

208 AREAWIDE WATER QUALITY MANAGEMENT PLAN
INTERIM REPORT

IMPACTS OF LAND USE ALTERNATIVES
ON WASTEWATER TREATMENT
FACILITIES
FORT COLLINS, GREELEY, LOVELAND
TRIANGLE

Prepared By:

Larimer-Weld Regional
Council of Governments

201 East Fourth Street
Loveland, Colorado 80537

F. A. Eidsness, Jr., 208 Program Director
Terrence L. Trembly, Assistant Director

June 1977

The preparation of this report was financed in part through a Water Quality Management Technical Assistance Planning Grant from the Environmental Protection Agency under the provisions of Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500).



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PHONE (303) 667-3288
ROOM 201
201 EAST 4th STREET
LOVELAND, COLORADO 80537

June 27, 1977

TO: General Distribution

FROM: F. A. Eidsness, Jr.
Director, 208 Water Quality
Planning

SUBJ: Transmittal of Interim Report, "Impacts of
Land Use Alternatives on Wastewater Treatment
Facilities - Fort Collins, Greeley, Loveland
Triangle"

The attached Interim Report has been prepared in partial fulfillment of the responsibilities of the Larimer-Weld COG under Section 208 of the Federal Water Pollution Control Act Amendments of 1972.

The information contained in this interim report will assist in the development of an Areawide Waste Treatment Management Plan for the Larimer-Weld region. Specifically, the federal law requires:

"(2) Any plan prepared under such process shall include, but not be limited to:

(A) the identification of treatment works necessary to meet the anticipated municipal and industrial waste treatment needs of the area over a twenty-year period, annually updated (including an analysis of alternative waste treatment systems), including any requirements for the acquisition of land for treatment purposes; the necessary waste water collection and urban storm water runoff systems; and a program to provide the necessary financial arrangements for the development of such treatment works;

(B) the establishment of construction priorities for such treatment works and time schedules for the initiation and completion of all treatment works;

(C) the establishment of a regulatory program to:

- (i) implement the waste treatment management requirements of section 201(c);
- (ii) regulate the location, modification, and construction of any facilities within such area which may result in any discharge in such area, and

(iii) assure that any industrial or commercial wastes discharged into any treatment works in such area meet applicable pretreatment requirements;

(D) the identification of those agencies necessary to construct, operate, and maintain all facilities required by the plan and otherwise to carry out the plan;"

Comments on the conclusions, recommendations, and technical accuracy of the interim report are welcomed.

FAE:psj
Attachment

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IMPACTS OF LAND USE ALTERNATIVES
ON WASTEWATER TREATMENT FACILITIES
FORT COLLINS, GREELEY, LOVELAND TRIANGLE

Prepared By
Larimer-Weld Regional Council of Governments
Water Quality Planning Department

1.0 PURPOSE

The purpose of this analysis is to evaluate the relationship of two future land use alternatives and associated population distributions to existing wastewater treatment facilities.

2.0 SCOPE

The analysis is directed at present and projected (year 2000) wastewater treatment requirements in the urban Fort Collins, Loveland, Greeley triangle.

3.0 BACKGROUND

The following materials are summarized from technical working papers prepared by the Larimer-Weld Council of Governments and its consultants for water quality management purposes, as required under Section 208, Areawide Waste Treatment Management Planning of the Federal Water Pollution Control Act as amended in 1972. The objective of the 208 Water Quality Planning Process is to determine strategies and programs to control water pollution from municipal and industrial sources; runoff from forestry, agricultural, and construction activities; and pollution from urban storm water which will be implemented by local units of government.

Through the use of its consultants, regional, county, and city planning and public works staffs, and citizen advisory committees, the COG has prepared five future land use alternatives which reflect (among other things) potential urban land use configurations that could be served by centralized municipal wastewater treatment facilities in the urban triangle area. The land use alternatives were developed using an overall regional population projection for the year 2000. In developing these alternatives, a total Larimer-Weld regional population estimate of 500,000 persons was disaggregated or allocated to various geographic areas.

The two land use alternatives selected for comparison reflect the commonalities and differences of the five land use alternatives that were prepared. Such concepts as avoiding environmentally sensitive areas, maximizing the use of existing services and utilities, infilling vacant areas within urban service boundaries, increasing urban densities, and maintaining community

identities were common threads running through several of the alternatives. These concepts are reflected in the Recommended Alternative prepared by Toups Corporation of Loveland. The Historic Trends Alternative illustrates future growth as a function of past trends. The associated urban population levels which could be served by centralized wastewater treatment facilities are likely occurrences depending upon land use policy direction taken by city and county government.

