RECONSIDERED
DRAINAGE REPORT
FOR THE

COLE DRAIN, CUT-OFF DRAIN & COLE DIVERSION DRAIN BRANCHES A & B

CORPORATION OF THE
CITY OF SARNIA

DILLON
CONSULTING

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Drainage Report for the
COLE DRAIN, CUT-OFF DRAIN & COLE DIVERSION DRAIN BRANCHES A & B
Corporation of the City of Sarnia

Consideration of Final Report Dated June 27, 2019

The meeting to consider the final report for adoption was held on 5 December 2019 in the City of Sarnia Council Chambers. Following the engineer's presentation of the report, discussion ensued from several landowners in attendance. The first item raised by Arlanxeo Canada Inc. pertained to the extensive drain repairs through their property where the Cut-Off Drain outlets and their high assessment associated with these costs.

Arlanxeo representatives were not opposed to the drain being incorporated, however they did inquire if any other options could be explored, with prioritization being given to repairs of the most deteriorated sections and/or possibly staging the repairs over multiple years. It was also expressed that Arlanxeo's site operations have changed with partial decommissioning of their facility and subdividing the property into several parcels for sale or lease. In terms of a drainage outlet via the Cut-Off Drain, the industrial site has an internal storm sewer system that conveys the majority of the site drainage on the south side of the drain directly into the St. Clair River. The outlet assessment should reflect this.

The next item shared by several upstream landowners was concern over the selective improvements being recommended to the Cole Drain, specifically the two stage approach to prioritize and presently replace some undersized driveway access culverts while leaving the majority of the other undersized culverts as future replacement within the next 5 years. It was acknowledged that costs continue to rise and to achieve the ultimate improvement to the drain will cost each landowner more if the necessary work is delayed.

City of Sarnia officials decided to table their recommendation to adopt the report and subsequently agreed to continue discussions with Arlanxeo Canada Inc. given the present circumstances involving land use changes.

Follow up Discussions with Arlanxeo Canada Inc.

As a follow-up, two additional meetings were held between Arlanxeo Canada Inc., City officials and the Engineer during February 2020. This included a site visit to ascertain the rate of deterioration of the existing concrete channel and to compare the present

condition of the drain to when it previously examined in August 2009.

The area of spalled concrete damage has noticeably increased with continued erosion over the 10+ years. However, the cracks within the concrete channel side banks and its geometry remain relatively unchanged over this time period. The seasonal freeze and thaw cycles have also contributed to the growing spalled concrete surfaces. Inevitably, the concrete channel will continue to weaken and pose a greater risk of structural failure if repairs are not made soon.

An alternative means of repair was proposed that considers new and innovative technologies deemed suitable for this type of application. A geosynthetic cementitious composite mat known as "Concrete Cloth" when affixed to an existing concrete channel having a relatively smooth uniform surface and stable foundation is available at a significantly lower material and handling cost compared to other heavy duty erosion control products. The installation is fast and the product also offers the flexibility to work around obstacles such as screens, catwalks and lateral piping that either cross over or protrude through the sides of the channel. The Concrete Cloth can also be used to extend the life span of corrugated steel pipe culverts reducing the rate of degradation. Furthermore, the drain channel's capacity is returned back to equal to or better than original conditions with the use of the Concrete Canvas overlay.

Arlanxeo representatives had also commented that historically, they have regularly monitored and ensured that drainage flows for the outlet of the Cut-Off Drain have been maintained. This includes the removal of any obstructions found at the two existing screens within a timely manner. The screens across the drain channel we understand are required for both safety and security reasons, however they add an increased level of maintenance. The City acknowledges these aspects and concurs these practices may continue despite its responsibility to maintain the entire municipal drain on behalf of all lands dependent on the Cut-Off Drain for a legal drainage outlet.

Arlanxeo further suggested that a phased in approach to the channel repairs be considered that would expand the time frame for the necessary work to be completed in sections on a priority basis. This approach would reasonably spread the cost commitments over time to be more manageable. With this consideration, the rate of degradation to the concrete channel over the last 10 years would need to be assessed. It was understood that the Engineer would ultimately make the recommendation on the preferred course of action.

Referral of Final Report Back to Engineer for Reconsideration

As a follow up to the February 2020 meetings with Arlanxeo Canada Inc., the City expressed to them that if this alternative repair method is considered, as outlined above, the responsibility for the additional design and report amending costs associated with the Cut-Off Drain would be borne by Arlanxeo. The City of Sarnia would also require a formal request from Arlanxeo in order to instruct the Engineer to consider amendments to the drainage report as they specifically relate to the Cut-Off Drain.

The formal request from Arlanxeo was received on 24 February 2020 and subsequently, on 28 February 2020 the City referred the final report back to the Engineer in accordance with Section 57 of the Drainage Act. It entailed the revised report consider both the alternative repair recommendation for the Cut-Off Drain's concrete channel as well as to include additional improvements to the Cole Drain with the replacement of all undersized access culverts and associated drain deepening to facilitate these works.

Changes to Original Report

The following changes have been made to the original report:

- Cut-Off Drain's existing concrete outlet channel from Station 1+004 to Station 1+473 to be repaired using a Concrete Canvas overlay in place of the Cable Concrete articulating block mat as originally recommended. A significant cost savings of nearly $1 million dollars and the manufacturer of the Concrete Canvas stipulates a 120 year lifespan may be expected from this product.
- Bridge No. 1 crossing the Cut-Off Drain from Station 1+271 to Station 1+294, consisting of two 2.44 m diameter corrugated steel culverts 23 m long each, to be remediated using a Concrete Canvas liner in place of slip lining the culverts with smaller 2.00 m diameter polyethylene pipes, as originally recommended. The Concrete Canvas will not raise the invert elevation of the culverts beyond that of the canvas lined channel, therefore resulting in no impediment to flows or increased standing water within the channel. It is recognized that the canvas liner is a temporary repair for these culverts at a much lower cost to remediate and extend the bridge's lifespan. Given the necessary requirements to accommodate the overhead processing pipes, when the time comes for the required full replacement of the culverts, the bridge owner may elect to replace the culverts sooner before signs of pipe deformation become visible. The costs of which are the responsibility of the bridge owner.
- Watershed area adjustment made to Roll No. 4-50-888 (Arlanxeo Canada Inc.) reducing it to 5.00 hectares from the previous 33.29 hectares and including a lower outlet assessment.
- Cole Drain from Station 6+275 to Station 6+850 and from Station 7+150 to Station 7+950 to be regraded to accommodate all access bridge replacements.
- Additional access bridge replacements and upsizing - Cole Drain Bridges No. 20, 21, 22, 25, 26, 27, 28, 29, 30, 31 & 37 have been included along with the previous Bridges No. 24, 32, 33, 34, 35, 36 & 38 that were originally recommended for immediate replacement.

Original Instructions

a) Petition Under Section 4

The City of Sarnia originally received a petition from BP Canada Energy Company (BP Canada which has since been acquired by Plains Midstream Canada U), under Section 4 of the Drainage Act, for the incorporation of two existing private open drains under the provisions of the Drainage Act of Ontario.

Currently, these two private open drains extend along the southerly limit of the railway property separating the property owned by Plains Midstream Canada U and the Canadian National Railway (CN Rail) property, located in Concession 4, City of Sarnia. They both are tributary drains of the Cole Drain at its most downstream end where it enters the Cut-Off Drain. In the past, one of the drains in question has been referred to as the Cole Diversion Drain. However, we understand that this drain does not have any current status under the provisions of the Drainage Act. Prior to the acquisition of the BP Canada property by Plains Midstream Canada U, we understand that some minor drain maintenance was undertaken by BP Canada.

The purpose of the petition is to have these two existing private drains incorporated as municipal drains under the provisions of the Drainage Act. This would provide a legal means of outlet for Plains Midstream Canada U and provide the City of Sarnia legal authority to access private property and maintain these drains in the future for the benefit of the adjoining property owners, being primarily Plains Midstream Canada U and CN Rail. The City of Sarnia would also have a mechanism to assess the maintenance costs against the affected lands and roads, in a fair and equitable basis. In addition to incorporating the existing open drains under the Act, some additional improvements are necessary to provide a sufficient outlet, including brushing, deepening of drain, bridge replacements, erosion protection associated thereof. In the context of this report, the proposed new drains are referred to as the Cole Diversion Drain Branches 'A' & 'B'.

Section 78 Request

Subsequent to receiving the Section 4 instruction, the City of Sarnia also received separate written requests from BP Canada (now known as Plains Midstream Canada) and the City Engineer representing the City of Sarnia under Section 78 of the Drainage Act, asking for the repair and improvement of the portion of the Cole Drain located within the City of Sarnia and the entire length of the Cut-Off Drain. The basis for these requests is attributed to the poor hydraulic performance experienced along portions of the Cole Drain and the Cut-Off Drain, including the various access bridges specifically located on the Cole Drain along Plank Road, downstream of Gladwish Drive, which have resulted in periodic flooding events. Consequently, improved drainage measures are required on both the downstream portion of the Cole Drain within the City of Sarnia and the Cut-Off Drain.

b) Council Resolutions

Council accepted the petition under Section 4 and the requests under Sections 78 of the Drainage Act and on 18 November 2008 appointed Dillon Consulting Limited under the provisions of the Drainage Act.

Dillon Consulting Limited completed a Preliminary Drainage Report in December 2012, which provided additional information to Council and the affected ratepayers as to the potential extent of the works required and the magnitude of the costs involved, before completion of a final report. Also provided was a preliminary breakdown of the magnitude of the assessments that would be made against the affected lands and roads.

Subsequent to the preliminary report, Dillon Consulting Limited has been instructed to prepare a final report based including detailed design, recommendations, drawings and assessments. The final report generally addresses the recommended improvements to the Cole Drain and Cut-Off Drain as previously set out in the preliminary report. Some additional improvements were considered upon closer examination of existing conditions.

Drawings

This report is comprised of various detailed design drawings which form part of the design process and subsequently form part of the report. The drawing package includes watershed plans showing property ownership, general location plans showing access bridge locations, detailed plan and profile sheets, and construction detail drawings. The drawings are included as part of this report and are attached.

Study Area

The attached drawings identify the location of the Cole Drain, the Cut-Off Drain and the proposed Cole Diversion Drain Branches 'A' & 'B', and their associated watershed areas. The portion of the Cole Drain within the City of Sarnia is located along Plank Road and flows in a northwest direction. Although the head of the Cole Drain is located in Lot 13, Concession 1 within St. Clair Township, the extents of the drainage works being considered for improvement under this report lies solely within the City of Sarnia. The Cole Drain outlets into the Cut-Off Drain just upstream of Indian Road after crossing Plank Road. The Cut-Off Drain is comprised of an open drain which extends downstream, in a westerly and southerly direction, which eventually outlets into a private drainage works located on the property owned by Arlanxeo Canada Inc., eventually discharging into the St. Clair River. The proposed Cole Diversion Drains comprised of Branches 'A' & 'B', are located in Concession 4 in the City of Sarnia, and flow in a westerly direction and outlet into the Cole Drain at Plank Road.

Watershed Description

At present, the overall drainage area, which is bounded as shown in the accompanying plans, is serviced by two major drains and their tributaries; namely the Cut-Off Drain and its major tributary, the Cole Drain. The Cole Drain is partially located in St. Clair Township and the City of Sarnia, while the Cut-Off Drain and the proposed Cole Diversion Drain Branches 'A' & 'B' are located entirely in the City of Sarnia.

The Cut-Off Drain is an open channel that runs primarily through existing industrial lands within the City of Sarnia. This municipal drain commences in the vicinity of Indian Road and flows generally in a westerly direction terminating on the west side of Vidal Street at the head of a private drain, which extends downstream through the Arlanxeo Canada Inc. property for a distance of approximately 900 m. This private drain conveys flows derived from the Cut-Off Drain by means of a concrete lined open channel prior to entering a private twin 1830 mm diameter concrete sewer outfall which discharges into the St. Clair River. This private drainage system also includes a concrete outfall chamber and submerged outfall into the St. Clair River.

The Cut-Off Drain serves approximately 1,753 hectares (4,332 acres) of lands in total including 3,904 acres within the City of Sarnia and 428 acres within St. Clair Township. The total length of the Cut-Off Drain is approximately 4,777 metres long to be extended to a full length of 6,250 metres with the incorporation of the private drain portion at the outlet to the St. Clair River.

The Cole Drain serves approximately 805 hectares (1,990 acres) of lands in total including 1,562 acres within the City of Sarnia and 428 acres within St. Clair Township. The total length of the Cole Drain within the City of Sarnia is approximately 4,975 metres long.

The Cole Diversion Drain Branch 'A' serves approximately 108 hectares (268 acres) of lands within the City of Sarnia. The total length of the Cole Diversion Drain Branch 'A' is approximately 1,450 metres long. The Cole Diversion Drain Branch 'B' serves approximately 17 hectares (42 acres) of lands within the City of Sarnia. The total length of the Cole Diversion Drain Branch 'B' is approximately 170 metres long.

Public Meetings

We conducted an on-site meeting in the form of a Public Meeting on 28 July 2009. The meeting was held at the City of Sarnia administration building. The purpose of the meeting was to inform the public on the study and process which will be followed in accordance with the Drainage Act. A record of the meeting has been provided in Schedule "A-1", which is attached hereto.

A second meeting was held on 27 February 2013. The purpose of the meeting was to inform the public of the findings from the Preliminary Drainage Report, and to receive further input for consideration in the development of the final report. A record of the meeting has been provided in Schedule "A-2", which is attached hereto.

Survey and Examination

Our detailed survey and examination of the Cole Drain, Cut-Off Drain and proposed Cole Diversion Drain Branches 'A' & 'B' was carried out in August 2009. The detailed survey involved the documentation of topographic data along the various drainage systems. The topographic survey commenced at the outlet of the private outfall chamber, which forms part of the private enclosed drainage channel which discharges into the St. Clair River, located on the Arlanxeo Canada Inc. property. The survey then proceeded upstream along the alignment of the private enclosed drain and subsequent private concrete channel, also located on the Arlanxeo Canada Inc. property to the outlet of the Cut-Off Drain located on the westerly side of Vidal Street. Subsequently, the survey proceeded in a northerly and easterly direction along the alignment of the Cut-Off Drain to the head of the drain and outlet of the Cole Drain, located on the easterly side of Indian Road. The survey then proceeded along the alignment of the Cole Drain crossing Plank Road and continuing along the south side of Plank Road to the head of the drain located just west of Waubuno Road in St. Clair Township.

The existing road crossings and private access crossings located along the alignment of these drains were surveyed and examined in an effort to determine their hydraulic capacity and structural condition.

Sufficient topographic survey data was collected to undertake a detailed hydrological and hydraulic analysis on the open channel, drain enclosures, road crossings and private access bridges associated with the Cole Drain and Cut-Off Drain. Rainfall runoff rates were subsequently established which in turn permitted the capacity of the existing channel and pipe enclosures and bridges to be determined.

A supplemental survey was conducted in August, 2014 to collect further topographical information pertaining to the proposed Cole Diversion Drain Branches 'A' & 'B'.

In order to characterize the nature of the sediment found within the bottom of the Cut-Off Drain, a preliminary soil sampling program involving a laboratory analysis of the sediment was performed.

History of the Cole Drain & Cut-Off Drain

Provided is an historical summary of the various Engineers' drainage reports performed under the Drainage Act and the other studies performed on the Cole Drain and the Cut-Off Drain:

a) 1909 to 1920

The original Cole Drain was constructed sometime in 1909-1910 under By-law 90-C of the Township of Sarnia as per a report by C.A. McCubbin, O.L.S., P. Eng., dated September 1909. At that time, a field survey was carried out and the lands deriving benefit from the drain were assessed accordingly.

Prior to the construction of the Cole Drain, natural drainage channels provided a degree of drainage for the watershed area. These channels discharged into the "Fourth Line Drain" which was considered a drainage ditch running parallel to the Fourth Line, otherwise known as Confederation Street in the City of Sarnia (i .e. West of Indian Road). The Fourth Line Drain eventually discharged into the St. Clair River.

As a result of land development in the vicinity of Confederation Street, various bridges were constructed over the Confederation Street Drain. Consequently, the hydraulic performance of the drain became compromised over time as a result of the numerous bridges which were constructed in the drain. In order to resolve this issue, the City of Sarnia constructed, prior to 1909, a "Cut-Off Drain" to manage a portion of the stormwater flows derived from the upstream lands located in the Township of Sarnia.

This drain extended from the outlet of the Cole Drain at the Grand Trunk Railway (now Canadian National Railway) near the crossing at Indian Road, downstream, in a westerly direction, through the Indian lands (now Imperial Oil), across Vidal Street, down Clifford Street eventually discharging into the St. Clair River.

A dispute over liabilities and assessments between the City of Sarnia and the Township of Sarnia arose over the outlet of the drain, which resulted in litigation proceedings in 1910. The Township was given the right of using the Cut-Off Drain as its outlet for the Cole Drain and was compelled to pay a reasonable sum (Cole Drain By-law 28-F, 1931) to the City for this right since the City had obtained the necessary rights-of-way and had in fact constructed the Cut-Off Drain. The City was given the right of using the Fourth Line Drain as its own municipal drain (Confederation Street Drain) except for the provision of servicing a few hundred acres of Township land lying north of the railway tracks and east of Indian Road.

The original Cut-Off Drain was north of its current location. The drain was an open channel with a timber outfall structure, extending along Clifford Street and discharged into the St. Clair River.

b) 1921 to 1930

The first documented drainage system to serve the area was known as the Cole and Cut-Off Drains. In 1924, the Cole Drain ratepayers petitioned the Township of Sarnia Council under the Drainage Act for the repair and improvement of the Cole Drain. The Cole Drain was located in the Township of Sarnia while the Cut-Off Drain was located entirely within the limits of the City of Sarnia. The Township of Sarnia was the initiating City and appointed W.G. McGeorge, C.E. to prepare a report under the provisions of the Drainage Act. The report included the repair and improvement of the Cole Drain and its outlet, the Cut-Off Drain, west to Vidal Street along Clifford Street. Work on the Cut-Off Drain downstream in the City of Sarnia was required to take the Cole Drain to a sufficient outlet as required by the Drainage Act. The report also included a new bridge being constructed at Scott Road. The McGeorge report officially designated the Cole

Drain and Cut-Off Drain as municipal drains under the Drainage Act.

Subsequently, the Cole Drain By-law No. 38-E of 1924 was passed by the Township of Sarnia Council allowing the repair and improvement to be completed on the drain, with the costs being assessed to the owners on the Cole Drain and the Cut-Off Drain. All works were implemented at that time.

c) 1931 to 1940

In 1931, the Canadian National Railway petitioned for repairs to the Cole Drain and Cut-Off Drain due to flooding that was experienced in the Canadian National Railway yards. In 1934, Imperial Oil Limited suggested to the Township of Sarnia that consideration should be given to diverting the lower reaches of the drain due to the fact that part of the drain was located on the Clifford Street property and that there was a possibility of flood damage to future refinery developments on adjacent lands.

Thus in 1934, the Council for the Township of Sarnia requested that W.C. McGeorge, O.L.S., and C.E. prepare a drainage report for the Cut-Off Drain. The report recommended the relocation of the drain to a new location which was further south of its original location on property which is currently owned by Arlanxeo Canada Inc.. The drain included the construction of an open channel, timber outfall and retaining structures. The cost of the work was shared by the abutting landowners with no upstream assessment.

In addition to the drainage improvements undertaken, new bridges were constructed at the Pere Marquette Railway tracks (presently the C&O tracks) in the River Range, at Vidal Street, at Tashmoo Avenue and at Clifford Street. The work also included new drainage tiles along Vidal Street. By-law No. 61-F of 1934 was prepared and passed for the financing of the works and assessment of costs against the properties fronting along the new diversion channel. The estimated cost of the work was $50,000. All works were implemented at that time.

d) 1941 to 1950

Minor drainage cleanouts were carried out in 1942 to the Cut-Off Drain, east of the Imperial Oil fence, and to the Cole Drain east of Indian Road. By-law No. 33 was prepared and passed for the financing of the works and assessment of properties in the Cole Drain watershed.

Polymer Corporation Limited, a Canadian Federal Crown Corporation, was established in 1942 to produce artificial rubber, which acted as a substitute for supplies cut-off by World War II. In 1942, Polymer Corporation Limited inquired as to the possibility of adding water to the Cut-Off Drain and were advised that if their additions caused backup onto upstream owners, then possible liability would ensue.

Also in 1942, the portion of the Cut-Off Drain, located west of Vidal Street, was relocated by moving it further north, to its present location on the Arlanxeo Canada Inc. property. The drain was relocated by Polymer Corporation, at its sole expense. The re-location of the drain consisted of an open concrete channel, extending downstream immediately west of Vidal Street. The drain relocation also included a twin 1830 mm diameter concrete pipe enclosure (approximately 380 metres long) discharging directly into the St. Clair River. This section of the drain was, and still is, used both as an outlet for storm runoff from adjacent lands and from the Cut-Off Drain and Cole Drain

watershed areas, as well as an outlet for industrial cooling water and treated process flows derived from neighbouring industrial properties.

The Township solicitor at that time had suggested that the system should be constructed and incorporated under Section 77 of the then Municipal Drainage Act (now Section 78). A thorough search of the records has established that there is no evidence that this was ever done. Therefore the entire section between Vidal Street and the St. Clair River was assumed to be a private drain and is not at present, officially part of the municipal drainage system known as the Cut-Off Drain.

In 1971, the Polymer Corporation site was sold to the Canada Development Corporation, a government controlled enterprise. It was renamed to Polysar in 1976 and the rubber component became a subsidiary, Polysar Rubber Corp. The company was privatized in 1988 with its sale to Nova Corp which in turn, sold Polysar Rubber in 1990 to Bayer AG of Germany. In 2005, Bayer AG created Lanxess Inc. also of Germany. Arlanxeo Canada Inc. is the current owner of this private drain, located west of Vidal Street, which acts as the outlet for the Cut-Off Drain into the St. Clair River.

e) <u>1951 to 1960</u>

In 1951, several Township ratepayers petitioned the Township of Sarnia to "bring in a report in order that the Cole Drain may be put in condition to take care of water which accumulates in the drainage area".

J.C. Monteith, O.L.S. and C.E. prepared a report for the cleanout of portions of the Cole Drain and the Cut-Off Drain. Subsequently, a By-1aw No. 91-R of 1951 was adopted and passed and the required improvements were carried out with the cost being assessed to all owners in the Cole Drain area and also a small portion of the cost being assessed to some owners west of Indian Road which was at this time part of the City of Sarnia.

In 1952, the Polymer Corporation requested and received permission to construct a trash rack in the Cut-Off Drain, located immediately west of Vidal Street. Both the City and the Township gave permission to Polymer Corporation Limited, on condition that the trash rack would be removed on request and also that Polymer Corporation Limited would be financially responsible for any damage caused by the restriction of flow in the drain as a result of the trash rack.

In 1952, the Township complained about the limited capacity of the two 1829 mm diameter pipes crossing below Indian Road and informed the City that the Township would hold the City responsible for any flooding caused in the Cole Drain area due to lack of capacity of the Indian Road bridges. (It was noted that these pipes gave only half the capacity of a former concrete structure.)

In 1953, Imperial Oil requested permission to construct a diversion in the Cut-Off Drain, comprised of a 250 feet square reservoir which included an inlet and outlet pipe capacity of 175 cubic feet per second. Upon receiving approval from both the City and the Township, the construction of these works was undertaken by Imperial Oil Limited.

The question of limited capacity was again raised in 1957 by the Township in a letter to the Canadian National Railway and subsequently a 1219 mm diameter corrugated metal culvert was installed in conjunction with the aforementioned two 1829 mm diameter bridges.

In 1957, twin 2440 mm diameter CSPs (approximately 22 metres long) were constructed in the concrete channel at Polymer's then new Second Street crossing. As a result of the deterioration of the bottom portion of these pipes, the pipes were relined accordingly.

The portion of the Cole Drain downstream of Kimball Road was last improved under a report dated November 13, 1956. The open channel was moved off of the road allowance onto abutting private lands. The drain was enclosed with pipe for 113 metres downstream of Kimball Road.

The portion of the Cole Drain upstream of Kimball Road was last improved under a report by J.A. Monteith dated November 5, 1957. The open channel was moved off the road allowance and onto abutting private lands. The drain was enclosed with pipe for 53 metres upstream of Kimball Road.

A portion of the Cole Drain in the vicinity of Kimball Road and Churchill Line is enclosed by means of an 1829 mm diameter pipe enclosure extending over a distance of 225.6 m. A portion of this enclosure, comprised of 166 metres in length, was installed on private lands as part of the drainage works and at the sole expense of the Road Authority.

f) 1961 to 1967

In 1963, concrete and steel reinforcement repairs were carried out on the twin 1830 mm diameter enclosure west of Vidal Street. The repairs were done over most of the length of the south 1830 mm diameter concrete pipe. This repair was over about a 1 metre width of the invert of the pipe.

In 1967, the Township requested that the City undertake the repair and improvement of the Cut-Off Drain so as to prevent flooding east of Indian Road in the Cole Drain area.

g) McLaren Report – 1968 to 1969

In 1968-1969, J.F. McLaren Limited, Consulting Engineers, prepared a report on the "Sewerage and Drainage for the City of Sarnia and Sarnia Township". The report included a comprehensive drainage study which made the following long term recommendations regarding the Cut-Off Drainage District:

1. That an alternative culvert for the twin 1830 mm diameter bridges located under the C&O Railway tracks (west of Polymer Corporation) be constructed because these pipes were restricting flow.
2. That a new outlet channel be constructed between the aforementioned proposed culvert and the St. Clair River.
3. That a portion of the existing Cut-Off Drain be diverted extending from the Scott Road tank farm area to the Canadian National Railway tracks.
4. That the existing grass lined channel between Indian Road and the above mentioned diversion be deepened and widened.
5. That the new diversion be constructed (along with the related trestles and bridges) to the same dimensions, slopes and design capacities that were used for the existing grass lined channel in Item No. 4.
6. That the channel west of the proposed diversion be lined with concrete, extending up to the point of juncture with the existing concrete channel at

the Polymer Corporation property. Due to space limitations within some areas of the Imperial Oil plant, a vertical walled channel or equivalent would be necessary.

7. That numerous process pipe crossings of the channel be raised over the channel so that no possible restriction to flow would occur during high flow rate (runoff) periods.
8. That the twin 1830 mm diameter and one 1219 mm diameter bridges, located at the Indian Road crossing be replaced by a properly designed box culvert.
9. That the Cole Drain, east of Indian Road, be deepened to permit free discharge of some future tributary storm sewers.
10. That a portion of the Cole Drain be diverted parallel and south of the Canadian National Railway tracks for approximately 1¼ miles east of Indian Road.
11. That several major trunk drainage channels are constructed which would be tributary to the aforementioned Cut-Off and Cole Drains.

All of the above recommendations were based upon actual field measurements in conjunction with micro drainage studies. Drainage area boundaries were set in the report. It is interesting to note that the land for the Cole Drain diversion could not be successfully acquired. In 1982, the proposed Cole Drain diversion was abandoned as a decade of land acquisition attempts met with almost unanimous negative response and the need for a major outlet north of Gladwish Drive was no longer required due to further land purchases by Dome Petroleum.

There were also some immediate recommendations that were made in the McLaren Report. These were:

1. Portions of the Cut-Off Drain be cleaned and reshaped.
2. A diversion be constructed to by-pass the Imperial Oil pond at Scott Road.
3. The replacement of the bridges across Indian Road with a box culvert, in order to reduce the risk of upstream flooding as a result of ice and debris blocking the existing bridges.

Recognizing the urgency of the problem presented by the existing conditions in the light of present and future developments, the Municipal Council of the City of Sarnia had budgeted a sum in 1969 for improvements to the system.

h) Nisbet, Letham Ltd. Report – 1969 to 1971

The firm of Nisbet, Letham Ltd., Consulting Engineers were retained to prepare a detailed drainage report for the City of Sarnia under the Drainage Act 1962-63. This was subsequent to a notice from the Township of Sarnia dated October 19, 1967, giving notice that flooding was occurring around the Cole Drain in Sarnia Township to the east of Indian Road. A Sarnia City Council motion dated October 20, 1969, instructed Nisbet, Letham Ltd. to prepare a drainage report on the Cut-Off Drain. This report was finally presented to Sarnia City Council, after many revisions, on September 16, 1971. This report was twice read before Sarnia City Council, but never given a third reading and finally adopted. This report made the following recommendations:

1. Replacement of the bridges across Indian Road with a box culvert to provide sufficient outlet for the Cole Drain, as requested by Sarnia Township.
2. The cleanout of the drain between Indian Road and Scott Road and between Clifford Street and Vidal Street in order to provide the immediate required channel capacity.
3. The construction of a drain diversion between Scott Road and Clifford Street around Imperial Oil lands in order to provide sufficient channel capacity (at that time restricted by obstructions) and to avoid pollution of the drain.
4. The construction of an enlarged culvert under Vidal Street. This was completed during the reconstruction of Vidal Street in 1970 and 1971.
5. The pipe obstructions be removed from that portion of the drain not being diverted in order to give a clear channel section. This included a concrete culvert at the CN Railway Crossing (located at Scott Road) and a concrete culvert at St. Andrew Street.

The estimated cost of the work was $503,177.00. The work contained in this report was not carried out.

i) 1972 to 1980

While the 1971 report was not finally passed the process was revived in 1978. Acting upon the original notice from the Township of Sarnia dated October 19, 1967, the City of Sarnia instructed Nisbet, Letham Ltd. to prepare another report for improvements to the Cut-Off Drain. That report was dated November 30, 1978 (revised February 1979). The recommended improvements were:

1. The three (3) bridges (twin 1830 mm diameter & one 1219 mm diameter corrugated steel pipes) at the Indian Road overpass were replaced with a 6.1 m span by 3.4 m rise concrete culvert.
2. The open drain was cleaned out from Indian Road, downstream to the point where it turns at Scott Road.
3. Some channel realignment was carried out both upstream and downstream of Indian Road to connect the drain to the new road crossing.

