

CLEAN ENVIRONMENT COMMISSION
REPORT ON
UPLAND COLONY FARMS
SEWAGE LAGOON SYSTEM

AUGUST 11, 1988

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UPLAND COLONY FARMS SEWAGE LAGOON SYSTEM

BACKGROUND

On July 28, 1987 Poetker Engineering Consultants filed a proposal with the Environmental Management Division under the Clean Environment Act for the construction of a wastewater treatment lagoon to serve the Upland Colony Farms. The lagoon was to be located in the NW 1/4 of Section 13-16-17W in the Rural Municipality of Minto, sized to treat domestic wastewater from a projected Colony population of 120 people, with discharge of effluent to a coulee emptying into Stony Creek (Neepawa Creek).

The Environmental Control Services submitted a report on this proposal to the Commission dated January 7, 1988 with recommendations for a control order to regulate the operation of the lagoon facilities.

The Commission advertised the proposal, in accordance with The Clean Environment Act, on February 11 and 12, 1988 in the Minnedosa Tribune, the Neepawa Press and the Winnipeg Free Press. Objections and concerns were registered with the Commission by a neighboring citizen. The Council of the R.M. of Minto had earlier given notice to the Environment Department that their approval of the lagoon would be withheld until the concerns of their citizens were satisfied. An objection was filed by the Board of the Whitemud Watershed Conservation District. A concern was also registered by the Fisheries Branch of the Manitoba Department of Natural Resources about the rate of discharge of lagoon effluent. The proposed discharge rate was considered to have potential for an adverse effect on a highly valued brook trout population in Stony Creek.

As a result of these objections, the Commission scheduled a hearing in Minnedosa for March 28, 1988, with the intention of making a control order to regulate the lagoon operation at its scheduled meeting March 30, 1988. However, in order to make a revision to accommodate the concerns of the Fisheries Branch, Poetker Engineering Consultants withdrew the original proposal and the Commission cancelled its hearing plans. The hearing had not yet been advertised; however, those who had expressed interest had received advance notification and these persons were advised of the cancellation and informed they would be notified when a new proposal was received.

At the end of March, 1988 The Clean Environment Act was repealed and The Environment Act was proclaimed, bringing into force a somewhat different set of procedures.

On April 7, 1988, Poetker Engineering Consultants filed a revised proposal with the Environmental Management Division, proposing that the rate of effluent discharge be restricted in conformance with a flow rate recommended by the Fisheries Branch.

April 29, 1988 the Commission received a memorandum from the Deputy Minister of Environment and Workplace Safety and Health requesting the Commission to hold a public hearing on the revised proposal pursuant to Section 11(10) of the new act and to provide a report pursuant to Section 7(3) of the Act.

When contacted, the local objectors expressed a continuing interest in a hearing; however, the Commission delayed the hearing until after June 15, 1988 in accordance with the wishes of objectors engaged in farming operations in order that spring work might be completed prior to the hearing.

The Commission scheduled a hearing in the Town Council Chambers in Minnedosa for 7:00 p.m., June 21, 1988. Advertisements were placed in the Minnedosa Tribune, the Neepawa Press, and the Winnipeg Free Press. As well, all those who had previously expressed an interest or a concern were individually notified of the new hearing by letter.

HEARING PRESENTATIONS

The following is a summary of the testimony received from witnesses at the hearing:

Mr. A.J. Poetker, P. Eng. Consultant to Upland Colony Farm

Mr. Poetker testified that sewage from the living quarters on the farm is being treated in a two-cell lagoon constructed on colony property in August, 1987. The design of the sewage lagoon system made provision for a maximum organic loading rate on the primary cell of only 35 kilograms per hectare of water surface, less than two thirds of the normal loading rate. Also, the hydraulic capacity was adequate to store and satisfactorily treat sewage at the anticipated maximum population level of the Colony. Discharge of effluent could be limited to once annually.

