

**PROGRESS REPORT ON IMPLEMENTATION ASPECTS
OF THE
THAMES RIVER BASIN WATER MANAGEMENT STUDY**

by the

Thames River Implementation Committee

May, 1978

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SUMMARY AND RECOMMENDATIONS

This progress report identifies the preliminary stance adopted by the Thames River Implementation Committee towards the 29 recommendations contained in the 1975 Thames River Basin Water Management Study and outlines the activities carried out by the Committee to date. In addition, the report clarifies the future directions that the Committee envisages it will take in carrying out its mandate.

The Committee stresses the need for financial support from the Province, particularly in promoting a greater appreciation of the potential for water quality impairment as a result of agricultural and other land use activities and the implementation of effective soil conservation and urban runoff control measures.

If the Thames River is to effectively serve the diverse needs imposed by often conflicting demands and uses, the achievements recorded thus far in the treatment of municipal wastes will have to be continued and matched by parallel improvements in the control of contaminants from non-point sources.

Based on its preliminary assessments, the Thames River Implementation Committee advances the following positions and/or recommendations related to a number of the 29 recommendations contained in the Thames River Basin Water Management Study and detailed in Appendix 1 (page 39) of this report. These same positions and recommendations are presented in full context throughout the report which addresses all of the 29 recommendations.

Recommendation No. 1 - Construction of Glengowan Dam

The Thames River Implementation Committee feels that much of the information required for this assessment is contained in the Thames River Basin Study and therefore the Conservation Authority should be allowed to use the study as the basis for the assessment. The Committee intends to assist the Authority wherever possible in this regard and firmly believes that the various water management options for the river were and still are adequately addressed in the original study.

The assessment itself should identify any concerns which possibly were not identified in the study, or were not fully researched and should complete the documentation of recreational potential. This expanded information base should be considered in the context of the original study, and should confirm the most feasible approach for resolving water management problems in the Thames River Basin.

...see page 4.

Recommendation No. 2 - Investigation of Limestone Deposits at Thamesford Dam Site

The Committee feels that no further action is required on this recommendation at the present time. see page 6.

Recommendation No. 3 - Construction of Thamesford Dam

In light of the findings with respect to recommendation No. 2, it is no longer feasible to consider the construction of the Thamesford Dam for good control purposes at the present time. Since the dam will not be built for the foreseeable future, there is no value in assessing its recreational potential and therefore the Committee does not intend to take any action on this recommendation.

Recommendation No. 4 - Construction of Wardsville Dam

In light of the fact that the Thamesford Dam and Reservoir cannot be initiated for the foreseeable future, (see statement on Recommendation No. 2), the construction of the Wardsville Dam and Reservoir for flood control purposes should be considered further by the Lower Thames Valley Conservation Authority.

In the interim, the Lower Thames Authority should begin to gather the necessary information on the various effects of Wardsville through a variety of mini-studies of the area. This information would then be available for consideration showed the detailed cost-benefit study of the project be initiated at some time in the future.

.... see page 7.

Recommendation No. 13 - Farm Waste Discharges

The Thames River Implementation Committee recommends that the Ministries of Housing, Environment and Agriculture and Food investigate the feasibility of changes in zoning enabling legislation to require that agriculture waste control practices be covered by a Certificate of Compliance.

The Thames River Implementation Committee recommends that the Ministry of the Environment lend full support to special programs (possibly using student assistance) to identify farm waste discharges and runoff associated with major livestock or intensive feedlot operations that may be contributing to degradation of the Thames River system, and that subsequent remedial programs be developed in co-operation with the Ontario Ministry of Agriculture & Food. see page 27.

Recommendation No. 19 - Bank Protection Program from Chatham to Delaware

The Lower Thames Valley Conservation Authority is implementing this program as quickly as possible and therefore the Committee is not planning any action on this recommendation. see page 11.

Recommendation No. 20 - Soil Erosion Control Practices

It is felt that the two Conservation Authorities should play a lead role in the implementation of specific programs both on their own lands and through arrangements with landowners to demonstrate and achieve various erosion control measures and practices, assisted where necessary by staff of the three ministries acting in a supportive capacity. It is recommended that the Province strengthen funding to the Upper and Lower Thames Conservation Authorities for acceleration of their Private Land Assistance Programs to accomplish erosion control objectives.

In addition, it is recommended that the Province make available financial assistance to the Thames River Implementation Committee for sub-watershed pilot projects to foster acceptance of the need for improved sand use practices. see page 31.

Recommendation No. 21 - Environmental Assessments for Land Drainage Projects

The Committee therefore recommends that guidelines for the construction and maintenance of drainage works be developed and agreed upon by the Ministry of the Environment and the Ontario Ministry of Agriculture and Food. Furthermore, the Committee agrees that major wetland areas deserve protection and that drainage schemes affecting such areas should be scrutinized under the Environmental Protection Act. see page 32.

Recommendation No. 22 - Groundwater Protection

It felt that this recommendation is being met and no further action is contemplated by the Thames River Implementation Committee in this connection.see page 34.

Recommendation No. 24 - Amalgamation of Conservation Authorities

This recommendation has been reviewed in detail and the Thames River Implementation Committee has determined that it should not be implemented. see page 12.

Recommendation No. 26 - Development of Improved Flood Warning System

This recommendation does not require any action by this Committee at the present time. see page 14.

Recommendation No. 27 - Conservation Measures

Similar to Recommendation 20, it is recommended that the Province strengthen funding to the Upper and Lower Thames Conservation Authorities for acceleration of their Private Land Assistance Programs to accomplish water retention and conservation objectives. see page 35.

Recommendation No. 28 - Drainage Construction Practices

The Thames River Implementation Committee recommend:

- 1) *That the land drainage grant structure be designed to encourage a regular maintenance program, including cattail or brush control and providing for structures or practices to prevent unnecessary erosion.*

- 2) *To upgrade the quality of supervision, municipalities should consider engaging suitably qualified drainage personnel on a joint basis e.g., to cover a county jurisdiction.*

- 3) *That Provincial and Federal sales tax exemption be extended to include materials used to protect water quality in connection with municipality drainage systems.*

- 4) *That participation in a course established for drainage personnel at the University of Guelph should be a mandatory requirement. This course should be enlarged in duration and scope, if necessary, and should attached emphasis to environmental concerns. Refresher courses should be offered as required to present the latest information on improved procedures. see page 36.*

Recommendation No. 29 - Groundwater Infiltration

The Thames River Implementation Committee views that the provision of constraint mapping by the Ministry of the Environment coupled with review processes now in effect, will effect the satisfactory achievement of this recommendation. see page 37.

INTRODUCTION

In 1975 a report on a Thames River Basin Water Management Study was issued by the Ministry of the Environment and the Ministry of Natural Resources. This report was based on a detailed study of the Thames River system carried out during the period 1972-1975, the objective of which was:

“ to develop guidelines for management of the basin's water resources to ensure that adequate quantities of water of satisfactory quality are available for the recognized uses at the lowest possible cost, and that erosion and good protection are provided consistent with appropriate benefit-cost criteria”

From water quality and flood control modelling results, twenty-two (22) options were defined to meet water management and flood control objectives, based on various combinations involving differing levels of waste treatment, construction and operational alternatives for dams and reservoirs and pipeline concepts to divert London's sewage to Lake Erie. From an evaluation of these options, a total of twenty-nine (29) recommendations (see Appendix 1) were advanced in the report, including a number of recommendations focussing on agricultural and other land use practices throughout the basin. Recommendation 23 in the report highlighted the need for a joint committee of government agencies and other appropriate bodies to *“overcome communication and co-ordination problems relating to water management in the basin, and to implement planning on a watershed basis”*. This recommendation resulted in the formation of the Thames River Implementation Committee in the latter part of 1976.