The estimated cost of the work was $413,400.00. The works contained in this report were implemented accordingly.

j) 1981 to 1990

In 1982, a 10 metre portion of the twin 1830 mm diameter concrete pipe enclosure was removed at the outlet of the St. Clair River. A new reinforced concrete outfall chamber was constructed in order to accommodate the twin 1830 mm diameter concrete pipe enclosure, as well as facilitate the introduction of industrial process flow at this location.

Approximately 74 metres of 3048 mm diameter pipe was also installed downstream of the outfall structure to act as an outfall pipe. This pipe is submerged and outlets into the St. Clair River some distance off shore. This work was undertaken for environmental considerations and was not needed for drainage purposes.

All works described herein were undertaken by the property owner of the lands currently held by Arlanxeo Canada Inc.

k) 2000 MIG Engineering Report

In 2000, P. Meharg of MIG Engineering Ltd. completed a drainage report, dated December 20, 2000, which attempted to incorporate the private drainage system, comprised of the concrete channel, twin pipe enclosed sewer, outfall chamber and submerged outfall which currently serves as the outlet for the Cut-Off Drain, through the Arlanxeo Canada Inc. property into the St. Clair River.

The report refers to the repair and improvement of the concrete lined open channel which extends downstream, west of Vidal Street, through the Arlanxeo Canada Inc. property. The existing channel was noted to be comprised, for the most part, of a concrete lining that was constructed in 1942. The concrete lining was considered in disrepair at the time the report was prepared in 2000. The estimated cost of the work to repair this portion of open drain was estimated to be $850,000.00.

A detailed summary of the report's recommendations are as follows:

1. A new concrete block lining extending from the west side of Vidal Street westerly to the inlet of the twin 1829 mm diameter concrete pipe enclosure located at the C&O Railway crossing, for a distance of 470 m.
2. The construction of a relocated trash rack.
3. The repair of a twin 2440 mm diameter corrugated steel pipe enclosure mid-way across the Arlanxeo Canada Inc. property.
4. Modifications to existing abandoned and active pipe inlets into the open channel.
5. Incorporation of the private drainage system extending across the Arlanxeo Canada Inc. property, comprised of the concrete channel, twin pipe enclosed sewer, outfall chamber and 1830 mm submerged discharge pipe as part of the Cut-Off Drain in accordance with the Drainage Act.
6. For the purpose of determining a compensation value for incorporating this private drainage system as part of the municipal drain, the MIG report considered the fact that the original drainage facility constructed as a result of the 1934 report along Clifford Street was deemed to be adequate for the purposes of the upstream watershed. Since the original construction of the drain, it is assumed that some minor maintenance of an open channel in terms of cleanouts, and reconstruction of the outlet works would have occurred. The past expenditure, based on 2000 Year dollars, was estimated to be $141,000.00. The depreciated value of this expenditure is considered to be much less. As a result, the MIG report recommended that Bayer Inc. (now Arlanxeo Canada Inc.) be provided an allowance of $1 as compensation for this private drainage system based upon the fact that the existing facility was largely 58 years old in the year 2000 and was originally funded by a Federal Crown Corporation and not Bayer Inc. directly.

Although the 2000 report was never adopted and the works did not proceed, the landowner proceeded to privately install a safety rack on the inlet headwall structure to

the twin 1830 mm concrete pipe enclosure and a trash screen within the concrete channel immediately downstream of Vidal Street.

l) 2003 Report of Ray Dobbin

The Council of the City of Sarnia instructed Ray Dobbin, P.Eng. to prepare a report under Section 78 of the Drainage Act, for the repair and improvement of the Cole Drain. That report was dated February 28, 2003. The section of the Cole Drain repaired and improved extends from Indian Road, upstream along the north side of Plank Road for a short distance and then along the south side of Plank Road to the City of Sarnia boundary, then continuing along the south side of Plank Road into St. Clair Township, as far as, the centre of Lot 13 Concession 1, St. Clair Township (former geographic Township of Moore). The estimated cost of the recommended work was $477,624.

The recommended work on the Cole Drain was as follows:

1. The existing open channel was maintained with minor improvements to the design grade, extending from Indian Road upstream to Kimball Road.
2. The existing open channel was maintained to original design grade, extending from Kimball Road upstream to the head of the drain in the centre of Lot 13, Concession 1 in St. Clair Township.
3. All access bridges from McGregor Road upstream to Modeland Road that were smaller than 2200 mm in diameter or were above the proposed gradeline had been replaced with an access culvert with a minimum 2200 mm dia. corrugated steel pipe (or to an equivalent 2500 mm x 1830 mm corrugated steel pipe arch).
4. The road/access/yard culvert extending from the upstream side of Kimball Road downstream to Churchill Line was replaced. That included the replacement and extension of the inlet pipe located on the west side of Kimball Road.
5. The existing access bridges located at Roll No. 4-51-299 (Kel-Gor Ltd.), Roll No. 4-51-29505 (Delcor Seaway Inc.), Roll No. 4-51-247 (1317513 Ontario Ltd.), and the access bridges downstream of McGregor Road to Roll No. 4-51-2201 (Enbridge Pipelines Inc.) were incorporated as part of the drain.
6. The access bridges from Kimball Road upstream to the head of the drain were to be maintained by the drainage area or replaced as required.
7. The existing bridges located between Kimball Road and McGregor Road that were not replaced in that report or designated in item No. 5 as part of the Cole Drain shall not become part of the Cole Drain. Those bridges are to be maintained by the Owner of the access culvert to the satisfaction of the Drainage Superintendent responsible for the maintenance of the Cole Drain.

   When replacement of the access bridges becomes necessary in the future, they were to be replaced under a new Engineers Report to the specifications contained in this Report.

In regards to the design standard for the access bridges, Mr. Dobbin sent a letter to Council dated November 23, 2002 that clarified the rationale for the culvert hydraulic design. That letter contained the following paragraph:

> *"The design of the access bridges between McGregor Road and Kimball Road are based upon those specified in the original Reports for the Cole Drain dated in 1956 and 1957. The drainage area has changed significantly with residential, commercial, and industrial development. The standard design criteria for open municipal drains are a 1 in 2 year storm. A preliminary report dated February 18, 2002 was presented to the ratepayers that contained a design for access bridges based on approx. 70% of the 1 in 2 year storm design (estimated cost - $800,318.00). It was agreed among all those present that the drainage works should be restored to the original design by replacing all bridges below the original size 7 foot dia.) and all those bridges that are above the open channel grade (estimated cost = $444,281.00).* ***This is probably less than a 1 year storm event.***"

A total of ten (10) access bridges located between McGregor Road and Kimball Road were replaced to that standard under the February 28, 2003 Dobbin report.

Existing Conditions

a) Private Portion of Drain Across Arlanxeo Canada Inc. Property

At Station 0+620, located on the east bank of the St. Clair River, a large reinforced concrete outfall chamber and associated building were constructed in 1982. Also at that time, 74 m of 3048 mm diameter corrugated steel pipe was installed from the outfall chamber at Station 0+620, downstream, westerly to Station 0+546. This pipe is submerged in the St. Clair River. The outfall chamber was constructed to allow for mixing of treated industrial flows derived from the lands located west of Vidal Street with the flows derived from the twin pipe sewer enclosure. These flows then outlet into the 3048 mm diameter submerged outfall which discharges into the St. Clair River. The submerged outfall was constructed for environmental considerations (temperature dispersion). This pipe has been inspected by divers in recent years on behalf of property owner and found to be structurally adequate at the time of the inspection.

From Station 0+629 to Station 1+000, twin 1830 mm diameter concrete pipes were installed in 1942 to enclose the open drain. A video inspection of the twin pipe enclosure was carried out by Video Inspections Limited in 2004. The results of the video inspection confirmed that the enclosure was structurally adequate and in reasonable condition. At Station 1+000, a concrete headwall complete with inlet screen was recently installed which serves as a safety provision restricting manual entry into the twin pipe enclosure.

From Station 1+000 to Station 1+473, the drain is a concrete channel west of Vidal Street. Many sections of the concrete lining show evidence of surface deterioration, cracking and undermining behind the panels and as a result are in need of immediate reconstruction. There are many process lines extending across the drain. The area immediately adjacent to the north side of the drain is occupied with industrial piping and process equipment. Access along both sides of the drain for construction equipment is very limited. At Station 1+430, a pivoting trash screen exists, which serves to collect trash and debris in the drain upstream of the twin pipe enclosure located further downstream.

At Station 1+282, there is one private drain crossing consisting of twin 2440 mm

corrugated steel pipe bridges that are in a deteriorating condition and requiring repair or replacement in the near future.

b) Cut-Off Drain

From Station 1+473 to Station 1+710, the drain is an open channel and is lined with a manufactured concrete paver brick system on the upper west bank portion abutting the existing industrial property (H.C. Starck Canada Inc.) and the remainder of the channel is grass lined. Parts of the brick lined channel are undermined and in need of immediate repair and reconstruction as identified on the drawings between Stations 1+530 to 1+702.

From Station 1+710 to Station 2+775, the drain is a grass lined open channel. From Station 2+775 to Station 3+411 the open drain channel traversing the developed section of the existing industrial property (Imperial Oil Ltd.) has stone riprap lined drain banks. Beyond Station 3+411, the open drain continues as a grass lined channel upstream to Station 6+275. Our survey and examination of the drain identified that a portion of the Cut-Off Drain between Scott Road and Indian Road South (Station 4+400 to Station 6+000) was obstructed heavily with brush and trees. Since the survey, that portion of the drain was partially cleared of brush and trees. This resulted in noticeable improvement in upstream drainage experiencing a lesser degree of flooding to the lands within the Cole Drain watershed. Additional brushing and drain cleaning is required to establish a consistent gradient for the drain.

An examination of the open channel extending from Station 1+710 to Station 6+275 has identified an inconsistent channel bottom gradient. Excavation of the channel bottom is needed to provide a consistent gradeline for the channel and improved flow characteristics.

Along the course of the Cut-off Drain there are eighteen (18) existing drain crossings of various conditions from satisfactory to good condition. These structures include five (5) roadway crossings and three (3) railway crossings. The existing bridge at Station 1+784 requires removal as it has deteriorated and appears to be no longer required. At various locations, various steel walkway bridges and supports, as well as process piping extends across the drain. In certain locations, wire fencing also extends across the drain which is intended to deter trespassing. Due to the fact that the fencing is located within the operating cross-section of the channel, the fencing tends to accumulate brush and debris, which results in partial obstruction of the flows in the drain. A siltation fence is also located across the bottom of the drain in the vicinity of Station 2+225.

c) Cole Drain

The Cole Drain is an existing open drain extending from Station 6+275 to Station 11+225 within the City of Sarnia. There is generally light to moderate brushing required throughout this reach. A limited amount of excavation is required to provide a consistent channel bottom gradient. Over the past few years, periodic flooding has been experienced along the Cole Drain, downstream of Gladwish Drive, possibly due to the limited hydraulic carrying capacity of the existing access bridges and concentration of several drain crossings in close proximity within this specific reach of the Cole Drain. There have been periodic flooding problems documented along this portion of the Cole Drain before and after the most recent drain improvements from 2004.

Along the course of the Cole Drain within the City of Sarnia there are twenty-eight (28)

existing drain crossings and four (4) roadway crossings. In order to confirm the hydraulic carrying capacity of the drain and associated structures, a detailed hydrologic and hydraulic analysis of the Cole Drain, Cut-Off Drain and downstream private drain was undertaken as well as the bridge structures in them. The results are provided in a following section entitled "Hydrologic and Hydraulic Analysis".

Existing Road Bridges, Railway Bridges and Private Access Bridges

The various road crossings and private access bridges found in the Cole Drain, Cut-Off Drain and Cole Diversion Drain Branches 'A' and 'B' are as follows in Table 1 below:

Table No. 1 – Summary of Existing Bridges

Sta.	Bridge No.	Existing Culvert / Bridge
CUT-OFF DRAIN		
1+283	1	Two (2) - 2440 mm dia. CSP
1+583	2	9.0 m span by 2.9 m rise concrete bridge
1+679	3	9.0 m span by 2.75 m rise concrete bridge
1+731 (Vidal Street)	4	30 m - 9.6 m span by 2.9 m rise concrete bridge
1+782	5	7 m - 6.5 m span by 2.5 m rise concrete bridge
2+285 (Imperial Ave)	6	27 m - 5.2 m span by 3.3 m rise corrugated steel pipe-arch c/w concrete footing
2+651 (CN Rail)	7	9 m - 5.0 m span by 2.1 m corrugated steel pipe-arch c/w concrete footing
2+665 (CN Rail)	8	Wooden rail bridge with concrete abutments
* 2+725	9	8 m - 11.3 m span by 1.9 m rise concrete bridge
* 2+997	10	6 m - 13.4 m span by 1.66 m rise concrete bridge
* 3+008	11	13 m - 5.3 m span by 3.0 m rise corrugated steel pipe-arch
* 3+266	12	15 m - 6.1 m span by 2.3 m rise concrete bridge
3+678 (CN Rail)	13	5.5 m span by 3.1 m rise metal rail bridge
3+869 (Scott Road)	14	12 m - 6.1 m span by 2.8 m rise concrete bridge with concrete end walls

Sta.	Bridge No.	Existing Culvert / Bridge
* 3+928	15	10.4 m span by 2.7 m rise wooden rail bridge (abandoned)
* 4+002	16	4 m - 4.2 m span by 2.5 m rise concrete bridge
* 4+218	17	9 m - 4.4 m span by 1.65 m rise steel bridge
6+010 (Indian Road)	18	50 m - 6800 mm span by 4000 mm rise corrugated steel pipe-arch
6+262 (Plank Road)	19	31m - 3.0 m span by 2.4 m rise concrete bridge
1+180, 1+225, 1+255, 1+310, 1+455, 2+370, 2+490, 2+575, 2+720, 2+750, 2+990, 3+230, 3+410, 3+535, 3+830, 3+905		Various steel bridge / pipe support structures
COLE DRAIN		
6+431	20	15 m - 3250 mm span by 2300 mm rise corrugated steel pipe-arch
6+492	21	28 m - 3450 mm span by 2200 mm rise corrugated steel pipe-arch
6+662	22	16 m - 3450 mm span by 2200 mm rise corrugated steel pipe-arch
6+826 (McGregor Road)	23	12 m - 3000 mm span by 2300 mm rise concrete bridge
7+161	24	9 m - 2300 mm diameter boiler pipe with concrete liner
** 7+324	25	15 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
** 7+355	26	15 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
** 7+483	27	18 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
** 7+581	28	15 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
** 7+610	29	16 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch

Sta.	Bridge No.	Existing Culvert / Bridge
** 7+739	30	24 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
** 7+794	31	15 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
** 7+879	32	16 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
7+926	33	6 m - 2100 mm diameter CSP culvert
7+959	34	9 m - 2100 mm diameter CSP culvert
7+999	35	13 m - 2100 mm diameter CSP culvert
8+045	36	22 m - 2500 mm x 1900 mm CSP arch culvert
8+133	37	20 m - 3400 mm x 2100 mm CSP arch culvert
8+205	38	24 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
8+390 (Gladwish Drive)	39	12 m - 3.0 m span by 2.0 m rise concrete bridge
8+526	40	22 m - 2200 mm diameter CSP
** 8+588	41	15 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
8+696	42	10 m - 2400 mm diameter CSP
** 8+798	43	15 m - 2500 mm span by 1830 mm rise corrugated steel pipe-arch
9+026 (Hwy #40)	44	60 m - 2.4 m span by 1.8 m rise concrete box culvert
9+240 to 9+469 (Churchill Line & Kimball Road)	45	229 m - 1800 mm diameter CSP culvert
9+499	46	20 m - 1650 mm diameter concrete culvert
9+924	47	8 m - 1500 mm diameter CSP culvert
10+433	48	8 m - 1500 mm diameter CSP culvert
10+743	49	8 m - 1500 mm diameter CSP culvert
11+001	50	10 m - 900 mm diameter CSP culvert
11+068	51	12 m - 900 mm diameter CSP culvert

Stn.	Bridge No.	Existing Culvert / Bridge
COLE DIVERSION DRAIN BRANCH 'A'		
0+000A	1A	20 m – Twin 900 mm diameter CSP bridges
0+236A	2A	6 m – 1100 mm diameter CSP culvert
0+407.5A (McGregor Sideroad)	3A	11 m – 750 mm diameter CSP culvert
0+718A	4A	31 m – 600 mm diameter CSP culvert
1+145A	5A	142 m – 600 mm diameter CSP culvert
COLE DIVERSION DRAIN BRANCH 'B'		
0+010B	1B	20 m – 750 mm diameter CSP culvert
0+164B	4B	12 m – 600 mm diameter CSP culvert

*Denotes bridges associated with Imperial Oil

**Denotes bridges replaced under the 2003 Dobbin drainage report.

d) Proposed Cole Diversion Drain Branches 'A' & 'B'

The proposed Cole Diversion Drain Branches 'A' & 'B' involve the incorporation of two existing open drains, a portion of which is commonly referred to as the Cole Drain Diversion. The lower portion of the existing open drain was recently brushed and cleaned in order to provide an improved outlet for the treated process water discharging from the Plains Midstream Canada U (previously BP Canada) site. Additional minor brushing and deepening of the drain is required to establish a consistent gradient for both of these drains as well as the placement of two new drain crossings for support of existing utility poles.

Industrial Flows, Stormwater Treatment and Stormwater Management

Various industrial properties have implemented methods of on-site detention and treatment of storm water runoff from their properties.

The majority of stormwater runoff from the Arlanxeo Canada Inc. property, that is located north of the drain, is collected and conveyed to a sewage treatment plant located near the northwest corner of their premises. The treated runoff is directed to the outfall chamber at Station 0+620 on the bank of the St. Clair River. The majority of stormwater runoff from the Arlanxeo Canada Inc. property, that is located south of the drain, is collected and conveyed through a private storm drainage system and discharged to the St. Clair River.

The Enbridge Pipelines Inc. property located on Plank Road has an internal stormwater collection system and two stormwater detention ponds which discharge directly into the Cole Drain. The stormwater management system is designed for a 1 in a 100 year rainfall event and is operated in accordance with a Certificate of Approval issued by the Ministry of the Environment.

A majority of the stormwater runoff generated from the developed areas of the Plains

Midstream Canada U (previously BP Canada) property is collected and conveyed to their on-site wastewater treatment facility. The treated effluent is then discharged into the proposed Cole Diversion Drain Branch 'B', which subsequently discharges into the Cole Diversion Drain Branch 'A'. Part of the developed and undeveloped area within the said property drains into the proposed Cole Diversion Drain Branch 'A' which also outlets into the Cole Drain at its confluence with the Cut-Off Drain. The remaining undeveloped areas on the property drain directly into the Cole Drain via bridges under Plank Road.

Stormwater runoff generated from the developed areas within the Imperial Oil properties is collected and conveyed to their wastewater treatment facility located adjacent to the St. Clair River. The treated effluent is then released directly into the St. Clair River by means of a separate discharge pipe system independent of the Cut-Off Drain and Cole Drain. The remaining undeveloped areas on the property drain directly into the Cut-Off Drain.

Hydrologic and Hydraulic Analysis

Dillon Consulting Limited carried out a detailed hydrologic analysis of the watershed and a detailed HEC-RAS hydraulic analysis of the Cut-Off Drain and the Cole Drain channels, as well as, the piped structures, road crossings and access bridges within these channels. The study revealed that the Cole Drain and some sections of the Cut-Off Drain only marginally accommodate the peak runoff flow generated by a 1 in 2 year return period storm event assuming there were no access bridges contained within the drain. The study concluded that the entire length of the Cole Drain would experience flows that significantly overtop the drain banks during a 1 in 5 year return period storm event. The study also concluded that some sections of the Cole Drain cannot contain the flows generated by a 1 in 2 year return period due to the greater concentration of existing access bridges within a relatively close spacing that creates a backwater condition and overtopping of the drain banks in various locations.

By undertaking the replacement of some access bridges in specific locations along Plank Road, the cumulative backwater effect created by the close proximity of these bridges can be reduced resulting in a reduction in localized flooding as a result of a 1 in 2 year return period. The study also acknowledged that the survey data collected may not have fully captured all the subtle variations in drain bank elevation which may exist and that a slight degree of overtopping may still occur. Depending on the variation in drain bank elevation, overtopping of the drain bank can be contained by introducing some minor localized berming and re-grading in certain locations on a site specific basis.

Downstream of the Cut-Off Drain and to the west of Vidal Street, the private drain conveying the Cut-Off drain flows to the St. Clair River. The private drain consists of an existing concrete trapezoidal channel for an approximate length of 475 m west of Vidal Street where it then becomes a covered drain consisting of twin 1830 mm diameter concrete pipes extending through the Arlanxeo Canada Inc. property for an approximate length of 371 m before reaching the 3048 mm diameter outfall pipe extending approximately 74 m into the St. Clair River. The outfall pipe being fully submerged below the river surface.

This covered drainage system has the capacity to easily handle the peak runoff flow rate generated by a 1 in 2 year storm event. In fact, it handles 132% of a 2 year storm flows or approximately 90% of a 5 year storm event, which in effect given the existing capacity

upstream within the Cut-Off Drain provides a sufficient outlet. There is also one bridge crossing (denoted as Bridge No. 1) over this private drain portion through the Arlanxeo Canada Inc. property. It consist of two 2440 mm diameter corrugated steel pipe bridges that have a slightly lesser capacity compared to the downstream enclosure, however it still conveys the 2 year storm without flows overtopping the drain channel. For the 5 year storm event, our analysis determined that some minor overtopping of the drain channel may be expected just upstream of both the downstream drain enclosure and Bridge No. 1.

The 2003 Dobbin report provided for the replacement of 10 access bridges along Plank Road with new structures designed to convey what he estimated to be 70% of the peak flow generated by a 2 year design storm event. These access bridges are designated in this report as Bridges Nos. 25, 26, 27, 28, 29, 30, 31, 32, 41 and 43. As previously stated, our detailed HEC-RAS study revealed that the hydraulic capacity of certain existing piped structures along the Cole Drain are not capable of handling the runoff generated by a 1 in 2 year return period storm, resulting in a cumulative backwater effect which results in localized overtopping of the drain banks. Where the study indicates that overtopping would occur, there are several access bridges in close proximity to each other that cause a cumulative increase in the upstream water levels to the point where the top of the southerly drain bank is breached.

Rather than replacing all of the ten (10) access bridges installed under the 2003 Dobbin report with larger bridges independently sized to accommodate a 1 in 2 year storm event, the HEC RAS study identified that the most cost effective approach is to enlarge bridges where the drain bank overtopping is most extreme. From our analysis, the worst condition appears to be from Bridge No. 32 (Sarnia Cabinets) upstream to Gladwish Drive. This would leave nine (9) of those ten (10) bridges in place and instead, replace just one of them, Bridge No. 32 and six (6) other bridges (Bridges Nos. 24, 33, 34, 35, 36 and 38) with larger structures. The recommended culvert size for each of these replacements is a 3650 mm span by 2280 mm rise corrugated steel arch pipe that we have determined to be the largest pipe culvert that can accommodate the Cole Drain without appreciable deepening of the channel.

The hydraulic performance of the Cole Drain without question could be improved to a greater extent with the subsequent replacement of all remaining undersized access bridges that are located downstream of Gladwish Drive with larger bridges. That constitutes eleven (11) more structures, namely Bridges No. 20, 21, 22, 25, 26, 27, 28, 29, 30, 31 & 37 in addition to the previous seven (7) bridges noted in the previous paragraph. This would be considered the ultimate improvement that could be made to the Cole Drain to convey the 1 in 2 year storm without the flows overtopping the drain banks.

With an appreciation for the high costs involved to replace all of these structures, many of which were replaced previously 15 years ago, we had originally recommended in our original report dated 27 June 2019, the phasing in of this additional improvement be undertaken over the next 5 to 10 years or sooner should conditions warrant. We are now recommending the full replacement of the same bridges at the present time rather than as a future replacement. It is of the utmost importance to stress that the hydraulic performance of these new larger bridges is very dependent on the Cole Drain being maintained regularly such that flows are not impeded or channel cross section reduced by any accumulating sediment.

Table No. 2 shown below lists the eighteen (18) access bridges on the Cole Drain

recommended for replacement to address the cumulative increases in the elevation of the hydraulic profile that is generated by several bridges in close proximity to each other.

For the Cole Diversion Drain Branch 'A', there are two access bridge crossings that require replacement due to being undersized or perched above the drain bottom that lead to sluggish flows and higher deposition of sediment in the drain. The McGregor Sideroad North crossing (denoted as Bridge No. 3A) requires a larger size culvert to convey the upstream flows obtained during a 1 in 2 year storm.

For the Cole Diversion Drain Branch 'B', there is one access bridge requiring replacement due to being perched above the drain and two new access bridges required to provide access and support of existing utility poles that are within the limits of the drain channel requiring deepening and widening to provide sufficient depth of outlet for the existing lateral storm drain pipes originating from Plain Midstream Canada U property. Table No. 2 as shown below lists the two (2) new access bridges on the Cole Diversion Drain Branch A and the three (3) new access bridges recommended for replacement and/or new installation.

Table No. 2 Recommended Culvert Sizing

Sta.	Bridge No.	Existing Culvert Size	Recommended Culvert Size
		Cole Drain	
6+431	20	15 m – 3250 mm x 2300 mm CSP arch culvert	11.5 m – 3890 mm x 2690 mm CSP arch culvert
6+492	21	28 m – 3450 mm x 2200 mm CSP arch culvert	29.5 m – 3890 mm x 2690 mm CSP arch culvert
6+662	22	16 m – 3450 mm x 2200 mm CSP arch culvert	11.5 m – 3890 mm x 2690 mm CSP arch culvert
7+161	24	9 m – 2300 mm diameter boiler pipe	11.5 m – 3650 mm x 2280 mm CSP arch culvert
7+324	25	15 m – 2500 mm x 1830 mm CSP arch culvert	11.5 m – 3650 mm x 2280 mm CSP arch culvert
7+355	26	15 m – 2500 mm x 1830 mm CSP arch culvert	12.5 m – 3650 mm x 2280 mm CSP arch culvert
7+483	27	18 m – 2500 mm x 1830 mm CSP arch culvert	14.5 m – 3650 mm x 2280 mm CSP arch culvert
7+581	28	15 m – 2500 mm x 1830 mm CSP arch culvert	11.5 m – 3650 mm x 2280 mm CSP arch culvert
7+610	29	16 m – 2500 mm x 1830 mm CSP arch culvert	11.5 m – 3650 mm x 2280 mm CSP arch culvert
7+739	30	24 m – 2500 mm x 1830 mm CSP arch culvert	20 m – 3650 mm x 2280 mm CSP arch culvert

Sta.	Bridge No.	Existing Culvert Size	Recommended Culvert Size
7+794	31	15 m – 2500 mm x 1830 mm CSP arch culvert	15 m – 3650 mm x 2280 mm CSP arch culvert
7+879	32	16 m – 2500 mm x 1800 mm CSP arch culvert	11.5 m – 3650 mm x 2280 mm CSP arch culvert
7+926	33	6 m – 2100 mm diameter CSP culvert	9.5 m – 3650 mm x 2280 mm CSP arch culvert
7+959	34	9 m – 2100 mm diameter CSP culvert	9.5 m – 3650 mm x 2280 mm CSP arch culvert
7+999	35	13 m – 2100 mm diameter CSP culvert	14 m – 3650 mm x 2280 mm CSP arch culvert
8+045	36	22 m – 2500 mm x 1830 mm CSP arch culvert	14 m – 3650 mm x 2280 mm CSP arch culvert
8+133	37	20 m - 3400 mm x 2100 mm CSP arch culvert	11.5 m – 3650 mm x 2280 mm CSP arch culvert
8+205	38	24 m – 2500 mm x 1830 mm CSP arch culvert	11.5 m – 3650 mm x 2280 mm CSP arch culvert
		Cole Diversion Drain Branch 'A'	
0+407.5A	3A	10m – 750mm dia. CSP culvert	15 m – 900mm diameter HDPE culvert
0+718A	4A	32m – 600mm diameter CSP culvert	32 m – 600mm diameter HDPE culvert
		Cole Diversion Drain Branch 'B'	
0+010B	1B	20 m – 750mm diameter CSP culvert	20 m – 750mm diameter HDPE culvert
0+040B	2B	N/A	9 m – 600mm diameter HDPE culvert
0+135B	3B	N/A	9 m – 600mm diameter HDPE culvert

Sediment Sampling and Characterization Analysis

A majority of the lands located within the Cut-Off Drain sub-watershed are industrial in nature. Similarly, the existing private drain which serves as the outlet for the Cut-Off Drain and Cole Drain to the St. Clair River extends through a sub-watershed area that is industrial in nature. By comparison, lands located in the Cole Drain sub-watershed are predominantly commercial and agricultural in nature. Due to the presence and nature of industrial development that exists primarily in the Cut-Off Drain sub-watershed, a

preliminary soil sediment sampling and characterization analysis was undertaken in order to forecast the environmental and financial impacts of managing future sediment removal from the drain.

The downstream portion of drain comprised of the concrete channel and twin pipe enclosure extending through the Arlanxeo Canada Inc. property was excluded from the sediment sampling and characterization analysis due to the fact that sediment removal from this reach would not be anticipated in the future. The sediment sampling and characterisation analysis was undertaken in the Fall of 2010. The samples were analyzed by AGAT Laboratories in London. On December 20, 2010, Dillon Consulting filed a report with the results. The results presented in the laboratory certificate of analysis illustrate that the sediment within the Cut-Off Drain is below the respective criteria of Ontario Regulation 558, Toxicity Characteristic Leaching Procedure (TCLP) criteria. The results indicate that the sediment within the Cut-Off Drain is considered non-hazardous and therefore would not require extensive material management protocols during the excavation of the drain.

