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POND INLET
DESIGN AND OPERATIONAL CONCEPTS BRIEF
FINAL SUBMISSION

Prepared For:

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Government of the Northwest Territories
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DPW Project No.: 92-4520

FSC Project No.: 92-1070

December 11, 1992

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Your File: 92-4520

Our File: 92-1070

December 11, 1992

Department of Public Works
Government of the Northwest Territories
P.O. Box 1320
Yellowknife, NWT
X1A 2L9

Attention: Mr. Gord Robertson, Project Officer.

RE: POND INLET SEWAGE & SOLID WASTE RELOCATION
DESIGN CONCEPT BRIEF - FINAL SUBMISSION

Please find enclosed five copies of the final submission of the above named report.

If you should have any questions or require additional information, please contact me directly at 920-2882.

Yours truly,

FERGUSON SIMEK CLARK

Kevin Hodgins, P. Eng.

Encl.

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1.0 INTRODUCTION

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The Department of Public Works (DPW) has commissioned Ferguson Simek Clark to complete a engineering study and design for the development of a sewage lagoon and a solid waste collection facility, and the restoration of the existing facilities in Pond Inlet, NWT. The result of this study will be used for the future planning and construction of infrastructure in the community. This study follows information gathered during a site visit to the community in early September.

The study is based on the "Sewage & Solid Waste Relocation - Pond Inlet Project No. 92-4520 - Terms of Reference for Engineering Services" developed by DPW and the Department of Municipal and Community Affairs (MACA), Government of the Northwest Territories. The work was undertaken under Contract No. CT 92-1077.

1.1 Objectives

This Design Concept Brief will discuss the objective of this project as identified in the Project Terms of Reference, review the design parameters and assumptions, present information gathered during the preliminary engineering phase, and develop conceptual designs for the project. The objectives of this project are as listed below:

1. To meet the environmental requirements imposed by DIAND, NWT Water Board, the Baffin Regional Health Board and the intent of the Hamlet Council.

2. To provide facilities satisfying a twenty year design life with the design life horizon being 2014/15.

3. To confirm the site chosen for the sewage lagoon by the community.

4. To design a facility with adequate storage volume for approximately 10 months, based on twenty year projected volumes.

5. To provide a method of draining the sewage lagoon in the fall.

6. To locate a solid waste and bulky waste disposal area within the vicinity of the proposed lagoon and proposed access road.

7. To provide divisions within the solid waste disposal area to allow for management of the varying types of refuse.

8. To provide a modified landfill facility which is simple to manage and operate by local personnel.

9. To provide site security and containment of wind blown refuse.

10. To provide a pit facility for the disposal of waste oil.

11. To provide a method of containment for hazardous wastes.

2.0 COMMUNITY INFORMATION

2.0 COMMUNITY INFORMATION

Pond Inlet is situated on north Baffin Island on the southern shore of Eclipse Sound facing Bylot Island approximately 1060 km northwest of Iqaluit and 1883 km northeast of Yellowknife. The geographical coordinates of Pond Inlet are 72°42' N and 77°59' W.(NWT Data Book, Outcrop)

The area around Pond Inlet exhibits the sandy, loamy topography characteristic of the high arctic glaciated tundra with numerous boulders and gravel at the surface. The glacial till found in the areas proposed for the new facilities comprises mainly gravel and sand with lesser quantities of cobbles and boulders. Pond Inlet is near the high glaciated mountains of Baffin and Bylot Islands.

Pond Inlet lies within the permafrost zone and landforms associated with permafrost are evident. The active layer in the areas of the proposed facilities varied from nil to a depth of one metre at the time of our investigation. (Thurber, 1992)

In Pond Inlet, winters are long and cold with a mean average temperature in January, the coldest month, of -31°C. The summers are short and cool with a mean daily temperature in July of 5°C. The mean annual rainfall in Pond Inlet is 5.7 mm and mean annual snowfall is 86.9 mm. The prevailing wind is from the east and west with an average windspeed of 24 km/hr. (NWT Databook, Outcrop)

3.0 CURRENT PRACTICES

3.0 REVIEW OF CURRENT PRACTICE

Municipal services are provided to the community of Pond Inlet by the Hamlet of Pond Inlet Council through a contract with the GNWT. The facts in the following section regarding the current water supply, waste collection and waste disposal practices of the community were collected in discussions with Hamlet personnel in early September, 1992.

3.1 Water Supply and Distribution

Pond Inlet obtains its potable water supply during the winter months from Water Supply Lake and during the summer months from Salmon Creek. These sources are approximately 4.5 kilometres south of the community. Water is drawn on demand and pumped into a water truck for distribution in the community.