4.0 LAND USE ALTERNATIVES

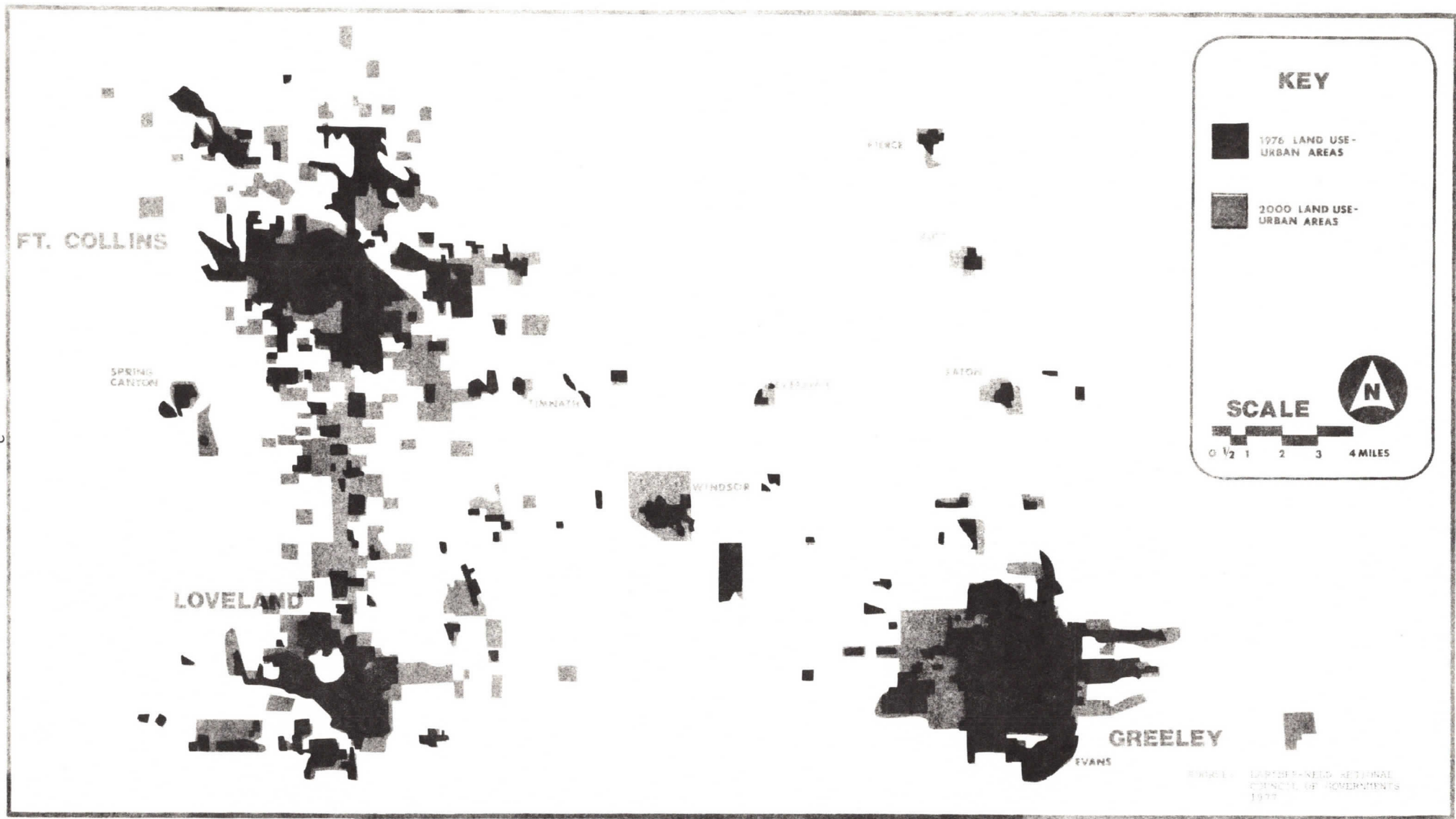
4.1 HISTORIC TRENDS

The Historic Trends Alternatives is a conceptualization of a land use pattern which could emerge from incremental progression of land uses without long-term direction (see Figure 4.1). Growth issues in Larimer and Weld Counties of necessity must be addressed separately, as the particular problems and policies of each of these areas is different. Weld County urban land use is directed by a county comprehensive land use plan adopted in 1973, which reflects two major policies. First, productive agricultural land should be retained for agricultural use. Second, new urban development should be encouraged to locate within or immediately adjacent to existing communities, but only to the extent the towns desire new growth. Therefore, growth is portrayed to occur within the urban areas of Weld County around existing communities to the extent that agricultural land can be avoided.

The Greeley urban area, including Evans and Garden City, would attract the majority of this growth. Existing land use densities would be maintained. The town of Windsor could be expected to grow at the fastest rate of all areas within Weld County -- roughly tripling in size because of its central location to the larger urban areas of Greeley, Fort Collins, and Loveland, as well as its proximity to one of the largest employers in this region, Kodak of Colorado.