If recommended operating considerations are followed, an effluent containing less than 200 fecal and 1500 total coliform per 100 millilitres and a biochemical oxygen demand of less than 30 milligrams per litre should result.

The lagoon was located to satisfy concerns related to seepage and odour. The soil underlying the lagoon had been tested by the consultants and shown to exceed the guideline limitation on hydraulic conductivity. The lagoon was placed some 900 metres from the home of the nearest neighbour, Mr. Morley Hutton. This distance is three times the normal 300 metre provincial guideline distance for separation from a dwelling based on avoidance of odour complaints.

Treated effluent from the secondary cell of the lagoon will be discharged to an intermittently flowing water course with drainage in a southerly direction toward Stony Creek, a distance along the water course of some 12 kilometres. A restricted rate of discharge, limited to only ten litres per second, was accepted by the proponent in conformance with a

recommendation by the Fisheries Branch to protect the trout fishery in Stony Creek. This was noted in Mr. Poetker's April 7, 1988 report and confirmed in his testimony before the Commission.

In answer to questions, Mr. Poetker stated that the use of effluent for irrigation had been considered but was not adopted by the Colony. There would not be any forage crops available for irrigation and, for cereal crops, the timing of effluent release would be inappropriate.

The Commission retained as exhibits of the hearing, Mr. Poetker's Summary Report of June 20, 1988 and his Design Report of July, 1987 as revised April 7, 1988.

Mr. Morley Hutton, The Nearest Resident

When the Commission advertised the lagoon proposal in February, 1988, a letter was received from Mr. Hutton outlining his concerns. These included the belief that as the intermittently flowing creek, which received the effluent from the lagoon, flowed through his hay meadow each spring, his drinking and stock watering wells would be polluted; that the effluent released in late spring would destroy his hay crop; and that the value of his property would drop. He was also concerned that hog manure from the Colony might be disposed of in the sewage lagoon system.

In testimony at the hearing, Mr. Hutton indicated that the route of the unnamed coulee or creek carrying the lagoon effluent came near his yard and buildings and within 183 to 274 metres (200 to 300 yards) of his well. He stated that his hay land in this low area was prone to flooding to a depth up to 60 centimetres (2 feet) in spring, even in the years before the lagoon was built. Mr. Poetker noted that, by arrangement between Mr. Hutton and the Upland Colony Farms, a low, earthen dyke had been constructed at the location indicated on the attached sketch (Appendix B) to prevent the surface runoff, including lagoon effluent, from reaching the Hutton farm yard. Unfortunately, Mr. Hutton now believed that even more surface water collected in the coulee in the vicinity of the dyke than previously, inundating parts of Mr. Hutton's hayland. In this connection, Mr. Hutton did not favour suggestions about the possible deepening and channelization of the flow in the hay field area to relieve this problem as this would interfere with the necessary movement of his farm equipment through the area. When questioned, Mr. Hutton was unable to suggest any action that would relieve his flooding problem.

Mr. Hutton stated that he felt he was located downwind of the lagoon, based on the prevailing wind direction in that location. However, he stated that he had not been bothered by any odour from the lagoon to date.

Mr. Hutton's letter of February 22, 1988 was filed as an exhibit to the record of the hearing.

Mr. Marshall Swift, Municipal Council Representative

Mr. Swift spoke as a representative of the Council of the Rural Municipality of Minto and as the owner of agricultural land immediately downstream of Mr. Hutton's farm. He testified that the Council had agreed to accept the lagoon proposal provided arrangements were made by the Colony, at their own expense, to detour the receiving waterway away from Mr. Hutton's yard area. It was his understanding that the detour had been duly completed by virtue of the Colony constructing a low earth dam designed to protect Mr. Hutton's hayland and residence area from spring flooding. He stated that the receiving water course was normally dry in summer as far downstream as his farm where a spring permitted cattle to be watered. He also stated that the prevailing winds in the area were from the northwest.