Design Considerations

The Cole Drain is an open drain which extends along the Plank Road throughout its entire length. Various works of repair and improvement have been undertaken over the years to provide an effective level of service for surface and sub-surface flows for the watershed. These works typically involved brushing, a minor cleaning of the drain bottom and limited trimming of the side slopes. Any attempt to deepen or widen the drain would be hindered due to its close proximity to the travelled surface of the Plank Road and intense occupation of commercial development along its alignment.

In terms of the Cut-Off Drain, the open channel extends through a significantly developed industrial land base. Similar to the Cole Drain, any attempt to significantly deepen or widen the drain would be hindered as a result of the extent of industrial development which abuts the drain in various locations.

The private drainage system, which conveys flows from the Cut-Off Drain downstream through the Arlanxeo Canada Inc. property to the St. Clair River, is also quite constrained due to the degree of intense occupation of the lands fronting the concrete trapezoidal shaped channel. In order to address the deteriorated channel condition and ensure its structural integrity while maintaining the use and function of the lands in the vicinity of the drain, various alternatives considered to improve the drain. These alternatives included overlaying the existing concrete channel with a concrete canvas liner system, an engineered articulating cable joined concrete block mat system, replace with new concrete channel or enclosing its length with pre-cast concrete box culvert units.

As previously highlighted, the area immediately adjacent to the north side of this channel is occupied by various process pipe racking systems, equipment and structures. The working area available for the construction of a drain enclosure is very limited and impractical to consider when considering the degree of physical disruption that is required. As well, the cost of enclosing this portion of the drain is extremely expensive. Due to the physical limitations and cost considerations, selecting the concrete canvas channel liner option as a necessary means of repair is more practical than enclosure or entire replacement of the concrete channel. Leaving the deteriorated concrete channel in place in its current condition with the continuation of freeze thaw cycles, cracking, crumbling and erosion by drainage flows will advance deterioration, undermining to a partial or eventual full collapse of the channel. Under these circumstances, a significant

obstruction or blockage of flows poses a higher risk for flooding of the Cut-Off Drain further upstream. The concrete canvas liner conforms to the concrete channel while at the same time providing a protective layer against the erosive nature of the channel flow velocities. The hydraulic capacity of the concrete channel will be maintained with the use of a concrete canvas overlay.

Design Criteria

It is necessary for the Cut-Off Drain, the Cole Drain, the Cole Diversion Drain Branches 'A' & 'B', and the downstream private drainage system which serves as an outlet through the Arlanxeo Canada Inc. property, to be kept in proper repair in order to provide effective service to the industrial, commercial, agricultural and residential lands within the watershed. The Cut-Off Drain, Cole Drain and Cole Diversion Drain Branches 'A' & 'B', are currently in need of maintenance in order to remove the silt and sediment from the channel. It will be necessary to selectively remove brush and trees from within the channel throughout its length. It will also be necessary to repair and improve various bridges found in the drain that are of limited hydraulic capacity.

The Design and Construction Guidelines for Work under the Drainage Act, as published by the Ministry of Agriculture, Food and Rural Affairs provides guidance as to the hydraulic standards required for bridges and bridges installed in Municipal drainage systems. It is recommended that agricultural field bridges be designed to freely pass the peak flow generated from a storm event having a frequency of occurrence of a 1 in 2 year design flow. Where residential, commercial or industrial properties are involved, the application of a 1 in 5 year design flow is more appropriate. However, due to the hydraulic limitations of the open channel for specifically the Cut-Off Drain and Cole Drain, both its current depth and width are marginally capable of supporting a 1 in 2 year design flow even if there were no structures present within the respective drains.

To even a greater degree for the Cole Drain, the introduction of culverts as a standard means of crossing the drain for so many properties situated along its course, the drain's ability the convey the 2 year storm flows is compromised. This is mostly attributed to the smaller cross sectional area for the culvert pipe when compared to the open channel. The channel depth is limiting the size of culvert that will fit the drain and satisfy the minimum pipe cover requirements. Some selective deepening of the drain channel in combination with replacing the access bridges with larger culvert sizes will achieve the 2 year storm capacity. These efforts will further alleviate flooding in the most flood prone areas located downstream of Gladwish Avenue during larger storm events.

Cole Drain (Future Improvements)

Since 2003 there has been increased development within the Cole Drain watershed. Our review of aerial imagery identified more than 70 hectares (173 acres) of previously vacant lands that are now occupied today by commercial and light industrial buildings including parking lot areas with a higher concentration of impervious areas. There appears to be little application of storm water pond detention systems in existence for both the older and newer developments to capture excess runoff and restrict drainage rates to pre-development conditions. Some runoff may temporarily be detained on site as depression storage within parking areas and lower lying vacant areas, however not as an effective means of controlling surface runoff amount and discharge rates especially when some of these areas are now replaced by new buildings, additional drain outlets, property infilling and re-grading.

We determined that the new developed areas occurring since 2003, which use the Cole Drain as an outlet upstream of McGregor Road, represent approximately 10% of the Cole Dain watershed area. This change in land use within the watershed has undoubtedly increased both the rate of flow and volume of runoff to an even greater extent today to beyond a 10% margin and has further compromised the already limited drainage capacity of the Cole Drain. Continuation of new developments without restrictive drainage flow control measures in place to temporarily hold back runoff volume and release it slower, will lead to greater frequency and severity of the flooding in the future.

Consideration has been be given to enlarging a greater number of existing bridges particularly along the downstream portion of the Cole Drain including some drain deepening to accept the larger size bridges and to further reduce the likelihood of flows overtopping the banks during a 2 year design storm event. We consider this to be the ultimate improvement that can be made to the Cole Drain's capacity. The extents of this work on the Cole Drain, as outlined below and that we have further detailed on the drain profile drawings appended to this report, include the lower portion of drain starting from the Plank Road bridge (Bridge No. 19) upstream to Gladwish Drive bridge (Bridge No. 39). Deepening of the drain from Station 6+275 to Station 6+850 and from Station 7+150 to Station 7+950 would also be necessary to accommodate the replacement of the eighteen (18) bridges located downstream of Gladwish Avenue with larger size culverts.

Seven (7) of these eighteen (18) bridges, namely Bridge Nos. 25, 26, 27, 28, 29, 30 & 31 were previously replaced as per the recommendations in the 2003 Dobbin report, however with bridges capable of conveying only 70% of the 2 year design flows and are still restrictive in terms of the available 2 year storm capacity within the channel if there were no bridges present. These bridges now 17 years old are nearly half way through their expected life span of approximately 30 to 35 years. The cross sectional end area of culvert sizes as shown here represents a 54% increase in size compared to the existing bridges. These larger sizes impose a minimal restriction of the existing drain channel's capacity and will convey a 1 in 2 year storm event without flows overtopping the drain banks. These improvements to the Cole Drain shall be made while still having sufficient capacity downstream within the Cut-Off Drain following improvements to the said drain recommended under this report. To go beyond this 1 in 2 year design storm improvement recommendation to a potential 5 year design storm capacity would require a major undertaking involving the reconstruction of the Cole Drain and Cut-Off Drain with increased depth and width to ensure sufficient outlet for these higher flows. The Cole Drain is presently confined by existing hydro poles found continuously along the north bank, while adjacent to the south bank in many locations the private property is used with existing fences or parking lot areas in close proximity to the drain.

Recommendations

We have reviewed the history of the Cole Drain, Cut-Off Drain and the proposed Cole Diversion Drain Branches 'A' & 'B', including the downstream private drainage system extending through the Arlanxeo Canada Inc. property; obtained information at an on-site meeting; collected and analysed the survey data; carried out an hydrological analysis of the watershed and prepared a detailed assessment of the hydraulics of the channels and the existing road bridges, railway bridge and private access bridges.

We recommend that the Cut-Off Drain, the proposed Cole Diversion Drain Branches 'A' & 'B', the portion of the Cole Drain extending through the City of Sarnia and the

downstream private drainage system located between Vidal Street and the St. Clair River which currently serves as the outlet for the Cut-Off Drain, be repaired and improved in order to:

- provide adequate outlet for surface and sub-surface drainage systems that discharge into these drainage works
- provide improved carrying capacity to reduce the frequency and severity of flood events on the adjacent properties
- provide a consistent design gradeline and accurate bylaw that will govern future works of maintenance
- improve the hydraulic capacity of the access bridges and lawn piping primarily on the Cole Drain, where required
- develop an accurate watershed and equitable assessment
- incorporate the private drainage system located west of Vidal Street, as part of the Cut-Off Drain and define which structures and bridges will remain as private structures

Consequently, our recommendations for the repair and improvement of the Cut-Off Drain and the Cole Drain, and the construction of the proposed Cole Diversion Drain Branches 'A' & 'B', are as follows:

CUT-OFF DRAIN (Station 1+004 to 6+275) Recommendations

The physical construction work that we recommend on the Cut-Off Drain is as follows:

1. We recommend that the existing concrete channel from Station 1+004 to Station 1+473 be improved as follows:

    - Supply and install concrete canvas liner system on top of the existing concrete channel. Given the current state and condition of the concrete where there exists significant damage to the channel surface being continuous throughout its length, we do not advise to staging the work or the completion of repairs in sections of greatest priority. There are cost advantages to complete repairs all at one time rather than remobilizing and losing efficiency of installation with a piecemeal approach. There is significant prep work involved to grout, fill and smooth out existing cracks and spalled concrete surfaces that will continue to worsen with time if not repaired. These repairs to the spalled surfaces are only considered temporary patch repairs if they are not soon covered thereafter with the canvas liner. The City offers various payment options for the larger drainage cost assessments that are levied against properties. The payment period may extend up to 10 years.
    - Stabilize sections of the concrete channel that are currently undermined by undertaking remedial works of injecting mortar into cracks and parging of spalled sections on side walls of existing channel at various locations.
    - Remove and re-install concrete barrier system adjacent to the drain to facilitate construction activities.
    - Adjust the concrete canvas liner to accommodate existing pipe outlets into the channel.
    - The existing trash screen and associated steel walkway located at Station

1+428 shall be temporarily removed and reinstalled after the new concrete canvas liner is in place.

2. From Station 1+473 to 1+750, where the drain extends along Vidal Street, we recommend that remedial works be undertaken to the existing concrete brick paver system which protects the integrity of the channel side slopes of the channel extending along Vidal Street from Station 1+530 to 1+545, Station 1+590 to 1+605, Station 1+647 to 1+652, and Station 1+700 to 1+702. We recommend that these localized areas of dislodged concrete bricks be removed and replaced with gabion stone erosion protection.
3. Throughout the Cut-Off Drain, various miscellaneous works are recommended, which include the removal and re-installation of various fencing material which span across the drain in order to reduce the accumulation of brush and debris from within the drain.
4. From Station 1+473 to 6+275, we recommend that the open channel be deepened and cleaned to a specific and consistent gradeline.
5. We recommend that material excavated from the Cut-Off Drain throughout the length of the work be loaded and hauled away off-site for disposal at an approved location.
6. We recommend that an additional soils characterization sampling program be implemented at various locations along the drain prior to excavation in order to further document and confirm the inert nature of the soil as being suitable for off-site disposal at an approved location.
7. We recommend the removal and disposal of all trees, brush, fallen timber and woody debris from within the channel throughout the Cut-Off Drain.
8. We recommend that all access bridges and road bridges be cleaned out as necessary to suit the new design gradeline.
9. We recommend that the existing bridge located at Station 1+282 denoted as Bridge No. 1, consisting of twin parallel 23 m long, 2440 mm diameter corrugated steel pipe (CSP) culverts, be repaired by applying the concrete canvas liner inside the pipe up to the springline (lower half of pipe). The capacity of the culverts will not be reduced due to the lower roughness properties of the concrete liner compared to corrugated steel pipe. The existing steel culverts exhibit considerable rusting of the lower inside half of the pipes, however the deterioration has not yet led to perforations within the steel. The pipes have so far retained their original shape and the structural integrity has not been compromised. The steel culvert pipes condition following these repairs should be routinely monitored by the bridge owner for signs of pipe deformation for which at that time, consideration should be given to fully replacing them with new culverts of same size and material.
10. We recommend that the existing concrete bridge located at Station 1+782 be removed and disposed from the drain since it is no longer in use. Abutments, headwalls and footings are to stay in place.
11. We recommend that the existing concrete channel extending from Station 2+628 to 2+646 be remediated by underpinning the undermined sections with rip-rap.
12. We recommend a new access bridge be located at Station 4+415 to provide

access within the Hydro One corridor for the City of Sarnia for a new waterworks installation. The bridge shall consist of an 18 m long, 4370 mm x 2890 mm corrugated steel pipe arch with sloping stone endwalls.

13. We recommend that the contractor implement silt control and water management measures in the channel throughout construction.
14. We recommend that any bank areas disturbed by the work be re-seeded. Furthermore, any lawn or grassed areas disturbed by the operation of equipment shall also be repaired to preconstruction conditions.

Incorporation of Private Drainage Works (Cut-Off Drain)

In addition to our recommendations regarding the physical work to be carried out on the drain, we also recommend that the existing private drainage system, involving the concrete lined open drain, twin pipe drain enclosure, outfall chamber/building and submerged discharge pipe extending through the Arlanxeo Canada Inc. property and beneath the St. Clair River, west of Vidal Street from Station 0+546 to Station 1+473 be incorporated as part of the Cut-Off Drain so that it becomes a part of the drainage works in accordance with the Ontario Drainage Act. The City will then have the authority to carry out future repair, maintenance or replacement of any component of this drainage system and have a legal mechanism to assess the costs of this work across the watershed. More particularly, the existing works being incorporated as part of the Cut-Off Drain are as follows:

1. In 1942, the portion of the Cut-Off Drain west of Vidal Street, was relocated by moving it towards the north, to its present location on the Arlanxeo Canada Inc. property. The work involved the construction of the open concrete channel, as well as, the construction of the twin 1830 mm diameter concrete pipe drain enclosure which discharged at the water's edge into the St. Clair River. We recommend that the twin 1830 mm diameter concrete pipe drain enclosure, extending from Station 0+629 to Station 1+000 be incorporated as part of the Cut-Off Drain.
2. We also recommend that the concrete channel, extending from Station 1+000 to Station 1+473, west of Vidal Street, be incorporated as part of the Cut-Off Drain.
3. We also recommend that the 74 m length of 3048 mm diameter submerged discharge pipe extending from Station 0+546 to Station 0+620, which is located downstream of the outfall chamber at Station 0+620 on the east bank of the St. Clair River also be incorporated as part of the Cut-Off Drain. Since this submerged discharge pipe is not required for drainage purposes, but is only required for discharge of treated process water, we recommend that this structure be incorporated as part of the Cut-Off Drain and be maintained by the City at the sole expense of the benefitting party being Arlanxeo Canada Inc. in this instance. The City may elect to have Arlanxeo Canada Inc. maintain this infrastructure since they are solely responsible for all costs.
4. We also recommend that the concrete outfall chamber/building located at Station 0+620 be incorporated as part of the Cut-Off Drain and be maintained by the City at the sole expense of the benefiting party being Arlanxeo Canada Inc.. The City may elect to have Arlanxeo Canada Inc. maintain this infrastructure since

they are solely responsible for all costs.

5. We also recommend that the existing private structures crossing the Cut-Off Drain on Imperial Oil property (Table No. 1 - Bridge #6, 9, 10, 11, 12, 15 16 and 17), and on CN Rail property (Table No. 1 – Bridge #7, 8 and 13) be incorporated as part of the municipal drain. Maintenance or replacement of these structures shall be undertaken to an acceptable standard that does not hinder the overall performance and level of service of the drain. The adjoining property owner shall submit plans for review and approval by the City prior to maintaining or replacing the structures. The end area of each access bridge opening shall meet or exceed what presently exists. The City reserves the right to remove the structures from the drain in the event that the hydraulic carrying capacity of the drain is impaired by the new or existing structures. Under Section 80 of the Drainage Act, the cost of removing the obstruction is assessable against the adjoining property.

6. We recommend that the existing trash screen and associated steel walkway located at Station 1+430 remain as a private structure operated and maintained by the adjacent property owner (Arlanxeo Canada Inc.) at their sole expense. Any maintenance or works involving these structures will be undertaken by the property owner in consultation with the City. The adjoining property owner (Arlanxeo Canada Inc.) shall submit plans for review and approval by the City prior to maintaining or replacing the structures. The City reserves the right to remove the structures from the drain in the event that the hydraulic carrying capacity of the drain is impaired by the new or existing structures. Under Section 80 of the Drainage Act, the cost of removing the obstruction is assessable against the adjoining property.

COLE DRAIN (Station 6+275 to Station 11+225) Recommendations

1. We recommend that the open channel be deepened and cleaned to a specific and consistent gradeline from Station 6+275 to 11+225 for the portion of the Cole Drain within the City of Sarnia.

2. From Station 6+275 to 9+550, we recommend that material excavated from the drain bottom be hauled away off-site. From Station 9+550 to 11+225, the excavated material will be deposited and spread on the farmland adjacent to the drain.

3. We recommend that the contractor implement silt control measures in the channel during construction.

4. We recommend that any bank areas disturbed by the work be reseeded. Further, any lawn or grassed areas disturbed by the operation of equipment shall also be repaired to preconstruction conditions.

5. We recommend that all access bridges and road bridges not requiring replacement be cleaned out as necessary to suit the new design gradeline.

6. We recommend the rehabilitation of the concrete block end walls on the existing structure located at Station 10+433.

7. In order to meet a minimum hydraulic design standard for the drain and reduce

the probability of periodic flooding, we recommend that the following access bridges No. 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 & 38, as listed previously in Table 2, be replaced now with larger sizes as noted herein. These bridges shall be accommodated with associated drain deepening to provide the ultimate hydraulic improvements that can be made to the Cole Drain without having to widen the drain.

8. We recommend the rehabilitation of any drain bank washouts, including Station 8+079, and Station 10+607 to 10+614. Additional rehabilitations may be undertaken at the direction of the Drainage Superintendent in the field.
9. We recommend that Bridge No. 41 be widened as per the owner's request to include the replacement of the sloping stone end treatment on the culvert with vertical concrete block headwalls.
10. We recommend that all existing private access bridges presently in the Cole Drain form part of the drainage works and are to be maintained by the City. Under the bylaw adopting the 2003 report on the Cole Drain, Bridges Nos. 24, 33, 34, 35, 37 & 38 were designated as not being a part of the Cole Drain. Under this report, all of these bridges are being replaced.

COLE DIVERSION DRAIN BRANCH 'A' Recommendations

1. We recommend that the open channel be deepened, widened and cleaned to a specific and consistent gradeline from Station 0+000A to 1+450A. Minor brushing will be carried out as necessary.
2. We recommend that material excavated from the drain be loaded and hauled away off-site for disposal at an approved location.
3. We recommend that the contractor implement silt control measures in the channel during construction.
4. We recommend that any bank areas disturbed by the work be reseeded. Further, any lawn or grassed areas disturbed by the operation of equipment shall also be repaired to preconstruction conditions.
5. We recommend that the existing road bridges be cleaned out as necessary to suit the new design gradeline.
6. We recommend the installation of a 914 mm diameter sluice gate and concrete headwall, along with the replacement of the existing road bridge (Bridge No. 3A) with a new 15 m length of 900 mm diameter HDPE at Station 0+407.5A.
7. We recommend replacement of Bridge No. 4A with a new 32 m long 600 mm diameter HDPE at Station 0+718A.
8. We recommend that the portion of drain referred to as the Cole Drain Diversion Drain Branch A be incorporated into the overall drainage works.

COLE DIVERSION DRAIN BRANCH 'B' Recommendations

1. We recommend that the open channel be deepened, widened and cleaned to a specific and consistent gradeline from Station 0+000B to Station 0+0170B.

Minor brushing will be carried out as necessary.

2. We recommend that material excavated from the drain be loaded and hauled away off-site for disposal at an approved location.
3. We recommend that the contractor implement silt control measures in the channel during construction.
4. We recommend that any bank areas disturbed by the work be reseeded. Further, any lawn or grassed areas disturbed by the operation of equipment shall also be repaired to preconstruction conditions.
5. We recommend replacement of Bridge No. 1B with a new 20 m long 750 mm diameter HDPE at Station 0+010B.
6. We recommend new hydro pole access bridges (Bridge No. 2B & 3B) consisting of a new 9 m long 600 mm diameter HDPE at Station 0+040B & 0+135B.
7. We recommend that the portion of drain referred to as the Cole Drain Diversion Drain Branch B be incorporated into the overall drainage works.

Stakeholder Requirements

It is imperative that all construction activities performed on each stakeholder's property as outlined herein or in relation to future maintenance on the drain be conducted in accordance with the specific construction and safety requirements of each stakeholder.

The stakeholders of note at the time of report filing include:

- Arlanxeo Canada Inc.
- H.C. Starck
- Imperial Oil
- CN Rail

All contractors and their related sub-contractors and affiliates selected to conduct the work on these premises must be qualified and certified to meet the individual stakeholder's corporate safety and technical requirements, as defined by these stakeholders while working on their property.

Pipe Penetrations along Concrete Lined Channel Banks

Rehabilitation of the concrete channel will require modification of the concrete canvas liner to accommodate existing pipes outletting into the concrete lined drain. The liner is to be modified to fit around the existing pipe penetrations then sealed with grout around the pipe penetration. Locations are as follows in Table No. 3 below:

Table No. 3 – Pipe Penetration Locations

Station	Side of Drain	Location	Pipe Diameter (mm)	Pipe Material
1+149	North	N/A	600	PVC Big-O
1+159	N/S	Crosses below top of bank	450	Steel
1+170 - 1+174	N/S	Two beams crossing below top of bank	N/A	Steel
1+172	North	2.65 m from drain centreline	Unknown	Unknown

Station	Side of Drain	Location	Pipe Diameter (mm)	Pipe Material
1+172	South	3.30 m from drain centreline	Unknown	Unknown
1+172	South	3.30 m from drain centreline	Unknown	Unknown
1+173	N/S	Crosses below top of bank	450	Steel
1+194	North	1.3 m from drain centreline	450	CSP
1+195	North	1.3 m from drain centreline	450	CSP
1+219	N/A	3.1 m from drain centreline	Unknown	Unknown
1+260	North	2.5 m from drain centreline	600	Steel
1+269	N/S	Crosses below top of bank	300	Steel
1+297	N//A	2.6 m from drain centreline	50	Steel
1+307	North	2.8 m from drain centreline	200	Steel
1+308	North	2.2 m from drain centreline	375	Concrete
1+331	South	2.5 m from drain centreline	300	Concrete
1+335	North	1.7 m from drain centreline	75	Steel
1+349	North	2.5 m from drain centreline	150	Steel
1+350	South	2.8 m from drain centreline	300	Concrete
1+351	North	1.7 m from drain centreline	500	CSP
1+356	South	2.8 m from drain centreline	300	Concrete
1+362	North	1.6 m from drain centreline	600	Concrete
1+364	South	3.1 m from drain centreline	Unknown	Steel
1+374	North	2.1 m from drain centreline	375	Concrete
1+384	South	3.0 m from drain centreline	300	Concrete
1+397	South	3.1 m from drain centreline	300	Concrete
1+401	North	1.9 m from drain centreline	375	CSP
1+411	North	3.6 m from drain centreline	Unknown	Steel
1+413	South	2.9 m from drain centreline	Unknown	Concrete spillway & pipe
1+423	North	2.7 m from drain centreline	Unknown	Steel
1+432 - 1+437	South	Bottom of channel same elevation as main channel	Rectangular	Concrete Channel
1+436	South	4.4 m from drain centreline	600	CSP
1+438	South	4.0 m from drain centreline	250	CSP
1+440	South	4.2 m from drain centreline	200	Steel
1+440	South	5.1 m from drain centreline	2080x1520	Concrete
1+448	South	1.5 m from drain centreline	Unknown	Concrete
1+473	South	3.1 m from drain centreline	Unknown	Steel
1+474	South	3.3 m from drain centreline	Unknown	Unknown

This list is not necessarily complete. Any additional pipes encountered projecting from the drain banks will require collaring as described.

Utilities

There are many instances of utilities crossing and directly adjacent to the Cole and Cut-Off Drains, including buried, above grade and overhead locations. Notification to each

utility that work is required at each utility location a minimum of 48 hours, or as stipulated by each utility in advance of performing any work. Identified crossings are included in the Table No. 4 below:

Table No. 4 – Utility Crossings

From Station	To Station	Crossing Description
1+000	1+260	Above Grade Pipes - Adjacent to left top of slope
1+041	1+048	Above Grade Pipes - Directly over channel
1+117	1+124	Above Grade Pipes - Directly over channel
1+159	N/A	Crossing Within Drain - 450 mm steel pipe below top of bank
1+173	N/A	Crossing Within Drain - 450 mm steel pipe below top of bank
1+175	1+180	Overhead Pipes - Supports towers adjacent to right top of slope
1+201	1+208	Above Grade Pipes - Directly over channel
1+212	N/A	Above Grade Pipes - Steel bridge supporting pipes above channel - 1.0 m wide
1+240	N//A	Above Grade Pipes - Steel bridge supporting overhead pipes - 1.5 m wide - Supports adjacent to top of slope
1+260	1+306	Overhead Pipes - Adjacent to left top of slope
1+260	N//A	Support Wires - Two support wire for overhead pipes from drain centreline - Concrete block 0.9 m to right top of slope
1+269	N/A	Crossing Within Drain – 300 mm steel pipe wrapped in epoxy - below top of channel - Pipe is cut and plugged on either end
1+302	N/A	Above Grade Pipe – 200 mm steel pipe
1+306	1+450	Above Grade Pipes - Adjacent to left top of slope Overhead Steel Frame - Adjacent to left top of slope
1+306	N/A	Overhead Steel Frame - Crossing the channel - Support located adjacent to right top of slope
1+457	N/A	Above Grade Pipes - Crossing the channel over bend in channel - Supports located near channel top of slope
1+705	1+715	Above Grade Pipes - Adjacent to the channel, 1.0 m from left top of slope
1+788	1+799	Crossing Within Drain - Multiple pipe crossings through concrete headwalls
2+022	N/A	Above Grade Pipe – 300 mm steel pipe at top of bank
2+360	N/A	Overhead steel bridge crossing with pipes, 0.9 m wide
2+490	2+494	Overhead steel bridge crossing with pipes, 3.8 m wide
2+574	2+578	Overhead steel bridge crossing with pipes, 3.8 m wide
2+716	2+719	Crossing Within Drain - Overhead steel bridge with pipes below top of bank - Steel bridge 3.0 m wide
2+721	2+729	Bridge Crossing - Concrete bridge across drain - Pipes connected to underside of bridge
2+749	2+751	Overhead steel bridge crossing with pipes, 1.8 m wide
2+775	N/A	Crossing Within Drain - Steel pipe below top of bank
2+777	N/A	Crossing Within Drain - Steel pipe below top of bank
2+790	2+995	Above Grade Pipe - Adjacent to right top of slope - 0.5 m from top of slope

From Station	To Station	Crossing Description
3+228	3+229	Overhead steel bridge with pipes crossing channel Supports for overhead bridge are in rip-rap slope
3+258	3+273	Bridge Crossing - Concrete bridge across drain - Pipes connected to side of bridge
3+405	3+406	Overhead steel bridge with pipes crossing channel Supports for overhead bridge are in rip-rap slope
3+532	3+533	Overhead steel bridge with pipes crossing channel Supports for overhead bridge are in rip-rap slope
3+640	N/A	Steel pipe crossing channel above top of channel
3+831	3+839	Overhead steel bridge with pipes crossing channel
3+840	3+857	Above Grade Pipe - Several (~25) steel pipes crossing channel above top of bank
3+895	3+915	Multiple overhead steel bridge crossings with pipes Concrete supports for overhead steel bridges in channel slope Multiple pipes crossing above top of channel
3+906	3+993	Above Grade Steel Pipes - Adjacent to right side of channel (2.0 m from top of bank)
3+999	4+004	Bridge Crossing - Concrete bridge across drain - Pipes attached to side of bridge
4+011	4+014	Crossing Within Channel - Two steel pipes crossing below top of bank
4+631	N/A	Steel pipe crossing above top of channel
6+813	N/A	Gas main crossing channel
6+933	6+936	Sign for oil/gas/hydrocarbon pipes adjacent to right top of bank
6+980	6+992	Sign for oil/gas/hydrocarbon pipes adjacent to right top of bank
7+077	7+079	Sign for oil/gas/hydrocarbon pipes adjacent to right top of bank
7+143	N/A	Sign for oil/gas/hydrocarbon pipes adjacent to right top of bank
7+169	N/A	Sign for oil/gas/hydrocarbon pipes adjacent to left top of bank
7+273	7+298	Sign for oil/gas/hydrocarbon pipes adjacent to right top of bank
7+454	N/A	Sign for oil/gas/hydrocarbon pipes 4.2 m from left top of bank
7+632	N/A	Sign for oil/gas/hydrocarbon pipes 5.2 m from left top of bank
7+739	N/A	Utility pole in middle of driveway, 5.4 m from drain centreline
7+765	N/A	Cleanout in slope of channel, 2.1 m from drain centreline
7+805	N/A	Guy wire in slope of channel, 2.4 m from drain centreline
7+895	N/A	Utility pole in channel slope, 3.6 m from drain centreline
8+226	8+242	Sign for oil/gas/hydrocarbon pipes adjacent to right top of bank
8+243	N/A	Guy wire in slope of channel, 2.2 m from drain centreline
8+665	N/A	Guy wire in slope of channel, 1.7 m from drain centreline
8+745	N/A	Sign for oil/gas/hydrocarbon pipes 3.8 m from left top of bank
8+809	N/A	Sign for oil/gas/hydrocarbon pipes 2.3 m from right top of bank
8+847	N/A	Sign for oil/gas/hydrocarbon pipes 4.0 m from left top of bank
9+185	N/A	Guy wire in slope of channel, 2.1 m from drain centreline
9+578	N/A	Guy wire in slope of channel, 2.0 m from drain centreline
10+067	N/A	Guy wire in slope of channel, 2.4 m from drain centreline

From Station	To Station	Crossing Description
10+148	N/A	Bell pedestal in slope of channel, 2.9 m from drain centreline
10+273	N/A	Guy wire in slope of channel, 1.9 m from drain centreline
10+715	N/A	Guy wire in slope of channel, 2.4 m from drain centreline
11+204	11+220	Signs for oil/gas/hydrocarbon pipes 2.0 m from left top of bank and adjacent to right top of bank

The above list of utilities is not necessarily complete. Any additional utilities encountered in the field will require sufficient notification and adherence to any stipulations required by the utility.