Urban growth in Larimer County, in contrast, has not been guided by a set of written policies or comprehensive land use elements to give any certainty to future land use patterns. Larimer County has, however, adopted a set of land use policies in early 1977. Loveland is the only community in Larimer County which has an adopted master plan to assist in guiding growth. To develop a historic conceptualization of the urbanizing parts of Larimer County, the following assumptions were made:

1. All privately-owned lands were available for development without constraint as to location.



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**HISTORIC TRENDS
 ALTERNATIVE (A)**

FIGURE 4.1 HISTORIC TRENDS ALTERNATIVE (A)

2. Growth could occur around areas that would attract urbanization growth (residential, industrial, commercial uses), including proximity to major employment centers, existing and potential public service areas, transportation networks, and scenic and aesthetic values.

Larimer County is characterized as having a dispersed land use pattern under the Historic Trends Alternative, with fragmented parcels of land in various urbanized uses. The overall density of urban land use, as in the past, would be lower than that of Weld County. Growth is portrayed occurring in the major population centers of Fort Collins and Loveland and throughout much of the unincorporated area between these two cities. (Though not illustrated in Figure 4.1, a similar pattern of dispersed unincorporated urban land use would occur between Loveland and Berthoud.)

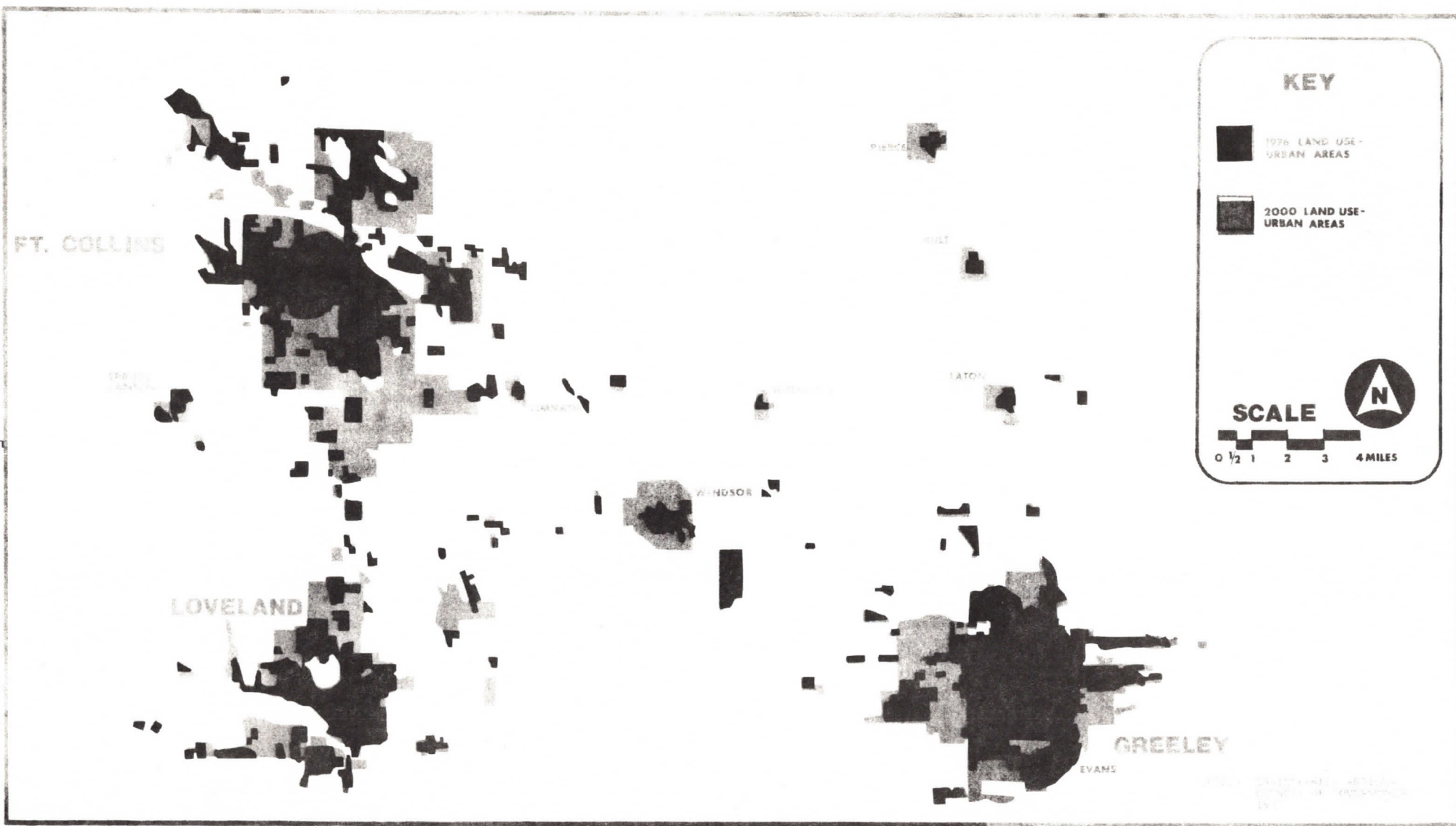
If existing trends in land use continue in Larimer County, low density urban-type development would be dispersed throughout the unincorporated areas. The unincorporated areas of the county could experience more than a ten-fold increase in population from its 1975 level.