THE THAMES RIVER IMPLEMENTATION COMMITTEE

The Thames River Implementation Committee was formed in October of 1976 which readily established terms of reference, settled on principal functions that would be addressed and defined those agencies that would be involved in implementation of the recommendations (see Appendix 2). Representation on the Committee includes the following agencies:

Ministry of Natural Resources

Ministry of the Environment

Upper Thames River Conservation Authority

Lower Thames Valley Conservation Authority

Ontario Ministry of Agriculture and Food

Ministry of Treasury, Economics and Intergovernmental Affairs

Ministry of Housing

Municipal Engineers Association

Ontario Federation of Agriculture

The specific representatives serving on the Thames River Implementation Committee at the time of preparation of this report are indicated in Appendix 3.

In the definition of implementing agencies, it was agreed within the Committee that municipalities throughout the Basin have a key role to play in the further assessment and implementation of the recommendations contained in the Thames River Basin Water Management Study and that effective communication with the municipalities would be essential to achieve a properly integrated Thames River Basin Water Management Program to be achieved through the Committee's efforts.

From a preliminary assessment of the 29 recommendations contained in the Thames River Basin Water Management Study report, the Committee decided that they fell into three separate categories and that the most efficient and manageable way to deal with the recommendations would be to develop a sub-committee to deal with each of the three separate groups. Accordingly, the following three subcommittees were formed: Dams, Reservoirs and Floodplain Management Subcommittee, Municipal Co-ordination Subcommittee; and Agriculture and Land Use Subcommittee. The distribution of the recommendations in the report amongst the three subcommittees is as follows:

Dams, Reservoirs and Floodplain Management	Municipal Co-ordination	Agriculture And Land Use
1, 2, 3, 4, 5, 14	6, 7, 8, 9, 10, 15*	11, 12, 13, 15*
16, 17, 18, 19, 24, 25, 26		20, 21, 22, 27, 28, 29

* Note overlapping responsibility

Recommendation 23 relating to formation of the Committee has been implemented.

Throughout 1977 the Subcommittees and the parent Committee have been engaged in an initial review of the recommendations contained in the Thames River Basin Water Management Study and related programs and activities that may have been implemented by various agencies since the report was issued in 1975. The Committee has adopted an immediate position in relation to certain of the recommendations, while there are other recommendations that will necessitate different degrees and kinds of effort for variable periods over the months and years ahead. A number of the recommendations relating to land use practices imply the need for modified educational and extension programs on the

part of specific ministries or interest groups, whereas some of the recommendations dealing with municipal sewage disposal practices imply a continuation of presently committed courses of action. Where further implementation programs are considered to be necessary, it is intended that each of the three subcommittees will act as a catalyst to bring together expertise and assistance from the implementing agencies and possibly other sources to attain the desired results.

REVIEW AND STATUS OF THE RECOMMENDATIONS

This report clarifies the preliminary reaction of the Thames River Implementation Committee to each of the recommendations contained in the Thames River Basin Water Management Study and indicates the present status of related implementation programs, as well as future directions that are considered to be desirable. The recommendations are considered hereafter, grouped according to the assignments made to each Subcommittee.

DAMS RESERVOIRS AND FLOODPLAIN MANAGEMENT SUBCOMMITTEE

Recommendation No. 1 - Construction of Glengowan Dam

The construction of the Glengowan Dam and Reservoir was identified in the Thames River Basin Study as a very important link which was common to all of the preferred options for maintaining or improving the quality and quantity of water in the river. The Implementation Committee as a whole have reaffirmed their support for the implementation of this recommendation as it was originally perceived.

In this respect, the Upper Thames River Conservation Authority has obtained the necessary approval from the Minister of Natural Resources to complete the acquisition of all of those lands required for the project. By the end of 1977 a total of 518.9 acres had been acquired and several other parcels of land were under active negotiation.

On January 31, 1978, the Province of Ontario placed the Glengowan Dam and Reservoir under the Environmental Assessment Act. The Upper Thames River Conservation Authority will be responsible for undertaking this assessment and same will begin once the terms of reference have been approved by the Province.

The Thames River Implementation Committee feels that much of the information required for this assessment is contained in the Thames River Basin Study and therefore the Conservation Authority should be allowed to use the study as the basis for the assessment. The Committee intends to assist the Authority wherever possible in this regard and firmly believes that the various water management options for the river were and still are adequately addressed in the original study.

The assessment itself should identify any concerns which possibly were not identified in the study, or were not fully researched and should complete the documentation of recreational potential. This expanded information base should be considered in the context of the original basin study, and should confirm the most feasible approaches for resolving waters management problems in the Thames River Basin.

Recommendation No. 2 - Investigation of Limestone Deposits
at Thamesford Dam Site

An investigation of the limestone deposit at the Thamesford Dam site has revealed that this is a very rich deposit situated almost entirely in the river valley immediately upstream of the proposed dam site. This information has been verified by a professional geologist employed by the Ministry of Natural Resources, based on the details of several core analysis obtained from drill holes on the site.

In light of the quality of the deposit and the fact that many of the properties in the valley are currently owned by a corporation which is not interested in disposing of them until the limestone has been removed, it would not appear feasible to even consider the construction of the Thamesford Dam for the foreseeable future.

The Committee feels that no further action is required on this recommendation at the present time.

Recommendation No. 3 - Construction of Thamesford Dam

In light of the findings with respect to recommendation No. 2, it is no longer feasible to consider the construction of the Thamesford Dam for flood control purposes at the present time. Since the dam will not be built for the foreseeable future, there is no value in assessing its recreational potential and therefore the Committee does not intend to take any action on this recommendation.

Recommendation No. 4 - Construction of Wardsville Dam

In light of the fact that the Thamesford Dam and Reservoir can not be initiated for the foreseeable future, (see statement on Recommendation No. 2), the construction of the Wardsville Dam and Reservoir for flood control purposes should be considered further by the Lower Thames Valley Conservation Authority.

At the present time, the Conservation Authority is undertaking channel improvement work in Chatham in an effort to partially relieve the flooding problems which currently exist in that city. The Committee supports the Authority's efforts in this regard and feels that such alternatives as channelization and the control of development in floodplain areas should be fully explored in an effort to reduce the overall flood risk for the lower portion of the river.

The basin study identifies that the implementation of the Wardsville and Glengowan projects are contingent on each other, if the various water management problems along the river are to be resolved. Therefore, the question of constructing the Wardsville Dam should be held in abeyance until a final decision on Glengowan is forthcoming.

In the interim, the Lower Thames Authority should begin to gather the necessary information on the various effects of Wardsville through a variety of mini-studies of the area. This information would then be available for consideration should the detailed cost-benefit study of the project be initiated at some time in the future.

The Thames River Implementation Committee endorses the approach of the Lower Thames Conservation Authority with respect to this recommendation in that all other alternatives are being fully explored and implemented where feasible.

Recommendation No. 5 - Environmental Impact of Proposed Dams

The Thames River Implementation Committee has not undertaken any action on this matter; however, with the establishment of the Environmental Assessment Act the intent of this recommendation has been achieved through a legislative means.