Mr. Erwin Hartley, Resident

Mr. Hartley, the owner of agricultural land downstream of Mr. Swift's farm, confirmed that in the reach downstream of the spring on Mr. Swift's land the receiving waterway normally flowed all year. In the drought of 1988, however, there was no regular flow and the springs served only to maintain water in standing pools in the reaches upstream of the junction with Stony Creek.

Mr. Bill Howard, Regional Fisheries Manager
Department of Natural Resources

Mr. Howard was the author of a memorandum dated November 23, 1987, received earlier by the Commission, which expressed concern about the effect of the lagoon effluent on fish in Stony Creek.

In his brief at the hearing, he stated that there had long been a population of brook trout in Stony Creek, sustained by the inflow of spring water. This was an extremely rare phenomenon in southern Manitoba. The effluent from the sewage lagoon could be expected to reach Stony Creek at the location of a known brook trout spawning area. The young fish, which hatched in January or February, were very sensitive to bacterial and other forms of pollution. They would be present in a four to six kilometre reach of the Creek in May and June at the time the lagoon would be discharged.

On eighteen occasions in the past thirty years the Fisheries Branch had carried out supplementary stocking of brook trout in Stony Creek. A considerable recreational fishery was known to be based in the Creek, although the extent of this fishery could not be accurately estimated.

Due to the sensitivity of the fish and the very limited dilution or buffering capacity offered by the small stream, any significant addition of pollutants should be avoided. Runoff from rainfall might be expected to carry nutrient loads from agricultural operations and other developments located near the Creek. This could be expected to have a greater potential to cause harm than the treated lagoon effluent. In an ideal situation, farming

activities should not be located in high gradient areas that would encourage runoff during rainfall events. Suitable buffering zones of natural vegetation should be retained along the Creek.

Mr. Howard was pleased to note that, in accordance with his earlier recommendations, the rate of discharge from the sewage lagoon was now proposed to be regulated at a reduced rate to ensure protection against shock loading and to encourage the assimilation of nutrients and the dissipation of any un-ionized ammonia along the discharge route before reaching the trout habitat. He considered the revised discharge rate of ten litres per second, as proposed by Mr. Poetker, to be acceptable.

Copies of Mr. Howard's memorandum and his brief were filed as exhibits.

Mr. Doug Peterson, Environmental Officer
Department of Environment and Workplace Safety and Health

Mr. Peterson, the Head of Water Pollution Control made reference to an Environmental Report prepared by his Section and submitted to the Commission in January, 1988. The report stated that the lagoon design was more than adequate in size and construction standard and included a list of limits and conditions recommended for inclusion in the lagoon licence. These limits and conditions included recommendations that all sewage from the Colony be directed to the lagoon with an organic loading rate limited to not more than 56 kilograms per hectare of water surface in the primary cell; that odour emissions be minimized; that lagoon effluent discharge be limited in its organic content to a biochemical oxygen demand of 30 milligrams per litre; and that fecal and total coliform counts be limited to 200 and 1500 per 100 millilitres respectively. The report recommended that effluent release be restricted to the period from May 15 to June 15 except where flooding was occurring in the discharge route when no discharge should be permitted. Specifications for limits on soil permeability and soil testing were also included in the recommendations.

In his testimony Mr. Peterson addressed several points that had arisen at the hearing. He confirmed that actual soil test results at the lagoon site met the construction recommendations. He stated that the small size of the lagoon and the low organic loading rate should alleviate any potential odour problems and confirmed that odours should only be produced for a limited period following the spring thaw. Based on his experience with a large number of other lagoons and his review of the Upland Colony lagoon project he testified that the effluent would not have any detrimental effect on cattle watering downstream.