Water is delivered three times per week to households with one 4550 litre water truck and two 6825 litre water trucks manned each by one operator. The trucks operate 5 to 5 1/2 days per week year round.

3.1.1 Water Consumption

Actual water consumption rates for the community cannot be established as data has not been recorded on a consistent basis.

There are presently 158 private residential units and 58 other units including government, retail and church occupied buildings. All but 7 of the units are fitted with pressurized water systems. These latter units do not receive trucked services.

As accurate water consumption data is not available, the DPW base residential consumption rate of 90 Lpcd will be assumed for design purposes. Total per capita consumption for residential and non-residential activities will be estimated by the DPW design formula for a population from 0 to 2,000 people which is

$$\text{Total Consumption} = \text{residential rate} \times (1 + 0.00023 \times \text{population})$$

where total consumption and residential rates are in lpcd

The second term in the above formula accounts for water consumption by non-residential activities.

3.2 Sewage Collection and Disposal

In Pond Inlet, 151 of the private residences are complete with a sewage pump out tank and 7 residences utilize honeybags for sewage disposal. There are 58 other units including government, retail and church occupied buildings. All of these units are fitted with sewage pump out facilities.

3.2.1 Pumped Sewage

The Hamlet of Pond Inlet Council utilizes three sewage trucks to pump out the sewage tanks. The schedule is for two to three pickups per week per tank with the trucks operating 5 to 5 1/2 days per week. The capacities of the trucks are 3185 litres, 5460 litres, and 6825 litres.

Sewage is disposed to a lagoon which is located approximately 600 metres southeast of the new NWTPC power house, 120 m beyond an area defined as future development on the projected Community Land Use Plan. The lagoon is defined by an existing ravine with a manmade earthen berm on its east end. The area included as the lagoon is approximately 80 m by 45 m in plan and the dimensions of the berm are approximately 55 m long, 8 m wide, and 5 m deep. The effluent outfall is provided by a nestable culvert through the berm located at the berm's east side. The culvert is placed at overflow level. There was no obvious control mechanism. From the culvert, the discharge is directed over a rip-rapped outlet towards a well-vegetated drainage course eventually discharging into Eclipse Sound. The length of the drainage path is approximately 270 metres over grades as steep as 25 percent. A liner within the berm assists in the retention of sewage. It was apparent by the erosion on the crest of the berm and the evidence of sewage on the upstream face that the berm is incapable of retaining the spring run-off and the winter accumulation of influent. Therefore, seasonally the berm is ineffective, allowing raw sewage to flow towards the Sound.

3.2.2 *Honeybag Collection and Disposal*

Honey bags are currently collected with the solid waste. Historically the bagged sewage was collected and disposed of separately, but as the volume of bagged sewage has reduced due to the majority of the sewage systems being retrofitted and replaced with sewage vacuum collection systems, the practice of separating the wastes has been discontinued. An area above the sewage lagoon on the south edge of the solid waste disposal site measuring approximately 150 m by 150 m has been historically used for the disposal of the bagged sewage. During the term of its full use, the area was covered with overburden and solid waste periodically.

The residents who are still using honey bags place the full bags in a cut 205 L drum by the roadside for pick-up. The historic practice of the collection crew was to pick up the entire drum to prevent bag spillage and empty the drums in the honey bag pit at the sewage waste disposal site. The empty drums were then returned to the residences. It would be possible to restore the practice of separating the honeybag bag disposal from the disposal of solid waste simply by returning to the routine of operating a separate pickup schedule.

3.3 Solid Waste Collection and Disposal

Solid waste is collected with a 10 m^3 capacity garbage truck and crew. Solid waste is placed by the residents in a 205 L drum which has had the top removed. Separate drums are used for honey bag and solid waste storage. The schedule is for one or two pickups per week per disposal point with the trucks operating 5 to 5 1/2 days per week.

Evidence was visible that combustible solid wastes are occasionally burned in the drum before pick-up.

Solid waste is disposed of in the solid waste site which is located approximately 500 m southeast of the community. The site measures approximately 70 m by 100 m and is located on the bank sloping towards Eclipse Sound.

Reduction of the solid waste is routinely practiced by the burning of the debris, however, maximum reduction is not being accomplished since it appears that the bulky wastes are not being properly segregated from the combustible refuse. The practice of burning is carried out two or three times per week. Used oil is placed on the waste prior to it being ignited. After incineration, the remaining material is leveled and then covered with available cover material. It appeared that there was not a sufficient volume of cover material routinely placed over the leveled refuse despite there being a granular source within 500 m of the disposal site. It should be noted that the practice of placing and leveling cover material is an extremely difficult operation during the winter months.