Allowances

a) Existing Drain (Cut-Off Drain)

Under Section 31 of the Drainage Act, an existing drain that was not constructed under the Drainage Act or any of its predecessors can be incorporated entirely or partly into a drainage works under the Act. An allowance can be paid to the owner of the drain for the value of the drainage works of the incorporated drain. For this project, we are providing an allowance for the private drainage system located downstream of the Cut-Off Drain which is currently governed by a bylaw under the Drainage Act. This section of the private drain is located on the Arlanxeo Canada Inc. property from Station 0+546 to Station 1+470 of the drain survey.

The Cut-Off Drain was originally constructed by the City of Sarnia at its sole expense. It was later partially funded by the Township of Sarnia as a result of a court decision. The portion of the drainage works downstream of Vidal Street to the St. Clair River was located along Clifford Street. Over the years, the drain has been relocated along the west side of Vidal Street and downstream across the Arlanxeo Canada Inc. property to the St. Clair River, without a report of an Engineer appointed under the Drainage Act. The drain was either enclosed or lined with concrete by the adjacent private property owner. These modifications were made solely for the benefit of the adjacent lands and were of little value to the upstream lands compared to the open drain that was replaced. Also, the enclosed portion of the existing private drain and the concrete lined open channel are approximately 78 years old and their value has since depreciated.

Over this period, Arlanxeo Canada Inc. or its predecessors have maintained this section of private drain and the upstream lands have not contributed towards its maintenance at any time. Consequently, the upstream watershed has derived a cost savings which equates to approximately $100,000 in current value, by not having to maintain the equivalent of an open channel and outlet structure over the past 78 year period. In this report, Arlanxeo Canada Inc. will be assessed for the majority of the cost associated with the repair of the concrete lining on the open channel and future maintenance of the drain enclosure on their property. Arlanxeo Canada Inc. will be assessed for the entire cost of the maintenance of the outfall structure and submerged outfall pipe that discharges at the bottom of the St. Clair River. Going forward, we estimate that the portion of the drainage works on the Arlanxeo Canada Inc. property lying west of Vidal Street will provide value to the upstream watershed once it is incorporated as part of the Cut-Off Drain.

In accordance with Section 31 of the Drainage Act, we estimate the value of the existing

private drainage works on the Arlanxeo Canada Inc. property to be $100,000 for the concrete channel and drain enclosure. This allowance shall be included as part of the project costs and shall be assessed to the adjoining properties and upstream lands in the watershed. This amount is shown in the attached Schedule 'B-1' entitled "Schedule of Allowances" under the heading "Cut-Off Drain".

In terms of the concrete outfall / building located at Station 0+620 and submerged outfall, these components were constructed by the abutting property owner for their sole benefit. Consequently, no consideration for an allowance under Section 31 for the value of the works is warranted. An allowance for land used to accommodate the drain across the Arlanxeo Canada Inc. property is not warranted in this case as appropriate consideration for land allowances was provided at the time of the original construction of the open drain as part of the 1934 By-law.

b) Damages to Lands and Crops (Cole Drain)

From Station 1+450 to 9+550, all of the excavated material from the drain is to be loaded and hauled away off-site to an approved location for disposal. The working areas will be restored to existing conditions. As a result, no damage allowances are to be provided to the abutting property owners.

For the balance of the drain extending upstream from Station 9+550 to 11+225 on the Cole Drain, the excavated material will be deposited and spread on the adjoining farmland. The affected property owners will be provided with monetary compensation for damages to lands and crops in the form of a damage allowance. In accordance with Section 30 of the Drainage Act, we determine the amounts to be paid to the owners of the adjoining agricultural lands along the course of the work, for damages to lands and crops (if any), occasioned by the work to be undertaken. The allowances for damages are calculated at a rate of $3,707 per hectare, ($1,500 per acre). This amount is shown in the attached Schedule 'B-2' entitled "Schedule of Allowances" under the heading "Cole Drain".

c) Existing Drain and Land Taken (Cole Diversion Drain Branch 'A')

Under Section 31 of the Drainage Act, an existing drain that was not constructed under the Drainage Act or any of its predecessors can be incorporated entirely or partly into a drainage works under the Act. An allowance can be paid to the owner of the drain for the value of the drainage works of the incorporated drain. For this project, we are providing an allowance for the private drainage system representing a branch of the Cole Drain at its downstream discharge point into the Cut-Off Drain. This section of the private drain is located on the Canadian National Railway Corporation property from Station 0+000A to Station 1+450A of the drain survey.

The recommended improvements to the Cole Diversion Drain Branch 'A' includes a portion of the drain to be widened in order to facilitate the necessary depth to provide sufficient outlet for lateral drains entering from the south side property being Plains Midstream Canada U.

Under Section 29 of the Drainage Act, the allowances for lands taken for the necessary drain widening are calculated at a rate of $50,000 per hectare, ($20,000 per acre). These amounts are shown in the attached Schedule 'B-3' entitled "Schedule of Allowances" under the heading "Cole Diversion Drain Branch 'A' ".

d) Existing Drain and Land Taken (Cole Diversion Drain Branch 'B')

Under Section 31 of the Drainage Act, an existing drain that was not constructed under the Drainage Act or any of its predecessors can be incorporated entirely or partly into a drainage works under the Act. An allowance can be paid to the owner of the drain for the value of the drainage works of the incorporated drain. For this project, we are providing an allowance for the private drainage system representing a branch of the Cole Diversion Drain Branch 'B' at its discharge point on the easterly side of McGregor Side Road. This section of the private drain is located on the Canadian National Railway Corporation property from Station 0+000B to Station 0+170B of the drain survey.

Under Section 29 of the Drainage Act, the allowances for lands taken for the necessary drain widening are calculated at a rate of $50,000 per hectare, ($20,000 per acre). These amounts are shown in the attached Schedule 'B-4' entitled "Schedule of Allowances" under the heading "Cole Diversion Drain Branch 'B' ".

Cost Estimate

Our estimate of costs for the drain improvements are as follows:

Item	Description	Amount
CUT-OFF DRAIN (Station 1+004 to 6+275)		
1.	Concrete channel Rehabilitation (Station 1+004 to Station 1+473). The work includes the supply and installation of Concrete Canvas over the existing concrete channel. The work also includes stabilizing the existing concrete side walls by means of concrete mortar of cracks and parging of spalled areas on side walls of existing channel.	
	a) Mobilization, demobilization, staging area for construction materials, traffic control as required, safety training, etc.	$ 25,000
	b) Removal and disposal of concrete debris, sediment, brush and vegetation from drain channel bottom and side slopes. Hydro flushing and vac truck equipment to be considered for sediment removal.	50,000
	c) Removal and re-installation of concrete barrier along south side of Cut-Off Drain (approx. 425 m length) to permit equipment access to working corridor.	10,000

Item	Description	Amount
	d) Sta. 1+004 to Sta. 1+259, Sta. 1+294 to Sta. 1+402. Concrete Canvas (CC8) geosynthetic cementitious composite mat 8 mm thickness (approx. 4,150 m^2). Work to include surface preparation with concrete mortar filling of cracks and parging of all spalled and damaged channel surfaces (approx. 1,500 m^2) troweled to a smooth uniform surface over the existing concrete channel. Concrete Canvas to be anchored and fastened to existing concrete channel as per Specifications outlined herein (all labour and supply of materials to be included). Prior to canvas liner placement, Concrete Canvas (CC5) geosynthetic cementitious composite mat 5 mm thickness (approx. 80 m^2) to be used to prepare donut gaskets to be placed over existing lateral pipe outlets (approx. 26 pipes @ 600 mm dia. or smaller) protruding through concrete channel wall. Channel liner overlay cut to suit for pipe openings and to be affixed with sealant and masonry screws as per Specifications outlined herein. Canvas edges along the top of the channel to be fasted down with stainless steel clamping bar (continuous) as specified herein.	645,000
	e) Sta. 1+259 to Sta. 1+271 and Sta. 1+402 to Sta. 1+473. Concrete Canvas (CC13) geosynthetic cementitious composite mat 13 mm thickness (approx. 950 m^2). Work to include surface preparation with concrete mortar filling of cracks and parging of all spalled and damaged channel surfaces (approx. 200 m^2) troweled to a smooth uniform surface over existing concrete channel. Concrete Canvas to be anchored and fastened to existing concrete channel as per Specifications outlined herein (all labour and supply of materials to be included). Prior to canvas liner placement, Concrete Canvas (CC5) geosynthetic cementitious composite mat 5 mm thickness (approx. 30 m^2) to be used to prepare donut gaskets to be placed over existing lateral pipe outlets (approx. 9 pipes @ 600 mm dia. or smaller) protruding through concrete channel wall. Channel liner overlay cut to suit for pipe openings and to be affixed with sealant and masonry screws as per Specifications outlined herein. Canvas edges along the top of the channel to be fasted down with stainless steel clamping bar (continuous) as specified herein.	155,000

Item	Description	Amount
	f) Water Management (temporary diversion of process waters during channel re-construction). Implement suitable water management strategy to facilitate the completion of the work throughout this reach. Water management techniques to consist of redirecting and maintaining base flows while accommodating unobstructed provisions for rainfall events without creating any backwater effects upstream. Of specific note, a suitable water management strategy must be implemented during construction to accommodate on-going process water flows originating from the outfall sewer exiting the HC Starck property at Station 1+260. Contractor is responsible to coordinate this activity with HC Starck in order to limit any disruption to their operations.	100,000
2.	Temporarily remove and reinstall existing trash screen and walkway at Station 1+428 to permit installation of Concrete Canvas (CC13) liner.	10,000
3.	Bridge No. 1 Sta. 1+271 to Sta. 1+294. Remediate twin 23 m long, 2440 mm diameter CSP culverts with Concrete Canvas (CC8) overlay on inside bottom half surface of pipes (approx. 200 m^2). Prior to canvas placement, prep work requires PVA adhesive and bonding agent application to inner pipe walls followed by semi dry grout to fill corrugations troweled to a smooth round surface. Concrete Canvas to be anchored and fastened to existing concrete channel as per Specifications outlined herein (all labour and material included). Work includes first cleaning, drying and removing any loose pipe surface materials prior to applying bonding agent.	30,000
4.	Rehabilitation of concrete paver blocks on side slopes from Station 1+530 to 1+702 (approximately 100 m^2). The work includes the removal, repair and replacement with gabion stone and filter fabric underlay.	15,000
5.	Clearing and brushing including disposal off-site. (Stations 1+473 to 6+275). Contractor must be certified and pre-approved to undertake construction activities within Imperial Oil property. Safety and technical requirements are defined by Imperial Oil. Contractor must be certified and pre-approved to undertake construction activities within CN property. Safety and technical requirements are defined by CN.	74,000

Item	Description	Amount
6.	Open drain excavation and hauling of spoils off-site – approximately 2,100 m^3 (Station 1+473 to 6+275) In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.	110,000
7.	Soils characterization sampling program	50,000
8.	Cleanout of ten (10) existing private access bridges:	
	a) Bridge No. 2 - Station 1+583 (Roll No. 4-50-008) - Clean drain through existing 9.2 m span x 2.9 m rise rectangular concrete open bottom bridge.	1,050
	b) Bridge No. 3 - Station 1+679 (Roll No. 4-50-008) - Clean drain through existing 9.0 m span x 2.75 m rise rectangular concrete open bottom bridge.	1,050
	c) Bridge No. 5 - Station 1+782 (Roll No. 4-50-297) - Clean drain through existing 6.5 m span by 2.5 m rise concrete bridge.	1,050
	d) Bridge No. 9 (Roll No. 4-49-400) - Station 2+725 - Clean drain through existing 11.3 m span x 1.9 m rise concrete bridge.	1,050
	e) Bridge No. 10 (Roll No. 4-49-400) - Station 2+997 - Clean drain through existing 13.4 m span x 1.66 m rise concrete pipe bridge.	1,050
	f) Bridge No. 11 (Roll No. 4-49-400) - Station 3+008 - Clean drain through existing 5300 mm x 3000 mm CSP arch culvert.	1,050
	g) Bridge No. 12 (Roll No. 4-49-400) - Station 3+266 - Clean drain through existing 6.1 m span x 2.3 m rise open bottom rectangular concrete bridge.	1,050

Item	Description	Amount
	h) Bridge No. 15 (Roll No. 4-46-353) - Station 3+928 - Clean drain through existing 10.4 m span by 2.7 m rise wooden rail bridge (abandoned).	1,050
	i) Bridge No. 16 (Roll No. 4-49-353) - Station 4+002 - Clean drain through existing 4.2 m span x 2.5 m rise rectangular concrete open bottom bridge.	1,050
	j) Bridge No. 17 (Roll No. 4-49-353) - Station 4+225 - Clean drain through existing 4.4 m span x 1.65 m rise steel bridge.	1,050
9.	Cleanout of three (3) existing CN railway bridges:	
	a) Bridge No. 7 (Canadian National Railway Corporation) - Station 2+651 - Clean drain through existing 5 m wide wooden rail bridge.	1,500
	b) Bridge No. 8 (Canadian National Railway Corporation) - Station 2+665 - Clean drain through existing 5 m wide wooden rail bridge.	1,500
	c) Bridge No. 13 (Canadian National Railway Corporation) - Station 3+678 - Clean drain through existing 5.5 m span x 3.1 m rise metal rail bridge.	1,500
10.	Cleanout of five (5) existing road bridges:	
	a) Bridge No. 4 - Station 1+731 (Vidal Street) - Clean drain through existing 30 m long, 9.6 m span by 2.9 m rise rectangular open bottom concrete bridge.	2,500
	b) Bridge No. 6 - Station 2+285 (Imperial Avenue) - Clean drain through existing 5200 mm x 3300 mm CSP arch bridge on concrete footings.	2,500
	c) Bridge No. 14 - Station 3+869 (Scott Road) - Clean drain through existing 12 m long, 6.1 m span x 2.8 m rise open bottom concrete bridge.	2,500
	d) Bridge No. 18 - Station 6+010 (Indian Road South) - Clean drain through existing 6800 mm x 4000 mm CSP arch culvert.	2,500
	e) Bridge No. 19 - Station 6+262 (Plank Road) - Clean drain through existing 3.0 m span by 2.4 m rise concrete bridge.	2,500
11.	Repair undermined concrete channel with rip-rap approximately 50 m^2 (Stations 2+628 to 2+646)	4,000

Item	Description	Amount
12.	Bridge No. 5 (Roll No. 4-50-297) - Station 1+782 - Removal of existing 6.5 m span x 2.5 m rise concrete bridge deck and jersey barriers, as required. Abutments, headwalls and footings to remain.	5,000
13.	Remove partial obstructions (fencing and swing gate materials) from within drain (Station 2+678, 3+411, 3+639, 3+893, 4+375). Removal and disposal of lower portion of existing fence pivoting within drain below top of drain banks which is attached to chain link fence crossing drain above at the following locations: Station 2+678, 3+411, 3+639, 3+893, and 4+375. Remaining portion of fence extending across top of drain to remain in place.	5,000
14.	Temporary silt control measures	2,000
15.	Hydro seeding of drain banks where disturbed from drain bottom widening (approximately 4,500 m^2)	22,500
	SUB-TOTAL	$1,340,000
16.	Allowance under Section 31 for value of existing private drain	100,000
17.	Survey, Design, Report and Assessment	450,000
18.	Contract Administration and Construction Observation	183,000
19.	Expenses and Incidentals	32,000
20.	Contingency for landfill dumping fee for disposal of drain spoils	30,000
SUB-TOTAL EXCLUDING SECTION 26 COSTS		**$2,135,000**
	SECTION 26 COSTS	
21.	Bridge 17A (Station 4+415 – Hydro One Networks Inc.) – Supply and install a new 18 m long, 4370 mm x 2890 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 100 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 500 tonnes), granular 'A' driveway material (approx. 70 tonnes), and stone erosion protection on drain banks (approx. 65 m^2).	$ 52,000
	SUB-TOTAL	**$52,000**
22.	Survey, Design, Report and Assessment (cost portion)	$ 10,000
SUB-TOTAL SECTION 26 COSTS		**$62,000**
CUT-OFF DRAIN – TOTAL ESTIMATE		**$2,197,000**

Item	Description	Amount
COLE DRAIN (Stations 6+275 to 11+225)		
1.	Open Drain	
	a) Excavation and hauling of excavated drain spoils off-site – approx. 2,500 m^3 (Station 6+275 to 9+550). In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.	$ 75,000
	b) Excavation and levelling of drain spoils on-site – approx. 400 m^3 (Station 9+550 to 11+225)	16,000
2.	Soils characterization sampling program	25,000
3.	Cleanout of ten (10) existing private access crossings:	
	a) Bridge No. 40 (Roll No. 4-51-295-05) - Station 8+526 - Clean drain through existing 2200 mm CSP culvert.	500
	b) Bridge No. 41 (Roll No. 4-51-296) - Station 8+588 - Clean drain through existing 2500 mm x 1830 mm CSP arch culvert.	500
	c) Bridge No. 42 (Roll No. 4-51-298) - Station 8+696 - Clean drain through existing 2400 mm CSP culvert.	500
	d) Bridge No. 43 (Roll No. 4-51-299) - Station 8+798 - Clean drain through existing 2500 mm x 1830 mm CSP arch culvert.	500
	e) Bridge No. 46 (Roll No. 4-51-607) - Station 9+499 - Clean drain through existing 1650 mm concrete culvert.	500
	f) Bridge No. 47 (Roll No. 4-51-568) - Station 9+924 - Clean drain through existing 1500 mm CSP culvert.	500

Item	Description	Amount
	g) Bridge No. 48 (Roll No. 4-51-559) - Station 10+433 - Clean drain through existing 1500 mm CSP culvert.	500
	h) Bridge No. 49 (Roll No. 4-51-570) - Station 10+743 - Clean drain through existing 1500 mm CSP culvert.	500
	i) Bridge No. 50 (Roll No. 4-51-573) - Station 11+001 - Clean drain through existing 900 mm CSP culvert.	500
	j) Bridge No. 51 (Roll No. 4-51-573) - Station 11+068 - Clean drain through existing 900 mm CSP culvert.	500
4.	Cleanout of two (2) existing City of Sarnia road crossing	
	a) Bridge No. 23 (McGregor Road) - Station 6+826 - Clean drain through existing 3000 mm x 2300 mm rectangular concrete bridge with open bottom.	2,500
	b) Bridge No. 39 (Gladwish Drive) - Station 8+390 - Clean drain through existing 3000 mm x 2000 mm concrete box culvert.	2,500
5.	Cleanout of two (2) existing County of Lambton road crossings:	
	a) Bridge No. 45 (Churchill Line, Kimball Road) - Station 9+355 - Clean drain through existing 2000 mm upstream and 1800 mm downstream CSP culvert.	10,000
6.	Cleanout of one (1) existing highway crossing:	
	a) Bridge No. 44 (Highway 40) - Station 9+026 - Clean drain through existing 2400 mm x 1800 mm rectangular concrete bridge with open bottom.	3,500
7.	Clearing and brushing including disposal off-site. (Stations 6+275 to 11+225)	32,000
8.	Bridge widening/repairs as follows:	

Item	Description	Amount
	a) Bridge 41 (Station 8+587-Kel-Gor Limited) – Remove existing slope stone treatment on culvert ends. Supply and place interlocking concrete block headwalls (26 full blocks, 16 half-high blocks, 4 half blocks) on culvert ends including backfill of the drain between headwalls and driveway edge with native materials compacted up to underside of granular driveway surface (approx. 20 m^3). Supply and place granular 'A' driveway surface minimum 300 mm thickness (approx. 40 tonnes) over filled drain portion both sides beyond existing driveway Work to includes placement of stone erosion protection on drain banks (approx. 15 m^2) and relocation of existing steel guard rails. Any excess stone salvaged from existing culvert end treatment to be disposed of off-site. Any damage to the existing culvert as a result of construction shall be repaired or replaced at the contractor's expense as determined by the Engineer and/or Drainage Superintendent.	10,500
	b) Bridge No. 48 (Station 10+433-Lloyd D. & Frances J. King) – Remove and re-install westerly concrete block headwall.	3,000
9.	Access Bridge replacements, as follows:	
	a) Bridge 20 (Station 6+431 – Enbridge Pipelines Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3890 mm x 2690 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 65 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 175 tonnes), granular 'A' driveway sub-base (approx. 80 tonnes), 6 block rows high interlocking concrete block headwall (36 full blocks, 4 half blocks, 20 half-high blocks), stone erosion protection on drain banks (approx. 45 m^2), restoration of asphalt driveway (approx. 20 tonnes), and remove and dispose of steel pipe guiderails to be replaced by block headwalls.	43,800

Item	Description	Amount
	b) Bridge 21 (Station 6+492 – Enbridge Pipelines Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 29.5 m long, 3890 mm x 2690 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 160 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 470 tonnes), granular 'A' driveway (approx. 230 tonnes), 6 block rows high interlocking concrete block headwall (36 full blocks, 8 half blocks, 18 half-high blocks, 4 half-high half blocks), and stone erosion protection on drain banks (approx. 75 m^2). Reshape south drain bank on upstream and downstream end to 1:1 side slope. Re-install steel pipe guiderails on top surface of concrete block headwall and reinstate chain-link fence as required.	85,400
	c) Bridge 22 (Station 6+662 – Enbridge Pipelines Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3890 mm x 2690 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 65 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 180 tonnes), granular 'A' driveway sub-base (approx. 90 tonnes), 6 block rows high interlocking concrete block headwall (36 full blocks, 8 half blocks, 18 half-high blocks, 4 half-high half blocks), stone erosion protection on drain banks (approx. 70 m^2), restoration of asphalt driveway (approx. 30 tonnes), Reshape south drain bank on upstream and downstream end to 1:1 side slope. Remove and dispose of steel pipe guiderails to be replaced by concrete block headwalls and reinstate chain-link fence as required.	45,600
	d) Bridge 24 (Station 7+161 – Sarnia Auto Wreckers) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 165 tonnes), granular 'A' driveway sub-base (approx. 45 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 45 m^2), restoration of concrete driveway (approx. 20 m^3), and re-fabricate existing steel guiderails to be straight and mounted on top surface of block headwall.	42,100

Item	Description	Amount
	e) Bridge 25 (Station 7+324 – Lamsar Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 155 tonnes), granular 'A' driveway sub-base (approx. 75 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 55 m^2), restoration of asphalt driveway (approx. 25 tonnes), and re-install steel pipe guiderails on top surface of block head wall.	38,900
	f) Bridge 26 (Station 7+355 – Lamsar Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 12.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 65 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 215 tonnes), granular 'A' driveway sub-base (approx. 85 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 50 m^2), restoration of asphalt driveway (approx. 30 tonnes).	41,900
	g) Bridge 27 (Station 7+483 – 612031 Ontario Ltd.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 14.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 75 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 205 tonnes), granular 'A' driveway sub-base (approx. 95 tonnes), 5½ block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), stone erosion protection on drain banks (approx. 55 m^2), restoration of asphalt driveway (approx. 35 tonnes).	46,100

Item	Description	Amount
	h) Bridge 28 (Station 7+581 – 376964 Ontario Ltd.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 170 tonnes), granular 'A' driveway sub-base (approx. 75 tonnes), 5 block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), stone erosion protection on drain banks (approx. 50 m^2), restoration of asphalt driveway (approx. 25 tonnes), and re-instate chain-link fence as required.	38,500
	i) Bridge 29 (Station 7+610 – Richard C. Perdeaux) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 150 tonnes), granular 'A' driveway sub-base (approx. 75 tonnes), 5½ block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), stone erosion protection on drain banks (approx. 50 m^2) and restoration of asphalt driveway (approx. 25 tonnes).	38,000
	j) Bridge 30 (Station 7+739 – John R. Bernhardt) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 20.0 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 100 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 365 tonnes), granular 'A' driveway (approx. 130 tonnes), 5 block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), and stone erosion protection on drain banks (approx. 45 m^2).	53,900

Item	Description	Amount
	k) Bridge 31 (Station 7+794 – Paul J. Babcock) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 15.0 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 75 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 245 tonnes), granular 'A' driveway (approx. 105 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 50 m^2), and relocation of existing steel gate.	43,100
	l) Bridge 32 (Station 7+879 – 1230868 Ontario Ltd.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 165 tonnes), granular 'A' driveway (approx. 75 tonnes), 5 block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), and stone erosion protection on drain banks (approx. 45 m^2).	33,500
	m) Bridge 33 (Station 7+928 – Gordon Bouma) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 9.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 50 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 125 tonnes), granular 'A' driveway sub-base (approx. 40 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 40 m^2). Reshape south drain bank on upstream and downstream end to 1:1 side slope and restoration of concrete driveway (approx. 11 m^3).	31,700

Item	Description	Amount
	n) Bridge 34 (Station 7+959 – Gordon Bouma) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 9.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 50 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 125 tonnes), granular 'A' driveway sub-base (approx. 40 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 75 m^2). Reshape south drain bank on upstream and downstream end to 1:1 side slope and restoration of concrete driveway (approx. 11 m^3).	33,500
	o) Bridge 35 (Station 7+999 – Gordon Bouma) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 14 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 70 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 180 tonnes), granular 'A' driveway sub-base (approx. 60 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 75 m^2). Reshape south drain bank on upstream and downstream end to 1:1 side slope and restoration of concrete driveway (approx. 18 m^3).	43,000
	p) Bridge 36 (Station 8+045 – Acklands Grainger Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 14.0 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 70 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 170 tonnes), granular 'A' driveway sub-base (approx. 90 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 55 m^2). Reshape south drain bank on downstream end to 1:1 side slope and restoration of asphalt driveway (approx. 30 tonnes).	44,300

Item	Description	Amount
	q) Bridge 37 (Station 8+133 – Plank Road Transfer Ltd.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 210 tonnes), granular 'A' driveway (approx. 70 tonnes), 5 block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), and stone erosion protection on drain banks (approx. 45 m^2).	37,900
	r) Bridge 38 (Station 8+205 – Barnim Property Holdings) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 165 tonnes), granular 'A' driveway sub-base (approx. 75 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 45 m^2), restoration of asphalt driveway (approx. 25 tonnes).	38,200
10.	Supply and install stone erosion protection to repair drain banks @ Station 10+610 and repair end of 300 mm diameter outlet pipe @ Station 8+079, approximately 20 m^2.	1,600
11.	Hydro seeding of drain banks where disturbed from drain bottom widening (approximately 9,000 m^2)	36,000
12.	Temporary silt control measures	2,000
	SUB-TOTAL	$1,004,000
13.	Allowance under Section 30	5,800
14.	Survey, Design, Report and Assessment	80,700
15.	Contract Administration and Construction Observation	68,000
16.	Expenses & Incidentals	10,000
17.	Contingency for landfill dumping fee for disposal of drain spoils	37,500
COLE DRAIN – TOTAL ESTIMATE		**$1,206,000**

Item	Description	Amount
COLE DIVERSION DRAIN BRANCH 'A' (Sta. 0+000A to 1+450A)		
1.	Clearing and brushing including disposal off-site. (Station 0+000A to 1+450A)	$ 16,000
2.	Drain bottom excavation and hauling of excavated material off-site approx. 320 m^3 Station 0+000A to 1+450A. In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.	12,200
3.	Drain widening excavation (north bank only) and hauling of excavated material off-site approx. 170 m^3 from Station 0+125A to 0+236A and Station 0+775A to 0+875A.	7,200
4.	Soils characterization sampling program	3,000
5.	Hydro seeding drain banks where disturbed (approx. 2,000 m^2).	8,000
6.	Supply and placement of stone erosion protection on north drain bank Station 0+849A to Station 0+859A (approx. 30 m^2).	1,800
7.	Cleanout of three (3) existing private access bridges:	
	a) Bridge No. 1A (Canadian National Railway Corporation) - Station 0+000A - Clean drain through the existing twin 20 m long 900 mm CSP culvert structures.	3,000
	b) Bridge No. 2A (Canadian National Railway Corporation) - Station 0+232A - Clean drain through the existing 6 m long 1100 mm concrete culvert structure.	3,000
	c) Bridge No. 5A (Plains Midstream Canada U) - Station 1+150A - Clean drain through the existing 140 m long 600 mm CSP culvert structure.	2,500

Item	Description	Amount
8.	Road Bridge Replacement / Sluice Gate Arrangement, as follows:	
	a) Bridge No. 3A – Station 0+407.5A - Remove and replace existing culvert. Supply and install a new 15 m long, 900 mm diameter high density polyethylene (HDPE Boss 2000) culvert complete with clearstone bedding (approx. 10 tonnes), full granular 'A' backfill (approx. 90 tonnes), pre-cast concrete headwall as per OPSD 804.03 (east end) and sloping stone endwall (approx. 30 m^2 on west end). Supply and installation of a 914 mm medium duty sluice gate to the concrete headwall as per Armtec Model 20-C or approved equal, complete with 2 m extension rod and turn wheel.	32,000
9.	Railway Bridge Replacement, as follows:	
	a) Bridge No. 4A – Station 0+718A - Remove and replace existing culvert. Supply and install a new 32 m long, 600 mm diameter high density polyethylene (HDPE Boss 2000) culvert complete with clearstone bedding (approx. 20 tonnes), full granular 'A' backfill (approx. 240 tonnes), sloping stone endwalls (approx. 60 m^2) and restoration of asphalt driveway 100 mm thickness (approx. 15 tonnes).	20,500
10.	Implementation of silt control and water management measures in the channel throughout construction.	1,000
	SUB-TOTAL	$110,200
11.	Allowances under Sections 29 & 31	20,500
12.	Survey, Design, Report and Assessment	19,500
13.	Contract Administration and Construction Observation	8,300
14.	Expenses & Incidentals	1,500
15.	Contingency for landfill dumping fee for disposal of drain spoils	7,000
COLE DIVERSION DRAIN BRANCH 'A' TOTAL COST ESTIMATE		**$167,000**

Item	Description	Amount
COLE DIVERSION DRAIN BRANCH 'B' (Sta. 0+000B to 0+170B)		
1.	Clearing and brushing including disposal off-site. (Stations 0+000B to 0+170B).	$ 2,000
2.	Drain bottom excavation and hauling of excavated material off-site (approx. 110 m^3) Station 0+000B to 0+170B including	4,600

Item	Description	Amount
	widening of north bank from Station 0+097B to 0+130B. In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.	
3.	Soils characterization sampling program	500
4.	Supply and place stone erosion protection on north bank (approx. 80 m^2) Station 0+044B to 0+085B.	4,800
5.	Supply and place stone erosion protection on both banks (approx.165 m^2) Station 0+020B - 0+035B, 0+085B - 0+097B	9,900
6.	Hydroseeding drain banks where disturbed (approx. 200 m^2).	800
7.	Private bridge replacement, as follows:	
	a) Bridge No. 1B – Station 0+010B - Remove and replace existing culvert. Supply and install a new 20 m long, 750 mm diameter high density polyethylene (HDPE Boss 2000) culvert complete with clearstone bedding (approx. 15 tonnes), full granular 'A' backfill (approx. 150 tonnes), sloping stone endwalls (approx. 40 m^2) and restoration of asphalt driveway 100 mm thickness (approx. 15 tonnes).	15,500
8.	New hydro pole access bridges, as follows:	
	a) Bridge No. 2B – Station 0+040B - Supply and install a new 9 m long, 600 mm diameter HDPE Boss 2000 culvert complete with clearstone bedding (approx. 5 tonnes), native backfill and sloping stone endwalls (approx. 20 m^2).	3,800
	b) Bridge No. 3B – Station 0+0135B - Supply and install a new 9 m long, 600 mm diameter density (HDPE Boss 2000) culvert complete with clearstone bedding (approx. 5 tonnes), native backfill and sloping stone endwalls (approx. 20 m^2).	3,800
	SUB-TOTAL	$45,700

Item	Description	Amount
9.	Allowances under Sections 29 & 31	$2,000
10.	Survey, Design, Report and Assessment	7,800
11.	Contract Administration and Construction Observation	3,400
12.	Expenses & Incidentals	600
13.	Contingency for landfill dumping fee for disposal of drain spoils	1,500
COLE DIVERSION DRAIN BRANCH 'B' TOTAL COST ESTIMATE		**$61,000**
OVERALL TOTAL ESTIMATE OF COST		**$3,631,000**

The estimate of cost provided in this report was prepared according to current material and installation prices as of the date of this report. For each of the cost items above, with the exception of the allowances items, there is a 1.76% tax included within the estimate that represents the non-rebated portion of the provincial sales tax. In the event of delays from the time of filing of the report by the Engineer to the time of tendering the work, it is understood that the estimate of cost is subject to inflation and sensitive to sudden increases in material costs. The rate of inflation shall be calculated using the Consumer Price Index applied to the cost of construction from the date of the report to the date of tendering.