The cities of Loveland and Fort Collins would also experience significant growth during the planning period, but much would result from extension of corporate boundaries to annex urban-type development in the adjacent unincorporated urban fringe areas. As a consequence, growth in total land area within the corporate boundaries of Loveland and Fort Collins would continue to increase at a much faster rate than the commensurate population increase resulting in an overall lowering of population density for the two cities.

The Historic Trends Alternative portrays a 20-mile elongated urban strip from Fort Collins to Loveland. The rural-country atmosphere now evident between Fort Collins and Loveland would be transformed into an area characterized by scattered urban sprawl, lacking in centralized or consolidated shopping areas, parks, schools, and other consumer or social services. Moving along a north/south axis, community separation would not be apparent for Fort Collins, Loveland, or the unincorporated urban area between the two cities.

4.2 RECOMMENDED LAND USE ALTERNATIVE

The Recommended Land Use Alternative prepared by Toups Corporation of Loveland (Figure 4.2) recognizes and emphasizes the continuation of prevailing patterns of land use, as balanced by the management of the area's unique environmental character and existing public utilities and services. Growth is concentrated within and adjacent to existing urban and rural communities. This



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**CONSULTANT'S RECOMMENDED
 ALTERNATIVE (E)**

FIGURE 4.2 CONSULTANT'S RECOMMENDED ALTERNATIVE (E)

alternative recommends limits to outward expansion beyond defined service areas and discourages development of new activity centers.

Most growth would be focused into the three urban centers of Fort Collins, Loveland, and Greeley. Direction of growth would be predicated upon a conscious attempt to develop a land use pattern which is environmentally sound, economically achievable, and fiscally responsible. It utilizes several basic assumptions to support this alternative in both Weld and Larimer Counties:

1. Infilling existing urban areas and encourage growth in urban areas as desired by that community;
2. Encourage "cluster-type" development where desired in rural areas;
3. Rejuvenate older communities or deteriorating urban land use areas;
4. Reduce adverse air quality, noise, and transportation network requirements by decreasing automobile traffic and number of vehicles miles traveled;
5. Minimize impacts to environmentally sensitive areas, including maintenance of native vegetation and wildlife habitat;
6. Conserve energy (electrical and petroleum products) by encouraging less energy consumptive housing modes;
7. Minimize adverse impacts to natural scenic characteristics of the area;
8. Maintain productive agricultural lands and other natural resources;
9. Maximize use of existing utilities and public services and insure that growth pays to the extent feasible, in all areas of public service.

5.0 EXISTING WASTEWATER TREATMENT CAPABILITIES

The existing capacity for secondary waste treatment facilities in the urban triangle are shown in Table 5.0, Column A, followed by an estimate of flow capacities expected for the Historic Trends and Recommended Land Use Alternatives (Column B). The Analysis shows that existing wastewater treatment plants have sufficient capacities to accommodate all population growth for the year 2000 in the Larimer County

TABLE 5.0
WASTEWATER TREATMENT CAPACITIES
AND PROJECTED NEEDS

Community	Column A	Column B		Column C	
	Existing Plant Capacity (mgd)	Flow in Year 2000 ¹ (million gallons/day mgd)		Year Secondary Treatment Capacity Exceeded or Excess Capacity by Year 2000 ²	
		Consultant's Recommended	Historic Trends	Consultant's Recommended	Historic Trends
Ft. Collins	21.80	15.00	11.20	6.8 excess ⁵	10.6 excess
Loveland	7.70	6.10	6.40	1.6 excess	1.3 excess
Boxelder S.D.	0.75	1.00	.74	1985	at capacity by 2000
S. Fort Collins S.D. (including Spring Canyon S.D.) ⁶	1.50	1.35	4.70	at capacity by 2000	1982
Evans S.D. ³	0.90	.94	.94	1998	1998
Greeley ⁴	6.00	11.50	11.00	at capacity by 2000	at capacity by 2000
Windsor ²	0.60	1.70	1.90	1977	1977

1 Assumes infiltration/inflow problems are corrected for areas where applicable.

2 Straight line projections for growth assumed in determining expansion dates.

3 Facilities planning for this area includes tie-in to Greeley.

4 To be upgraded in 4 mgd increments now and in 1989 with an additional 8 mgd expansion anticipated in 1995.

5 Flows include .67 mgd domestic flow from Kodak employees.

6 Flows from Spring Canyon Service Area included.

7 South Fort Collins Sanitation District has expansion capability to 3.0 mgd. This would advance exceeded capacity date to 1991.

portion of the study area. In Weld County, additional capacity will be required for Evans, Greeley, and Windsor. A factor which may affect some systems is a substantial infiltration-inflow (I/I) problem which is caused by large quantities of subsurface waters from irrigation ditches and other natural groundwater entering sewer mains and interceptors, thereby increasing flows beyond that which would be encountered serving a normal population. The areas with economically correctable infiltration problems are Fort Collins and Greeley, and possibly South Fort Collins Sanitation District. Correction of these situations would permit greater portions of the hydraulic capacity to be used in carrying waste rather than clean subsurface waters. Failure to correct the I/I problems would result in inefficient use of waste treatment capabilities.

