

REPORT ON THE WELLAND AND FEEDER CANALS

by

W. G. McGEORGE, C.E.

**Chatham, Ontario
November 8, 1947**

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Chatham, Ontario
November 8th, 1947

C. G. Edwards, Esq.
Deputy-Minister
Department of Transport
Ottawa, Canada.

Dear Sir:

As instructed, I have made certain investigations in connection with the Welland Ship Canal and Feeder Canal, and particularly in connection with drainage problems which have arisen in the vicinity of that part of the Ship Canal between Port Colborne and Welland and in the vicinity of the Feeder Canal.

Feeder Canal: The Feeder Canal, as constructed about the year 1829, extended from the Grand River, at Dunnville, through parts of Moulton, Wainfleet, Humberstone and Crowland Townships to the Welland Ship Canal at a point in what is now the City of Welland. Later (about 1842) a branch was constructed, running from the Junction, at Stromness, through a small corner of Moulton Township and part of Sherbrooke Township, to Lake Erie, at Port Maitland. This Feeder Canal was designed to supply water, at a high level, to the Welland Canal, the water being raised about eight feet above ordinary Lake Erie level by a dam in the Grand River, at Dunnville, and because of this high water level, the Feeder, itself, offered to the adjacent lands, no opportunity for drainage. As a matter of fact, the Feeder Canal acted as a barrier to the natural flow of the water, particularly in the four townships mentioned above.

To offset the effect of the construction of the Feeder Canal, intersecting drains, known as the North Back Drain and South Back Drain, were constructed, along the northerly/ and southerly sides of the Feeder Canal, to collect the waters from the adjacent lands and carry them to certain points, where underpasses were constructed (under the Feeder Canal) to provide for the waters so collected. These underpasses were located at the main natural runs or watercourses and, eventually, there were in existence, underpasses at eight different locations: one in Dunnville; three between Dunnville and Stromness; one at Beaver Creek a short distance east of Marshville (Wainfleet Village); one at the Brown Tap Drain (which is an artificial channel constructed by the Department of Transport, or its predecessor, as an outlet for the back drains, and emptying into the Welland River at or near Lot 30, in Crowland Township); and two at Stromness, under the branch to Port Maitland. About the year 1908, the underpass at Beaver Creek, which was of wood, three and three-quarter feet by five feet, was supplemented by the construction of an additional concrete under-pass, eight feet square and in 1914 an additional underpass, also eight feet square, was constructed at Broad Creek, about one-half mile northwest of Stromness.

Since the construction of the Welland Ship Canal (and, in fact, since the construction of the Third Canal) there has been no necessity to operate the Feeder Canal for its original purpose and the eastern or Welland end has actually been filled in. The water, in the Feeder, is no longer maintained at its former height, although still kept high enough to maintain a current, and the flow of water from the Grand River, through the

Feeder, is now limited to the relatively small amount, which will flow through a two-foot diameter pipe, located at Maple Creek in Moulton Township. Part of this water now runs easterly, in the Feeder Canal, to the Brown Tap Drain and thence along the Brown Tap Drain to Chippawa Creek (or Welland River) and the remainder runs westerly to the Grand River to Port Maitland. The water in the Feeder is now low enough, except at flood time, to permit the Feeder to be used for drainage purposes by some of the adjacent lands and, in fact, it is being so used, to a limited extent, at the present time.

The Feeder Canal was constructed with tight banks (of earth) which were necessary to confine the water in the Feeder and which were substantial enough to be used as towpaths. These towpaths are now used, for the most part, as public highways and are maintained as such by the municipalities in which they are situated. The portions of the towpath, on the northerly side of the Feeder, between Stromness and Dunnville and in front of Lots 3 to 8 inclusive, Concession 3, Moulton Township, have actually been conveyed to Haldimand County but the rest of the towpaths are used by the municipalities with the consent of the Department of Transport. Insofar as drainage is concerned, these towpaths present obstacles to the free use of the Feeder, for drainage purposes, inasmuch as they have to be bridged at all drains entering the Feeder.

Affected Areas

As intimated above, the Feeder Canal has acted as a barrier to the natural flow of the water. In Sherbrooke Township, the total area cut off by the Feeder is small (350 acres or less) and, because of its proximity to the Grand River, the effect, as to drainage, is small.

