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TECHNICAL SUPPORT DOCUMENT

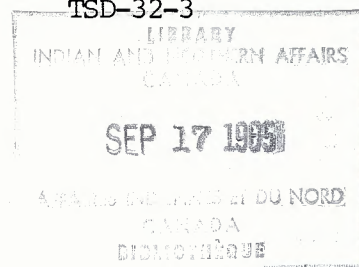
PLANNING FOR MUNICIPAL SERVICES

October 1984

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**Technical Services
and Contracts**

**Services techniques
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PLANNING FOR MUNICIPAL SERVICES

October 1984

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PLANNING FOR MUNICIPAL SERVICES

1.0 INTRODUCTION

This publication provides information on the planning and preliminary considerations required for designing municipal service facilities (water, wastewater and solid waste) suitable for use in Indian communities and northern locations. It is mainly intended for designers and planners of municipal service facilities. Information is given on practices, infrastructure planning, alternatives analysis, and project documentation requirements.

This publication is a support document for DRM 10-7/32, Planning and Site Development. It also directly relates to the following documents:

- DRM 10-7/40, Water Supply and Distribution.
- DRM 10-7/41, Wastewater Collection, Treatment and Disposal.
- DRM 10-7/42, Solid Waste Collection and Disposal.

2.0 HEALTH AND WELFARE CANADA AND ENVIRONMENT CANADA

2.1 Joint Objective

A memorandum of understanding between the three departments states their joint objective:

"the Departments of Indian and Northern Affairs Canada (INAC), Health and Welfare Canada (HWC) and Environment Canada (EC) play essential roles in the provision and operation of environmental facilities (water, wastewater and solid waste) on Indian reserves and settlements. It is the objective of these Departments that Indian Communities be provided with environmental facilities that meet acceptable standards of design, construction and operation such that the health of the people is protected and maintained, and the quality of the environment is protected and enhanced."

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2.2 Standards

The standards for municipal services are presented in DRM 10-7/40 (water), DRM 10-7/41 (wastewater) and DRM 10-7/42 (solid waste). These standards are based upon:

Guidelines for Canadian Drinking Water Quality 1978 - HWC.

Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments - EC.

Codes of Good Practice for Handling Solid Wastes at Federal Establishments - EC.

2.3 Roles of HWC and EC

HWC and EC should be involved in the early stages of planning municipal service projects. These projects may require the review and comments of HWC and EC, who may seek input from related provincial authorities.

3.0 BASIC PLANNING CONSIDERATIONS

3.1 Environmental Assessment Review Process

The Cabinet decision of December 20, 1973 requires that federal departments and agencies consider environmental matters when planning and implementing projects, programs, and activities. DRM 10-7/33, Environmental Impact Assessment contains details on the Environmental Assessment and Review Process (EARP).

3.2 Community Planning

Municipal service projects should not normally be implemented in the absence of sound community planning.

It is recommended that all planning decisions relating to a project be made in conjunction with the community, and acted upon in consultation with the planners and designers of these facilities.

Community plans should be based on local requirements, which, in some cases, may be considerably different from requirements in a non-Indian community of similar size, and must also be based on sound planning principles.

Specific considerations are given below which should be evaluated when planning municipal services. Table 1 shows the information required in a community plan to assess a proposed municipal service project.

Table 1

INVESTIGATIONS REQUIRED*

	New Site	Existing Site Without Comprehensive Planning	Existing Site With Comprehensive Planning
1. Physical Infrastructure			
a) Access -----	X	X	X
b) Utilities -----	X	X	
c) Community Layout ----	X	X	
2. Socio-economic Data			
a) Education -----		X	
b) Health -----		X	X
c) Government -----	X	X	X
d) Local Economy -----	X	X	
e) Labour Force -----	X	X	
3. Biophysical Environment			
a) Climate -----	X	X	
b) Soils -----	X	X	
c) Topography -----	X	X	
d) Resources -----	X	X	
e) Ecology -----	X	X	

* If a need for investigation is not noted as required, information is normally available from previous investigations and studies.

3.3 Site Survey and Analysis

3.3.1 General Requirements

Projects may require new sites, which are isolated from the community, such as sites for water or wastewater treatment plants, lagoons, sludge disposal, or landfill.

Water distribution and wastewater collection systems for existing developments or communities are normally located within the existing street allowance. For the community developments, system design requirements for collection and distribution should be an important consideration in selecting the site and layout.

Planners and designers should gather the site information necessary for the initial evaluation of all possible alternatives and for additional detailed evaluation of two or three solutions.

Design and Selection of Small Wastewater Treatment Systems discusses the type of information which should be gathered for any small municipal service project.

See Environment Canada's Cold Climate Utilities Delivery Design Manual, for information needed on cold climate projects.

3.3.2 Access to Community

Access to the community may be by air, water, rail or road.

Variables to be assessed include:

- a. frequency of service,
- b. daily and seasonal dependability,
- c. capacity,
- d. cost, and
- e. terminal facilities.

3.3.3 Community Service Report and Plan

All constructed features and land use in the community should be identified and located on a plan. These include:

- a. buildings, streets and roads;
- b. utility elements; and
- c. drainage elements.

All services offered in the community should be identified and their needs or impact on the proposed system assessed. These include:

- a. utilities (electricity, fuel delivery, telephone, water supply, wastewater collection and treatment, solid waste collection and disposal);
- b. educational services;
- c. health services;
- d. commercial outlets; and
- e. equipment repair facilities.