This act will ensure that all of the environmental effects of any major dam on the Thames River are identified at the initial planning stage and will ensure that all feasible alternatives have been adequately considered prior to any decisions on the final course of action to be followed. The assessment that is completed will also ensure that the adverse impacts of selected alternatives are reduced as much as possible.

The Committee concurs with the recommendation to undertake environmental assessments of proposed dams and the course of action followed by the Province in this regard.

As a follow-up to this recommendation, the Committee will meet with representatives of the Environmental Approvals Branch of the Ministry of the Environment to discuss the various requirements under the legislation and the effect on the programs of the two Conservation Authorities. This information will then be conveyed to all interested parties in the basin.

Recommendation No. 14 - Channel Protection Program

The Thames River Implementation Committee supports the idea of implementing channel protection programs along the river as a form of preventative action; however, the financial implications of such a program have to be fully considered before its initiation.

The only action completed to date has involved an initial identification and classification of erosion problems along several tributaries to the river (see statement on recommendation No. 20). The Committee would support an extension of the aforementioned program along the main channels of the Thames River with the express intent of identifying potential problem areas and suitable forms of preventative action to be implemented on said sites. Such a program should occur as an extension to the MacLaren studies along the lower portion of the river and would have to be consistent with the action resulting from recommendation No. 19.

Recommendation No.'s 16, 17 and 18 - Operation of Dams and Reservoirs

These recommendations relate primarily to the operation of the existing dams and reservoirs in the Thames River system. Due to the fact that all of the major reservoirs exist in the area administered by the Upper Thames River Conservation Authority, the initiation of further research and implementation of any changes should rest with that Authority. The Committee recognizes that the operation of these reservoirs has a tremendous impact on the whole of the river; however, it feels that the Committee's role should be a supportive one to the efforts of the Authority in this regard.

It should be noted that since the completion of the basin study, the Upper Thames River Conservation Authority has implemented a variety of changes in the operating procedures for its reservoirs.

The Authority now has an engineer on staff and this individual has established the system which is currently in place. This system has been reviewed and approved by the Conservation Authorities Branch of the Ministry of Natural Resources.

Although the operating procedures have recently been improved, the Committee feels that additional research and analysis might yield some further changes which should be implemented. In this regard, the Committee has recommended that the Authority proceed with the establishment of a watershed model based on computer analysis of alternative operating procedures, in an effort to maximize the overall benefits from these existing reservoirs.

This system would also reflect the actual benefits to be derived from the construction of additional reservoirs in specified locations, as well as the value of implementing other water management techniques in the basin.

The Committee proposes to pursue this recommendation by arranging a meeting between the affected parties from the Ministries of Natural Resources and Environment, and the two Conservation Authorities to review this matter in greater detail. The additional research and documentation which is required could be identified at that time.

The responsibility for undertaking these studies and implementing the necessary changes would be left to the Upper Thames River Conservation Authority. The Committee would ensure that the interests and concerns of the Lower Thames River Conservation Authority were adequately addressed prior to the implementation of any changes.

Recommendation No. 19 - Bank Protection Program from Chatham to Delaware

The implementation of this recommendation is the responsibility of the Lower Thames Valley Conservation Authority and, to this end, the MacLaren Report covering that section of the river from Chatham to Delaware has been adopted in principle. The Authority has established a priority for the sites identified in the report and this work is being initiated on a request basis in concert with the local municipality. The limiting factor with respect to this recommendation is one of finances, in that the Authority only has sufficient Provincial funds in any given year to enable, at most, two or three of these projects to proceed.

The Lower Thames Valley Conservation Authority is implementing this program as quickly as possible and therefore the Committee is not planning any action on this recommendation.

Recommendation No. 24 - Amalgamation of Conservation Authorities

This recommendation has been reviewed in detail and the Thames River Implementation Committee has determined that it should not be implemented.

Although a basin-wide approach to the water management problems on the river would have certain merits the committee has determined that the disadvantages greatly outweigh the advantages which currently exist. It should be noted that each Authority covers an area that is very different from the other in terms of topography, land use and even public attitude toward the river itself. Due to these basic differences, the problems which each Authority faces are very diverse and, therefore, require different solutions and different approaches to the conservation problems at hand.

One has to realize that there are several significant problems associated with a Conservation Authority which would cover as large an area as the Thames basin. The actual distance involved, the size of the membership, the different conservation philosophies as they relate to the local topography, and the fact that many municipalities would lose their identity in such a large organization, all tend to be factors which negate the advantages of amalgamation.

Finally, it must be recognized that each of the Conservation Authorities was originally formed as a result of local interest and the willingness of the local municipalities to participate financially in a conservation program. Any decision on amalgamation should therefore rest with the affected municipalities. In light of the many disadvantages outlined above, the committee has decided against pursuing this recommendation any further.

Recommendation No. 25 - Control of Floodplain Development

The Conservation Authorities are currently pursuing this recommendation in that fill line and floodplain mapping is being undertaken in both the upper and lower portions of the basin. The immediate thrust is to ensure that mapping is completed for all urban areas on the river in an effort to establish some form of control over the development of critical floodplain lands. The actual definition of the floodplain is currently a problem in that the Province has initiated a review of the current design criteria and a final decision in this regard has not been forthcoming to date.

The Conservation Authorities and the municipalities along the Thames River are working toward the common goal of protecting the people living adjacent to the river from the dangers of flooding. However, the implementation of change can be a very slow process as the authorities attempt to initiate significant alterations to the Official Plans and zoning bylaws of the affected municipalities. Once again, the definition of what is actually the flood-plain comes into play, with each municipality having a slightly different attitude toward the problem.

The future efforts of the Committee will be directed toward the promotion of an acceptable resolution to the floodplain criteria question for the Thames River and through attempts to assist the Authorities in influencing the local municipalities to initiate controls on the floodplain lands within their jurisdictions.

Recommendation No. 26 - Development of Improved Flood Warning System

Both Conservation Authorities are moving quickly to improve their flood warning system through the purchase and installation of stream flow recording devices and rain gauges. As well, the preparation of flood contingency plans in co-operation with the local municipalities has enabled both authorities to be in a position to react quickly should any flood emergencies arise.

The Authorities maintain constant communication with the Flood Forecast Centre of the Ministry of Natural Resources during critical periods of the year to ensure that they are aware of the most up-to-date weather information and current flood forecasts. As well, the Authorities are improving their internal communications through the purchase of radio equipment for their vehicles. This link-up will ensure constant monitoring of any emergency with authority staff remaining at any critical location and conveying accurate information back to a central point for interpretation and immediate follow-up.

It would appear that the Authorities have nearly accomplished the overall task as identified in this recommendation. In future, it will be a matter of ensuring that the flood warning system is up-to-date and is working effectively.

This recommendation does not require any action by this Committee at the present time.

MUNICIPAL CO-ORDINATION SUBCOMMITTEE

Recommendation No. 6 - Sewage Treatment for the City of London

The City of London, upon receiving the Thames River Basin report, immediately instituted studies to determine the best method of achieving the goals of the Thames River Basin Water Management Study within the City of London. The City commissioned James F. MacLaren Company Limited, Consulting Engineers, to develop a "master plan" for treating the sewage in London over an extended period of time. As a result all alternatives are being examined such as the upgrading of the treatment plants, direction of the final effluent or raw sewage to Lake Erie (the latter to be treated at the lake) and increasing river flow through the construction of dams. The report is not yet available but is expected shortly and will be made available to all Committee members for comment. Until such time as the report is received, meaningful comments from the Municipal Co-ordination Subcommittee cannot be provided.