Utilities

It may become necessary to temporarily or permanently relocate utilities that may conflict with the construction recommended under this report. In accordance with Section 26 of the Drainage Act, we assess any relocation cost against the public utility having jurisdiction. Under Section 69 of the Drainage Act, the public utility is at liberty to do the work with its own forces, but if it should not exercise this option within a reasonable time, the City will arrange to have this work completed and the costs will be charged to the appropriate public utility.

Assessment of Estimated Project Costs

We recommend that the above estimates of cost be levied against all of the lands and roads within the Cut-Off Drain, Cole Drain and proposed Cole Diversion Drain Branch 'A' and Branch 'B' watersheds as shown in the Schedules of Assessment attached to this report. Detailed Schedules of Assessment labelled Schedule 'C-1', Schedule 'C-2', Schedule 'C-3' and Schedule 'C-4' are attached to this report which show assessments against specific properties in the watershed.

Schedule 'C-1' is a schedule of assessment for the estimated cost of the work on the Cut-Off Drain. The actual assessments levied against the assessed land and roads in Schedule 'C-1' will be based upon the actual total cost of the work on the Cut-Off Drain plus a portion of the total engineering costs, expenses, interest and any other incidental costs incurred on the overall project proportional to the actual total capital cost associated with the Cut-Off Drain. The work on the Cut-Off Drain must be tendered as separate items in the tender form. Schedule 'C-1' contains Special Benefit assessments that will be prorated

along with the other assessments in Schedule 'C-1'. Details of Special Benefit listed in Schedule 'C-1' are provided in Schedule 'D-1'.

Schedule 'C-2' is a schedule of assessment for the estimated cost of the work on the Cole Drain. The actual assessments levied against the assessed land and roads in Schedule 'C-2' will be based upon the actual total cost of the work on the Cole Drain plus a portion of the total engineering costs, expenses, interest and any other incidental costs incurred on the overall project proportional to the actual total capital cost associated with the Cole Drain. The work on the Cole Drain must be tendered as separate items in the tender form. Schedule 'C-2' contains Special Benefit assessments that will be prorated along with the other assessments in Schedule 'C-2'. Details of Special Benefit listed in Schedule 'C-2' are provided in Schedule 'D-2'.

Schedule 'C-3' is a schedule of assessment for the estimated cost of the work on the "Cole Diversion Drain Branch A". The actual assessments levied against the assessed land and roads in Schedule 'C-3' will be based upon the actual total cost of the work on the "Cole Diversion Drain Branch A" plus a portion of the total engineering costs, expenses, interest and any other incidental costs incurred on the overall project proportional to the actual total capital cost associated with "Cole Diversion Drain Branch A". The work on the "Cole Diversion Drain Branch A" must be tendered as separate items in the tender form. Schedule 'C-3' contains Special Benefit assessments that will be prorated along with the other assessments in Schedule 'C-3'. Details of Special Benefit listed in Schedule 'C-3' are provided in Schedule 'D-3'.

Schedule 'C-4' is a schedule of assessment for the estimated cost of the work on the "Cole Diversion Drain Branch B". The actual assessments levied against the assessed land and roads in Schedule 'C-4' will be based upon the actual total cost of the work on the "Cole Diversion Drain Branch B" plus a portion of the total engineering costs, expenses, interest and any other incidental costs incurred on the overall project proportional to the actual total capital cost associated with the "Cole Diversion Drain Branch B". The work on the "Cole Diversion Drain Branch B" must be tendered as separate items in the tender form.

Assessment Provisions of the Drainage Act

Under the Drainage Act, the Engineer must decide how the cost of the drainage project will be assessed against the lands and roads in the watershed and against any public utilities affecting the work. The Drainage Act gives the Engineer authority to determine assessments based upon the following three (3) types of assessment components, as follows:

i. Benefit (*advantages relating to the betterment of lands, roads, buildings, or other structures resulting from the improvement to the drain).*
ii. Outlet Liability *(part of cost required to provide outlet or improved outlet for lands and roads).*
iii. Special Benefit *(additional work or feature that may not affect function of the drain. Includes any increase in project cost caused the existence of utilities, roads and railways).*

More specifically, the three (3) assessment components involve the following:

1) Benefit

The Benefit to be derived by the proposed work relates to higher market value, improved

appearance, reduced flooding, and better control of surface and sub-surface runoff. Also, Benefit relates to having a legal outlet for runoff from the adjoining properties. The adjoining properties in the watershed will have the right to drain directly into this drainage works. In the case of the lands and roads in the Cut-Off Drain and Cole Drain watersheds, a reduction of flooding will be a significant benefit to various properties.

2) Outlet Liability

All properties in the watershed have a legal responsibility to make sure that water artificially caused to flow from their property is conveyed to a "sufficient outlet". "Sufficient outlet" means a point at which water can be discharged safely so that it will do no damage to lands or roads. The appointed Engineer has a duty to ensure that storm runoff artificially caused to flow from a property is taken to a sufficient outlet.

Lands that artificially collect and discharge surface and sub-surface flows into a drainage system are liable for an Outlet Assessment under the provisions of the Drainage Act. In accordance with Section 23 of The Drainage Act, all lands that use the drainage works may be assessed for Outlet Liability based on the rate and volume of runoff artificially caused to flow to the drainage works. The distribution of the Outlet Liability Assessment against the lands and roads within the drainage area is relative to land use, size and location of property within the watershed. Consideration has been given to the type of drainage (surface, sub-surface or both) as well as the effects of existing storm water management facilities. Modified runoff factors have been applied on the relevant lands, as well as, the roads.

All properties in the watershed are assessed for outlet liability which is a share of the cost of the work downstream of their property. No property is assessed for the cost of any work upstream of locations where runoff from that land enters the drainage works. When determining the outlet assessments the number of hectares of each property in the watershed is considered. We also consider runoff factors which represent the type of surface covering the area. Grassed areas, gravel areas, asphalt and concrete areas all have different run off factors. The length of drain that each property uses has a direct influence on the outlet assessment against each property. On-site storm water management practices such as detention ponds have an effect upon the volume and rate of flow of runoff artificially caused to flow from a property typically resulting in a lower rate of outlet assessment.

In general, a property or road is not assessable for any work carried out upstream of it. To ensure that the assessment method applies this principle, we have divided the Cut-Off Drain into four (4) sections and the Cole Drain into two (2) sections. The Cole Diversion Drain Branches A & B are considered separately. The estimated cost of the work in each section was determined and assessed as Special Benefit, Benefit and Outlet. Only those lands and roads located within that section, upstream of that section are assessed for Outlet Liability. This is carried out for all sections of the various drains involved to determine the final drainage assessment against each property.

3) Special Benefit

On this project, Special Benefit assessments have been made for new access bridges, access bridge replacements, access bridge removal or repairs, road and railway bridge cleaning, sluice gate arrangement and any special bank treatments required such as channel lining that is required because of industrial facilities or operations near the drain

that make the existence of an ordinary earthen channel and the required working corridor for future maintenance not feasible, impractical or impossible. The rationale for the Special Benefit assessments shown in Schedules 'C-1', 'C-2', 'C-3' and 'C-4' and detailed in the corresponding Schedules 'D-1', 'D-2', 'D-3' and 'D-4' for the various types of work is as follows:

i. *Channel Lining (Sta. 1+000 to Sta. 1+473) – Cut-Off Drain*

The downstream reaches of the Cut-Off Drain through the Arlanxeo Canada Inc. property located west of Vidal Street, have banks that are lined with concrete across the entire channel. Normally, the drain banks could be made stable given enough land to permit a stable side slope to be constructed, and an allowance for future bank erosion and adequate working area along the sides of the drain to permit the operation of maintenance equipment (crane, excavator, trucks, etc.). In this particular case, the banks of the downstream reaches of the Cut-Off Drain have been lined with concrete because of the close proximity of industrial piping, equipment and other plant facilities. Historically, the adjacent landowner has undertaken the maintenance of this portion of drain channel to remove debris and prevent obstructions. Given these factors, we have assessed 95% of the cost of repairing the concrete channel including engineering cost portion against the adjoining industrial property (Roll No. 4-50-888) as a Special Benefit assessment. The remaining 5% of the cost is assessed as Benefit assessments against the adjacent lands and Outlet assessments against the upstream lands in the watershed.

ii. *Bridge No. 1 Repair (Sta. 1+282) – Cut-Off Drain*

The repairs to the lower halves of the two (2) existing 2.44 m diameter corrugated steel culverts is recommended in lieu of full bridge replacement. We have assessed 100% of the cost of repairs including engineering cost portion against the adjoining industrial property (Roll No. 4-50-888 – Arlanxeo Canada Inc.) as a Special Benefit assessment.

iii. *Drain bank repairs (Sta. 1+530 to Sta. 1+702) – Cut-Off Drain*

The west bank consisting of concrete paver blocks that are failing due to bank instability, is to be repaired using gabion stone. We have assessed 100% of the cost of repairs including engineering cost portion against the adjoining industrial property (Roll No. 4-50-008- H.C. Starck Canada Inc.) as a Special Benefit assessment.

iv. *Bridge No. 5 Removal (Sta. 1+764) – Cut-Off Drain*

For the removal of Bridge No. 5, the costs shall be assessed entirely as a Special Benefit to the property owner Roll No. 4-50-297 Lanxess Inc.

v. *New Access Bridge No. 17A (Sta. 4+415) - Cut-Off Drain*

The City of Sarnia requested a bridge for access to the Hydro-One lands off of Scott Road to facilitate future construction of a water main. For this access bridge No. 17A, the cost shall be assessed entirely as a Special Benefit to the City of Sarnia in accordance with Section 26 of the Drainage Act. All Section 26 assessments shall be determined as non pro-ratable assessments.

vi. *Cleanout of Road & Railway Bridges – Cut-Off Drain*

For the cleaning of all road and railway bridges, the costs shall be assessed entirely as a Special Benefit to the applicable road authority or railway authority respectively, in accordance with Section 26 of the Drainage Act. All Section 26 assessments shall be determined as non pro-ratable assessments.

vii. *Access Bridge Replacements – Cole Drain*

In the case of access bridges, part of the cost of an access bridge is assessed partly against the adjoining property that benefits from this access bridge as a Special Benefit. The remainder of the access bridge cost is assessed as outlet liability against the upstream lands and roads that drain through this bridge. A past decision of The Ontario Drainage Tribunal indicated that under normal circumstances the cost of a crossing should be assessed 50% as Special Benefit to the adjoining property and 50% as Outlet Liability against the upstream lands and roads. This assessment rationale applies only to the primary or first access bridge to a property. Additional access bridges servicing the same property are normally assessed 100% to the adjoining private property.

On this particular project, Bridge Nos. 25, 26, 27, 28, 29, 30, 31 & 32 on the Cole Drain were replaced approximately 17 years ago under the 2003 report, which equates to approximately one third of its intended lifespan. Their hydraulic carrying capacity is below current design standards, which will implicate the frequency and degree of periodic flooding that may occur in the upstream area. Although the limitations in hydraulic carrying capacity associated with these access bridges were noted in 2003, the ratepayers were in support of the more restrictive bridge sizing in order to reduce costs. The project proceeded without objection from the engineer, the ratepayers and the City of Sarnia.

Bridges Nos. 20, 21, 22, 24, 33, 34, 35, 36, 37 & 38 were not considered part of the Cole Drain, prior to the recommendations contained in this report, and they are being replaced to upgrade the conveyance capacity of the Cole Drain to a 1 in 2 year design standard. From a structural perspective, these bridges have not reached the end of their life span. This factor was considered when assessing the cost of their replacement under this report.

The hydraulic modelling and design undertaken herein for this report indicated that upgrading the capacity of Bridges No. 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 and 38 is the most cost effective alternative for upgrading the overall level of service of the drainage works to attain the 1 in 2 year storm capacity within the Cole Drain without flows overtopping.

Under the 2003 report, the cost of replacing the ten (10) access bridges was assessed partly to the Road Authority, partly to the adjoining private property served by the crossing and partly to the upstream watershed as Outlet liability.

Under this report, the cost of replacing the eighteen (18) access bridges is assessed partly to the Road Authority (40% cost portion), partly to the adjoining private property served by the crossing (30% cost portion) and remaining amount to the upstream watershed as Outlet liability (30% cost portion). Bridges No. 33, 34 and 35 all serve one property. For the purposes of assessment, we have considered the

primary crossing to be Bridge No. 35. Bridges Nos. 33 and 34 are secondary access bridges and no part of the assessment for these bridges would apply to the upstream properties.

Given the unique circumstances and approach being recommended for the bridge replacements to upgrade the drain capacity, we are recommending the following assessment rationale for the bridge replacements:

a) Bridges Nos. 20, 24, 25, 27, 29, 31, 32, 35, 36, 37 and 38 are primary access bridges to the adjoining properties. For these structures, we recommend that the replacement cost of each bridge be assessed 40% against the City of Sarnia as a Special Benefit, 30% against the adjacent property owner served by the bridge as a Special Benefit and the remaining 30% assessed as Outlet Liability against the upstream lands and roads.

b) Bridges Nos. 33 and 34 are secondary access bridges to the property served by Bridge No. 35. For these structures, we recommend that the replacement cost of each bridge be assessed 40% against the City of Sarnia as a Special Benefit and the remaining 60% assessed against the adjacent property owner served by the bridges as a Special Benefit.

c) Bridges Nos. 21 and 22 are secondary access bridge to the property served by Bridge No. 20. For these structures, we recommend that the replacement cost of the bridge be assessed 40% against the City of Sarnia as a Special Benefit and the remaining 60% assessed against the adjacent property owner served by the bridges as a Special Benefit.

d) Bridge No. 26 is a secondary access bridge to the property served by Bridge No. 25. For this structure, we recommend that the replacement cost of the bridge be assessed 40% against the City of Sarnia as a Special Benefit and the remaining 60% assessed against the adjacent property owner served by the bridge as a Special Benefit.

e) Bridge Nos. 28 and 30 are shared access bridges each serving two properties. For these structures we recommend that the replacement cost of the bridge be assessed 40% against the City of Sarnia, 30% shared equally between the two property owners as Special Benefit and the remaining 30% assessed as Outlet Liability against the upstream lands and roads.

viii. *Access Bridge Repairs & Widening – Cole Drain*

For repairs to existing access bridge headwall for Bridge No. 48, we recommend the repair costs be assessed 50% to the bridge owner (Roll No. 4-51-559) and 50% against the upstream lands as an outlet assessment. For the widening of access Bridge No. 41, we recommend the widening costs be assessed 100% to the bridge owner (Roll No. 4-51-559).

ix. *Road Bridge Cleaning – Cole Drain*

Cleaning of road bridges, the costs shall be assessed to the applicable road authority in accordance with Section 26 of the Drainage Act. All Section 26 assessments shall be determined as non pro-ratable assessments.

x. *Utilities & Railways Access Bridges – Cole Diversion Drain Branch 'A' & 'B'*

In the case of public utilities and railways, any increase in cost caused by the

existence of the works of the public utility or railway is assessable against the public utility or railway under the provisions of Section 26 of the Drainage Act. For the replacement of Bridge No. 4A and No. 1B, we have assessed 100% of the costs to Canadian National Railway Corporation for the purpose of access for the existing roadway crossing of the Cole Diversion Branch 'A' and Branch 'B' respectively. For the cleaning of Bridge No. 2A, we have assessed 100% of the costs to Canadian National Railway Corp.

For the placement of stone erosion protection of the north bank to protect existing utility poles located within the limits of the drain channel on both the Cole Diversion Drain 'A' & 'B', we have assessed 100% of the costs to Hydro One Networks Inc.

For the new hydro pole access bridges (Bridge Nos. 2B & 3B), they are recommended to protect and support the existing utility poles located within the limits of the drain channel on the Cole Diversion Drain Branch 'B'. We have assessed 100% of the costs to Hydro One Networks Inc.

xi. *Sluice Gate, Headwall for Bridge No. 3A – Cole Diversion Drain Branch A*

The sluice gate and headwall arrangement to be installed at Station 0+415A (upstream side of Bridge No. 3A) is as per the specific request of Plains Midstream Canada U as a preventative measure to isolate potential flows emanating from their site. The estimated cost of these works as part of Bridge No. 3A replacement costs represents approximately 65% of the total costs for Bridge No. 3A. We have recommended this amount be assessed as a Special Benefit against Plains Midstream Canada U. The remaining 35% costs of Bridge No. 3 we have against the City of Sarnia road authority for McGregor Sideroad North.

xii. *Cleaning of Bridge No. 5A – Cole Diversion Drain Branch A*

For the cleaning of Bridge No. 5A, we have assessed 100% of the costs to Plains Midstream Canada U.

Future Maintenance - General

The Cut-Off Drain, the portion of the Cole Drain within the City of Sarnia, the Cole Diversion Drain Branches 'A' and 'B' shall be maintained by the City of the City of Sarnia as described in the following sections. The portion of the Cole Drain in St. Clair Township shall be maintained by the St. Clair Township in accordance with the by-law adopting the 2003 drainage report on the Cole Drain. All provisions for maintenance are subject to any other variations that may be made under the authority of the Drainage Act.

Future Maintenance – Cut-Off Drain Outlet from Station 0+629 to Station 1+473

The cost of maintaining the twin piped drain enclosure from Station 0+629 to Station 1+000 and the concrete channel liner from Station 1+000 to Station 1+473 are assessed 95% against the adjoining private properties as a Special Benefit. The remaining 5% of the future maintenance costs are assessed against the adjacent lands and roads as Benefit assessments and against all of the upstream lands and roads as Outlet liability. The attached Schedule 'E-1' which is a Schedule of Assessment to be used to levy these future maintenance costs based on an arbitrary amount of $50,000.

The cost of maintaining the remainder of the Cut-Off Drain from Station 1+473 to Station 6+225 shall be assessed against the affected lands in its watershed in accordance with the provisions as described below. Schedule 'C-1' is the schedule to be used for assessing

drain maintenance costs but the "Special Benefit" assessments shall be deleted from the schedule prior to pro rating the maintenance costs. Future maintenance costs shall be levied on the affected lands and roads that are located upstream of the maintenance work carried out. We recommend that the costs of future works of repair and maintenance of the drain be assessed as described below:

1. Certain Special Features on the Cut-Off Drain that are incorporated as part of this report have special maintenance conditions and assessment provisions. These items are detailed in a following section entitled "Special Features on Cut-Off Drain".
2. The concrete channel liner from Station 1+000 to Station 1+473 shall be maintained by the City and the cost assessed 95% against the adjacent private property as a Special Benefit. The remaining 5% shall be assessed as Benefit and Outlet liability using Schedule 'E-1' as described above.
3. All bridges on the Cut-Off Drain across road properties shall be assessed 100% to the applicable Road Authority.
4. All other drain maintenance work shall be assessed against the affected lands and roads that are located upstream of the maintenance work carried out, in the same relative proportions as the amounts listed in Schedule 'C-1' under "Value of Benefit" and "Value of Outlet".
5. Table 5 shown below outlines the assessment share for the future maintenance costs of all private access bridges on the Cut-Off Drain.

Table No. 5 – Cut-Off Drain Access Bridges (Future Maintenance)

Bridge No.	Type of Access Crossing	Property Roll No.	Bridge Owner	Outlet to Upstream Properties
1	Secondary	4-50-888	100%	-
2	Primary	4-51-201	50%	50%
3	Secondary	4-51-201	100%	-
7	Secondary	Railway	100%	-
8	Primary	Railway	100%	-
9	Primary	4-49-400	50%	50%
10	Secondary	4-49-400	100%	-
11	Secondary	4-49-400	100%	-
12	Secondary	4-49-400	100%	-
13	Primary	Railway	100%	-
15	Secondary	4-49-353	100%	-
16	Secondary	4-49-353	100%	-

Bridge No.	Type of Access Crossing	Property Roll No.	Bridge Owner	Outlet to Upstream Properties
17	Primary	4-49-353	50%	50%
17A	Primary	(Hydro One & City of Sarnia)	50% / 50%	

Special Features on Cut-Off Drain

In addition to the work being considered under this report, the report recommends the incorporation of the remaining downstream portion of the drain which extends from Station 0+546 to Station 1+000 across the Arlanxeo Canada Inc. property and underneath the St. Clair River. This includes the submerged 3048 mm outfall, extending from Station 0+546 to Station 0+620, the concrete outfall/building located at Station 0+620 and the twin pipe enclosure extending from Station 0+629 to 1+000, including the safety inlet screen and headwall.

Provided is a brief outline on the future assessment methodology associated with these specific drainage components:

1. *Submerged Discharge Pipe (Station 0+546 to Station 0+620)*

   The submerged discharge pipe is not required for drainage purposes and is only required for the discharge of treated process water derived from Arlanxeo Canada Inc. Consequently, we recommend that this structure be incorporated as part of the Cut-Off Drain and be maintained by the City at the sole expense of the benefiting party being Arlanxeo Canada Inc. in this instance. The City may elect to have Arlanxeo Canada Inc. maintain this infrastructure since they are responsible for all of the costs. The adjoining property owner (Arlanxeo Canada Inc.) shall submit plans for review and approval by the City prior to maintaining or replacing this structure.

2. *Concrete Outfall Chamber/Building (Station 0+620)*

   The concrete outfall chamber/building was constructed to facilitate the introduction of treated process water into the stormwater outfall. Prior to the establishment of this structure, the twin pipe enclosure discharged directly into the St. Clair River. Consequently, we recommend that the concrete outfall chamber/building be incorporated as part of the Cut-Off Drain and be maintained by the City at the sole expense of the benefiting party being Arlanxeo Canada Inc. The City may elect to have Arlanxeo Canada Inc. maintain this infrastructure since they are responsible for all of the costs. The adjoining property owner (Arlanxeo CanadaInc.) shall submit plans for review and approval by the City prior to maintaining or replacing this structure.

3. *Twin Pipe Drain Enclosure (Station 0+629 to Station 1+000) – Arlanxeo Canada Inc.*

   The enclosed outlet of the channel from Station 0+628 to 1+000 is to be surveyed through video inspection to confirm the structural integrity of the

outlet. This inspection is to be undertaken on a periodic basis or as required by the City at the sole expense of Arlanxeo Canada Inc.

The twin 1830 mm diameter pipe enclosure extending across a portion of the Arlanxeo Canada Inc. property was constructed to facilitate the development of the overlying lands for industrial purposes. Although the construction of the drain enclosure primarily benefits Arlanxeo Canada Inc., there is a slight benefit to the upstream watershed as a result of the reduced long-term reduction in on-going maintenance that would normally be associated with an open drain. Consequently, we recommend that this enclosed portion of drain be maintained by the City on the basis of 95% of the cost being assessed against the benefiting party being Arlanxeo Canada Inc. with the remaining 5% of the cost being assessed against the upstream watershed as Outlet liability. Schedule 'E-1' is to be used to prorate the cost of future maintenance.

The City may elect to have Arlanxeo Canada Inc. maintain this infrastructure since they are responsible for most of the costs. The maintenance costs must be approved by the City prior to carrying out the work. The adjoining property owner (Arlanxeo Canada Inc.) shall submit plans for review and approval by the City prior to maintaining or replacing this structure.

4. *Safety Inlet Screen (Station 1+000) and Trash Screen (Sta. 1+430) – Arlanxeo Canada Inc.*

   The trash screen at Station 1+430 on the Cut-Off Drain is intended to collect trash in a more concentrated location and coordinated manner prior to flows entering the twin pipe enclosure further downstream. The removal and disposal of debris at the trash screen and safety inlet screen is to be coordinated by the City with Arlanxeo Canada Inc.. The cost to remove debris, maintain and replace the trash screen and safety inlet screen in the future is considered a Special Benefit assessed on the basis of 95% of the cost being assessed against the benefiting party being Arlanxeo Canada Inc. with the remaining 5% of the cost being assessed against the upstream watershed as Outlet liability.

   Schedule 'E-1' is to be used to prorate the cost of future maintenance. The City may elect to have Arlanxeo Canada Inc. maintain this infrastructure since they are responsible for most of the costs. The adjoining property owner (Arlanxeo Canada Inc.) shall submit plans for review and approval by the City prior to maintaining or replacing the structures.

Future Maintenance – Cole Drain

The cost of maintaining the portion of the Cole Drain in the City of Sarnia shall be assessed against the affected lands in its watershed in accordance with the provisions as described below. Schedule 'C-2' is the schedule to be used for assessing drain maintenance costs but the "Special Benefit" assessments shall be deleted from the schedule prior to pro rating the maintenance costs. Future maintenance costs shall be levied on the affected lands that are located upstream of the maintenance work carried out. We recommend that the costs of future works of repair and maintenance of the drain be assessed as described below:

1. The cost of maintaining the various access bridges and lawn enclosures shall be

carried out and assessed in accordance with the following section entitled "Future Maintenance – Cole Drain Access Bridges".

2. All bridges on the Cole Drain across road properties shall be assessed 100% to the applicable Road Authority.

   All other work shall be assessed against the affected lands and roads that are located upstream of the maintenance work carried out, in the same relative proportions as the amounts listed in Schedule 'C-2' under "Value of Benefit" and "Value of Outlet".

Future Maintenance – Cole Drain Access Bridges

Replacement Bridges Nos. 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 and 38 shall be maintained to the technical standards contained in this report. The other access bridges that were made a part of the Cole Drain under the 2003 report and are located upstream of Gladwish Drive (including Bridge Nos. 40, 41, 42 and 43) shall be maintained in accordance with the technical specifications set out in the 2003 report.

Once the access bridges as outlined above have been replaced the future maintenance cost of each primary access bridge designation (See Table No. 6 below) thereafter shall be assessed as a Special Benefit assessment 50% against the property or properties served by the bridge and the remainder of the maintenance cost shall be assessed as Outlet assessment only to the lands and roads upstream of each bridge prorated to the assessments shown in Schedule 'E-2' based on an arbitrary amount of $10,000.