Greeley waste treatment facilities are currently approaching existing capacity. The Greeley-Evans area is in the process of upgrading facilities using a phasing approach which permits expansion as required to meet demand (see Table 5.0, footnotes 3 and 4). Phasing the construction of new waste treatment facilities may result in higher total capital construction costs than constructing all facilities on a one-time construction effort. However, the phasing option allows construction to occur only as needed, and the cost of unused facilities will not be passed on to existing customers, in the event that anticipated growth does not occur.

The waste treatment facilities at Windsor are currently at capacity as the community facilities serve Windsor, domestic wastes from the 3,200 working employees at Kodak, and emergency industrial flows from the Kodak facility. Waste treatment facilities expansion is currently needed.

Fort Collins has an existing waste treatment capacity of 21.8 million gallons per day (mgd). This capacity is sufficient to serve a population of approximately 200,000 if infiltration and inflow problems are corrected. If the problems are not corrected, the city will have to expand its capacity by 1985.

Loveland has recently expanded and upgraded its secondary waste treatment capacity to 7.7 mgd. This capacity would be sufficient to serve a population equivalent to approximately 75,000.

South Fort Collins Sanitation District has a 1.5 mgd facility which was constructed in 1976. The District is currently extending a major trunk line to serve the Spring Canyon Sanitation District on the southwest end of Horsetooth Reservoir. The existing facility can serve an equivalent population of 15,000.

Boxelder Sanitation District to the east of the immediate Fort Collins area has a capacity of .75 mgd. This facility processes substantial flows from commercial and industrial development along U. S. Highway 14, as well as residential flows.

6.0 COMPARISON OF ALTERNATIVES

The two land use alternatives reveal different population distributions in the urban triangle. Figure 6.0-A shows the urban population distribution for the Historic Trends Alternative. Figure 6.0-B gives the Recommended Alternative urban population distribution. The urban land uses within these boundaries are assumed to require centralized waste treatment service by existing treatment plants in the area indicated in Figure 6.0-C. Those areas which could be served by two systems are the subject of ongoing analysis by 208 consultants. However, it is expected that for this level of analysis, the population figures associated with the treatment facilities are realistic.

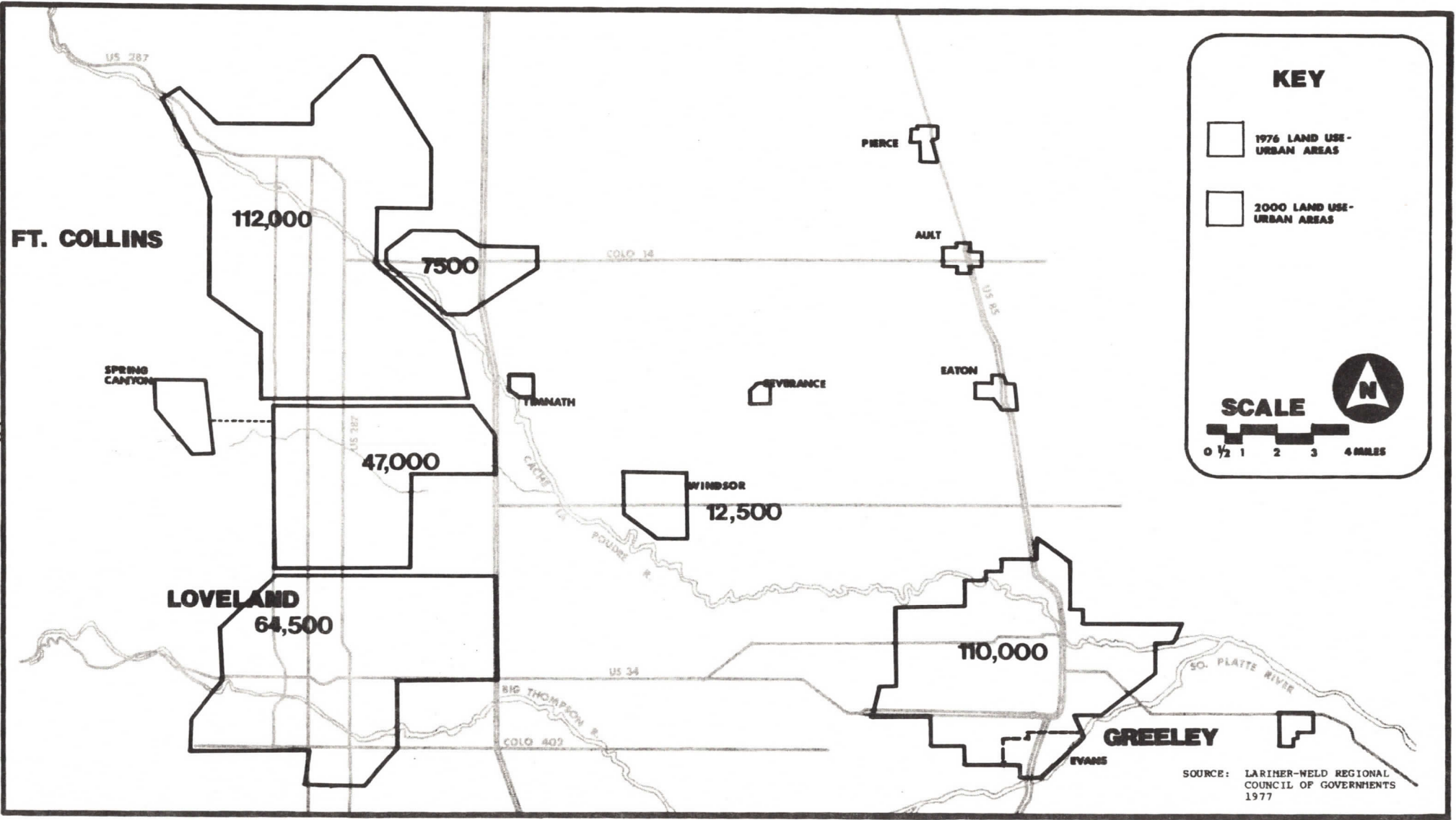
Column B of Table 5.0 shows expected flow in the year 2000 for each alternative. Column C indicates the corresponding year which secondary treatment capacity would be exceeded or where there would be excess or unused capacity by the year 2000.