In the portion of Moulton Township affected, the natural fall was southerly towards the Grand River or, in part of the Township, towards Lake Erie. Three or four natural creeks were intersected by the Feeder Canal but the underpasses provided (and in the case of Maple Creek, the opening across the Feeder, provided after the water was lowered in the Feeder), seem to be operating, on the whole, satisfactorily.

In Wainfleet and Humberstone Townships, there is an area of between 15 and 20 thousand acres (of which a large part is comparatively low land and the greater portion of which is south of the Feeder Canal), which had two main natural outlets. One of these outlets was Beaver Creek (which was intersected by the Feeder at a point near Marshville or Wainfleet Village) and the other one was Lyons Creek (which was intersected by the Welland Canal). Both of these Creeks carried the waters, eventually, to Chippawa Creek (or Welland River), Beaver Creek running northerly and emptying into the Welland River at a point on or near Lot 15, Wainfleet Township, and Lyons Creek running easterly and emptying into the Welland River near its mouth, in the vicinity of the Village of Chippawa. With the water in the Welland Ship Canal maintained at a comparatively high level (elevation 578 feet), an underpass was necessary to permit the water to continue its flow through Lyons Creek, but with the water level in the Ship Canal now maintained at a lower elevation (elevation 569 feet), it is possible for the eastern part of this low area, (including a part of Wainfleet Township), to be adequately drained into the Ship Canal and the last mentioned under-pass has been abandoned. The only outlet available for the western part of the area in question, comprising between 12 and 15 thousand acres, is Beaver Creek. The portion of this western area lying north of the Feeder Canal and comprising between

four thousand and five thousand acres, drains into the North Back Drain, which carries part of the water to an artificial channel known as the Mill Race (which, in turn, empties into Beaver Creek), part direct to Beaver Creek and the balance to the Brown Tap Drain. The portion south of the Feeder, comprising about ten thousand acres, reaches the underpasses at Beaver Creek chiefly through the South Back Drain and a Township drain known as the Second Main Drain.

Another area, affected by the Feeder and Welland Ship Canals, was the Hellems Creek area. This creek commenced in the northwestern corner of Humberstone Township, ran northerly to enter the Welland River at a point now in the City of Welland, and was the natural outlet for possibly two thousand acres in Humberstone and Crowland Townships and in the City of Welland. Conditions have been so altered by the construction of the Canals (and the deposit of the materials excavated) that the exact location of Hellems Creek is difficult to ascertain, but it seems reasonably clear that the Feeder and Ship Canals actually occupied parts of what were the original beds of the Creek and its branch. The greater part, of the Hellems Creek Drainage area, was west of the present Ship Canal and can be satisfactorily drained into the Brown Tap Drain or directly to the Welland River. Because the high levels of the water in the Welland and Feeder Canals prevented their use (for drainage purposes) by the adjacent lands, including the portion of the Hellems Creek area, east of the Ship Canal, the Government Drain was constructed by the Department of Transport, or its predecessors. This drain extends along the easterly side of the Ship Canal, and took the place, insofar as drainage on the easterly side of the Ship Canal is concerned, of Hellems Creek. Originally an open channel, this drain is now a

covered sewer extending for about one and two-thirds miles, from the property of the Electro-Metallurgical Company, in Crowland Township, to the Welland River, in Welland.

Problems

As a result of my discussions with the engineers of the Welland Ship Canal staff, landowners in the areas in the vicinity of the Feeder Canal, municipal representatives and, in some cases, officials of Moulton, Wainfleet, Humberstone and Crowland Townships, the County of Welland and the City of Welland, I gather that the problems, which have arisen, are chiefly as follows:

In Moulton Township, the only urgent drainage problem is in connection with the portion of Maple Creek lying south of the Feeder Canal, it being alleged that this portion of the Creek is not deep enough to provide a satisfactory outlet for the portion of the Creek to the north.

In Wainfleet Township, there is an area of ten or 12 thousand acres, part of which is suffering damage because of inadequate drainage facilities and part of which cannot be properly developed because of the lack of adequate drainage facilities.

In Humberstone Township, there is no drainage problem, insofar as the Canals are concerned, so long as the area, formerly tributary to Lyons Creek, is allowed, as at present, to drain into the Welland Ship Canal and so long as the Brown Tap Drain is maintained in efficient condition.