The City has proceeded with the expansion of the Adelaide Sewage Treatment Plant and has designed this facility to meet the effluent requirements spelled out in the Thames River Basin report. Construction of this facility is now underway.

In addition, the City has conducted nitrification studies at its other sewage treatment plants and reports dealing with modification and/or expansion have been submitted to the Ministry of the Environment.

Recommendation No. 7 - Sewage Treatment for Mitchell, Stratford, Tavistock, Glencoe, Tilbury and Ridgetown

In order to describe the progress being made towards achieving this recommendation the status of sewage treatment in each of the municipalities included in the recommendation is outlined below:

The Town of Mitchell

While the Thames River Basin Report recommends that the most practical approach to minimize water quality impairment of the North Thames River at Mitchell is to add a mechanical treatment plant to the existing sewage treatment facilities, further studies of the Thames River in the Mitchell area have revealed that there may be other options available for the upgrading of the treatment works. As a result a consultant has been retained to examine the methods of expanding the facilities without increasing the river loading. Concurrent with this approach is an examination of the internal servicing in the municipality in order to reduce the sewage flows. The development of the municipality is being restricted and at least one major housing development is being constructed on the periphery of Mitchell, utilizing subsurface effluent disposal.

The City of Stratford

The City of Stratford, even though it is presently treating its wastes to an extremely high degree and is using only about two-thirds of its sewage treatment plant capacity, continues to have an adverse effect on the Avon River during low-flow periods. In order

to assess this impact the Ministry of the Environment has undertaken a further study of the river. It is expected that a report outlining the suggested courses of action to enable Stratford to minimize this impact will be available in the summer of 1978.

The City is presently examining the various options placed before it in the Thames River Basin report and has commenced by looking at methods of reducing extraneous flows in the sewerage system. Extensive work has been completed and initial corrective action has been taken. However, no single source of major infiltration has been found that could be readily eliminated.

When the results of the recent study of the river are finalized, the City will be asked to proceed with the least expensive method to achieve the water quality objective defined.

In the meantime, staff of the Ministry of the Environment have reached an accord with the City of Stratford which, acknowledging the high cost of treatment the City could be facing, allows the adequate production of various types of housing units in order to keep housing competitively priced and available to the public.

The Township of East Zorra-Tavistock (Tavistock)

At the present time the lagoons at Tavistock need expansion and the provision of different phosphorus removal facilities. Prior to the establishment of the terms of reference for the expanded treatment works the Ministry of the Environment conducted an assimilation study of the portion of the Thames felt to be affected by the discharge. As a result of this effort design parameters for the expansion have been established and a

specific discharge period has been agreed upon. Information relating to these requirements has recently been published and progress is now underway on the design report for the expanded facilities. At present, housing development is being discouraged until the true costs of development can be determined.

The Village of Glencoe

Since the growth in the Village of Glencoe is seriously constrained at present due to a lack of water, the solution to this problem has become paramount. Once the water question is resolved studies of the sewage treatment options will commence.

The Town of Tilbury

The Town of Tilbury has been advised of the most practical sewage treatment options open to it, namely expansion of the present lagoons with discharge of effluent further downstream, or the provision of spray irrigation. Contrary to the statements in the Thames River Basin report, Tilbury has indicated a willingness to grow and shoulder the progressively higher costs of treatment. The Town has completed preliminary studies for both spray irrigation and an expanded lagoon facility. It is expected the works will be constructed in 1978.

The Town of Ridgetown

The Town of Ridgetown presently is served by a lagoon system discharging to McGregor Creek and subsequently to the Thames River at Chatham. Studies of McGregor Creek have been completed and the results conveyed to the municipality, along with an indication that the current system would be adequate for a population expansion to 4,000 persons with the addition of continuous phosphorus removal facilities. Growth beyond a population level of 4,000 will require that the municipality add to the system's storage capacity or consider alternative forms of treatment.

Recommendation No. 8 - Sewage Treatment at Woodstock, Beachville, Ingersoll, Lambeth, Dorchester, St. Marys, Bothwell, Thamesville and Chatham

The City of Woodstock

Construction of expanded sewage treatment facilities is underway in the city of Woodstock. These facilities will be able to treat 8,000,000 gallons per day while meeting water quality requirements and it is anticipated that the City will be able to grow to 35,000 people and, still reserve some capacity for new industries. The treatment facilities will be built in a staged program. The first stage consists of the provision of secondary treatment with phosphorus removal and nitrification. The second stage will provide effluent filtration when this is shown to be necessary. At the present time, aside from cautions to the municipality that it must be careful in its assignment of capacity to any large industries, housing is not being restricted.

The Township of South West Oxford (Beachville)

At present, the community of Beachville is not serviced by a communal sewage system. Notwithstanding earlier concerns, recent investigations by the Ministry of the Environment have indicated that responses to complaints by the Oxford County Health Unit and the severance and relocation of drains (causing pollution) during the reconstruction of Highway 2 have collectively resolved a serious pollution problem.

The Town of Ingersoll

The Town of Ingersoll is presently serviced by a sewage treatment plant producing an excellent effluent. Since it is well within the effluent criteria spelled out in the Thames River Basin Study and only 50% of the capacity of the plant is being used at present, changes are not anticipated for some time.

The Police Village of Lambeth (Township of Westminster)

Expansion of either the South Land Park sewage treatment plant in Lambeth or the Westminster sewage treatment plant south of Highway 401 is not anticipated. Since both plants utilize effluent filtration an adequate degree of treatment is being achieved at present. Development in Lambeth is presently proceeding on the basis of subsurface disposal of domestic wastes.

The Police Village of Dorchester (Township of North Dorchester)

The Police Village of Dorchester requested that the Ministry of the Environment provide a sewage treatment plant and sewerage system in order to resolve the pollution problems in the community. The proposal has recently been reviewed by the Ontario Municipal Board and the proposal for major communal facilities was turned down. The alternatives for resolving the existing problems and options for additional development will be reviewed further with the municipality.

The Town of St. Marys

The sewage treatment plant serving the Town of St. Marys is generally operating in an acceptable fashion. However, it is receiving high strength wastes from one industry and steps are being taken both by the municipality and the Ministry of the Environment to reduce the loadings to the plant.

Development in St. Marys is proceeding without restriction at the present time.

The question of the industrial sewage treatment facilities will be discussed under a later recommendation.

The Town of Bothwell

The Town of Bothwell in conjunction with the Ministry of the Environment is developing a complete sewerage and sewage treatment system. The project will be

financed by the Ministry of the Environment and consists of a conventional activated sludge treatment plant and sewers where pollution problems have been found. Phosphorus treatment is included in the design and it is proposed to discharge the effluent into the Thames River. The plant is sized large enough to accommodate 1,500 people.

Residential development in the Town of Bothwell is proceeding slowly at the present time.

The Village of Thamesville

The Village of Thamesville, like Bothwell, has undertaken a project with this Ministry for the development of a sewage treatment plant capable of serving 1,500 people. Effluent from this plant will be discharged to the Thames River. No subdivision development is taking place and only minor development will be considered within the municipality until the sewage works project is underway.

The City of Chatham

The City of Chatham is serviced by a conventional activated sludge system supplemented by aerated lagoons for industrial wastes. The design flow for this plant is 4.5 million gallons and in 1976 the average daily flow was 4.7 million gpd. The City has recently undertaken an expansion program consisting of several stages. The first stage will utilize storage lagoons that will expand the capacity of the plant to 7.9 million gallons per day. Development is not restricted at the present time and the municipality is actively working to separate storm water from its sewerage system in order to reduce the loads

being imposed on the sewage treatment plant.