The solid waste generated in Pond Inlet is primarily domestic in nature consisting of food and packaging material. Solid waste is also generated from construction projects in the community. There is very little generation of industrial waste in the community. What little there is consists mainly of used lubricants from the operation of the power plant and the local maintenance garage. The majority of the waste lubricants disposed of at the dump site are stored in drums in an area to the north end of the solid waste disposal site. The barrels of refuse were not identifiable and were poorly sorted. Some were laying on their sides, their contents obviously leaking. This area was heavily stained by fuel, oil, and other chemicals.

Bulky wastes (cars, appliances, furniture etc.) were partially segregated from the general community refuse and placed in an area just to the north of the solid waste disposal area. No organization was apparent in the manner of disposal within this area of the refuse site and therefore it was far under-utilized. The bulky waste disposal area measured approximately 40 m by 100 m. Staining typical of fuel oil spills was evident throughout the area. Numerous articles of bulky waste were scattered along the east side of the access road in areas far beyond the apparent intended limits of the bulky waste storage area.

The solid waste disposal site is partially bounded to the northwest by two courses of 205 L barrels laying on their sides welded end to end. The barrels act as a wind break and aid in the containment of the refuse within the defined disposal limits. Due to the vicinity of the community and the airstrip to the refuse site, a proper fence would be much preferable to this barrier arrangement.

4.0 PREVIOUS STUDIES

4.0 REVIEW OF PREVIOUS INSPECTIONS AND PLANNING STUDIES

4.1 Pond Inlet - Water Supplies & Waste Disposal, 1976

A study was carried out in 1976 by the Federal Department of Health and Welfare concerning the water supply and waste disposal practices in the Community of Pond Inlet, NWT (Grainge, Nov. 8, 1976).

The study concerned itself primarily with the supply of water to the community and secondly with the disposal of refuse produced by the residents. The conclusion of this report was that more sanitary practices should be adopted for the supply of water to the residents and that the disposal of wastes should be confined to a defined managed area.

The recommendations of this report were as follows:

1. Improvements should be made to the water supply access road;
2. Improvements should be made to the water suction and delivery hoses of the mechanical delivery system including the provision of power-driven hose reels;
3. Attempts should be made to upgrade the household water retention reservoirs to levels acceptable by the practice of the day;
4. Chlorine should be added to the delivered water to provide a degree of disinfection;
5. The use of plasticized paper refuse disposal bags should be adopted by the residents of the community;
6. The solid waste disposal site should be improved by the practice of segregating the combustible materials, the non-combustible materials, and the bulky objects;
7. A piped water supply and sewer disposal system should be planned for the community.

4.2 Pond Inlet - Water Supply & Waste Disposal, 1978

In 1978 W.D. Buchanan Limited completed a study of municipal servicing alternatives for the community of Pond Inlet. Three alternate water supply sources and methods were compared, and the health hazards of the current waste disposal practices were outlined.

The recommendations of this report were as follows:

1. Individual pressurized internal water systems and vacuum pump out sewage tanks should be provided to all buildings of the community;

2. The solid waste disposal site should be relocated further from the community and should be used for the disposal of both solid waste and sewage, this practice will isolate the pollutants.

4.3 Pond Inlet - Northern Waters Act Inspection Report , 1990

A letter report was prepared by David Jessiman, a Water Resources Officer for the federal department of Indian and Northern Affairs dated August 13, 1990. The reporter inspected the location of and practices pertaining to the water supply, the sewage disposal, and the solid waste disposal, and the Community's fuel storage.

The recommendations of this report were as follows:

1. That remedial repairs be made to the existing sewage lagoon berm, including repairs to the obvious erosion strips and that consideration be given to raising the berm to provide better containment during the spring runoff season.

2. That better practices of the placement of granular cover over the solid waste site be adopted.

3. That proper waste oil disposal practices be adopted by the Community including a plan to clean up the existing spills, contain the waste, and control the future disposal.

4. That the existing solid waste disposal site be properly cleaned up and restored following the construction of a new facility.

5. That warning signs be posted at the water supply and solid waste disposal sites.

4.4 Pond Inlet - Sewage/Solid Waste Report , 1990

A letter report was prepared by Wing Yeung, a Project Officer for the DPW Baffin Region dated November 1990. The title of the report is "An overview and recommendations for the relocation of existing sewage and solid waste sites in Pond Inlet, Clyde River, and Broughton Island, NT". The reporter inspected the existing waste facilities in each of three communities, met with the Hamlet personnel, and attempted to develop solutions to the obvious problems.

The recommendations for Pond Inlet presented in this report were as follows:

1. That the existing sewage lagoon be closed and restored and that a new site acceptable to the governing bodies be developed fully employing the practices of the day including flow control methods.

2. That a new solid waste site be developed further from the community and that the existing site be restored to acceptable standards. The importance of a simple yet properly planned and managed facility was stated, allowing for the sorting and separation of different waste types at their disposal locations.