In Crowland Township, on the east side of the Welland Ship Canal, there is a developed area, of possibly 10 or 15 acres extent, immediately north of the Michigan Central Railway line, which is now entirely drained into the Government Drain. In this area there are a number of basements of houses, which are frequently flooded, chiefly in times of freshet in the Welland River. At these times of freshet, the subway under said railway line and part of the road along the east side of the Ship Canal are also flooded.

In Welland City, there seems to be no serious drainage difficulty in the Hellems Creek area, the Government Drain and City sewers apparently operating with at least reasonable satisfaction. Any flooding that has occurred in connection with the Government Drain, in Welland, has apparently been due to obstructions in the drain. When these obstructions were removed, the flooding ceased. Since the water in the Welland Ship Canal is used as a source for water for the City of Welland and other municipalities, there is some anxiety as to the possible contamination of this water supply by contaminated water entering the Ship Canal between Port Colborne and Welland.

Recommendations

Leaving aside, for the moment, the question of responsibility for the work proposed, I recommend the following measures to meet the difficulties that have arisen.

- (1) That the practice of raising the water at the Dunnville end of the Feeder Canal, to ensure a flow in the Feeder, be abandoned and that the Town of Dunnville be permitted, if it desires so to do, to fill in the Dunnville end of the Feeder Canal.

The only objection, that I anticipate will be raised to this, will be on the part of landowners, along the Feeder, who may desire to obtain water for cattle from the Feeder. However, it is not practicable to provide adequate drainage and at the same time assure an adequate supply of water.

(2) That improvement of the portion of Maple Creek south of the Feeder Canal be done, at an estimated cost of \$2000, this estimated cost being based on the improvement of the channel for a distance of one-half mile, with a bottom width of 12 feet, side slopes of one and one-half to one, and a bottom elevation of 570 feet. This work would be necessary for the drainage of the Maple Creek area in Moulton Township whether or not the Feeder had been constructed.

(3) That a culvert of not less than four feet diameter be constructed under the south towpath, at the point where a branch of Broad Creek intersects the Feeder Canal (near Stromness), at an estimated cost of \$1200.

This culvert will permit the discharge of water from the Feeder Canal into Broad Creek, at Lake Erie level, thus providing an improved outlet for the Moulton Township lands draining into the Feeder and will make the Moulton Township end of the Feeder more or less independent of the Branch through Sherbrooke Township to Port Maitland.

(4) That a dam, of adequate dimensions to prevent the flow of water from the Moulton Township end of the Feeder Canal through the Wainfleet Township portion of the said

Canal, be constructed, in the Feeder, at a point at or near the Moulton-Wainfleet Townline. The cost of this dam I would estimate at \$500 (based on a dam with top elevation 579 feet, top width of six feet and side slopes one and one-quarter to one)

This suggestion results from my opinion that this flow, from Moulton Township into Wainfleet Township, constitutes a diversion of the Moulton Township, water from its natural course and aggravates the difficulties in connection with the drainage of the low lands in Wainfleet Township, without any commensurate advantage to Moulton Township lands.

(5) That the Moore Cut-off Drain be opened into the Feeder Canal, by means of a culvert under the north towpath, at an estimated cost of \$1800 (this cost being based on the installation of a pipe culvert of at least five feet diameter).

Once the Feeder (as far as Beaver Creek) has been improved, this work will provide a better outlet for the Moore Cut-off lands, north of the Feeder, than the present outlet along the North Back Drain to the old Mill Race.

(6) That the portions of the Feeder Canal from the road between Lots 27 and 28, Wainfleet Township, to Beaver Creek (about 14500 feet) and from the Wainfleet-Humberstone Townline to the Brown Tap Drain (about 5000 feet) be repaired and improved at an estimated cost of \$25000 (exclusive of any necessary expenditure in connection with the highway bridge on King's Highway no. 3). This estimated cost is

based on bottom widths of 14 feet, side slopes of one and one-half to one, elevation in the bottom, at 27-28 Sideroad, of 572 feet, at Beaver Creek of 566.20 feet, at Townline of 570 feet and at Brown Tap Drain of 567.50 feet. This bottom width is suggested with a view to permanence rather than required capacity.

This work in the Feeder is necessary if the Feeder is to adequately serve the lands now dependent on the back drains for drainage.

(7) That the owners of lands adjacent to the Feeder Canal, now using the back drains, use the Feeder instead of the back drains. This is suggested with a view to eliminating the necessity for maintaining the back drains.