Recommendation No. 9 - Urban Runoff

Prior to the widespread implementation of this recommendation an experimental storm water control program is being applied to one municipality outside the basin. Once the program is developed to a high degree of reliability it can be applied to the larger centres in the watershed to determine the most effective means of dealing with urban runoff. New development in all of the basin's municipalities is being reviewed as a potential source of runoff and as technology becomes available and municipal planning policies change, runoff water and the resultant pollution loads will be reduced.

It is anticipated that this recommendation will be the most difficult for municipalities to comply with both from a financial and technical point of view. However, progress is being made and cost-effective means of handling storm water runoff are being implemented for new developments where possible. In addition a Manual of Practice on Urban Drainage is being formulated jointly by the Municipal Engineers Association and the Ministry of the Environment.

Recommendation No. 10 - Industrial Wastes and Sewer Use By-Laws

As indicated in the recommendation most municipalities already have municipal sewer use bylaws. The enforcement of these bylaws is an extremely difficult task for most municipalities that are too small to provide their own technical staff for enforcement purposes. As a result, Ministry staff from the Industrial Abatement Section are beginning

to undertake industrial waste surveys upon request within municipalities experiencing problems. With the implementation of this program it is expected that the waste loadings to sewage treatment plants operated by municipalities can be effectively reduced where industrial problems exist.

The second part of the recommendation that industries discharging treated wastes and process wastes directly to the Thames system should implement waste treatment necessary to meet defined water quality objectives is slowly being met. In the case of the Campbell Soup Company in St. Marys additional treatment works have been installed and upgraded phosphorus removal equipment has been placed in operation. As a result, the quality of treatment has improved substantially and the problems expressed in the Thames River Basin Water Management Study have been largely resolved. In the case of Neilson's at Beachville the present direction of the Ministry of the Environment is to have the industry's treatment facilities achieve consistently good treatment and to upgrade the system if necessary to attain water quality conditions desirable for this section of the Thames River.

The Stelco and Beachville Lime Quarry discharges are generally acceptable for pumping to the river. Domtar Beachville is investigating means of reducing suspended solids being discharged in water from process waste settling ponds, and have already installed two settling ponds to reduce suspended solids levels during storm water runoff periods. Similarly, industries within the City of London and further downstream in Chatham and Tilbury are presently meeting discharge requirements.

AGRICULTURE AND LAND USE SUBCOMMITTEE

Recommendation No. 11 - Fertilizer Use

The representative from the Ontario Ministry of Agriculture and Food on the Thames River Implementation Committee arranged for a detailed review of this recommendation by an ad hoc committee comprised of soil scientists from that Ministry, including staff members of the Ridgetown College of Agricultural Technology, and the University of Guelph. This review substantiated that farmers tend to follow the recommended fertilizer rates for nitrogen, but that phosphorus applications frequently exceed the levels recommended by 2 to 4 times (substantially higher potash excesses have been recorded).

The ad hoc committee agreed with the intent of the recommendation to achieve the wise use of fertilizers but did not agree that this objective can be reached by legislative or regulatory means. It was recommended that emphasis be placed on education and extension services to gain acceptance of the validity of the provincial soil testing service.

The ad hoc committee's viewpoint was supported by the Thames River Implementation Committee, following review of a comprehensive report submitted by the ad hoc committee summarizing the subject of fertilizer use.

The ad hoc committee subsequently met with the Agriculture and Land Use Subcommittee to discuss what further action should be taken in regard to this recommendation. Agreement was reached that the most essential requirement is to determine why farmers are using fertilizer in the amounts applied, in order to properly

structure an educational program to stimulate greater acceptance of the soil test as the proper basis for determining rates of fertilizer application. A questionnaire survey being carried out under the auspices of the Thames River Implementation Committee to assess existing agricultural practices and farmers' perceptions and attitudes with respect to conservation farming was developed with this question in mind.

The ad hoc committee also agreed to submit a request to the Ontario Ministry of Agriculture and Food that through involvement of its Soils and Crops Branch and Extension Branch, plans be initiated to accomplish a series of projects in 1979 devoted to convincing farmers of the validity of the soil test and related recommendations. It was envisaged that these projects might well involve Experience 79 students along with Soil and Crop Improvement Associations.

Recommendation No. 12 - Cattle Access

Through an Experience '77 program carried out on behalf of the Thames River Implementation Committee by 15 students, information has been obtained on locations throughout the Thames River Basin where cattle have access to the main stream and its tributaries. Situations were also documented where cattle access has led to erosion problems, determined by the study to be a significant problem in the middle and upper portions of the Thames River Basin. The Committee feels that the intent of this recommendation should be limited to areas where significant erosion or other problems are identified.

Information is presently being obtained to identify locations of major cattle operations and to determine the sizes of the herds retained. The Agriculture and Land Use Subcommittee has sponsored a questionnaire survey to farmers throughout the Thames River Basin which has tested attitudes towards restricting cattle access to streams and has solicited reactions to alternative methods of accomplishing this objective and the need for subsidies to encourage such a program.

Recommendation No. 13 - Farm Waste Discharges

Monitoring of farm operations to control farm waste discharges implies the evaluation of source control performance by direct observations, investigation of process operations, and sampling of waste water discharges to receiving waters. Such an intensive approach to the assessment of livestock operations is not possible due to the large number of these operations relative to the number of staff available for monitoring. For this reason, present control measures depend largely upon the assessment of receiving water quality through sampling and analysis of specific reaches of the tributary streams and direct observations of visual indicators of water quality impairment.

Staff of the Ministry of the Environment and the two Authorities are providing assistance to an Experience 78 program being carried out by the University of Western Ontario that will evaluate the impact of selected intensive feedlot operations on nearby watercourses and assess the value of air photo interpretation in identifying problem situations, thus providing a basis for follow-up investigations where required.

Prevention

At the present time, prevention is limited to the control provided by the livestock farm Certificate of Compliance program administered jointly by the Ontario Ministry of Agriculture and Food and the Ministry of the Environment. The Code of Practice on which certification is based has been recently revised to strengthen the information relating to avoidance of water pollution and to provide a mechanism for rural land use control by the municipalities.

Although the submission of an application for a Certificate of Compliance is voluntary, over the past year an increasing number of townships have required either informally or by by-law that livestock farmers first obtain a Certificate of Compliance before the municipality will issue a building permit. As a result, an increasing number of livestock farm developments are brought to attention at an early stage when revisions to the design of these facilities to minimize the potential for water pollution are still possible. However, the legal validity of such by-laws in relation to water pollution control requirements is questionable.

The Thames River Implementation Committee recommends that the Ministries of Housing, Environment and Agriculture and Food investigate the feasibility of changes in zoning enabling legislation to require that agricultural waste control practices be covered by a Certificate of Compliance.

Correction

Historically, situations where enforcement is required to bring about correction of a water pollution problem have been brought to attention by complaints stemming from visually evident water quality impairment, obvious discharges of manure to streams or fish kills. Initially an effort is made to bring about correction by persuasion.

If this approach is unsuccessful and prosecution is being considered, the Farm Pollution Advisory Committee is contacted by the Ministry of the Environment to attempt a resolution of the problem before prosecution is proceeded with. Thus far, all significant water pollution problems relating to intensive livestock operations have been resolved or improved upon through this approach, although correction of some problems has taken considerable time.