Following the replacement of all the access bridges as noted above, the cost to maintain concrete curb and gutter and any special driveway treatments such as concrete pavement or asphalt pavement shall be assessed 100% against the property served by the access bridge. Table No. 6 shown below outlines the assessment share for the future maintenance costs of all access bridges on the Cole Drain that are downstream of Gladwish Drive (Bridge No. 39) as outlined herein. For the existing access bridges on the Cole Drain that are upstream of Gladwish Drive (Bridge Nos. 40 to 43 and Nos. 46 to 51, the existing bridge sizes are adequate and future maintenance costs of these bridges shall be assessed in the relative percentages outlined below.

Table No. 6 – Cole Drain Access Bridges (Future Maintenance)

Bridge No.	Type of Access Crossing	Property Roll No.	Bridge Owner	Outlet to Upstream Properties
20	Primary	4-51-220	50%	50%
21	Secondary	4-51-220	100%	-
22	Secondary	4-51-220	100%	-
24	Primary	4-51-235	50%	50%
25	Primary	4-51-236	50%	50%

Bridge No.	Type of Access Crossing	Property Roll No.	Bridge Owner	Outlet to Upstream Properties
26	Secondary	4-51-236	100%	-
27	Primary	4-51-238	50%	50%
28	Primary	4-51-240	25%	50%
	Shared	4-51-239	25%	
29	Primary	4-51-241	50%	50%
30	Primary	4-51-242	25%	50%
	Shared	4-51-242-01	25%	
31	Primary	4-51-244	50%	50%
32	Primary	4-51-245	50%	50%
33	Secondary	4-51-246	100%	-
34	Secondary	4-51-246	100%	-
35	Primary	4-51-246	50%	50%
36	Primary	4-51-247-01	50%	50%
37	Primary	4-51-247	50%	50%
38	Primary	4-51-247-15	50%	50%
40	Primary	4-51-295-05	50%	50%
41	Primary	4-51-296	50%	50%
42	Primary	4-51-298	50%	50%
43	Primary	4-51-300	50%	50%
46	Primary	4-51-607	50%	50%
47	Primary	4-51-568	50%	50%
48	Primary	4-51-559	50%	50%
49	Primary	4-51-570	50%	50%
50	Primary	4-51-573	50%	50%
51	Secondary	4-51-573	100%	-

Bridge No. 44 is a road bridge across Highway No. 40 and future maintenance costs of the said bridge are 100% assessed against the road authority having jurisdiction over this road. Bridge No. 45 is a section of drain enclosure that crosses Kimball Road, Churchill Line and several private driveways and lawns. This drain enclosure is to be maintained to the technical standards and costs assessed as per the provisions set out in the 2003 report.

Future Maintenance – Cole Diversion Drain Branch 'A'

The cost of maintaining Branch 'A' of the Cole Diversion Drain shall be assessed against the affected lands in its watershed in accordance with the provisions as described below. Schedule C-3" is the schedule to be used for assessing drain maintenance costs but the "Special Benefit" assessments shall be deleted from the schedule prior to prorating the maintenance costs. Future maintenance costs shall be levied on the affected lands that are located upstream of the maintenance work carried out.

We recommend that the costs of future works of repair and maintenance of the drain be as described below:

1. The sluice gate, culvert pipe and headwall arrangement to be installed at Station 0+415A is as per the specific request of Plains Midstream Canada U as a preventative measure to isolate potential flows emanating from their site. The cost to operate, maintain and repair this work is assessed entirely against the adjoining property owner.
2. Access Bridges Nos. 1A, 2A and 4A shall be assessed 100% to Canadian National Railway Corporation for railway access required across the drain.
3. Access Bridges No. 5A shall be assessed 100% to Plains Midstream Canada U (Roll No. 4-51-207) as it is required solely for their use.
4. The road crossing (Bridge No. 3A) shall be assessed 100% to the applicable Road Authority.
5. All other work shall be assessed against the affected lands that are located upstream of the maintenance work carried out, in the same relative proportions as the amounts listed in Schedule 'C-3' under "Value of Benefit" and "Value of Outlet".

Future Maintenance – Cole Diversion Drain Branch 'B'

The cost of maintaining Branch 'B' of the Cole Diversion Drain shall be assessed against the affected lands in its watershed in accordance with the provisions as described below. Schedule C-4" is the schedule to be used for assessing drain maintenance costs but the "Special Benefit" assessments shall be deleted from the schedule prior to pro rating the maintenance costs. Future maintenance costs shall be levied on the affected lands that are located upstream of the maintenance work carried out.

We recommend that the costs of future works of repair and maintenance of the drain be as described below:

1. Access Bridge No. 1B shall be assessed 100% to Canadian National Railway Corporation as a Special Benefit assessment.
2. Access Bridges No. 2B and No. 3B shall be assessed 100% to Hydro One Networks Inc. as Special Benefit assessment.
3. Access Bridge No. 4B shall be assessed 100% to Plains Midstream Canada U (Roll No. 4-51-207) as Special Benefit assessment.
4. All other work shall be assessed against the affected lands that are located upstream of the maintenance work carried out, in the same relative proportions as the amounts listed in Schedule 'C-4' under "Value of Benefit" and "Value of Outlet".

Drawings and Specifications

Attached to this report is Schedule F," which contains specifications setting out the details of the recommended works, and Schedule G," which represents the following drawings that are also attached to this report:

Page 1 of 50: Watershed Partial Plan 1
Page 2 of 50: Watershed Partial Plan 2
Page 3 of 50: Watershed Partial Plan 3
Page 4 of 50: Cut-Off Drain Plan and Profile from Sta. 0+546 to Sta. 0+735
Page 5 of 50: Cut-Off Drain Plan and Profile from Sta. 0+735 to Sta. 0+960
Page 6 of 50: Cut-Off Drain Plan and Profile from Sta. 0+960 to Sta. 1+350
Page 7 of 50: Cut-Off Drain Plan and Profile from Sta. 1+350 to Sta. 1+700
Page 8 of 50: Cut-Off Drain Plan and Profile from Sta. 1+700 to Sta. 2+050
Page 9 of 50: Cut-Off Drain Plan and Profile from Sta. 2+050 to Sta. 2+400
Page 10 of 50: Cut-Off Drain Plan and Profile from Sta. 2+400 to Sta. 2+750
Page 11 of 50: Cut-Off Drain Plan and Profile from Sta. 2+750 to Sta. 3+100
Page 12 of 50: Cut-Off Drain Plan and Profile from Sta. 3+100 to Sta. 3+450
Page 13 of 50: Cut-Off Drain Plan and Profile from Sta. 3+450 to Sta. 3+800
Page 14 of 50: Cut-Off Drain Plan and Profile from Sta. 3+800 to Sta. 4+150
Page 15 of 50: Cut-Off Drain Plan and Profile from Sta. 4+150 to Sta. 4+500
Page 16 of 50: Cut-Off Drain Plan and Profile from Sta. 4+500 to Sta. 4+850
Page 17 of 50: Cut-Off Drain Plan and Profile from Sta. 4+850 to Sta. 5+200
Page 18 of 50: Cut-Off Drain Plan and Profile from Sta. 5+200 to Sta. 5+550
Page 19 of 50: Cut-Off Drain Plan and Profile from Sta. 5+550 to Sta. 5+900
Page 20 of 50: Cut-Off Drain Plan and Profile from Sta. 5+900 to Sta. 6+200
Page 21 of 50: Cut-Off Drain / Cole Drain Plan and Profile from Sta. 6+200 to Sta. 6+550
Page 22 of 50: Cole Drain Plan and Profile from Sta. 6+550 to Sta. 6+900
Page 23 of 50: Cole Drain Plan and Profile from Sta. 6+900 to Sta. 7+250
Page 24 of 50: Cole Drain Plan and Profile from Sta. 7+250 to Sta. 7+600
Page 25 of 50: Cole Drain Plan and Profile from Sta. 7+600 to Sta. 7+950
Page 26 of 50: Cole Drain Plan and Profile from Sta. 7+950 to Sta. 8+300
Page 27 of 50: Cole Drain Plan and Profile from Sta. 8+300 to Sta. 8+650
Page 28 of 50: Cole Drain Plan and Profile from Sta. 8+650 to Sta. 9+000
Page 29 of 50: Cole Drain Plan and Profile from Sta. 9+000 to Sta. 9+350
Page 30 of 50: Cole Drain Plan and Profile from Sta. 9+350 to Sta. 9+700
Page 31 of 50: Cole Drain Plan and Profile from Sta. 9+700 to Sta. 10+050
Page 32 of 50: Cole Drain Plan and Profile from Sta. 10+050 to Sta. 10+400
Page 33 of 50: Cole Drain Plan and Profile from Sta. 10+400 to Sta. 10+750
Page 34 of 50: Cole Drain Plan and Profile from Sta. 10+750 to Sta. 11+100
Page 35 of 50: Cole Drain Plan and Profile from Sta. 11+100 to Sta. 11+225
Page 36 of 50: Cole Diversion Drain Branch A Plan and Profile from Sta. 0+000A

to Sta. 0+340A

Page 37 of 50: Cole Diversion Drain Branch A Plan and Profile from Sta. 0+340A to Sta. 0+690A

Page 38 of 50: Cole Diversion Drain Branch A Plan and Profile from Sta. 0+690A to Sta. 1+040A

Page 39 of 50: Cole Diversion Drain Branch A Plan and Profile from Sta. 1+040A to Sta. 1+390A

Page 40 of 50: Cole Diversion Drain Branch A Plan and Profile from Sta. 1+390A to Sta. 1+450A

Page 41 of 50: Cole Diversion Drain Branch B Plan and Profile from Sta. 0+000B to Sta. 0+170B

Page 42 of 50: Cole Diversion Drain Branch A and B Bridge Details

Page 43 of 50: Cut-Off Drain Typical Cross Sections

Page 44 of 50: Typical Bridge Replacement Details

Page 45 of 50: Bridge Location Plan 1

Page 46 of 50: Bridge Location Plan 2

Page 47 of 50: Bridge Location Plan 3

Page 48 of 50: Access Bridge Replacement Details

Page 49 of 50: Cut-Off Drain Access Bridge Details

Page 50 of 50: Concrete Canvas Liner Details

Fisheries Issues and Agency Approvals

The upper portion of the Cole Drain south of Highway 40 is considered a Type F drain, while the lower portion is considered a Type C drain. The Cut-Off Drain has been classified as a Type C drain and the Cole Diversion Drain Branch A and B are not rated according to the DFO Drain Classification Mapping.

At the time of construction or maintenance the Drainage Superintendent shall contact all regulatory agencies to confirm any construction limitations including timing windows or construction limitations related to the in-stream work etc. as required for the installation. All disturbed areas should be stabilized immediately, and upon completion of work returned to a pre-disturbed state or better as soon as conditions allow.

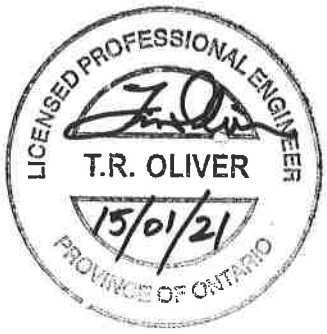
The proposed drainage works for the Cut-Off Drain, Cole Drain and Cole Diversion Drain Branches 'A' & 'B' were reviewed by both the Department of Fisheries and Oceans and the St. Clair Region Conservation Authority. Letter of advice approvals were obtained from the said agencies on April 8, 2016 and March 22, 2016 respectively. Copies of these approvals are appended hereto in Schedule 'A-3'.

Grants

In accordance with the provisions of Sections 85, 86 and 87 of the Drainage Act, a grant in the amount of 33–1/3 percent of the assessment eligible for a grant may be made in respect to the assessment made under this report upon privately owned lands used for agricultural purposes. The assessments levied against privately owned agricultural land must also satisfy all other eligibility criteria set out in the Agricultural Drainage Infrastructure Program policies. A portion of the privately owned lands are used for agricultural purposes and are eligible under the A.D.I.P. policies for a grant.

We recommend that application be made to the Ministry of Agriculture and Food in accordance with Section 88 of the Drainage Act, for this grant, as well as for all other grants for which this work may be eligible.

Respectfully submitted,



DILLON CONSULTING LIMITED

Tim R. Oliver, P.Eng.

TRO:oem:ges

SCHEDULE 'A-1'

PUBLIC MEETING NO. 1

COLE CUT-OFF DRAIN
City of Sarnia
MINUTES OF MEETING

DATE: Tuesday, July 28, 2009, 7:00pm
City of Sarnia Council Chambers

1. Presentation by Jerome Trudell of Dillon Consulting Limited

- Jerome proceeded through presentation outlining details of 2 instructions received from the City of Sarnia.
- Will confirm validity of Section 4 Petition from BP Canada after this evening's meeting.
- Went through a brief history of the Cole and Cut off Drain.

2. Question and Answer Period

Name	Location	Question	Answer
Jim Saul	1316 Plank Road	Has any study performed on the Arlanxeo Canada outlet? Concerned about outlet, and was unsure why money was spent on Plank Road and not on outlet. He is also concerned about capacity of the entire drain.	No study has been done to this date. Analysis will be done as a part of this work on the outlet and the entire drain
Gordon	Sarnia Cabinets	When were the petitions filed?	K-Smart provided a letter of advice in 2008 which recommends a Section 78 be requested. Dillon was hired and appointed this report. Has been ongoing for 3 years
Gordon	Sarnia Cabinets	Who polices the drain? Who to contact if there is obstruction?	Policing is done on a request only basis; no maintenance can be done based on the old report. Call Dave Moores of the City of Sarnia to address any concerns about obstruction.
Gordon	Sarnia Cabinets	Was the clean out of the downstream Cut-off included in the previous report?	Cut off drain was included in MIG report and was considered and recommended works upstream, work was $800,000.00 and came in at 1,400,000.00 and stakeholders said no to the work and it was abandoned.
Gordon	Sarnia Cabinets	Concerns about assessment and wanted to see copy of MIG report. Stated he had no voice in report.	Arlanxeo Canada was paying 100% of the cost involved therefore none of the upstream watershed was involved, 1971 report was the last report before the MIG report.
Jim Saul	1316 Plank Road	When was maintenance last done?	Only in regards to the reports. The township may have done it before it became City of Sarnia.

Lewis Mitchell	Electrosat	New culvert to cutoff Drain. Dow put money aside for Bridge when Scott Road is to be reconstructed	Duly Noted, will be addressing the entire report beginning to end.
Lewis Mitchell	Electrosat	What about other drains connection?	Would have to be a separate report, but will deal with Cole-Cutoff from beginning to end.
Rick Purdell	1283 Plank Road	Report will be based on 1971 Report? Is this considered a wish list?	Will analyze, Design, Recommend The work will be completed.
Rick Purdell	1283 Plank Road	There never used to be flooding.	Standards have changed, but we will increase performance of the drain as best as possible. Intention is to provide a certain level of service at a reasonable cost. There will be opportunity to comment on the report once it is completed
Jim Boble		How is cost proportioned?	Brief explanation was given on Outlet/Benefit/Special Benefit
Mark	BP Canada	Is there opportunity to divert drain outlet to new location	Will explore this option but it is easier to keep it in the same location.
Gord	Sarnia Cabinets	Will Dillon walk the drain?	Yes we will be doing a detailed survey in sections and pick up everything.
	Arlanxeo Canada	No breaching at their outlet, it is in excellent condition	
Gord	Sarnia Cabinets	Kenny Street has been flooded in their area	
Charlie Sans		Currently not draining into this watershed. Plank Road is flooding regularly past 1283 Plan Rd, Concern is after Indian Road Crossing	
Guy Levesque	504 McGregor Line	Solar Farm outflows are coming into the Cole Drain	We will explore this further
Gordon	Sarnia Cabinets	Look at sub drainage areas	This will be only used for analysis, and please submit information.

ERRORS AND/OR OMISSIONS

These minutes were prepared by Jerome Trudell, who should be notified immediately of any errors and/or omissions.

DISTRIBUTION

All Present

ACS August 6, 2009

SCHEDULE 'A-2'

PUBLIC MEETING NO. 2

COLE DRAIN, CUT-OFF DRAIN
& COLE CIVERSION DRAIN
City of Sarnia
MINUTES OF MEETING

DATE: Wednesday, February 27, 2013, 7:00pm
City of Sarnia Council Chambers

1. Presentation

- Presented by Jerome Trudell, outlining status of project, history, and photos.

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2. Question / Answer Period

Responses to questions provided by Jerome Trudell and David Moores.

Name	Location	Question	Answer
Ken Johnson	Sandercock Construction	Did not notice any estimates of flow, how much different will the flow be with the improvements? Is it common to include the flow in m^3/s, or not?	A hydraulic analysis of the drain has been undertaken accounting for various catchment areas and entry points into the drain. As a result a variation in flow is noted along the length of the channel. The improvements of the structures won't necessarily change the degree of flow along the drain as compared to the hydraulic profile.
		Concerns about BPs location on both sides of the drain -- Cole Diversion and Cole Drain. How will improvements to the Cole Diversion Drain help their flow move faster?	The BP property collects all stormwater from their developed lands and treats it, then diverts it into the Cole Diversion Drain. A portion of the property drains into the Cole. Improvements to the Diversion drain and Cut-Off Drain are necessary to allow their process operations to operate efficiently. Improvements to the Cole Drain will enhance the removal rate from the balance of their property.
Greg / Drake Pumpell	Property on Gladwish	How long will it take for the project to go ahead – including timing for work to be done, and when the assessment will show up on the taxes?	JT: If the report goes through, detailed design and specifications would be prepared this year, the report would go to council at the end of this year, and the expectation would be that construction would be scheduled next year. Some construction could possibly occur in fiscal 2014, potentially 2 years from now the assessments would be levied. Depending on the City's position, property owners may have the opportunity to pay their drainage costs on their tax bill. (Note: David Moores clarified that the City of Sarnia does not debenture drainage costs on the tax bill, each property owner is responsible for their individual assessment billed separately from their taxes.)

			DM: In terms of timing, the potential for delays resulting from potential appeals to drainage assessments, etc. may delay the project from going to construction for 2 years. If the report is done in 2013, anticipate 7 or 8 months in the public process before tender. Maybe 2014 for construction of the concrete channel. Probably 3 years before seeing any costs. The City does not recover drainage costs on the tax bill. Each property owner will be directly assessed. Recommended to start to budget for cost, and advised how the bill would be received.
Dan Penford	Numbered Ontario Company on Babel	Concerns with bridge at station 1+780 and its current slating for removal. It is in current use apparently serving both properties which they own. He would like it to remain.	According to the legal fabric, it does not appear as though the property has ownership on both sides of the drain. Regardless, if the owner wishes to have the bridge remain, it will require repairs. Suggested that he document his request on the comment forms outside the door and will get in contact with him to clarify use and requirement of bridge.
Rick Perdeaux	1283 Plank Road	Concerns about 9 or 10 flooding events since 1972. Concerned that we are only removing, cleaning and lowering elevations in the ditch, so adding a new concrete superimposed concrete liner on the trapezoidal channel may create a reduced end area thereby negatively impacting the flow in the drain. Was the upstream flow modeling undertaken with the decreased area in the concrete trapezoidal channel? Is the information presented then not necessarily correct?	The hydraulic carrying capacity of that section of the channel is significantly higher than the balance of the drainage system upstream, so the slight reduction in available end area is not projected to have any significant negative impact on the upstream watershed in terms of backwater effect. The effects of the reduction of size will be negligible.
		How large would the storm that happened yesterday be? The water levels in the ditches are currently very high. In previous storm events, doors have had to be sandbagged. Suggested running further past Plains Midstream if that will work.	The storms are named by probability, Probably looking at a 1 in 2 year for yesterday's storm. Improvements on the downstream reach on the Cut-Off Drain in terms of brushing and sediment removal will enhance the carrying capacity upstream. However due to the limitations in the drainage system achieving no greater than a 1 in 2 Year design, localized overtopping of the drain banks on the Cole Drain can be expected and will continue. In order to improve the performance of the drain beyond a 1 in 2 Year design, the channel would need to be widened and deepened– which would mean encroachment on the lands, and possibly diverting the upstream watershed, both very expensive options. Historically, there has been effort to try to divert, but weren't able to get cooperation of the stakeholders. We're

			demonstrating that we can't get to a 5 year standard. We can optimize where we can, including localized berming. We're looking for input from stakeholders. It's a question of affordability; this is the reason for the preliminary report and our recommendations.
Jim Pumpell	McGregor Road	Commented encouraging moving the project forward to solve the water issues.	N/A

CLOSING COMMENTS

It was noted that during detailed design we will engage stakeholders for further input.
The next steps are to send the report to council, and get further instruction. Comments and photographs of any recent flooding events were encouraged to be provided from the audience which further document specific locations of concern. This may assist in refining the final design.

ERRORS AND/OR OMISSIONS

These minutes were prepared by Jerome Trudell, who should be notified immediately of any errors and/or omissions.

St. Clair Conservation

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E-Mail: stclair@scrca.on.ca
Website: www.scrca.on.ca

22 March 2016

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255 Christina Street North, P.O. Box 3018
Sarnia, Ontario N7T 7N2

Attention: **David Moores, Drainage Superintendent**

Subject: **Cole Drain, Cut-off Drain & Cole Diversion Branches A & B, Geographic Township of Sarnia**

St. Clair Region Conservation Authority (SCRCA) staff have reviewed your correspondence of March 16, 2016.
Authority staff reviewed the following as part of this proposal:

- Engineers Report, prepared by Dillon Consulting dated January 11, 2016
- SCRCA Natural Heritage screening identified END/THR fish and critical habitat in the impact zone (St. Clair River)

We understand that you propose to:

- Perform additional soils characterization sampling at various locations along the drain prior to excavation to confirm the inert nature of the soil as being suitable for off-site disposal at an approved location
- Make every effort to preserve mature trees which are beyond the drain side slopes, and the working corridors
- Seed any bank areas disturbed by the work
- Develop a strategy for the management of flow while working within the channel
- Notify SCRCA at least 24 hours prior to initiation of any construction and no more than 24 hours following completion of the work
- Complete work in the dry
- Perform no in-stream work or construction activity between March 15 and June 30 without specific written permission from the SCRCA
- Install sediment and erosion control structures prior to construction and inspect/maintain them during the construction phase
- Prevent the entry of petroleum products, debris, rubble, concrete, or other deleterious substances into the water
- Conduct vehicular re-fuelling and maintenance away from the water
- Install a 600mm high silt fence around the site where required to ensure all surface water is treated prior to entering the drain
- Install straw bale check dams as required
- Carefully capture and all wildlife and fish from within the cofferdam to be immediately released downstream of the structure prior to commencing dewatering
- Filter all sediment laden runoff from the site prior to it entering the drain using suitable methods, as approved by the Engineer
- Remove all silt fence only after construction is complete, vegetation has been established, and silt build-up in front of the silt fence is removed
- Embed culverts a minimum of 10% below grade

"working together for a healthy environment"

Acting under the Conservation Authorities Act as a watershed management agency, we provide the following advice to further the conservation and management of the existing natural heritage features of this watershed:

- Limit soil movement and erosion; use appropriate control measures before work begins and inspect and maintain those measures regularly until all disturbed areas are stabilized
- If the sediment and erosion control measures are not functioning properly, no further work should occur until the sediment and/or erosion problem is addressed. In the case that the sediment and erosion controls do not serve their intended purpose and/or function at an acceptable level, it is the proponent's responsibility to correct and/or implement the necessary measures to achieve an acceptable level of performance.
- All in-water work should be conducted in the dry and not be conducted when flows are elevated due to local rain events, storms or seasonal flooding.
- All culverts should be embedded and appropriate erosion protection installed.
- To minimize impacts to bank stability during the project work should be completed between July 1st and September 15th.
- Except on cultivated lands, any areas of disturbed or bare soil about the drain should be seeded with native, non-invasive herbaceous material while the ground is moist and conditions are appropriate for germination.

As of November 25, 2013 Conservation Authorities no longer provide regulatory review under the federal Fisheries Act. For more information on the Fisheries Act **please refer** to the DFO website http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html, or contact them directly by phone: 1 855 852-8320 or email fisheriesprotection@dfo-mpo.gc.ca. Please, also ensure that a screening for this project with respect to the Endangered Species Act (2007), is undertaken by the Ministry of Natural Resources.

We request that a copy of this letter be kept on site while work is in progress. If you have any questions concerning the above, please contact myself at our Strathroy office at (519) 245-3710, by fax at (519) 245-3348, or by email at gwilcox@scrca.on.ca.

Greg Wilcox
Biological Technical Assistant

Fisheries and Oceans Canada | Pêches et Océans Canada

Central & Arctic Region
Fisheries and Oceans Canada P.O. Box 5050
867 Lakeshore Rd.
Burlington, Ontario
L7R 4A6

Your file *Votre référence*

April 8, 2016

Our file Notre référence
16-HCAA-00213

David Moores
Drainage Superintendent, City of Sarnia
255 North Christina St.
P.O. Box 3018
Sarnia, Ontario
N7T 7N2

Dear David Moores:

Subject: Implementation of mitigation measures to avoid and mitigate serious harm to fish.

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received your proposal on March 17, 2016.

Your proposal has been reviewed to determine whether it is likely to result in serious harm to fish which is prohibited under subsection 35(1) of the *Fisheries Act.*

The proposal has also been reviewed to determine whether it will adversely impact listed aquatic species at risk and contravene sections 32, 33 and 58 of the *Species at Risk Act.*

Our review consisted of:

- Notification of Drain Maintenance or Repair for Cole Drain, Cut-Off Drain and Cole Diversion Drain Branches A & B in the City of Sarnia
- The Agriculture Information Atlas (Drain Maps)
- Species at Risk Maps Distribution of Fish and Mussel Maps

We understand that you propose to complete maintenance and repair works on Cut-Off Drain (unrated drain):

- Installation of an articulated concrete block overlay on existing concrete lined channel.
- Installation of graded stone rip rap in localized areas
- Minor bottom cleanout

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- Minor brushing (of Imperial Oil/CN Railway property locations of the drain, as seen in pictures ImpOilArea3_ 1793 and ImpOilArea 4_1825).

We also understand that you propose to complete maintenance and repair works on Cole Drain and Cole Diversion Drain Branches A & B (Class F portion only):

- Minor bottom cleanout
- Minor brushing of drain banks
- Replacement of 5 access culverts
- Installation of road culvert and flow control gate.

Your proposed activity has also been reviewed to determine whether it is likely to affect a federally listed aquatic species at risk. The following species are believed to use the area:

- Northern Madtom [ENDANGERED]
- Silver Lamprey [SPECIAL CONCERN]
- Spotted Sucker [SPECIAL CONCERN]
- Channel Darter [THREATENED]

To avoid affecting the above-identified aquatic species at risk, the mitigation measures listed below, in addition to those set out in your project plans, are to be followed:

- Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
- Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
- Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required.
- Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry.
- Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
- Repairs to erosion and sediment control measures and structures if damage occurs.
- Removal of non-biodegradable erosion and sediment control materials once site is stabilized.

To avoid the potential of serious harm to fish and their habitat, we are also recommending that the following mitigation measures be included into your plans.

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Timing

- If you are conducting in stream work during periods of low flow to further reduce the risk to fish and their habitat no in-stream work or construction activity should occur from March 15th to June 30th
- If the drain is dry, work can proceed at any time of the year

Shoreline Re-vegetation and Stabilization

- Clearing of riparian vegetation should be kept to a minimum.
- Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.
- If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.
- Remove all construction materials from site upon project completion.

Operation of Machinery

- Operate machinery in a manner that minimizes disturbance to the banks of the watercourse.

Provided that you implement the required mitigation measures for your project, and follow the guidance available on the DFO website at http://www.dfo-mpo.gc.ca/pnw-ppe/measures/index-eng.html, the Program is of the view that your proposal should not result in serious harm to fish or contravene sections 32, 33 or 58 of the Species at Risk Act. No formal approval is required from the Program under the Fisheries Act or the Species at Risk Act in order to proceed with your proposal.

For the remaining bottom cleanout and brushing works on Cut-Off Drain (approximately 2 km, from Scott Road west to Vidal Street) and the Class C portion of Cole Drain, please complete and submit the Notification of Drain Maintenance form at the time these works are to be completed. We are requesting that brushing of these drain sections be completed only on one side, or on alternating sides of the drain and that offsetting measures be included in your plans.

If your plans have changed or if the description of your proposal is incomplete, or changes in the future, you should consult our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review is required by the Program.

A copy of this letter should be kept on site while the work is in progress.