(8) That the Brown Tap Drain be repaired and improved at an estimated cost of \$3000, based on a bottom width of ten feet, side slopes of one and one-half to one, and a bottom gradient of 0.10 feet per 100 feet.

(9) That the Beaver Creek be opened up across the Feeder Canal at an estimated cost of \$7500, which estimate is based on the construction of an additional concrete culvert (ten feet square and with invert at elevation 564 feet) under the south towpath, the construction of an open cut through the north tow-path and the construction of an earth dam in the Feeder, immediately to the east of Beaver Creek, this dam to be used as a south towpath. At the point in question the north tow-path is used for local travel only.

This additional opening, together with the existing concrete under-pass (altered to conform with the lowered bottom of Beaver Creek) will enable the Wainfleet lands to make full use of Beaver Creek as an outlet. The existing wooden underpass will probably disintegrate when drained and will eventually have to be abandoned.

(10) That Beaver Creek be improved from the Feeder Canal to the Forks Creek, at an estimated cost of \$21500. This estimate is based on a bottom width of 16 feet, from the Feeder to the Mill Race, and 20 feet from the Mill Race to Forks Creek, side slopes of one and one-half to one, a bottom elevation of 564 feet at the Feeder and a bottom gradient of 0.05 feet per 100 feet from the Mill Race to Forks Creek.

This improvement of Beaver Creek is necessary if the Wainfleet Township lands referred to herein are to be satisfactorily drained, and would have been necessary even if the Feeder Canal had never been constructed.

(11) That the lands in Wainfleet and Humberstone Townships, the waters from which once found an outlet in Lyons Creek and, which are now being drained into the Welland Ship Canal, chiefly through the Beiderman Drain and Haun Drain, be allowed to continue to discharge storm water into the Ship Canal, but only so long as the discharge from these drains remains uncontaminated with sewage or other objectional matters that would render the waters of the Ship Canal unfit for use as a source for water supply.

In making this recommendation, I have in mind the following:

- (a) That there is no objection to any reasonable volume of uncontaminated water being discharged into the Welland Ship Canal.
- (b) That, while there is some responsibility on the Department of Transport to take care of storm waters from the area in question, because of the interference (in constructing the Canals) with Lyons Creek, this carries with it no responsibility to take care of sewage or other objectional materials, particularly as the discharge of such materials (untreated), even into Lyons Creek or other streams is illegal, under Ontario Statutes.
- (c) That, while it would be possible to divert the water from the area mentioned, partly to Lyons Creek and partly to the Brown Tap Drain, the cost would be very great because it would involve the construction of necessary connecting drains, the improvement of a large portion of Lyons Creek (which is about 15 miles in length and is a comparatively sluggish stream), and a substantial improvement of the Brown Tap Drain, including the enlargement of highway and railway bridges. Even if this diversion were carried out, the possibility of contamination would not be ended but merely moved from one locality to another.

In considering the question of contamination, I have had the advantage of very cordial discussions with Dr. A. E. Berry, Chief Sanitary Engineer of the Ontario Department of Health and I may add that this reference, herein, to Dr. Berry is made with his consent and approval. From these discussions, I have gathered that it is the opinion of Dr. Berry that, under Ontario Statutes, the Ontario Department of Health has, not only the necessary authority, but also the responsibility, for protecting the water supplies of the communities

in Ontario and, that it is the policy of his Department to exercise this authority and assume this responsibility. I, also, gather that, if a source of water supply is being seriously contaminated, through discharge from a drain for which a municipality is responsible, the municipality will be required to take the necessary remedial measures or, if the contamination is discharged through a private drain of an individual or company, the said individual or company will be required to take the necessary remedial measures.

In view of the above, it would seem to follow that requests for permission to drain into the Welland Ship Canal might be dealt with on the basis that any waters discharged into the Ship Canal must be of a character approved by the Ontario Department of Health.

In connection with the drainage, from the area in question (namely the former Lyons Creek area in Wainfleet and Humberstone Townships), I would like to emphasize that the use of the Welland Ship Canal, for storm drainage, confers on this area a more adequate outlet than ever has been available or would be available in Lyons Creek unless a substantial work of improvement were undertaken in connection with the said Creek, the reason being, as previously mentioned in this report, that the water in the Ship Canal is now maintained at a controlled level considerably lower than the flood level of the water in Lyons Creek.