Over the past two years a growing number of farmers have adopted the use of cannery wastes as a feed supplement. This material has a high moisture content and in a number of instances leachate gaining access to streams has resulted in dramatic fish kills. With the help of the Ontario Ministry of Agriculture and Food, guidelines have been developed by the Ministry of the Environment for the proper storage and handling of this material to avoid environmental problems.

In 1977 a special program was initiated whereby all potential users of cannery wastes were contacted to advise of the need for effective control measures and a site inspection of selected farms using this material was undertaken.

Illegal Septic Tank Connections To Municipal Drains:

Occasionally milking barns have been encountered that discharge directly or have illegal septic tank connections to drainage systems or natural watercourses, often by way of field drainage tiles. About five incidents have been encountered and rectified in the past two years but it is difficult to say how many illegal connections might exist. This is one aspect of potential contamination from agricultural sources that needs additional evaluation.

The Thames River Implementation Committee recommends that the Ministry of the Environment lend support to special programs (possibly using student assistance) to identify farm waste discharges and runoff associated with major Livestock or intensive feedlot operations that may be contributing to degradation of the Thames River system, and that subsequent remedial programs be developed in co-operation with the Ontario Ministry of Agriculture and Food.

It is felt that more can be achieved by educating the farmer and giving guidance in the avoidance of pollution problems than could be achieved by court proceedings with their attendant delays and resulting adverse publicity which tends to work against the development of a co-operative attitude in the farming community.

Recommendation No. 15 - Management of Headwater Areas

Efforts being carried out in relation to Recommendations 11, 12 13, 20, 27 and 28 dealing with agricultural practices and Recommendations 7, 8, 9 and 10 that relate to

urban waste problems and controls are being regarded as particularly important in headwater areas by the Thames River Implementation Committee.

Recommendation No. 20 - Soil Erosion Control Practices

Work carried out by 15 Experience '77 students involved in an erosion and agricultural land use survey throughout a significant proportion of the Thames River Basin included documentation of erosion sites and the presence of existing vegetative buffer zones along stream margins, as well as any areas where soil erosion control practices are currently in effect. A report pertaining to this program has been prepared and is soon to be published.

It is planned that the results of this effort will be utilized in the selection of both practical demonstration and pilot study areas. The former should be utilized to demonstrate the various land use practices that assure water quality protection in the hope that widespread application of such practices will gradually materialize. In addition, one or two pilot sub-watershed study areas should be selected where all applicable soil erosion control practices can be implemented and related to before and after assessments of water quality to demonstrate the benefits to be gained from remedial measures of this type. It is felt that such pilot projects will be critical to achieving an appreciation and understanding of the forces that contribute to soil erosion and acceptance on the part of landowners and municipalities of the measures that must be implemented to reduce soil losses to a minimum throughout the watershed. The Agriculture and Land Use Subcommittee will pursue further the best means of initiating these sub-watershed pilot projects.

It is felt that the two Conservation Authorities should play a lead role in the implementation of specific programs both on their own lands and through arrangements with landowners to demonstrate and achieve various erosion control measures and practices, assisted where necessary by staff of the three ministries acting in a supportive capacity. It is recommended that the Province strengthen funding to the Upper and Lower Thames Conservation Authorities for acceleration of their Private Land Assistance Programs to accomplish erosion control objectives.

In addition, it is recommended that the Province make available financial assistance to the Thames River Implementation Committee for sub-watershed pilot projects to foster acceptance of the need for improved land use practices.

Recommendation No. 21 - Environmental Assessments for Land Drainage Projects

The Drainage Act is administered by the Food Land Development Branch of the Ministry of Agriculture and Food. Its primary objective is to facilitate the construction, operation and maintenance of drainage works in order to improve crops and soil condition.

It is the position of the Thames River Implementation Committee that most agricultural drainage projects carried out in Southwestern Ontario should not be subject to individual environmental assessments, since this would create an unwieldy and time-consuming process that is unwarranted, considering that most of the agricultural land is presently drained and the emphasis is on clean-out and maintenance of existing drains.

Drainage proposals are currently circulated to the Ministry of Natural Resources, the Ministry of the Environment and the appropriate Conservation Authority for review prior to the inception of a drainage project within any municipality. Any of these may, within thirty days, require an environmental appraisal for the drainage works in the subject area. The cost of the appraisal is borne by the party requesting it. The initiating municipality may also undertake an environmental appraisal on its own.

The Committee feels that a major lack is the absence of consistently applied guidelines to ensure that drainage works are designed and constructed by drainage contractors in a manner that will ensure protection of the aquatic environment. Guidelines developed for the construction and maintenance of drainage works should identify the anticipated environmental effects and the measures required to prevent or mitigate such effects. These measures would, for example, necessitate proper attention to slope and soil characteristics, proper stabilization and maintenance of ditch banks, satisfactory handling and disposition of extracted materials, fencing of cattle from ditches where necessary and proper construction of drainage outlets to meet erosion control objectives.

The Committee therefore recommends that guidelines for the construction and maintenance of drainage work be developed and agreed upon by the Ministry of the Environment and the Ontario Ministry of Agriculture and Food. Furthermore, the Committee agrees that major wetland areas deserve protection and that drainage schemes affecting such areas should be scrutinized under the Environmental Assessment Act.

The two Conservation Authorities should identify critical wetlands and attempt to acquire such areas under their land acquisition programs.

As noted under Recommendation No. 28, proper attention to environmental considerations could be assured by having drainage works carried out under the supervision of properly qualified superintendents at the municipal level.

Recommendation No. 22 - Groundwater Protection

Legislation pertaining to water supply interference and groundwater quality impairment has been incorporated in the Ontario Water Resources Act and Environmental Protection Act, both administered by the Ministry of the Environment. Prevention of water supply interference is not altogether practical since there are, and always will be, obvious conflicts. Present information mechanisms forewarn of developments that will extract large volumes of groundwater so that the potential problems of interference and use conflict can be established at an early date and adequate restoration measures can be assured.

Where environmental hearings are involved the interference potential would be given appropriate attention. In short, the interference portion of this recommendation is being met through forewarnings of potential interference so that the problem can be assessed and costed at an early stage, and arrangements made to minimize disruption of affected water supplies.

The objectives of this recommendation with respect to groundwater quality impairment are being accomplished through the review of official plans, official plan amendments and proposals covering a variety of developments and land uses. Sensitivity mapping through the review of water well record information and available soils and geological maps is being undertaken as staff resources permit. Intensified water well inspections are helping to guarantee the security of individual water supplies.

It is felt that this recommendation is being met and no further action is contemplated by the Thames River Implementation Committee in this connection.

Recommendation No. 27 - Conservation Measures

As for Recommendation No. 20, it is felt that the Experience '77 student project has afforded a preliminary data base for making progress on this recommendation. Demonstration projects and educational efforts to be supported by the Thames River Implementation Committee will assist in exemplifying the benefits to be derived from the implementation of soil conservation measures. As stipulated for the earlier recommendation, it is projected that the Upper and Lower Thames Conservation Authorities will play a lead role in dealing with farmers and other landowners to implement specific projects, with supportive assistance from the Ministries of Natural Resources, Environment and Agriculture and Food through ongoing co-ordination afforded by the Agriculture and Land Use Subcommittee of the Thames River Implementation Committee.

Similar to Recommendation 20, it is recommended that the Province strengthen funding to the Upper and Lower Thames Conservation Authorities for acceleration of their Private Land Assistance Programs to accomplish water retention and conservation objectives.