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If you have any questions, please contact Ashley Bedford at our Burlington office at 905- 336-6445, by fax at 905-336-6285, or by email at Ashley.Bedford@dfo-mpo.gc.ca.
Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely

Jennifer Thomas
A/Team Leader, Triage and Planning
Copy:
Greg Wilcox, Saint Clair Region Conservation Authority
Jerome Trudell, Dillon Consulting Limited

SCHEDULE 'B-1'

SCHEDULE OF ALLOWANCES

CUT-OFF DRAIN

RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

Roll No.	Con.	Description	Owner	Section 31 Value of Existing Drain	Total Allowances
4- 50-888	2	(West of Vidal Street) Reg Comp Plan 725 Pt Lots 3 & 4 RP 25R6118 Pts 1-42, 48-50, 52-58 & 61	Arlanxeo Canada Inc.	$100,000	$100,000
TOTAL ALLOWANCES				**$100,000**	**$100,000**

SCHEDULE 'B-2'

SCHEDULE OF ALLOWANCES

COLE DRAIN

RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

Roll No.	Con.	Description	Owner	Section 30 Damages	Total Allowances
4- 51-568	2	Lot 15	1565670 Ontario Ltd	$2,000	$2,000
4- 51-559	2	Part of Lots 14 & 15	Lloyd D. & Frances J. King	$1,750	$1,750
4- 51-570	2	Part Lot 14	Donald A. & Catherine Rae Cressman	$700	$700
4- 49-391	2	Part Lot 14	Hydro One Network Inc	$200	$200
4- 51-573	2	Part Lot 14	David Harold Payne & Elizabeth Jean Parkins	$700	$700
4- 51-546	2	Part Lot 14	David Alan Jr. & Joyce Eileen Crowe	$450	$450
TOTAL ALLOWANCES				**$5,800**	**$5,800**

SCHEDULE 'B-3'

SCHEDULE OF ALLOWANCES

COLE DIVERSION DRAIN BRANCH 'A'

RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

Roll No.	Con.	Description	Owner	Section 29 Land Taken	Section 31 Value of Existing Drain	Total Allowances
			Canadian National Railway Corp.	$500	$20,000	$20,500
TOTAL ALLOWANCES				**$500**	**$20,000**	**$20,500**

SCHEDULE 'B-4'

SCHEDULE OF ALLOWANCES

COLE DIVERSION DRAIN BRANCH 'B'

RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

Roll No.	Con.	Description	Owner	Section 29 Land Taken	Section 31 Value of Existing Drain	Total Allowances
			Canadian National Railway Corp.	$100	$1,900	$2,000
TOTAL ALLOWANCES				**$100**	**$1,900**	**$2,000**

SCHEDULE 'C-1'
SCHEDULE OF ASSESSMENT
CUT-OFF DRAIN
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

ONTARIO LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Highway 40 (Churchill Rd)	95.47	38.64	Transportation Ministry	$0	$0	$17,922	$17,922
Roll No. 4-51-226 - Plan 13 S Pt Lot 17 RP 25R411 Part 1	7.75	3.14	Environment And Energy Ministry	$0	$0	$424	$424
Roll No. 4-51-309- Plan 13 Blk B Pt Lot 5 RP 25R2928	1.27	0.51	Transportation Ministry	$0	$0	$219	$219
Roll No. 4-51-288- Con 3 E Pt Lot 16 (Roll No.	0.55	0.22	Transportation Ministry	$0	$0	$109	$109
Roll No. 4-51-309- Con 3 Pt Lot 16	3.21	1.30	Transportation Ministry	$0	$0	$190	$190
Roll No. 4-51-313	0.55	0.22	Transportation Ministry	$0	$0	$109	$109
Total on Ontario Lands				$0	$0	$18,973	$18,973

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Roll No. 4-50-251- Plan 134 Pt Blk 170 Pt Closed Gas St	0.90	0.36	City of Sarnia	$0	$0	$111	$111
Roll No. 4-51-256- Plan 13 Blk B Pt Lt 4 RP25R2376 Pt 3	1.58	0.64	City of Sarnia	$0	$0	$269	$269
Roll No. 4-49-352 - Plan 122 Range 3 Pt Lot 11 T/W ROW	31.84	12.89	City of Sarnia	$0	$0	$3,088	$3,088
Roll No. 4-49-390 - Plan 194 Lot 1 To 26 Plan 155 Lot 1 To 38 Plan 134 Blk 5 Plan 192 Pt Lot 1 Pt Lot 39 Plan 122	26.30	10.64	City of Sarnia	$0	$0	$2,553	$2,553
Scott Road	16.20	6.56	City of Sarnia	$3,144	$15,098	$2,766	$21,008
St. Andrew Street	4.78	1.93	City of Sarnia	$0	$0	$789	$789
Vidal Street	14.21	5.75	City of Sarnia	$3,144	$14,674	$2,486	$20,304
Imperial Ave	0.26	0.11	City of Sarnia	$3,144	$695	$100	$3,939
Kenny Street	3.00	1.21	City of Sarnia	$0	$0	$356	$356
Tashmoo Ave	7.03	2.84	City of Sarnia	$0	$0	$801	$801
Huron Boulevard	3.64	1.47	City of Sarnia	$0	$0	$427	$427
Indian Road S	26.56	10.75	City of Sarnia	$3,143	$3,020	$5,285	$11,448
McGregor Side Road S	10.93	4.42	City of Sarnia	$0	$0	$2,831	$2,831
McGregor Side Road N	2.37	0.96	City of Sarnia	$0	$0	$635	$635
Gladwish Drive	9.42	3.81	City of Sarnia	$0	$0	$2,444	$2,444
Plank Road	18.19	7.36	City of Sarnia	$3,143	$0	$4,698	$7,841
Plank Road (County Road 20)	18.44	7.46	County of Lambton	$0	$0	$4,762	$4,762
Bill Boulevard	1.43	0.58	City of Sarnia	$0	$0	$393	$393
Duff Drive	1.39	0.56	City of Sarnia	$0	$0	$381	$381
Atkin Ave	0.41	0.17	City of Sarnia	$0	$0	$133	$133
Churchill Line (County Road 14)	1.50	0.61	County of Lambton	$0	$0	$412	$412
Union Street	0.82	0.33	City of Sarnia	$0	$0	$235	$235
Kimball Road (County Road 31)	7.79	3.15	County of Lambton	$0	$0	$2,025	$2,025
Williams Drive	9.00	3.64	City of Sarnia	$0	$0	$1,466	$1,466
Roll No. 4-51-511	1.75	0.71	County of Lambton	$0	$0	$476	$476
Total on Municipal Lands				$15,718	$33,487	$39,922	$89,127

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 49-332		Plan 237 Plan 3 to 5 Hydro Annette Lane Pt, Plan 261 Lot 1-L19 Plan 156 Lot 1-L19 Plan 156	13.54	5.48	St Marys Cement Inc, Attn: Lisa Baldi, Exec Assistant	$0	$0	$1,327	$1,327
4- 49-345-01		Plan 122 Range 2 Pt Lts 10 & 11	117.02	47.36	Imperial Oil Limited	$0	$0	$2,576	$2,576
4- 49-346		Plan 122 Range 2 Pt Lots 8, 9 & 10	189.02	76.49	Imperial Oil Limited	$0	$0	$3,902	$3,902
4- 49-348		Plan 122 Range 3 Lt 9 Pt Lt 8 Pt Lt 10	193.74	78.40	Imperial Oil Limited	$0	$0	$3,688	$3,688
4- 49-349		Plan 122 Range 3 Pt Lot 10	9.45	3.82	Owens Corning Canada Gp I	$0	$0	$328	$328

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 49-350		RCP 725 Pt Lot 16 Plan 122 RG3 Pt Lots 10 & 11, RP 25R7543 Pts 1 &2	48.05	19.45	Dow Chemical Canada Ulc.	$0	$0	$1,565	$1,565
4- 49-351		RCP 725 Lt 16 RP 25R5727 Pt 12 & PL 122 RGS 2 & 3 Pt Lts 10 & 11 RP 25R7034 Pts 1, 2 &3 RP 25R7412 Pt 1	34.36	13.90	Lanxess Inc	$0	$0	$1,126	$1,126
4- 49-353		Plan 122 Range 2 To 3 Lot 12 Pt Lot 13	37.33	15.11	Imperial Oil Limited	$0	$43,785	$6,627	$50,412
4- 49-374		Plan 157 Lot 8	0.09	0.04	Aluma Systems Inc	$0	$0	$35	$35
4- 49-375		Plan 157 Lot 9 Pt Lots 6 To 7 Pt Lots 10 To 12 RP 25R3187 Part 8	0.33	0.13	Matthews Equipment Limited, c/o Hertz Corporation	$0	$0	$56	$56
4- 49-379		Plan 238 Lot 11 To 13 Pt Lane & Plan 157 Pt Lot 1	0.17	0.07	Union Gas Limited, Property Tax Dept	$0	$0	$42	$42
4- 49-380		Plan 238 Pt Plan 157 & Lane RP 25R3187 Pts 1 to 7	1.87	0.76	Matthews Equipment Limited, c/o Hertz Corporation	$0	$0	$206	$206
4- 49-392		Plan 134 Pt St Clair St Plan 192 Lot 34 Pt Lots 5 to 9, 32, 33 & 35	0.43	0.17	Phoenix Safety & Rescue L	$0	$0	$65	$65
4- 49-394		Plan 122 Range 4 Pt Lot 12 Plan 134 Pt St Clair St Plan 192 Lots 21 To 30 Pt Lots 9 To 20 31 32	6.11	2.47	Phoenix Safety & Rescue L	$0	$0	$638	$638
4- 49-395-01		Plan 122 Range 4 Pt Lot 11	2.09	0.85	Imperial Oil Limited	$0	$0	$227	$227
4- 49-395-02		Products Pipeline	0.33	0.13	Imperial Oil Limited	$0	$0	$56	$56
4- 49-396		Plan 122 Range 4 Lot 11 To Pt Lot 12	40.85	16.53	Imperial Oil Limited	$0	$5,871	$3,952	$9,823
4- 49-400		Plan 122 Rngs 4&5 Pt Lots 10 11,12 Plan 192 Lot 38&Blk A& Pt Lots 1,2,39Pt St Clair St	215.68	87.28	Imperial Oil Limited	$0	$39,465	$13,570	$53,035
4- 49-400-01		Plan 134 Pt Lots 70 To 73 101 To 104 Pt Sombra Ave Pt Bloor Ave Pt Limerick Ave Pt Adelaide	18.33	7.42	Imperial Oil Limited	$0	$2,779	$2,206	$4,985
4- 49-400-02		Plan 134 Pt Lots 73 To 75 99 To 101 Pt Wilton Ave Pt McKinley Ave Pt Warner St RP 25R7699 Parts	14.01	5.67	Imperial Oil Limited	$0	$0	$1,692	$1,692
4- 49-402		Plan 122 Range 5 Pt Lot 11 Pt Lot 12	3.49	1.41	Imperial Oil Limited	$0	$0	$686	$686
4- 49-403		Plan 134 Pt Blk 23 & Pt Lane Plan 193 Lt 12&Pt Lts 8,9,11 &Pt Clifford St RP25R2234 Pt 1	0.64	0.26	Aluma Systems Inc	$0	$0	$147	$147
4- 49-404		Plan 134 Pt Blk 23 Plan 194 Pt Lts 1 To 8 Pt Being RP 25R7686 Part 3	1.27	0.51	Imperial Oil Limited	$0	$0	$264	$264
4- 49-406		Plan 240 Lot 16 to Lot 25 Pt Lane	0.51	0.21	829814 Ontario Inc 829815 Ontario Inc, c/o Timothy J. Mc Carthy	$0	$0	$75	$75
4- 49-407		Plan 240 Lots 3 To 15 Pt Lots 1 & 2 & Pt Lane RP 25R5241 Part 2	0.68	0.28	Mc Intosh Mechanical Inc	$0	$0	$92	$92
4- 49-408		PL 160 Lots 1-10 PL 195 Lots 1-26 PL 241 Pt Lots 1-7 PL 242 Lots 3-Pt 6 PL 134 Pt 18 & Streets	6.56	2.65	Aluma Systems Inc	$0	$0	$655	$655
4- 50-006		Plan 122 Range River Pt Lots 36 To 44 & Water Lot	6.76	2.74	Imperial Oil Limited	$0	$0	$703	$703
4- 50-007-02		Plan 122 Range R Pt Lot 37 Pt Lot 38	2.04	0.83	Praxair Canada Inc, Attn: Realty Services	$0	$832	$161	$993

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-008		Reg Comp Plan 725 Pt Lots 3 And 4 RP 25R8485 Parts 2 To 12 17 To 20 And 29 To 32 17 To 20 & 29	12.90	5.22	H C Starck Canada Inc	$18,855	$15,031	$2,054	$35,940
4- 50-008-10		Reg Comp Plan 725 Pt Lot 4 RP 25R5727 Part 3 EXC RP 25R5997 Part 1	18.94	7.66	Styrolution Canada Ltd.	$0	$0	$1,281	$1,281
4- 50-161		Plan 122 Range 6 Pt Lot 6 Range 7 Pt Gore Lot C RP 25R8638 Pt 2-7,24,43-97	15.24	6.17	Suncor Energy Products Inc, Taxation Department	$0	$0	$211	$211
4- 50-180		Plan 122 Range 6 Pt Lot 7 RP 25R8638 Part 1,8-23,25-41	63.78	25.81	Suncor Energy Products Inc, Taxation Department	$0	$0	$730	$730
4- 50-198		Plan 122 Range 4 Pt Lot 6	9.58	3.88	1863828 Ontario Ltd	$0	$0	$661	$661
4- 50-244		Plan 134 Pt Lot 83 Pt Quebec St Closed RP 25R4181 Parts 1, 3 & 6	1.02	0.41	1974362 Ontario Ltd.	$0	$0	$122	$122
4- 50-244-01		Plan 134 Pt Lot 84 Pt Quebec St RP 25R4181 Parts 2,4,5,7 EXC RP 25R6852 Pts 1 & 2	1.35	0.55	Istvan S. Feher	$0	$0	$156	$156
4- 50-245		Plan 134 Pt Lot 84 & Pt Quebec St RP 25R1573 Part 2 RP 25R6852 Pt 1 & Pt 2	1.91	0.77	Matrix Service Inc	$0	$0	$208	$208
4- 50-246		Reg Comp Plan 725 Lot 15 RP 25R5727 Part 11	2.53	1.02	Lanxess Inc.	$0	$0	$267	$267
4- 50-247		Plan 134 Blk 85 Pt Closed Warner St	1.26	0.51	Acier Gendron Ltee	$0	$0	$146	$146
4- 50-247-01		Plan 134 Blk 88 Pt Closed Warner St	1.19	0.48	WHM Enterprises (Sarnia) Ltd	$0	$0	$139	$139
4- 50-248		Plan 134 Pt Blk 88,89,167, 168 Pt Ottawa,Murray, Park St	12.83	5.19	1919443 Ontario Ltd.	$0	$0	$1,258	$1,258
4- 50-248-04		Plan 134 Pt Blk 167 To 168 Pt Park St	2.85	1.15	Veolia ES Canada Industries	$0	$0	$298	$298
4- 50-248-05		Plan 134 Pt Blks 167 To 169 Pt Closed Kent & Murray Sts RP 25R3606 Parts 1 & 2	1.90	0.77	Total Support Services Ltd	$0	$0	$208	$208
4- 50-248-06		Plan 134 Pt Lot 169 RP 25R5702 Part 2	2.62	1.06	ZBR Investments (Sarnia) Ltd	$0	$0	$277	$277
4- 50-248-07		Plan 134 Pt Lots 170 & 171 Pt Perch St, Petrolia St & Gas St RP 25R5702 Part 1	1.31	0.53	1272054 Ontario Limited, c/o Wayne Brandon	$0	$0	$151	$151
4- 50-249		Plan 134 Pt Lot 170 Pt Lot 171 Pt Gas St Pt Peach St RP 25R3700 Part 1	1.19	0.48	1684616 Ontario Limited, Ayerco	$0	$0	$139	$139
4- 50-253		Plan 134 Pt Lot 171 Pt Gas St Pt Perch St And RP 25R482 Part 3 RP 25R7511 Pt 2	1.68	0.68	7794703 Canada Inc.	$0	$0	$187	$187
4- 50-255		Plan 134 Pt Mitton St	0.24	0.10	Bluewater Power Distribution Corporation	$0	$0	$49	$49
4- 50-296		Plan 149 Plan 150 Plan 170 Plan 198 Plan 199 Plan 232 Plan 134 Pt Blk 99 To 104	32.69	13.23	VIP Rail ULC	$0	$2,779	$3,914	$6,693
4- 50-297		Reg Comp Plan 725 Lot 6 RP 25R5727 Part 4	0.48	0.19	Lanxess Inc	$6,287	$0	$56	$6,343
4- 50-298		Plan 134 Pt Blk 106 Pt Boyd St Pt Tashmoo Ave Pt Sombra Ave Pt Lane And Plan 144 Lot 1	2.42	0.98	1777745 Ontario Limited	$0	$2,953	$302	$3,255

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-299		Plan 122 Range 5 Lot 10 To Pt Lot 12	3.16	1.28	Imperial Oil Limited	$0	$2,953	$466	$3,419
4- 50-317		PL 134 Blk 107A 126-130 PL 135 Lts 1-7 PL 136 Lts 1-4 & 23-26 PL 516 Lt 1 Pt Sts RP 25R4644 Pt 1 25R 7410	24.98	10.11	Cabot Canada Limited	$0	$0	$1,682	$1,682
4- 50-336		Reg Comp Plan 725 Lots 7 & 8 RP 25R5727 Part 5 Part 6	30.53	12.36	Lanxess Inc	$0	$0	$2,051	$2,051
4- 50-427		Reg Comp PL 725 Lt 11 Pt Lt 10 RP 25R6556 Parts 1-6 RP 25R 8237 Parts 1-2	1.33	0.54	United Rentals Of Canada Inc, c/o Fischer & Company- Uri	$0	$0	$114	$114
4- 50-453		Reg Comp Plan 725 Lot 10 RP 25R5727 Part 7 EXC RP 25R6556 Parts 1 To 4 EXC RP 25R8237 Parts 1	43.03	17.41	Lanxess Inc	$0	$0	$2,879	$2,879
4- 50-466		Plan 136 Lots 25 And 26 Pt Lots 1 2 3 23 And 24 Pt McKinley Ave RCP 725 Pt Lot 14 RP 25R6825 Parts	73.52	29.75	Lanxess Inc	$0	$0	$1,775	$1,775
4- 50-467		RCP 725 Pt Lots 13 And 14 RP 25R6825 Parts 1 31 And 32 RP 25R6121 Pt Parts 8 and 10	19.36	7.83	Styrolution Canada Ltd.	$0	$0	$1,440	$1,440
4- 50-468		RCP 725 Pt Lots 13 And 14 RP 25R5727 Part 9 RP 25R6825 Parts 2 33 & 34 6825 Parts 2,33,34	34.53	13.97	Styrolution Canada Ltd.	$0	$0	$2,551	$2,551
4- 50-469		RCP 725 Pt Lots 13 And 14 Pt Huron Blvd RP 25R5727 Part 10 RP 25R6825 Parts 27, 30 & 35	126.88	51.35	Lanxess Inc	$0	$0	$13,094	$13,094
4- 50-888		Reg Comp Plan 725 Lot 1 Pt Lots 3 And 4 RP 25R6118 Pts 1 To 42 48 To 50 52 To 58 61 See NTE	12.36	5.00	Arlanxeo Canada Inc.	$1,491,847	$6,801	$1,312	$1,499,960
4- 50-888-50		Reg Comp Plan 725	11.24	4.55	LCY Biosciences	$0	$3,274	$1,140	$4,414
4- 51-171	3	Pt Lot 16 RP 25R1658 Part 2 With EXC	12.48	5.05	Plains Midstream Canada U	$0	$0	$1,949	$1,949
4- 51-176	3	Pt Lot 16 RP 25R8746 Part 3	5.04	2.04	10173169 Canada Limited	$0	$0	$802	$802
4- 51-176-30	3	Pt Lot 16 RP 25R8554 Part 3	2.14	0.87	2654583 Ontario Ltd.	$0	$0	$356	$356
4- 51-176-50	3	Pt Lot 16 RP 25R8746 Part 1	7.44	3.01	Capuchye Management Limit	$0	$0	$1,172	$1,172
4- 51-177-14	3	Pt Lot 16 RP 25R8280 Part 2	0.91	0.37	Jenron Holdings Ltd	$0	$0	$166	$166
4- 51-177-15	3	Part Lot 16 RP 25R8280 Part 1	0.89	0.36	Modig Properties Inc	$0	$0	$162	$162
4- 51-187	3	Pt Lot 16 RP 25R5224 Part 1 EXC RP 25R7789 Part 1 EXC RP 25R7789 Part 1	1.97	0.80	9056297 Canada Inc.	$0	$0	$330	$330
4- 51-187-02	3	Pt Lot 16 Plan 753 Blks 5 & 10	1.14	0.46	876652 Ontario Limited	$0	$0	$200	$200
4- 51-188	3	SPt Lot 16 RP 25R4574 Part 2 EXC RP 25R7789 Part 2 EXC RP 25R7789 Part 2	0.92	0.37	876652 Ontario Limited	$0	$0	$166	$166
4- 51-188-01		Plan 753 Pt Blks 1 & 6 RP 25R8010 Parts 1 & 2	1.54	0.62	Helmut Sauerbeck, c/o Montvest Realty Ltd	$0	$0	$261	$261

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-188-10	3	Part Lot 16 Plan 753 Blks 1 & 6	3.99	1.61	Jenron Holdings Ltd	$0	$0	$638	$638
4- 51-188-15		Plan 753 Pt Blks 3 & 8 RP 25R7863 Pt 1	3.14	1.27	Blattner Investments Inc	$0	$0	$509	$509
4- 51-188-20		Plan 753 Blks 3 & 8 EXC RP 25R7863 Part 1 EXC RP 25R8076 Part 1 S/T Easement	2.76	1.12	1016746 Ontario Limited, O/A J D Lawn Service	$0	$0	$452	$452
4- 51-188-25		Plan 753 Part Blks 3 & 8 RP 25R8076 Part 1 S/T Ease.	0.74	0.30	1016746 Ontario Limited	$0	$0	$139	$139
4- 51-188-80		Plan 753 Pt Blks 2 And 7 RP 25R8516 Parts 1 And 2 RP 25R8702 Pts 1 & 2	0.69	0.28	JHARC Holdings Inc.	$0	$0	$132	$132
4- 51-189	3	S Pt Lot 16 RP 25R1128 Part 1	3.11	1.26	Kel-Gor Limited	$0	$0	$505	$505
4- 51-190	3	S Pt Lot 16	1.67	0.68	Kel-Gor Limited	$0	$0	$284	$284
4- 51-191	3	S Pt Lot 16	2.11	0.85	Marcotte Disposal Inc	$0	$0	$349	$349
4- 51-192	3	Pt Lot 17 RP 25R5580 Part 1	1.99	0.81	Lindross Holdings (Sarnia) Limited	$0	$0	$334	$334
4- 51-193	3	Pt Lot 16 RP 25R7157 Part 1	3.64	1.47	Gregmill Investments Ltd	$0	$0	$585	$585
4- 51-201		Plan 13 Blk B Pt Lot 4 Pt Lot 10	4.14	1.68	Dorothy A. Mc Elhone	$0	$0	$665	$665
4- 51-202		Plan 13 Blk B Pt Lot 10 RP 25R4911 Pt 1	0.67	0.27	At-Tec Heavy Equipment Ltd	$0	$0	$128	$128
4- 51-203		Plan 13 Blk B Pt Lots 9 And 10 RP 25R8475 Part 2 and Pt Part 1	9.69	3.92	Superior Tire Services Sarnia Inc	$0	$0	$1,518	$1,518
4- 51-203-50		Plan 13 Blk B Pt Lot 10 RP 25R8801 Pt 1	2.50	1.01	Tek Holdings Limited	$0	$0	$410	$410
4- 51-204		Plan 13 Blk B W Pt Lot 9 E Pt Lot 10	1.45	0.59	1863960 Ontario Inc	$0	$0	$250	$250
4- 51-205		Plan 13 Blk B Pt Lot 9 Pt Lot 10	2.81	1.14	1863960 Ontario Inc	$0	$0	$459	$459
4- 51-206		Plan 13 Blk B Pt Lot 9 Pt Lot 10 RP 25R5620 Part 1 RP 25R5620 Pt 1	5.74	2.32	Huron Alloys Incorporated	$0	$0	$909	$909
4- 51-207		Plan 13 Blk B Lot 7 Pt Lots 8&9 Con 3 Pt Lots 16&17 RP 25R1658 Pt 1 RP 25R3255 Pts 1 to 8	288.43	116.72	Plains Midstream Canada U	$0	$0	$14,630	$14,630
4- 51-207-01		Plan 13 Part Lot 8 Blk B RP 25R7049 Part 7 T/W Ease. Over RP25R7049 Parts 1 to 3	0.46	0.19	Union Gas Limited, Property Tax Dept	$0	$0	$97	$97
4- 51-210		Plan 13 Lot A Pt Lot 11 RP 25R3578 Pt Part 4	4.25	1.72	Lenie N. Severin	$0	$0	$680	$680
4- 51-211		Plan 13 Pt Lot 11 RP 25R3578 Part 3 RP 25R4129 Part 1 RP 25R5854 Part 1 RP 25R7483	4.53	1.83	CMM Properties Inc	$0	$0	$722	$722
4- 51-212		Plan 13 Blk A Pt Lots 5 & 11 RP 25R3578 Part 2	1.58	0.64	Sandercock Construction Limited, c/o Marjorie Sandercock	$0	$0	$177	$177
4- 51-213		Plan 13 Pt Lots 5 & 11 RP 25R3578 Pt 1	2.96	1.20	Lambton Hot Mix Ltd	$0	$0	$482	$482
4- 51-220		Plan 13 Blk B S Pt Lot 11 N Pt Lot 17 Lot A RP 25R8474 Parts 1 & 4	122.21	49.46	Enbridge Pipelines Inc, c/o Property Tax Manager	$0	$0	$6,306	$6,306
4- 51-220-10		Plan 13 Pt Blk 3 and Pt Lot 17 RP 25R8474 Pts 2 & 3	5.23	2.12	1432334 Ontario Inc T/A Preferred Towing	$0	$0	$529	$529
4- 51-223		Plan 13 Blk B Pt Lot 16 Pt Lot 17	106.45	43.08	Imperial Oil Limited	$0	$0	$4,675	$4,675
4- 51-224		Plan 13 Blk B Pt Lot 17 RP 25R4582 Parts 1,3,4 & 5	5.00	2.02	Marcus Terminals Inc, c/o Harold Marcus Ltd	$0	$0	$505	$505

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-225		Plan 13 Blk B Pt Lot 17 RP 25R4582 Part 2	0.34	0.14	Imperial Oil Limited	$0	$0	$58	$58
4- 51-235		Plan 13 Blk B Pt Lot 9	2.90	1.17	Samia Auto Wreckers Ltd	$0	$0	$471	$471
4- 51-236		Plan 13 Blk B Pt Lots 9 And 10 RP 25R2677 Part 1 RP 25R4513 Pt 1	9.40	3.80	Lamsar Inc	$0	$0	$1,473	$1,473
4- 51-238		Plan 13 Blk B Pt Lots 9 & 10 RP 25R2728 Pts 1 to 3	5.52	2.23	612031 Ontario Ltd	$0	$0	$875	$875
4- 51-239		Blk B Plan 13 Pt Lot 9 Pt Lot 10 RP 25R2728 Part 4	0.36	0.15	376964 Ontario Ltd/612031 Ontario Ltd, Trijan Industries	$0	$0	$82	$82
4- 51-240		Plan 13 Blk B Pt Lot 9 Pt Lot 10 RP 25R5026 Part 1	4.08	1.65	3769694 Ontario Limited	$0	$0	$654	$654
4- 51-241		Plan 13 Blk B Part Lot 10	1.44	0.58	Richard C. Perdeaux	$0	$0	$246	$246
4- 51-242		Plan 13 Blk B Pt Lot 10	11.35	4.59	Plank Road Auto Wreckers Ltd	$0	$0	$1,774	$1,774
4- 51-242-01		Plan 13 Blk B Pt Lot 10	1.22	0.49	John R. Bernhardt	$0	$0	$212	$212
4- 51-244		Plan 13 Blk B Pt Lot 10	1.01	0.41	Paul J. Babcock, c/o Babcock & Sons Welding	$0	$0	$181	$181
4- 51-245		Plan 13 Blk B Pt Lot 10 RP 25R9320 Parts 1 & 3	2.24	0.91	1230868 Ontario Limited, c/o Paul J Babcock Jr	$0	$0	$372	$372
4- 51-246		Plan 13 Blk B Pt Lots 4 And 10 And RP 25R5694 Parts 1 And 2 RP 25R9320 Parts 2 &4	2.22	0.90	Gordon Bouma	$0	$0	$368	$368
4- 51-247		Plan 13 Block B Pt Lot 4 RP 25R8306 Pts 3 4 & 7 To 13 S/S Plank Rd	19.29	7.81	Plank Road Transfer Inc	$0	$0	$3,000	$3,000
4- 51-247-01		Plan 13 Blk B Pt Lot 4 RP 25R8306 Pts 1 & 2 S/S Plank Rd	2.54	1.03	Acklands-Grainger Inc	$0	$0	$417	$417
4- 51-247-15		Plan 13 Blk B Pt Lot 4 RP 25R8306 Pts 5 & 6	3.51	1.42	Barnim Property Holdings	$0	$0	$566	$566
4- 51-248	3	Pt Lot 17 RP 25R7059 Part 3 Part 4	9.93	4.02	Franco Vozza	$0	$0	$1,556	$1,556
4- 51-250		Plan 13 Blk B Pt Lot 5 RP 25R5598 Pt1	10.69	4.33	Mario & Antonio B. DeCarolis	$0	$0	$1,675	$1,675
4- 51-251		Plan 13 Blk B Pt Lot 5 RP 25R5991 Pt 2	1.21	0.49	451547 Ontario Limited	$0	$0	$212	$212
4- 51-251-01		Plan 13 Blk B Part Lot 5 RP 25R5991 Part 1	1.01	0.41	Lambton Construction Company Limited, c/o Antoine Van Crey	$0	$0	$181	$181
4- 51-252		Plan 13 Blk B N Pt Lot 5 RP 25R2835 Part 1	2.40	0.97	Lambton Woodworks Division Of Lambton	$0	$0	$395	$395
4- 51-253		Plan 13 Blk B Pt Lots 4 And 5 RP 25R5822 Parts 1 And 2 And RP 25R9093 Part 2	5.51	2.23	Seven Star Investments Inc.	$0	$0	$875	$875
4- 51-253-10		Plan 13 Blk B Pt Lot 4 RP 25R5822 Pt 3	1.70	0.69	Duo Ray Ltd	$0	$0	$288	$288
4- 51-254		Plan 13 Blk B Pt Lot 4 RP 25R3150 Pt 1	1.78	0.72	Duo Ray Ltd	$0	$0	$299	$299
4- 51-255		Plan 13 Blk B Pt Lot 4 RP 25R8734 Pt 1	4.88	1.97	Duo Ray Ltd	$0	$0	$775	$775
4- 51-257		Plan 13 Blk B Pt Lots 4 And 5 RP 25R8734 Part 2 RP 25R9093 Parts 3 To 7 RP 25R8312 Parts 1, 3 & 4	39.75	16.09	1109606 Ontario Ltd	$0	$0	$6,155	$6,155
4- 51-258		Plan 13 Blk B Pt Lot 4 RP 25R5490 Pt 1	4.70	1.90	748104 Ontario Ltd	$0	$0	$749	$749
4- 51-260		Plan 13 Blk B Pt Lot 4 Pt Lot 10 Pt Being RP 25R3489 Part 2	2.50	1.01	Guy J. & Susane Levesque	$0	$0	$410	$410
4- 51-261		Plan 13 Blk B Pt Lot 10	0.96	0.39	Susane Levesque	$0	$0	$174	$174
4- 51-262		Plan 13 Blk B Pt Lot 10	0.89	0.36	Edward A. Young	$0	$0	$162	$162