With regard to the impact on the fishery, he noted that there had been agreement by the proponent to comply with the reduced effluent flow rate as recommended by the Fisheries Branch and his Department. As a result, the lagoon would not cause any significant problem with the fishery downstream. He agreed with a questioner that lagoon effluent typically contains un-ionized ammonia, which is toxic to fish; however, he predicted that when the effluent

was mixed with water in the discharge route, in circumstances where there was enough water present to cause the liquid to flow downstream, the stream environment would reduce the un-ionized ammonia and lessen ammonia toxicity. He also believed that it would not be necessary to discharge the lagoon for a number of years because of the anticipated low hydraulic loading rate during the initial period of operation.

In questioning Mr. Hutton, Mr. Peterson explored the problem of standing water on his farm property along the lagoon discharge route. This discussion indicated that there would be some ponding in Mr. Hutton's property with or without the lagoon and that the construction of the dyke along the discharge route had not alleviated the problem. Mr. Peterson believed that the well water in Mr. Hutton's two wells was unlikely to be affected by this condition as the groundwater flow would be in a southerly direction, away from the wells.

Mr. Peterson agreed with Mr. Howard's remarks to the effect that, in order to protect Stony Creek and the fishery from any water quality degradation, careful management of all farming practices in the entire Creek watershed would be necessary. Present farming methods and operations would likely result in sediment and nutrient loading of the Creek having as much or greater effect on Stony Creek than the lagoon effluent. It was impossible for him to say precisely the effect that the lagoon discharge, in combination with the other environmental factors, would have on the fishery.

VISUAL INSPECTION OF DRAINAGE ROUTE

On the morning following the hearing, the Commission met with R.M. of Minto Councillors Lorne Erven and Marshall Swift at the lagoon site and walked along the lagoon discharge route as far downstream as Mr. Hutton's farm, including the area where the low earth dyke had been constructed by the Colony, at Mr. Hutton's request. The purpose of the dyke was to divert the flow of water in spring, including lagoon effluent, away from Mr. Hutton's residential yard area. It was apparent that the natural flow of water, in the area where the dyke had been constructed, was not well defined or readily determined by casual observation. For this reason, it could not be ascertained whether or not the newly constructed dyke was alleviating or adding to the springtime flooding conditions which were of concern to Mr. Hutton. It appeared logical to the Commission that the installation of a small culvert with gated flow control would allow Mr. Hutton to choose to utilize the dyke for diversion purposes or to allow flow through the dyke according to his perception of which condition provided the most benefit to him.

FINDINGS OF THE COMMISSION

In the light of the evidence and representations received, the Commission finds as follows.

1. Lagoon Construction

The lagoon has already been constructed and inspection and soil test results have proven to be satisfactory.

The sewage lagoon was appropriately designed, constructed and sited, having regard to the protection of the environment and the prevention of any nuisance conditions.

2. Impact on Neighbours

The sewage lagoon is unlikely to have any significant adverse effect on the health, well-being or on the agricultural operations of Mr. Morley Hutton and other downstream residents. The comparatively low volume of effluent relative to total spring run-off is unlikely to add materially to the ponding on Mr. Hutton's land in spring.

The dyke constructed in the hay meadow on Mr. Hutton's land was reported by Mr. Hutton as adding to the flooding problem rather than alleviating this condition. The installation of a gated culvert through this dyke would provide Mr. Hutton with some optional control over spring flooding of his property (See Visual Inspection of Drainage Route - Page 6).

With regard to other residents and agricultural operations, the Commission concluded that the sewage lagoon system would not have any appreciable effect on other residents or farming operations downstream of Mr. Hutton's farm.

3. Environmental Impact

In hundreds of applications in Manitoba, sewage lagoon technology has been proven to provide acceptable standards of sewage treatment and an environmentally acceptable effluent when properly constructed and operated.

The treated effluent from the sewage lagoon system is unlikely to result in any adverse impact on the environment in the receiving waterway or in Stony Creek, with the exception of the eventual carryover of some plant nutrients; however, this impact was expected to be minimal because of the following factors.

- (a) The low hydraulic loading rate would mean there would be no effluent discharge for a number of years.