Practical research programs being carried out by Conservation Authorities to assess land use impacts on water retaining areas, such as the Greenock Swamp study being carried out by the Saugeen Valley Conservation Authority, are expected to provide a better understanding of water quality and quantity as influenced by land use practices and land use changes.

Recommendation No. 28 - Drainage Construction Practices

Realizing that the prime purpose of municipal drainage systems is to provide adequate drainage for agricultural and urban lands, it is imperative that these ditches be well maintained to operate effectively.

Coupled with the development of appropriate guidelines to protect water quality as suggested in Recommendation 21, improved supervision and management of drainage projects at the municipal level should lead to the utilization of satisfactory construction procedures for drainage ditch installations.

To effect this improvement, the Thames River Implementation Committee therefore recommends:

- 1) *That the Land drainage grant structure be designed to encourage a regular maintenance program, including cattail or brush control and providing for structures or practices to prevent unnecessary erosion.*
- 2) *To upgrade the quality of supervision, municipalities should consider engaging suitably qualified drainage personnel on a joint basis e.g., to cover a county jurisdiction.*
- 3) *That Provincial and Federal sales tax exemptions be extended to include materials used to protect water quality in connection with municipal drainage systems.*
- 4) *That participation in a course established for drainage personnel at the University of Guelph should be a mandatory requirement. This course should be enlarged in duration and scope, if necessary, and should attach emphasis to environmental concerns. Refresher courses should be offered as required to present the latest information on improved procedures.*

Recommendation No. 29 - Groundwater Infiltration

Protection of 'recharge' or high infiltration areas is considered in the review of official plans and specific development proposals. Protection of the Woodstock well field area was raised specifically in respect to a proposal to construct a dam on Cedar Creek. Concern for groundwater has resulted in passage of a by-law limiting additional septic tank utilization in Strathroy, the refusal of additional subdivision development in Komoka (upheld by the Environmental Appeal Board) and the establishment of a 'safe zone' to be

applied in the vicinity of the Dorchester wells. This recommendation is, therefore, being adequately carried out as it relates to the protection of sensitive, municipal and private groundwater supplies.

There has been less involvement in the protection of groundwater quality in areas which provide significant baseflows. However, an extensive groundwater mapping program has been carried out by the Ministry of Environment for the Thames River Basin to support the program of the Thames River Implementation Committee. This mapping is completed and is expected to be published within the next year. It will identify surficial water-bearing deposits which supply significant base flows to adjacent streams. A product of this effort will be constraint mapping that will identify those areas that require land use controls to protect the streams identified.

The Thames River Implementation Committee views that the provision of constraint mapping by the Ministry of the Environment, coupled with review processes now in effect, will effect the satisfactory achievement of this recommendation.

APPENDIX 1
RECOMMENDATIONS FROM THAMES RIVER BASIN
WATER MANAGEMENT STUDY REPORT

Recommendation No. 1

It is recommended that the Glengowan Dam should be constructed first, for the primary purpose of flow augmentation. Furthermore, a study should be made of what type and level of recreational use, if any, could be provided at the reservoir.

Recommendation No. 2

It is further Recommended that the Upper Thames River Conservation Authority and the Ministry of Natural Resources investigate in detail, as soon as possible, the question of the limestone deposit at the Thamesford dam site to determine the opportunity cost associated with its development, so that a decision can be made as to the feasibility of constructing the Thamesford Dam.

Recommendation No. 3

If construction of the Thamesford dam is feasible, then the Thamesford dam should be built primarily for flood control purposes. Furthermore, a study should be made of the desirable level of recreational use of the reservoir, ensuring that such use would not seriously constrain the primary use of the reservoir.

Recommendation No. 4

If construction of the Thamesford dam is not feasible, then the Wardsville dam should be constructed for flood control purposes only. A flow retarding structure rather

than a conventional dam should be constructed to minimize the loss of agricultural land and to protect the yellow pickerel runs and spawning grounds. Detailed studies should be undertaken to ensure the design will permit the safe passage of fish, and to determine on a benefit-cost basis whether a 43,000 acre-foot or a larger retarding structure is the more economical. The environmental effects and the effects on road communications of the larger versus the smaller structure should be considered. There should also be close consultation with Indian bands concerning the effects on reservation lands.

Recommendation No. 5

Prior to construction of any major dam, detailed studies should be undertaken to examine environmental effects, to determine methods of minimizing such effects, and to determine what type of discharge structure and operating practices would best protect both reservoir and downstream waters quality.

Recommendation No. 6

The City of London should immediately institute plans to upgrade its sewage treatment facilities to meet the waste loading guidelines outlined in this report. Specifically, this involves providing an effluent from all treatment plants equivalent in quality to the effluent from the Greenway Sewage Treatment Plant as defined in this report .

Recommendation No. 7

At several municipalities in the basin, the waste assimilative capacity of the receiving stream has been reached or exceeded. Accordingly, it is recommended that the municipalities of Mitchell, Stratford, Tavistock, Glencoe, Tilbury and Ridgetown should not increase their waste loadings from all sources to the receiving stream, and in some cases

should reduce these loadings, as described in Chapter 8 of this report.

Recommendation No. 8

The municipalities of Woodstock, Beachville, Ingersoll , Lambeth, Dorchester, St. Marys, Bothwell, Thamesville and Chatham should adopt sewage treatment techniques selected from approved options as described in this report, either to provide immediately required upgrading or to accommodate additional growth if such growth is found to be desirable when other factors are considered.

Recommendation No. 9

All municipalities should immediately undertake studies to determine the significance of existing urban runoff and runoff associated with future development as a source of pollutants, and take steps to control this waste input where it is found to constitute a water quality problem.

Recommendation No. 10

It is recommended that all affected municipalities enact and enforce sewer use bylaws to prevent industrial pollution problems. Industries discharging treated waste and process waters directly to watercourses in the basin should implement waste treatment necessary to meet water quality objectives as outlined in this report.

Recommendation No. 11

It is therefore recommended that fertilizer application rates be limited to those recommended by the Ontario Ministry of Agriculture and Food, using services such as

those at the University of Guelph for determining appropriate rates. Individual and group activity by the agricultural community and the active support of government agencies is important to implement this practice.

Recommendation No. 12

A program of restricting free access of livestock to streams should be commenced. It is recommended that the Ontario Department of Agriculture and Food take the lead role in undertaking a detailed study of the implications of such a program to farmers, of the best methods such as fencing or vegetative barriers, and of the feasibility of provincial subsidies to encourage such a program.

Recommendation No. 13

It is recommended that increased environmental surveillance and enforcement be undertaken by appropriate government agencies to control farm waste discharges, particularly from intensive feedlot operations, and illegal septic tank connections to municipal drains.

Recommendation No. 14

It is recommended that channel protection programs as described in this report be implemented, with initial emphasis on areas of greatest need which should be identified in detail by appropriate government agencies.

Recommendation No. 15

Rural-oriented management practices and conservation practices should be applied with special rigor in headwater areas, and municipalities in these areas must pay special attention to sewage disposal practices to safeguard both local and downstream water uses.

Recommendation No. 16

It is recommended that resolution of water quality problems in existing reservoirs be achieved by the two conservation authorities through appropriate combinations of bottom draw, destratification, algae control, disinfection of swimming areas, or modified operating policies as outlined in this report for each reservoir.

Recommendation No. 17

It is recommended that these reservoirs be operated in such a manner as to ensure the maintenance of the specified minimum flows on a daily basis. It is also recommended that there be close liaison between the Ministry of Natural Resources and the Ministry of the Environment to ascertain if alterations to these operating schedules would optimize the use of existing reservoirs for flow augmentation, without adversely affecting other uses.