The existing biophysical environment should be described in detail and includes:

- a. climate (temperature, wind, precipitation);
- b. soil data (ground frost, surface condition, bore hole data);
- c. drainage and topography;
- d. vegetation (land and aquatic);
- e. wildlife (land-based and aquatic);
- f. fish and shellfish resources; and
- g. available construction materials (sand, gravel, water, timber, etc.).

The facilities in adjacent communities should be described in sufficient detail to allow their consideration as alternatives by identifying and describing pertinent elements such as:

- a. collection and trunk sewers,
- b. pumping stations,
- c. force mains,
- d. wastewater treatment plant(s), and
- e. effluent disposal facilities.

Local residents will have to participate directly in facility planning through public meetings to discuss how they can be involved in the construction phase (day labour for example) and in the operation of the facility.

3.3.4 Socio-economic Data

Because social factors have a direct bearing upon the suitability and acceptability of a municipal services proposal in a given community, the level of technical education, the general health, and the role the community will play in the project development and/or operation should be investigated.

Economic factors to be considered when planning improvements in municipal services include:

- a. the ability of users to pay for and maintain improved facilities;
- b. possible increases in usage arising from improvements in services; and
- c. jobs created through construction and maintenance of the facility.

3.4 Design Concept

3.4.1 Identification of Alternatives

When identifying alternative systems, the following should be considered:

- a. The planning period for municipal systems is normally at least 20 years and the design life of various system components ranges from 5 to 40 years.
- b. The layout and density of the community should be noted.
- c. Other land uses should be noted such as existing rights of way, future land use and densities, and the availability of nearby land for water source, treatment and/or disposal options.

- d. Sufficient statistical and planning information should be available for a realistic estimate of community growth.
- e. Remote communities should consider alternatives that minimize the shipment of heavy and large equipment, and use of consumables such as chemicals and fuels.
- f. Difficult conditions, such as shallow or surface bedrock, permafrost, muskeg, high groundwater levels, and steep inclines, may eliminate alternatives. See DRM 10-7/30, Geotechnical Surveys and Investigations, for guidelines on routine soils investigation.
- g. The availability of local construction material (sand, gravel, clay, crushed stone, etc.), is an important consideration in the selection of material-intensive alternatives.
- h. To avoid contamination of existing ground water supplies, geotechnical investigations should identify the water table and the subsurface flow characteristics.
- i. The effect of climatic conditions on alternatives should be identified.
- j. Local utility types and capacities, and local and regional service capabilities should be examined. For instance, a power-intensive mechanical plant should not be located in a community which generates its electricity locally through diesel-powered plants.
- k. Local social or policy factors should be taken into consideration.
- l. The potential for the existing facilities of neighbouring communities, subdivisions or single buildings to provide services should be investigated.

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- m. Local construction factors may make the construction of alternatives excessively difficult or expensive.
- n. The operation and maintenance of existing systems in the community should be reviewed to assess past performance.
- o. Capital costs and annual operation and maintenance costs should be estimated.

3.4.2 Final Choice

Develop a comparison matrix with the selection criteria and the alternative systems previously identified. Select the three most cost effective systems which best meet community needs.

A final choice is determined by analyzing the parameters in greater detail and carrying out a detailed life-cycle cost analysis. Community consultation and a very detailed assessment of construction, operation, maintenance and management requirements are important at this stage.

The chosen alternative should be carefully studied to determine all the information required for the project brief (design), and the transition to the design phase.

Review, analyze and present the following information in the context of the final choice, and include it in the project brief:

- a. general land and development data;
- b. regulations, permits, ordinances and a brief environmental assessment;
- c. the site survey and analysis, a review of all detailed site information necessary for the design of the selected alternative and any additional field surveys and information required to support the project brief;
- d. a set of site and concept plans;

- e. a preliminary schedule for designing and constructing the alternative; and
- f. proposed construction procedures.

3.5 Operation and Maintenance

The technology should be appropriate to the community and its capabilities. Wherever feasible, select non-mechanical options over complex mechanical ones. Mechanical equipment should be reliable, locally manageable and capable of being maintained mostly by the local work-force.

At the planning stage, identify potential operators and managers of the proposed facility, and assess their training requirements.

Discuss potential maintenance requirements with the community.

Individual on-site systems have some maintenance requirements which may necessitate setting up community-wide maintenance programs administered by the community.

Where applicable, consider the possibility of having part, or all, of the operation and maintenance done by the neighbouring community. Contracting out of maintenance should also be considered.

4.0 ENGINEERING REPORTS

4.1 Report Function

The function of the engineering report is to:

- a. assemble basic information and design criteria;
- b. examine alternatives and their cost;
- c. present concepts for the plans and specifications;
- d. present conclusions and recommendations on the proposed facility; and
- e. outline the steps for implementing the recommendations.

4.2 Report Content

The engineering report normally contains the following:

- a. a summary of conclusions and recommendations;
- b. introduction;
- c. background (history, site, economic considerations);
- d. an investigation of existing facilities and their conditions;
- e. a proposed facility evaluation for the best alternatives;
- f. an estimate of project financing (capital and maintenance costs);
- g. conclusions;
- h. recommendations; and
- i. appendices, for example, a project schedule.

4.3 Report Plans

Overall and site specific (project system) plans should always accompany the report to assist in presenting data and the recommended alternative. The plans should show both the general area and the proposed site.

5.0 NORTHERN CONSIDERATIONS

The provision of municipal services in northern locations is complicated by the interaction of two major concerns -- climate and access. Additional considerations for these locations include the following:

- a. continuous and discontinuous permafrost;
- b. long periods of low temperature and high winds;
- c. a short construction season;
- d. a short shipping season, which may not coincide with the construction season;
- e. high energy costs;
- f. labour force limitations; and
- g. operation and maintenance limitations.

6.0 REFERENCES

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