- (b) The volume of the effluent was expected to be small compared with the total natural seasonal flow in the receiving waterway.
- (c) Virtually all of the nutrients, the potentially harmful un-ionized ammonia and the bacterial content were expected to have been diluted, neutralized or otherwise removed by natural processes before they reach Stony Creek.
- (d) The proponent has agreed to restrict the flow of the lagoon discharge to a rate recommended by the Fisheries Branch and has designed a mechanism to accomplish this.

For these reasons the brook trout in Stony Creek are unlikely to be adversely effected by the lagoon operation.

RECOMMENDATIONS

1. The Commission recommends that the limits, terms and conditions as originally recommended by Environmental Control Services of the Department of Environment and Workplace Safety and Health be included in the licence issued for the Upland Colony Farms Sewage Lagoon System. These are attached as Appendix "A" to this report.
2. It is further recommended that, the license include a condition that the Upland Colony Farms install a gated culvert in the previously constructed dyke, the approximate location of which is marked on the sketch attached as Appendix "B" to this report. This culvert should not be installed by the Colony without the prior agreement and consent of Mr. Morley Hutton, who should also be given the sole right to control the flow through the culvert by operation of the gate valve. Such control would allow Mr. Hutton to take advantage of any favourable control provided by the dyke or to release the flow of water through the dyke whenever he considers that flow through the dyke would be more advantageous to him to reduce flooding. During the discharge of lagoon effluent, flow could also be diverted from Mr. Hutton's yard area. Mr. Hutton would have to be apprised by the Colony in advance of planned sewage lagoon effluent releases.

APPENDIX "A"

RECOMMENDATIONS FOR INCLUSION
AS LIMITS, TERMS AND CONDITIONS
OF A LICENCE FOR THE UPLAND COLONY
FARMS SEWAGE LAGOON SYSTEM

Operational and Discharge Conditions

1. The applicant shall ensure that all sewage generated within the Upland Colony Farms is directed toward the said sewage lagoon.
2. The applicant shall maintain and operate the said sewage lagoon system in such a manner that:
 - (a) the release of offensive odours is minimized;
 - (b) the organic loading on the primary cell, as indicated by the five day biochemical oxygen demand, is not in excess of 56 kilograms per hectare per day.
3. The applicant shall not discharge sewage effluent from the said lagoon system between June 15th of any year and May 15th of the following year without receiving prior approval from the Director of the Department of Environment and Workplace Safety and Health.
4. The applicant shall ensure that:
 - (a) effluent is not discharged when flooding from any cause is occurring along the drainage route; and
 - (b) effluent is not discharged when it will cause or contribute to flooding in or along the drainage route; and
 - (c) Mr. Hutton or his successor as operator of the downstream farm shall be apprised 14 days in advance of a sewage lagoon discharge.
5. The applicant shall not release effluent from the said lagoon system at a rate greater than 0.01 cubic metres per second.

Effluent Quality Limits, Terms and Conditions

6. The applicant shall not discharge effluent from the said lagoon system where:
 - (a) the organic content of the sewage effluent, as indicated by the five day biochemical oxygen demand, is in excess of 30 milligrams per litre;

- (b) the faecal coliform content of the sewage effluent, as indicated by the MPN Index, is in excess of 200 per 100 millilitres of sample;
- (c) the total coliform content of the sewage effluent, as indicated by the MPN Index, is in excess of 1,500 per 100 millilitres of sample.

Other Conditions

7. The applicant shall, on or before the 1st day of September, 1989, install a gated culvert in the dyke, the location of which is indicated approximately in the sketch attached as Appendix "B" to this report, provided that prior to such installation, the applicant seeks and receives the permission, agreement and consent of the owner of the land where the said dyke is located — the said dyke to be, thereafter, under the supervision and control of the said owner or farm operator for the purpose of regulating the flow of water through the said dyke.