Recommendation No. 18

It is recommended that the Upper Thames River Conservation Authority and the Ministry of Natural Resources undertake a detailed computer analysis to determine what modifications of reservoir operating practices would optimize their flood control and flow augmentation use and enhance their recreational use potential.

Recommendation No. 19

It is recommended that a program of corrective action concerning bank erosion from Chatham, upstream as far as Delaware, should be initiated by the Lower Thames Valley Conservation Authority in line with the recommendations in the 1971 report by James F. MacLaren Limited entitled "Flood and Erosion Control Works on the Lower Thames River from Chatham to Delaware".

Recommendation No. 20

Soil erosion control programs including strip cropping, crop rotation, diversion terraces, grassed waterways and vegetative buffer zones or reforestation should be implemented throughout the watershed, with initial emphasis on areas that should be identified by staff of the Ministries of Agriculture and Food, Natural Resources and Environment.

Recommendation No. 21

It is recommended that environmental impact assessments of land drainage proposals be undertaken to screen out or modify proposals which would damage the environment and that selected wetlands of ecological importance, such as the Zorra Swamp, be protected from further drainage.

Recommendation No. 22

Prevention of water supply interference and ground water quality impairment, rather than remedial action after the problem has occurred, should be practiced using procedures detailed in Chapter 7 of this report.

Recommendation No. 23

To overcome communication and co-ordination problems relating to water management in the basin, and to implement planning on a watershed basis, a joint committee of government agencies and other appropriate bodies should be established. The committee should include representatives of the Ministries of Agriculture and Food, Environment, Housing, Natural Resources, and Treasury, Economics and Inter-governmental Affairs, the two Conservation Authorities, municipalities, citizen groups and the agricultural community.

Recommendation No. 24

Because of the interrelationships of water resources problems and solutions in the upper and lower watershed, and in order to further the basin-wide approach to water management advocated in this report, it is recommended that consideration be given to the amalgamation of the Upper Thames River Conservation Authority and the Lower Thames Valley Conservation Authority into a single authority.

Recommendation No. 25

It is recommended that further controls of floodplain development under The Planning Act and through regulations administered by the Conservation Authorities be developed.

Recommendation No. 26

It is recommended that the Conservation Authorities Branch and the Conservation Authorities consider the development of an improved flood warning system.

Recommendation No. 27

For long term flood control, flow augmentation and erosion control benefits, it is recommended that sound conservation measures such as reforestation, sound agricultural tillage, use of appropriate ground cover, and preservation of water retaining areas be encouraged and implemented. Reforestation and establishment of shrub cover along streambanks should be directed to areas where they would specifically aid in erosion control streambank stabilization, and the improvement of fish habitats.

Recommendation No. 28

It is recommended that municipalities and government agencies encourage and enforce careful construction practices during drainage ditch installations and other construction activities in and along watercourses.

Recommendation No. 29

It is recommended that development in areas of sand and gravel not be permitted to hinder infiltration or to degrade the quality of infiltrating water. This is particularly true of areas of municipal water supply, such as the Woodstock well field. In addition, areas providing significant baseflow such as the Harrington-Lakeside Moraine should be protected.

APPENDIX 2
ORGANIZATIONAL CONCEPTS FOR THE THAMES RIVER
IMPLEMENTATION COMMITTEE

Terms of Reference

The Thames River Implementation Committee shall provide advice, communication and co-ordination to the implementing agencies and assist in implementing the recommendations of the Thames River Study, or their modifications, by seeking a consensus of involved agencies, establishing a forum for communication with those involved in the implementation and fostering public understanding and participation.

Functions of the Committee

Based on the above terms of reference, the following principal functions of the Committee emerge:

1. Co-ordination of Existing Programs

To achieve liaison and co-ordination amongst agencies currently involved with responsibilities or functions that impact on basin management to:

- maximize the benefits to be derived from existing programs,
- identify and deal with current problems and issues of interest or concern to one or more implementing agencies, ensure that decisions in the short term do not preclude the consideration of options that may be essential to the achievement of long-term goals for the basin.

2. Assessment and Implementation of the Recommendations

To achieve the development of an effective river basin management program for the Thames River watershed by:

- assessing the recommendations outlined in the report, including impact of the recommendations on municipalities and the level of municipal acceptance,
- determining those recommendations that should receive priority attention,
- reviewing present programs and activities that may contribute wholly or in part to the achievement of the recommendations,
- identifying effective implementation measures,
- providing for a periodic re-assessment of the recommendations and the extent of their application.

3. Public Information and Participation

To foster a program of public involvement to;

- achieve public appreciation of the integrity of the Thames River Basin and inter-dependencies that exist,
- to provide an avenue for dissemination of information in order to foster understanding of the Thames River report and the ongoing activities of the Thames River Implementation Committee,
- obtain an ongoing input from the public and municipalities concerning the recommendations contained in the Thames River Basin Study and related implementation measures.

Implementing Agencies

Implementing agencies are considered to be those that have a direct means (legislative or otherwise) of initiating programs or applying incentives or controls to achieve the purposes of the Thames River Basin Study. They are identified as follows:

Ministry of Natural Resources

Ministry of Industry and Tourism*

Ministry of the Environment

Municipalities throughout the Basin*

Upper Thames River Conservation Authority

Ontario Ministry of Agriculture and Food

Lower Thames Valley Conservation Authority

Ministry of Treasury, Economics and
Intergovernmental Affairs

Ministry of Housing

* not represented on Implementation Committee

APPENDIX 3

MEMBERS OF THAMES RIVER IMPLEMENTATION COMMITTEE

Mr. H. J. Thomas, (Chairman)
City Engineer,
P.O. Box 640,
Chatham, Ontario.
N7M 5K8

Mr. L. Spittal,
Manager, Community Planning
Advisory Branch,
Ministry of Housing,
495 Richmond Street,
London, Ontario.
N6A 5A9

Mr. R. Heard,
Area Co-ordinator,
Ministry of Agriculture & Food,
195 Dufferin Avenue,
London, Ontario.
N6A 1K7

Mr. K. Thompson,
Ontario Federation of Agriculture, R. R. #1,
Blenheim, Ontario.
NOP 1A0

Mr. J. A. Stephen,
Chairman, Upper Thames River Conservation Authority,
P.O. Box 6278,
Station "D"
London, Ontario.

Mr. C. M. Wilson,
Chairman, Lower Thames Valley Conservation Authority,
R. R. #3,
Chatham, Ontario. NOM 2V0

Mr. W. M. Fenn,
Field Services Branch,
Ministry of Treasury, Economics and Intergovernmental Affairs,
7th Floor,
495 Richmond Street,
London, Ontario.
N6A 5A9

Mr. R. Hunter,
Regional Conservation Authorities Program Supervisor,
Ministry of Natural Resources,
1106 Dearness Drive,
London, Ontario.
N6E 1N9

Mr. J. McFadden,
Conservation Authorities Land Management Co-ordinator,
Ministry of Natural Resources,
1106 Dearness Drive,
London, Ontario. N6E 1N9

Mr. J. R. Bray, Manager,
Municipal and Private Abatement,
Ministry of the Environment,
985 Adelaide Street South,
London, Ontario.
N6E 1V3

Mr. C. F. Schenk, (Secretary) Manager,
Technical Support Section,
Ministry of the Environment,
985 Adelaide Street South,
London, Ontario.
N6E 1V3