(12) That Crowland Township be permitted to discharge, into the Welland Ship Canal, storm waters (only) from the low area in the vicinity of the Michigan Central Railway line, previously referred to (including storm water from the subway under said line) and that the

industries in Crowland Township, now discharging their process waters (waters taken from the Ship Canal for cooling or other purposes) into the Government Drain, be permitted to discharge these process waters into the Ship Canal, under safeguards similar to those suggested in (11) above. Such safeguards should include the sealing off of the Government Drain from any possible connection with the storm drains into the Ship Canal.

The carrying out of these suggestions will, in my opinion, relieve the Government Drain to such an extent as to enable it to function satisfactorily for the area it is now serving, but this does not mean that it (Government Drain) will be a satisfactory outlet for the cellar drains from at least a portion of the houses in the said low area in Crowland Township. The fact is that a number of the basement floors of the houses in the area are at, or below, flood level in the Welland River and hence it is not practicable to make the Government Drain function so as to drain these cellars under flood conditions. It is only fair to the engineers, who designed the sewers in the area in question, to point out that in their reports, providing for the construction of these sewers connecting with the Government Drain, it was clearly pointed out that these sewers would not adequately drain basements. These low basements should not be connected directly with the sewers leading to the Government Drain unless proper backwater traps are installed or suitable riser-pipes fitted to the drains. Floor drains could be eliminated and individual sumps and sump pumps installed. A resort to pumping of the waters from the area in question, using the Government Drain as an outlet, could also be resorted to but my present impression is that the flooding of the cellars, complained of, which I believe is chiefly by water backing up in floor drains, could be most economically remedied, individually, by one of the methods mentioned and should be remedied by the individual owners.

Responsibility

The question of the responsibility for the cost of carrying out the measures recommended above, is to some extent, at least, a legal problem. It is difficult to define, exactly, the various responsibilities, particularly, as the difficulties, which require attention, have been accumulating over a period of more than one hundred years and, during this time, there have been a very considerable development of the lands in the drainage areas, a change in the function of the Feeder Canal and changes in the water levels in the Feeder, the Welland Ship Canal and even the Welland River (one change in this latter being due to hydraulic operations of the Ontario Hydro-Electric Power Commission). However, in fixing the various responsibilities the following may be useful:

(a) It is my opinion that the facilities, eventually provided by the Department of Transport (or its predecessors), including the back drains, underpasses, Brown Tap Drain, Government Drain and the right of drainage into the Welland Ship Canal, were sufficient to offset the interference, with natural drainage conditions, resulting from the construction and maintenance of the Feeder Canal and the portion of the Ship Canal in question here. If the areas, affected, had remained in their natural conditions and not been developed and drained (the inevitable result of the development and drainage being increased and more speedy runoff of the water from the areas in question), the problems enumerated in this report would have been of little if any importance. These facilities, particularly insofar as the Wainfleet Township lands are concerned, have not been sufficient to take care of the changes in conditions resulting from the development and drainage referred to, nor to provide for the future development of the area which now appears probable.

(b) The change in the status of the Feeder Canal (it no longer being necessary for canal purposes) would make it possible, at least partially, to restore to the adjacent lands any natural drainage facilities which they may have originally possessed, by merely making openings across the Feeder (and towpaths) at all natural depressions or runs but, because of the use of the towpaths as highways, culverts would have to be provided. It may be argued, on behalf of the Department of Transport, that there is no obligation, on their part, to provide highways and that if the Feeder and towpaths had not been in existence, the Townships would have had to develop their own highways and drainage facilities, at their own expense. On the other hand, it will be argued that the highways are necessary because of the severance caused by the existence of the Feeder and that this places a responsibility on the Department. On the whole, it does seem that, as the Feeder, including towpaths, is no longer useful to the Department but is of use to the municipalities, it should be turned over to the municipalities and, as an inducement to the municipalities to accept it, the Department would be justified in assuming more than its actual responsibility for the cost of the remedial measures recommended in this report.

(c) While the responsibility of the Department of Transport, to provide facilities sufficient to offset the interference with natural drainage conditions resulting from the construction of the Canals, carries with it the responsibility of maintaining these facilities, it does not carry with it the responsibility of enlarging and improving these facilities to enable them to cope with the increased amounts of water resulting from the artificial drainage and development of the areas in the watersheds affected.