3. That the practice of incineration be reviewed and evaluated with particular emphasis on the practicality, management, capital, operation, and maintenance costs.

4.5 Pond Inlet - An Update of the Status of Solid Waste Management , 1990

The GNWT department of Municipal and Community Affairs has prepared documentation of the inventory of Solid Waste Facilities and Practices in each of the communities in the NWT. This document was prepared by Gary Heike and Jeffery Wong and submitted in December 1990. This catalogue was referred to prior to the writing of this Design Concept Brief.

4.6 Pond Inlet - Water Supply & Sanitation Sites Inspection Report, 1991

A short inspection report was prepared by the Baffin Regional Health Board on June 27, 1991 following a site inspection. The author of this report was B. A. Stephen, Health Officer.

The recommendations presented in this report were as follows:

1. That the practice of the chlorination of potable water prior to its distribution be continued.

2. That a new solid waste disposal site be developed further from the community employing proper management practices, and that the existing facility be consolidated and properly restored.

3. That a new sewage lagoon be developed further from the community with an increased capacity and that the existing site be rehabilitated.

4.7 Discussion with MACA and Hamlet Personnel

Discussions with Municipal and Community Affairs personnel in Iqaluit and the Administration and Field personnel of the Hamlet of Pond Inlet were undertaken during the site visit in early September. Attention was focused on the operation of the existing facilities and the planning of future facilities.

Rick Armstrong of the Baffin Region MACA office was helpful in discussions prior to the site visit. The intent of the project and particular concerns were discussed and pertinent files, information, and air photos were made available for study.

Meetings were held with Jake Anaviapik, Senior Administrative Officer of the Hamlet of Pond Inlet and the Hamlet maintenance personnel on September 11, 1992. Discussions included the routine practices of the municipal servicing, the operation and maintenance of the existing disposal facilities, the historical use of the area proposed for the relocation of the disposal sites, the alignment of the road proposed to access these proposed sites, and the closure of the existing facilities once new disposal sites have been developed.

4.8 Discussions with Governing Bodies with Jurisdiction

Discussions were carried out with the government departments having jurisdiction and concern for the impacts of this project.

Tim Young of the Iqaluit district office of the Federal Department of Fisheries and Oceans was consulted. His concerns were of the impact of the effluent on the marine environment. Mr. Young agreed that any improvement to the existing situation was welcome and encouraged. Mr. Young also provided information on the marine activities of the region.

Kevin McDonnell of the Water Resources Division of Indian and Northern Affairs (DIAND) Canada was consulted and asked for his concerns. Mr. McDonnel requested that DIAND be included in the evaluation of the proposed design. Mr. McDonnel noted that Pond Inlet currently does not have a water license issued by the NWT Water Board.

Bill Davies of the GNWT Department of Transportation Arctic Airports Division was consulted. Mr Davies requested that his department be included in the review process of this project. The vicinity of the solid waste disposal facility to the airstrip was the primary concern of Mr. Davies. The reasons for concern are, the possibility of interference by the bird population which frequent the disposal site and the air traffic, the loss of visibility caused by the smoke produced from the practice of incineration of the wastes at the solid waste disposal site, and the possibility of wind blown refuse interfering with the air traffic. Mr. John Graham of the Department of Transportation in Iqaluit voiced similar concerns but noted that there are only two reported incidents of bird strikes on Baffin Island, neither of which occurred at Pond Inlet and that the relocation of the solid waste disposal site further from the airport is a welcome and acceptable change.

Mr. Burt Dean, the local Officer of the GNWT Department of Renewable Resources was consulted regarding the proposed relocation of the disposal facilities and asked for his predictions on the impact. Mr. Dean stated that the areas which are proposed for the new facilities are not presently used as recreation or hunting and fishing areas, and that these areas are reasonable for such purposes. Mr. Dean stated gulls are the primary bird of occupancy in the vicinity of the Pond Inlet refuse disposal areas.

Ms. Pat Fowler of the Baffin Regional Health Board in Iqaluit was consulted regarding the proposed relocation of the sewage lagoon and the solid waste disposal facilities. Ms. Fowler noted that the shores of Eclipse Sound in the vicinity of Pond Inlet are currently used for the cleaning of freshly harvested seal and whale. There are health concerns regarding the vicinity of the effluent discharge to these areas used for cleaning the animals. Ms. Fowler did state that an improvement over the existing sewage treatment facilities would help reduce these risks.

The NWT Water Board was consulted regarding the present water use and sewage disposal practices of Pond Inlet. It was noted that Pond Inlet is not presently governed under a water license as issued by the Board. It is recommended however that the guidelines as set out by the Board be considered in the planning for the new facilities.