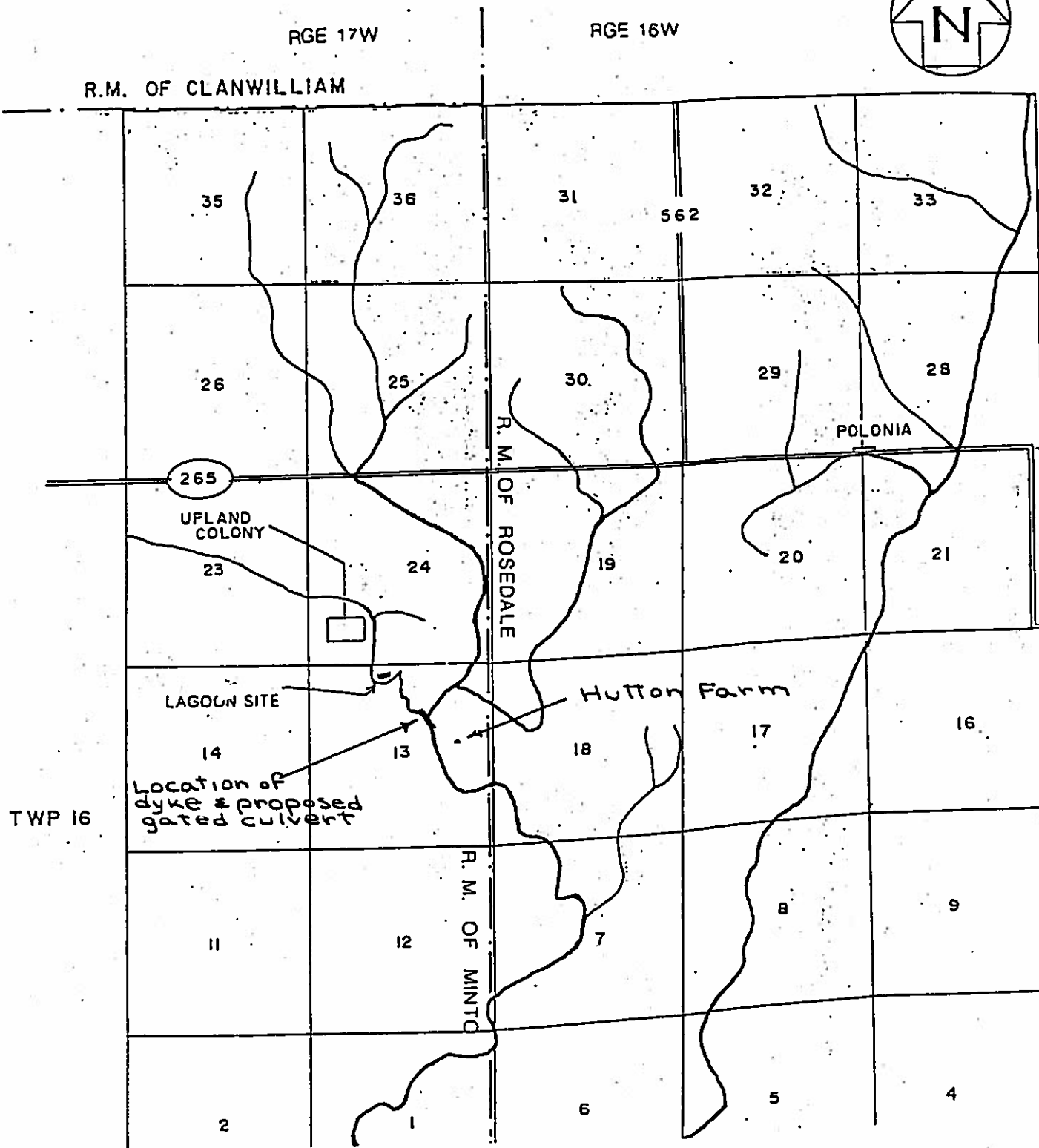
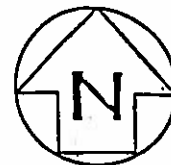


FIGURE 1