(d) It is impossible to work out the respective responsibilities, for the cost involved in the measures proposed, on a strictly mathematical basis.

Recommendations as to cost

After considering the various factors involved, I am of the opinion that, provided Moulton Township takes over the portion of the Feeder Canal and right-of-way in the Moulton Township (exclusive of the parts thereof already conveyed to Haldimand County) and Wainfleet, Humberstone and Crowland Townships, similarly, take over the respective portions of the Feeder and right-of-way in those Townships, the Department of Transport being relieved of any further responsibility (including responsibility for maintenance) in connection with the Feeder and the lands connected with it, the Department would be justified in making the following contributions:

Firstly: That the Department of Transport (at its own expense) construct the suggested culvert at Broad Creek in Moulton Township, at an estimated cost of \$1200 (recommendation No. 3 above), construct the suggested dam at or near the Moulton-Wainfleet Townline, at an estimated cost of \$500 (recommendation No. 4 above), open up the Moore Cut-off Drain into the Feeder Canal at an estimated cost of \$1800 (recommendation No. 5 above), repair parts of the Feeder, at an estimated cost of \$25,000 (recommendation No. 6 above), and open up Beaver Creek across the Feeder, at an estimated cost of \$7500 (recommendation No. 9 above), the total estimated cost of these projects being \$36,000.

Secondly: That the Department consider making grants towards the cost of improving Maple Creek, south of the Feeder Canal (recommendation No. 2 above), repairing and improving the Brown Tap Drain (recommendation No. 8 above), and improving Beaver Creek from the Feeder to Forks Creek (recommendation No. 10 above), these projects to be carried out by the Municipalities, preferably under the provisions of the Municipal Drainage Act, and these grants to be for construction purposes only and to be final insofar as the Department is concerned. As the Maple Creek and Brown Tap improvements will each cost less than \$10,000, they will not be eligible for grants under the Provincial Aid to Drainage Act and, with this in mind, I would suggest grants, by the Department of Transport, to the municipalities initiating these projects, of amounts up to 40 per cent of the cost of these two improvements. The other project would be eligible for a 20 per cent grant, under the said Act and I would suggest that this 20 per cent Provincial grant be duplicated by the Department of Transport. I believe that the Townships have the necessary authority, under the Municipal Drainage Act, to initiate and carry out these projects.

Under these suggestions, the Department would be carrying out the projects located on its own property, directly connected with the Feeder Canal and designed to put the Feeder in efficient condition for drainage purposes, and the municipalities would be carrying out those projects which, while necessary if the Feeder is to function satisfactorily, for drainage purposes, would be largely necessary for the drainage of the lands whether or not the Feeder had been constructed. It is my opinion that these latter projects should be, if at all possible, under local control and responsibility.

In connection with those recommendations, I would suggest that the Crowland Township (or Wainfleet or Humberstone Township, if either of these should be the initiating municipality for the drainage work in question) be allowed to use the Brown Tap Drain as an outlet for any drainage work being constructed, repaired or improved under the provisions of the Municipal Drainage Act and to incorporate the Brown Tap as part of the drainage work, it being understood that, in the bylaw providing for such use and incorporation, provision will be made for the future maintenance of the Brown Tap Drain in accordance with the provisions of the Municipal Drainage Act.

Alternative Suggestion

It is possible that some or all of the projects recommended to be carried out by the Department of Transport (firstly above) might be eligible for provincial grants (highway or drainage grants), if carried out by the municipalities, and that the municipalities would prefer to take over the Feeder Canal in its present condition (or possibly with the dam constructed at or near the Moulton-Wainfleet Townline) and receive, in cash, grants based, to some extent, on the estimated costs of the projects recommended to be carried by the Department (firstly above) and the estimated amounts of grants recommended (secondly above). If this could be done under an arrangement which would relieve the Department from all future responsibility and if this arrangement would expedite the taking over of the Feeder by the municipalities, I can see no objection to it. There would be a decided advantage to the municipalities if they were free to locate and entirely carry out, the drainage works needed for the drainage of their lands. For example, without questioning, in any way, the effectiveness of the work proposed herein, I would expect that if, instead of improving the Feeder for a distance of about [?] miles west of Beaver Creek,

the same amount of money was allocated towards the cost of a new drain to be located in the lower lands [?] of the Feeder, the ultimate benefit to the lands would be greater than if the said work in the Feeder were to be carried out.