The differences between the Recommended and Historic Trends Alternatives vary most in Larimer County. The variation in total demand on wastewater treatment facilities for the Greeley-Evans area will not differ substantially between the Recommended Alternative and the Historic Trends Alternative. This is primarily because of the comprehensive land use planning effort between the City of Greeley and Weld County, coordination between Greeley and Evans, and the "phasing approach" being taken to expand facilities as growth increases.

Under both alternatives, the City of Windsor would require construction of waste treatment facilities. In the Historic Trends Alternative, a population of approximately 12,500 plus increased industrial and domestic flows from Kodak would be anticipated. The Recommended Alternatives reflects a more conservative population growth of 10,000.

The greatest variation in demand on wastewater treatment plants between the two land use alternatives occurs in Larimer County around Fort Collins and Loveland. Fort Collins would utilize 15 mgd of its 21.8 capacity or approximately 70 percent in the Recommended Alternative. The Historic Trends Alternative would result in utilization of only 11.2 mgd or 50 percent by the year 2000. South Fort Collins Sanitation District would use 1.35 mgd in the Recommended Alternative and would be near capacity by year 2000. The Historic Trends Alternative shows full utilization of capacity occurring by 1982 for its 1.5 mgd plant.

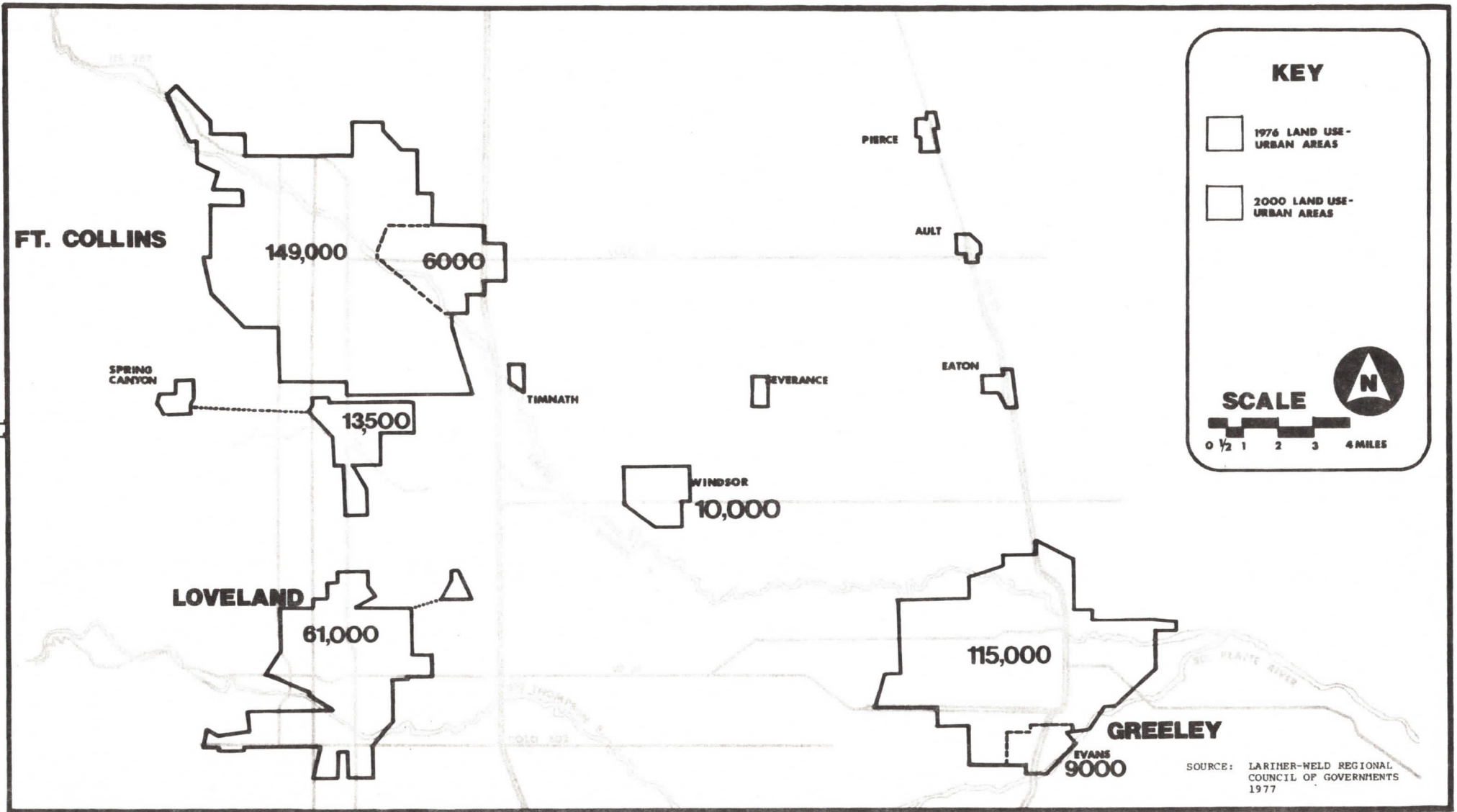
Boxelder Sanitation District, with existing capacity of .75 mgd, would be at capacity by 1985 in the Recommended Alternative. Expansion of facilities to accommodate an additional capacity of .25 mgd to serve domestic and commercial flow in its service area would be required. As an alternative to expansion of the Boxelder wastewater treatment plant, excess flow could



