stream gauges (waterwatch.usgs.gov), or current meter via wading following USGS protocol (54). River discharge is reported as cubic meters per second.

Land Use. Watersheds were delineated and then land use and septic system statistics were calculated for each watershed using Esri ArcMap GIS software (Table S4). The spatial analyst watershed tool was used to develop surface watersheds for each sampling point at 1 arc-second. Two watersheds were defined for each river site, referred to in this paper as full watersheds, which include the entire upstream drainage area ($n = 64$), and reduced watersheds, which only include drainage areas upstream of the sampling site to the nearest lake, reservoir, or pond ($n = 52$). The full watershed analysis ($n = 64$) included 12 sites that were at or near lake outlets, resulting in significantly smaller watersheds (average = 108 km²) than the other 52 watersheds (average = 366 km²). These 12 sites were removed in the reduced watershed analysis because it was originally hypothesized that longer retention time in the lentic water systems would likely reduce microbe concentrations owing to environmental decay. A digital map of land cover from 30-m resolution Landsat imagery and the National Land Cover Database (NLCD 2006; www.mrlc.gov/nlcd2006.php) was used to define land use in each watershed and buffer. Land use was categorized using the NLCD classification system with 16 categories and seven categories using the Anderson Level 1 Land Cover Classification System (55); Table S5 describes the Anderson classifications and equivalent NLCD categories. A 60-m riparian buffer was applied to streams in both full and reduced watersheds because land parcels are generally located adjacent to roads and require a buffer between surface waters and septic tanks. The average septic system setback from surface waters in Michigan is 15 m. Additionally, the 60-m riparian buffer ensured all riparian land uses were accounted for if the land use/river/septic system GIS layers were not completely matched under the 30-m resolution.

A map of households that likely use on-site septic systems to treat wastewater was previously developed for this study region (35). Briefly, septic system totals and locations were estimated following the cumulative examination of WWTP infrastructure, incorporated municipality areas, household location according to 2010 census blocks, 2006 NLCD and road layers, and residential drinking water well information. Estimated septic system numbers (per watershed) and densities (per square kilometer) in each watershed and 60-m-wide buffer around surface water bodies were calculated for the 64 river systems.

Estimates of total population and population relying on WWTPs for water treatment were performed for each watershed and 60-m buffer. The total population in each watershed was estimated by multiplying the number of households (based on 2010 census data, described above during septic system estimates) by the average household size in each census block. The number of people relying on WWTPs was estimated by overlaying census block information and wastewater treatment plant service area boundaries. Additionally, the USEPA Discharge Monitoring Report (DMR) Pollutant Loading Tool (cfpub.epa.gov/dmr/ez_search.cfm) was used to estimate the ratio of average annual WWTP effluent to measured baseflow. A full description of this method is provided in *Supporting Information*.

Statistical Analysis. A constant value of 1 was added to *E. coli* and *B. theta* concentrations before log transformation and analysis. Soil hydraulic conductivity values were log₁₀-transformed before statistical analyses. Spearman correlation tests were used to examine relationships among physical, geochemical, and microbial measurements. Descriptive statistics were performed using IBM SPSS Statistics software (Version 19.0) with a significance threshold of (α) 0.01.

CART analysis was used to compare *E. coli* and *B. theta* (dependent variables) data to the independent geochemical, hydrologic, environmental, and land use variables. CART has been used to investigate pathogenic bacteria and parasite relationships with environmental and land use factors (56), to classify lakes based on chemistry and clarity (57), and to predict the occurrence of fecal indicator bacteria with respect to physiochemical variables (58). CART was selected because it allows for robust nonlinear model development using multiple potentially interacting predictor variables (59) that splits dependent variables into categories based on the influence of independent variables. Following previously published methods (56, 57), CART recursively split dependent variables using a recursive partitioning algorithm (rpart) and a 10-fold cross-validation criterion. The 10-fold cross-validation approach breaks all data into 10 subsets and calculates the split based on 9 of the 10 subsets. This method is used for each group until reaching a minimum stopping criterion of five observations per subgroup.

Fully developed CART outputs often required pruning to remove insignificant splits and ensure significant variable associations were not missed due to the splitting and stopping criteria (60). We first pruned CART outputs using the 1-SE rule (61–63), and, if needed, a subsequent pruning step was performed if splits did not reduce error by 5% or more. This rule minimized the cross-validated error of the model, which has been shown to produce optimal sized trees that are stable across replications (61, 64).

Detailed CART outputs were investigated to identify competitor and surrogate variables for each node. Competitor splits are ranked according to the reduction in model error from other potential splits, whereas surrogate splits are ranked according to how similar the resultant groups are relative to the primary split groups. Model accuracy was assessed by summing the proportional reduction of error from each split. All CART analyses were performed using the R software system (R Foundation for Statistical Computing).

To compare concentrations of the two organisms at each site relative to the average concentration of each organism, the Z-score of each sample was calculated. Z-scores [(observed – mean)/SD] for *E. coli* and *B. theta* were calculated in R using the “scale (dataset, center=TRUE, scale=TRUE)” command. This is defined as the sample concentration minus the mean of the population divided by the SD of the population. In this case, the Z-score of the log-transformed concentration was calculated. Positive Z-scores indicate samples with concentrations greater than the population mean, whereas negative Z-scores indicate the opposite. A CART analysis of the difference in Z-scores, calculated as *E. coli* – *B. theta*, was then performed using the same set of predictor variables in the single-organism models.

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