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POPULATION DISTRIBUTION ALTERNATIVE (A)

6.0-A. POPULATION DISTRIBUTION - HISTORIC TRENDS ALTERNATIVE (A)



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**POPULATION DISTRIBUTION
 ALTERNATIVE (E)**

FIGURE 6.0-B. POPULATION DISTRIBUTION - CONSULTANT'S RECOMMENDED ALTERNATIVE (E)

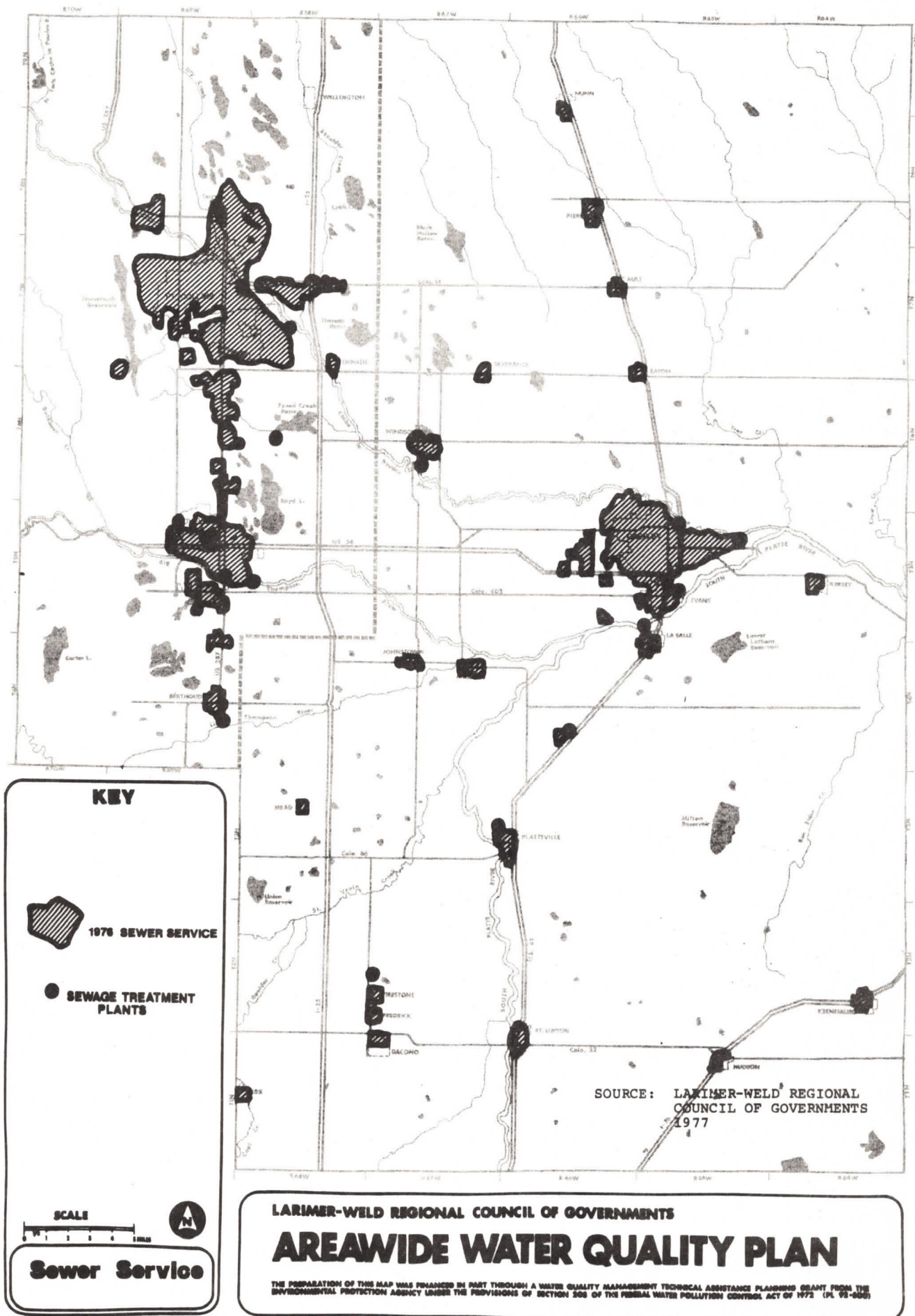


FIGURE 6.0-C. SEWER SERVICE 12

be served by Fort Collins which has sufficient capacity to treat waste from the Boxelder area. Under the Trends Alternative, the existing Boxelder treatment plant will approximate full capacity by the year 2000.

Loveland would utilize approximately the same capability for both alternatives at 6.1 mgd for the Recommended Alternatives and 6.4 for the Historic Trends.

In summary, the Recommended Alternative uses more of the existing secondary waste treatment capacity than the Historic Trends Alternative. This would require less additional waste treatment facilities construction to serve anticipated future populations. The Recommended Alternative also minimizes the need to install many miles of additional sewer lines to serve scattered growth areas between and around Fort Collins and Loveland.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

1. The Greeley-Evans area will require additional waste treatment capacity by the year 2000 to serve anticipated growth under both land use projections. Greeley's phasing policy will result in efficient utilization of existing and proposed facilities.
2. Windsor will require additional waste treatment capacity to serve both municipal and industrial flow in both land use alternatives.
3. There is sufficient wastewater treatment capacity in the urban area of Larimer County to meet projected population levels which could be served by central wastewater treatment facilities for the next 25 years.
4. Under the Trends Alternative, Fort Collins would have substantial excess capacity (10.6 mgd) by the year 2000 whereas South Fort Collins Sanitation District would have to triple its waste treatment capacity beginning in 1982.
5. Under the Consultant's Recommended Alternative, Fort Collins would be at 70 percent waste treatment capacity by the year 2000. Excess flows from the Boxelder Sanitation District could further reduce unused Fort Collins capacity.
6. South Fort Collins Sanitation District waste treatment facility would be at approximate capacity by the year 2000 under the Recommended Alternative.

7. Loveland's waste treatment facility would be at 80 percent capacity under the Recommended Alternative and 83 percent capacity under the Trends Alternative.
8. The Consultant's Recommended Alternative encourages more efficient utilization of existing wastewater treatment plants than the Trends Alternative. This is evident in the Fort Collins-South Fort Collins area.
9. Conversely, the Trends Alternative would necessitate a three-fold increase in wastewater treatment capability for the area which could be potentially served by the South Fort Collins Sanitation District, whereas Fort Collins' facility would be 50 percent underutilized.
10. Land use decisions by city and county government will influence the degree of utilization of existing and planned waste treatment plants and the financial integrity of the systems.

7.2 RECOMMENDATIONS

1. Windsor should undertake a detailed facility planning study leading towards expanding their wastewater treatment capabilities.
2. Boxelder and South Fort Collins Sanitation Districts should restrain from expanding their waste treatment capacity until a detailed analysis has been completed which addresses the following topics:
 - . Definition of potential service areas for the City of Fort Collins, Boxelder and South Fort Collins Sanitation Districts
 - . Determination of interceptor sewers, collector lines, pump stations, and related sewerage facilities which would be served by existing plants including capital and operation and maintenance costs
 - . Analysis of fiscal capability of Boxelder and South Fort Collins Sanitation Districts and the City of Fort Collins as it relates to retiring existing indebtedness and assuming new debt in accordance with potential sewerage expansion requirements.
 - . Determination of service areas and population distributions in and around Fort Collins which maximize existing facilities and insures fiscal integrity.

- . Determination of financial policies which insure fair and equitable distribution of costs for retiring old and new debt for the residents of Fort Collins and adjacent unincorporated areas (including Spring Canyon Sanitation District residents)
- . Determination of institutional arrangements necessary to insure implementation of the most cost effective sewerage facility expansion/debt retirement program for the urban service area of Fort Collins.