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-263		Plan 13 Blk B Pt Lot 10	2.00	0.81	Richard R. Larochelle	$0	$0	$334	$334
4- 51-264		Plan 13 Blk B Pt Lot 10	3.00	1.21	PD Properties & Rentals Inc.	$0	$0	$486	$486
4- 51-265		Plan 13 Blk B Pt Lot 10 RP 25R3365 Part 1	12.03	4.87	1109662 Ontario Ltd	$0	$0	$1,880	$1,880
4- 51-266		Plan 13 Blk B Pt Lot 10	1.88	0.76	629260 Ontario Limited 1777705 Ontario Inc	$0	$0	$315	$315
4- 51-267		Plan 13 Blk B Pt Lot 10	0.75	0.30	Duo Ray Ltd	$0	$0	$139	$139
4- 51-268		Plan 13 Blk B Pt Lot 10	0.76	0.31	469135 Ontario Limited	$0	$0	$143	$143
4- 51-269		Plan 13 Blk B N Pt Lot 9 S Pt Lot 10	2.00	0.81	469135 Ontario Limited	$0	$0	$334	$334
4- 51-270		Plan 13 Blk B Pt Lot 9	2.00	0.81	2448514 Ontario Inc.	$0	$0	$334	$334
4- 51-271		Plan 13 Blk B Pt Lot 9	1.00	0.40	2274916 Ontario Inc	$0	$0	$177	$177
4- 51-272		Plan 13 Blk B S Pt Lot 9	1.30	0.53	John Healy Care Trustee	$0	$0	$227	$227
4- 51-273		Plan 13 Blk B Pt Lot 9	1.00	0.40	Dean R. Williams	$0	$0	$177	$177
4- 51-274		Plan 13 Blk B Pt Lot 9	1.00	0.40	Jeffery P. Williams	$0	$0	$177	$177
4- 51-275		Plan 13 Blk B Pt Lot 9	3.00	1.21	Dean R. Williams	$0	$0	$486	$486
4- 51-276	3	Plan 13 Blk B Pt Lot 9 Pt Lot 9	2.47	1.00	Jeffery P. Williams	$0	$0	$406	$406
4- 51-277	3	Plan 13 Blk B Pt Lot 9 Pt Lot 9	0.57	0.23	Dean R. Williams	$0	$0	$113	$113
4- 51-278		Plan 13 Blk B Pt Lot 9	2.00	0.81	Lamsar Inc, c/o 608 Mc Gregor Sd Rd	$0	$0	$334	$334
4- 51-286		Plan 13 Blk B S Pt Lot 5	1.86	0.75	1565685 Ontario Limited	$0	$0	$311	$311
4- 51-287		Plan 13 Blk B S Pt Lot 5	5.33	2.16	Harold Marcus Limited	$0	$0	$848	$848
4- 51-289		Plan 13 Blk B S Pt Lot 5 EXC RP 25R2928 Part 4	2.72	1.10	1830370 Ontario Inc	$0	$0	$444	$444
4- 51-290		Plan 13 Blk B Pt Lot 5 EXC RP 25R1605 Part 7 Part 8	35.19	14.24	Curran & Herridge Construction Company Limited	$0	$0	$1,833	$1,833
4- 51-292		Plan 13 Blk B S Pt Lot 5 EXC RP 25R1605 Part 6	1.17	0.47	Imperial Roofing (Sarnia) Ltd	$0	$0	$204	$204
4- 51-293	3	Pt Lot 17 RP 25R7059 Part 5 & Part 6	5.47	2.21	Calanit Inc, c/o Morris Lindenbaum	$0	$0	$867	$867
4- 51-295	3	Pt Lot 17 RP 25R7059 Part 1 Part 2 EXC RP 25R7793 Part 1	6.86	2.78	Bruce A Bond Petroleum Ltd	$0	$0	$1,084	$1,084
4- 51-295-05	3	Pt Lot 17 RP 25R7793 Part 1	2.60	1.05	Delcor Seaway Inc, c/o Cordell Kendel	$0	$0	$425	$425
4- 51-296	3	Pt Lot 16 RP 25R1214 Pts 1 & 6	2.00	0.81	Kel-Gor Limited, c/o St Clair Valve	$0	$0	$334	$334
4- 51-298	3	Pt Lot 16 RP 25R1214 Pts 2 to 5	3.35	1.36	Kel-Gor Limited	$0	$0	$543	$543
4- 51-299	3	Pt Lot 16 RP25R5650 Part 1 Part 12 RP 25R6036 Pts 3 To 11 Pt 15 Pt 16 S/T	6.83	2.76	Kel-Gor Limited	$0	$0	$1,076	$1,076
4- 51-300	3	Pt Lot 16 RP 25R6036 Parts 1, 2 & 17	1.15	0.47	D S Ashman Industries Inc	$0	$0	$204	$204
4- 51-302	3	Pt Lots 16 And 17 And RP 25R1485 Part 1	12.47	5.05	Jenron Holdings Ltd	$0	$0	$1,949	$1,949
4- 51-310	3	E Pt Lot 16	1.05	0.42	Randy G. & Partricia J. Varsava T/A Varsava Trailers	$0	$0	$185	$185
4- 51-311	3	Pt Lot 16	0.50	0.20	Gerald M. Mcauley	$0	$0	$101	$101
4- 51-312	3	Pt Lot 16	0.41	0.17	Gerald M. Mcauley	$0	$0	$90	$90
4- 51-321		Plan 13 Blk A Pt Lot 15 RP 25R2953 Part 1 to Part 12	32.16	13.01	Air Products Canada Ltd	$0	$0	$4,981	$4,981
4- 51-323		Plan 13 Blk A Pt Lot 15	20.79	8.41	Transco Recycling Inc	$0	$0	$3,229	$3,229
4- 51-324		Plan 13 Blk A Pt Lot 15 RP 25R5223 Part 7 to 11	9.92	4.01	408980 Ontario Ltd, c/o Tony Savo	$0	$0	$1,553	$1,553
4- 51-325		Plan 13 Blk A Pt Lot 15 RP 25R5223 Parts 1 to 6	4.13	1.67	852129 Ontario Limited, c/o Lamblon Metal	$0	$0	$661	$661
4- 51-340		Plan 13 Blk A Pt Lot 6 RP 25R8484 Parts 1 to 8 &12	4.26	1.72	876652 Ontario Ltd	$0	$0	$680	$680
4- 51-340-50		Plan 13 Blk A Pt Lot 6 RP 25R8484 Pt 9	5.35	2.17	121 Duff Drive Inc	$0	$0	$852	$852

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-341		Plan 13 Blk A Part Lot 6 RP 25R8073 Part 1	13.21	5.35	Mac Pump Developments Ltd	$0	$0	$2,063	$2,063
4- 51-341-01		Plan 13 Blk A Part Lot 6 RP 25R8073 Part 2	1.14	0.46	2506612 Ontario Ltd.	$0	$0	$200	$200
4- 51-344	2	W Pt Lot 16	1.00	0.40	Randolph A. Elviage	$0	$0	$177	$177
4- 51-345	2	W Pt Lot 16	1.00	0.40	Sarnia Plumbing And Mecha	$0	$0	$177	$177
4- 51-346	2	E Pt Lot 16	0.62	0.25	Auke & Denise Zylstra	$0	$0	$120	$120
4- 51-353	2	Pt Lot 16 and RP 25R7974 Part 1 RP 25R9924 Pt 1	6.38	2.58	Vandenheuvel Auto Sales Ltd.	$0	$0	$1,008	$1,008
4- 51-354	2	Pt Lot 16	0.75	0.30	Kukura Construction Limited, K C L Warehouse	$0	$0	$139	$139
4- 51-355	2	Pt Lot 16	0.41	0.17	Vandenheuvel Auto Sales Ltd.	$0	$0	$90	$90
4- 51-356	2	Pt Lot 16	0.40	0.16	Michael W. Kidd	$0	$0	$86	$86
4- 51-357	2	Pt Lot 16 And RP 25R7067 Part 3 RP 25R9934 Pt 1	0.36	0.15	1600850 Ontario Limited	$0	$0	$82	$82
4- 51-512	2	Pt Lot 15	0.35	0.14	Renald I. Joseph & Brenda L. Blyth	$0	$0	$78	$78
4- 51-513	2	Pt Lot 15	0.35	0.14	William K. & Dianne J. Spencer	$0	$0	$78	$78
4- 51-514	2	Pt Lot 15	0.07	0.03	Carol A. O'Reilly	$0	$0	$36	$36
4- 51-561	2	Pt Lot 15	0.84	0.34	2551030 Ontario Inc.	$0	$0	$155	$155
4- 51-606	2	Pt Lot 15 RP 25R4901 Part 1	1.00	0.40	Mills Land Farms Inc, c/o Mr M Darrell Mills	$0	$0	$177	$177
4- 51-607	2	Pt Lot 15	0.47	0.19	Vink Network Cables Inc.	$0	$0	$97	$97
4- 51-608	2	W Pt Lot 15	0.46	0.19	Margaret J. Nyp	$0	$0	$97	$97
Railway		Ref's #2, #8, #10, #21, #36, #176, and #185 on Plan Sheet 1 and 2	291.58	118.00	Canadian National Railway Corp.	$5,658	$56,051	$41,373	$103,082
Railway		Ref #186 on Plan Sheet 1	5.06	2.05	Chesapeake and Ohio Railway	$0	$0	$485	$485
4- 49-321		Plan 134 Pt Blk 15	6.87	2.78	Hydro One Networks Inc.	$0	$0	$245	$245
4- 50-195		Plan 122 Range 2	2.19	0.89	Hydro One Networks Inc.	$0	$0	$49	$49
4- 50-231		Plan 122 Range 2 To 3 Lot 5 to Pt Lot 7	34.98	14.16	Hydro One Networks Inc.	$0	$0	$412	$412
Public Utlity		Ref. #15 on Plan Sheet 1	1.75	0.71	Hydro One Networks Inc.	$0	$0	$81	$81
Public Utlity		Ref. #17 on Plan Sheet 1	1.23	0.50	Hydro One Networks Inc.	$0	$0	$65	$65
Public Utlity		Ref. #18 on Plan Sheet 1	0.22	0.09	Hydro One Networks Inc.	$0	$0	$32	$32
Public Utlity		Ref. #20 on Plan Sheet 1	0.40	0.16	Hydro One Networks Inc.	$0	$0	$38	$38
Public Utlity		Ref. #22 on Plan Sheet 1	1.75	0.71	Hydro One Networks Inc.	$0	$0	$81	$81
Public Utlity		Ref. #24 on Plan Sheet 1	5.12	2.07	Hydro One Networks Inc.	$0	$1,042	$189	$1,231
Public Utlity		Ref. #25 on Plan Sheet 1	15.05	6.09	Hydro One Networks Inc.	$0	$29,805	$912	$30,717
Public Utlity		Ref. #32 on Plan Sheet 1	0.10	0.04	Hydro One Networks Inc.	$0	$0	$28	$28
Public Utlity		Ref. #53 on Plan Sheet 2	0.22	0.09	Hydro One Networks Inc.	$0	$0	$36	$36
Public Utlity		Ref. #113 on Plan Sheet 2	4.49	1.82	Hydro One Networks Inc.	$0	$0	$256	$256
Public Utlity		Ref. #115 on Plan Sheet 1	4.77	1.93	Hydro One Networks Inc.	$0	$0	$270	$270
Public Utlity		Ref. #121 on Plan Sheet 2	17.10	6.92	Hydro One Networks Inc.	$0	$0	$904	$904
Public Utlity		Ref. #171 on Plan Sheet 2	37.73	15.27	Hydro One Networks Inc.	$0	$0	$1,964	$1,964
Public Utlity		Ref. #172 on Plan Sheet 2	14.53	5.88	Hydro One Networks Inc.	$0	$0	$772	$772
Public Utlity		Ref. #173 on Plan Sheet 1	2.20	0.89	Hydro One Networks Inc.	$0	$0	$95	$95
Public Utlity		Ref. #174 on Plan Sheet 1	19.64	7.95	Hydro One Networks Inc.	$0	$0	$655	$655
Total on Privately-Owned - Non-Agricultural Lands.....						$1,522,647	$213,421	$237,591	$1,973,659

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-249		Plan 13 Blk B Pt Lots 4 & 5 RP 25R9267 Pts 1 & 3	44.62	18.06	1109606 Ontario Limited	$0	$0	$2,318	$2,318
4- 51-376			302.97	122.61	DST Farms Inc., and LMH Farms Inc.	$0	$0	$15,595	$15,595
4- 51-546	2	W Pt Lot 13 EXC RP 25R592 Part 1	1.44	0.58	David A. & Joyce E. Crowe	$0	$0	$99	$99

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-559	2	W Pt Lot 14 E Pt Lot 15	45.07	18.24	Lloyd D. & Frances J. King	$0	$0	$2,341	$2,341
4- 51-560	2	Pt Lot 15	24.93	10.09	2299107 Ontario Inc	$0	$0	$1,306	$1,306
4- 51-568	2	W Pt Lot 15	120.98	48.96	1565670 Ontario Limited	$0	$0	$6,242	$6,242
4- 51-570	2	Pt Lot 14	9.89	4.00	Donald A. & Catherine R. Cressman	$0	$0	$533	$533
4- 51-573	2	E Pt Lot 14	9.99	4.04	David H. Payne & Elizabeth J. Parkins	$0	$0	$538	$538
Total on Privately-Owned - Agricultural Lands						$0	$0	$28,972	$28,972

SECTION 26 NON-PRORATABLE COSTS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Public Utility			0.00	0.00	City of Sarnia	$62,000	$0	$0	$62,000
Total on Section 26 Non-Proratable Costs						$62,000	$0	$0	$62,000

	(Acres)	(Ha.)
Total Area (City of Sarnia):	**3,903.87**	**1,579.80**

TOTAL ASSESSMENT IN THE CITY OF SARNIA						**$1,600,365**	**$246,908**	**$325,458**	**$2,172,731**

ST. CLAIR TOWNSHIP

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Kimball Road	7.22	2.92	County of Lambton	$0	$0	$1,879	$1,879
Plank Road	1.72	0.70	County of Lambton	$0	$0	$469	$469
Waubuno Road	1.00	0.40	St. Clair Township	$0	$0	$177	$177
Total on Municipal Lands				$0	$0	$2,525	$2,525

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-215	1	Pt. Lot 15 RP25R3796, Pt. 1	2.00	0.81	Julie M. Core	$0	$0	$128	$128
Total on Privately-Owned - Non-Agricultural Lands						$0	$0	$128	$128

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-206	1	E Pt. Lot 13	20.00	8.09	James R. Elliott	$0	$0	$1,052	$1,052
4- 50-207	1	W Pt. Lot 13, E Pt Lot 14	96.00	38.85	David A. Jr. & Joyce E. Crowe	$0	$0	$4,958	$4,958
4- 50-209	1	W Pt. Lot 13, E Pt Lot 14	44.49	18.00	Charles E. Sands	$0	$0	$2,311	$2,311
4- 50-210	1	E Pt. Lot 14	8.05	3.26	Rodney K. Weese	$0	$0	$439	$439
4- 50-211	1	W Pt. Lot 14	66.41	26.88	Wray Enterprises	$0	$0	$3,438	$3,438
4- 50-212	1	SE 1/4 Lot 15 exc.RP25R5450, Pt. 1	12.53	5.07	Bruce A. & Kelly T. Bond	$0	$0	$669	$669
4- 50-214	1	W Pt. Lot 15 exc. RP25R3769, Pt. 1	63.68	25.77	Donna M. Fisher	$0	$0	$3,297	$3,297
4- 50-216	1	W Pt. Lot 15	50.28	20.35	James Elliott	$0	$0	$2,609	$2,609
4- 60-111	1	Lot 16	54.83	22.19	DST Farms Inc./ LMH Farms Inc., Tenants in Common	$0	$0	$2,843	$2,843
Total on Privately-Owned - Agricultural Lands						$0	$0	$21,616	$21,616
TOTAL ASSESSMENT IN ST. CLAIR TOWNSHIP						**$0**	**$0**	**$24,269**	**$24,269**

	(Acres)	(Ha.)
Total Area (St. Clair Township):	**428.21**	**173.29**

GRAND TOTAL - SCHEDULE 'C-1' - (BOTH MUNICIPALITIES)						**$1,600,365**	**$246,908**	**$349,727**	**$2,197,000**

	(Acres)	(Ha.)
Overall Total Area:	**4332.08**	**1753.09**

SCHEDULE 'C-2'
SCHEDULE OF ASSESSMENT
COLE DRAIN
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

ONTARIO LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Highway 40 (Churchill Rd)	95.47	38.64	Transportation Ministry	$4,396	$2,904	$38,335	$45,635
Roll No. 4-51-309- Plan 13 Blk B Pt Lot 5 RP 25R2928 Pt 4	1.27	0.51	Transportation Ministry	$0	$0	$334	$334
Roll No. 4-51-288- Con 3 E Pt Lot 16	0.55	0.22	Transportation Ministry	$0	$0	$158	$158
Roll No. 4-51-309- Con 3 Pt Lot 16	3.21	1.30	Transportation Ministry	$0	$3,542	$287	$3,829
Roll No. 4-51-313- Con 3 Pt Lot 16	0.55	0.22	Transportation Ministry	$0	$3,187	$158	$3,345
Total on Ontario Lands.....				$4,396	$9,633	$39,272	$53,301

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
McGregor Side Road S	10.93	4.42	City of Sarnia	$3,140	$885	$634	$4,659
Gladwish Drive	9.42	3.81	City of Sarnia	$3,140	$885	$3,613	$7,638
Plank Road	18.19	7.36	City of Sarnia	$351,516	$108,300	$4,406	$464,222
Plank Road (County Road 20)	18.44	7.46	County of Lambton	$0	$17,654	$7,396	$25,050
Bill Boulevard	1.43	0.58	City of Sarnia	$0	$0	$586	$586
Duff Drive	1.39	0.56	City of Sarnia	$0	$0	$567	$567
Atkin Ave	0.41	0.17	City of Sarnia	$0	$0	$189	$189
Churchill Line (County Road 14)	1.50	0.61	County of Lambton	$6,280	$229	$641	$7,150
Kimball Road (County Road 31)	7.79	3.15	County of Lambton	$6,280	$175	$3,204	$9,659
Roll No. 4-51-256- Plan 13 B0lk B Pt Lt 4 RP25R2376	1.58	0.64	City of Sarnia	$0	$0	$427	$427
Roll No. 4-51-511	1.75	0.71	County of Lambton	$0	$0	$741	$741
Total on Municipal Lands.....				$370,356	$128,128	$22,404	$520,888

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-171	3	Pt Lot 16 RP 25R1658 Part 2 With EXC	12.48	5.05	Plains Midstream Canada U	$0	$0	$2,955	$2,955
4- 51-176	3	Pt Lot 16 RP 25R8746 Part 3	5.04	2.04	10173169 Canada Limited	$0	$0	$1,209	$1,209
4- 51-176-30	3	Pt Lot 16 RP 25R8554 Part 3	2.14	0.87	2654583 Ontario Ltd.	$0	$0	$530	$530
4- 51-176-50	3	Pt Lot 16 RP 25R8746 Part 1	7.44	3.01	Capuchye Management Limit	$0	$0	$1,771	$1,771
4- 51-177-14	3	Pt Lot 16 RP 25R8280 Part 2	0.91	0.37	Jenron Holdings Ltd	$0	$0	$240	$240
4- 51-177-15	3	Part Lot 16 RP 25R8280 Part 1	0.89	0.36	Modig Properties Inc	$0	$0	$234	$234
4- 51-187	3	Pt Lot 16 RP 25R5224 Part 1 EXC RP 25R7789 Part 1 EXC RP 25R7789 Part 1	1.97	0.80	9056297 Canada Inc.	$0	$0	$499	$499
4- 51-187-02	3	Pt Lot 16 Plan 753 Blks 5 & 10	1.14	0.46	876652 Ontario Limited	$0	$0	$298	$298
4- 51-188	3	SPt Lot 16 RP 25R4574 Part 2 EXC RP 25R7789 Part 2 EXC RP 25R7789 Part 2	0.92	0.37	876652 Ontario Limited	$0	$0	$240	$240
4- 51-188-01		Plan 753 Pt Blks 1 & 6 RP 25R8010 Parts 1 & 2	1.54	0.62	Helmut Sauerbeck c/o Montvest Realty Ltd	$0	$0	$385	$385
4- 51-188-10	3	Part Lot 16 Plan 753 Blks 1 & 6	3.99	1.61	Jenron Holdings Ltd	$0	$0	$959	$959

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-188-15		Plan 753 Pt Blks 3 & 8 RP 25R7863 Pt 1	3.14	1.27	Blattner Investments Inc	$0	$0	$762	$762
4- 51-188-20		Plan 753 Blks 3 & 8 EXC RP 25R7863 Part 1 EXC RP 25R8076 Part 1 S/T Easement	2.76	1.12	1016746 Ontario Limited, O/A J D Lawn Service	$0	$0	$675	$675
4- 51-188-25		Plan 753 Part Blks 3 & 8 RP 25R8076 Part 1 S/T Ease.	0.74	0.30	1016746 Ontario Limited	$0	$0	$199	$199
4- 51-188-80		Plan 753 Pt Blks 2 And 7 RP 25R8516 Parts 1 And 2 RP 25R8702 Pts 1 & 2	0.69	0.28	JHARC Holdings Inc.	$0	$0	$187	$187
4- 51-189	3	S Pt Lot 16 RP 25R1128 Part 1	3.11	1.26	Kel-Gor Limited	$0	$0	$756	$756
4- 51-190	3	S Pt Lot 16	1.67	0.68	Kel-Gor Limited	$0	$0	$420	$420
4- 51-191	3	S Pt Lot 16	2.11	0.85	Marcotte Disposal Inc	$0	$0	$518	$518
4- 51-192	3	Pt Lot 17 RP 25R5580 Part 1	1.99	0.81	Lindross Holdings (Sarnia) Limited	$0	$0	$495	$495
4- 51-193	3	Pt Lot 16 RP 25R7157 Part 1	3.64	1.47	Gregmill Investments Ltd	$0	$0	$878	$878
4- 51-201		Plan 13 Blk B Pt Lot 4 Pt Lot 10	4.14	1.68	Dorothy A. Mc Elhone	$0	$0	$639	$639
4- 51-202		Plan 13 Blk B Pt Lot 10 RP 25R4911 Pt 1	0.67	0.27	At-Tec Heavy Equipment Ltd	$0	$0	$124	$124
4- 51-203		Plan 13 Blk B Pt Lots 9 And 10 RP 25R8475 Part 2 and Pt Part 1	9.69	3.92	Superior Tire Services Sarnia Inc	$0	$0	$1,457	$1,457
4- 51-203-50		Plan 13 Blk B Pt Lot 10 RP 25R8801 Pt 1	2.50	1.01	Tek Holdings Limited	$0	$0	$381	$381
4- 51-204		Plan 13 Blk B W Pt Lot 9 E Pt Lot 10	1.45	0.59	1863960 Ontario Inc	$0	$0	$255	$255
4- 51-205		Plan 13 Blk B Pt Lot 9 Pt Lot 10	2.81	1.14	1863960 Ontario Inc	$0	$0	$469	$469
4- 51-206		Plan 13 Blk B Pt Lot 9 Pt Lot 10 RP 25R5620 Part 1 RP 25R5620 Pt 1	5.74	2.32	Huron Alloys Incorporated	$0	$0	$637	$637
4- 51-207		Plan 13 Blk B Lot 7 Pt Lots 8&9 Con 3 Pt Lots 16&17 RP 25R1658 Pt 1 RP 25R3255 Pts 1 to 8	150.43	60.88	Plains Midstream Canada U	$0	$11,120	$5,975	$17,095
4- 51-207-01		Plan 13 Part Lot 8 Blk B RP 25R7049 Part 7 T/W Ease. Over RP25R7049 Parts 1 to 3	0.46	0.19	Union Gas Limited, Property Tax Dept	$0	$0	$54	$54
4- 51-210		Plan 13 Lot A Pt Lot 11 RP 25R3578 Pt Part 4	4.25	1.72	Lenie N. Severin	$0	$0	$102	$102
4- 51-211		Plan 13 Pt Lot 11 RP 25R3578 Part 3 RP 25R4129 Part 1 RP 25R5854 Part 1 RP 25R7483	4.53	1.83	CMM Properties Inc	$0	$0	$96	$96
4- 51-220		Plan 13 Blk B S Pt Lot 11 N Pt Lot 17 Lot A RP 25R8474 Parts 1 & 4	70.00	28.33	Enbridge Pipelines Inc, c/o Property Tax Manager	$103,438	$18,912	$237	$122,587
4- 51-223		Plan 13 Blk B Pt Lot 16 Pt Lot 17	53.00	21.45	Imperial Oil Limited	$0	$0	$280	$280
4- 51-235		Plan 13 Blk B Pt Lot 9	2.90	1.17	Sarnia Auto Wreckers Ltd	$14,241	$3,896	$144	$18,281
4- 51-236		Plan 13 Blk B Pt Lots 9 And 10 RP 25R2677 Part 1 RP 25R4513 Pt 1	9.40	3.80	Lamsar Inc	$41,504	$5,419	$690	$47,613
4- 51-238		Plan 13 Blk B Pt Lots 9 & 10 RP 25R2728 Pts 1 to 3	5.52	2.23	612031 Ontario Ltd	$15,594	$2,727	$426	$18,747
4- 51-239		Blk B Plan 13 Pt Lot 9 Pt Lot 10 RP 25R2728 Part 4	0.36	0.15	376964 Ontario Ltd/612031 Ontario Ltd, Trijan Industries	$6,512	$567	$52	$7,131

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-240		Plan 13 Blk B Pt Lot 9 Pt Lot 10 RP 25R5026 Part 1	4.08	1.65	3769694 Ontario Limited	$6,512	$3,258	$328	$10,098
4- 51-241		Plan 13 Blk B Part Lot 10	1.44	0.58	Richard C. Perdeaux	$12,854	$1,133	$153	$14,140
4- 51-242		Plan 13 Blk B Pt Lot 10	11.35	4.59	Plank Road Auto Wreckers Ltd	$9,116	$3,719	$1,207	$14,042
4- 51-242-01		Plan 13 Blk B Pt Lot 10	1.22	0.49	John R. Bernhardt	$9,116	$1,204	$152	$10,472
4- 51-244		Plan 13 Blk B Pt Lot 10	1.01	0.41	Paul J. Babcock, c/o Babcock & Sons Welding	$14,579	$1,204	$169	$15,952
4- 51-245		Plan 13 Blk B Pt Lot 10 RP 25R9320 Parts 1 & 3	2.32	0.94	1230868 Ontario Limited, c/o Paul J Babcock Jr	$11,332	$4,321	$355	$16,008
4- 51-246		Plan 13 Blk B Pt Lots 4 And 10 And RP 25R5694 Parts 1 And 2 RP 25R9320 Parts 2 &4	2.14	0.87	Gordon Bouma	$58,653	$4,179	$360	$63,192
4- 51-247		Plan 13 Block B Pt Lot 4 RP 25R8306 Pts 3 4 & 7 To 13 S/S Plank Rd	19.29	7.81	Plank Road Transfer Inc	$12,820	$1,027	$3,405	$17,252
4- 51-247-01		Plan 13 Blk B Pt Lot 4 RP 25R8306 Pts 1 & 2 S/S Plank Rd	2.54	1.03	Acklands-Grainger Inc	$14,985	$3,187	$520	$18,692
4- 51-247-15		Plan 13 Blk B Pt Lot 4 RP 25R8306 Pts 5 & 6	3.51	1.42	Bamim Property Holdings	$12,921	$2,231	$764	$15,916
4- 51-248	3	Pt Lot 17 RP 25R7059 Part 3 Part 4	9.93	4.02	Franco Vozza	$0	$5,702	$2,281	$7,983
4- 51-250		Plan 13 Blk B Pt Lot 5 RP 25R5598 Pt1	10.69	4.33	Mario & Antonio B. DeCarolis	$0	$0	$2,156	$2,156
4- 51-251		Plan 13 Blk B Pt Lot 5 RP 25R5991 Pt 2	1.21	0.49	451547 Ontario Limited	$0	$0	$101	$101
4- 51-251-01		Plan 13 Blk B Part Lot 5 RP 25R5991 Part 1	1.01	0.41	Lambton Construction Company Limited, c/o Antoine Van Crey	$0	$0	$88	$88
4- 51-252		Plan 13 Blk B N Pt Lot 5 RP 25R2835 Part 1	2.40	0.97	Lambton Woodworks Division Of Lambton	$0	$0	$175	$175
4- 51-253		Plan 13 Blk B Pt Lots 4 And 5 RP 25R5822 Parts 1 And 2 And RP 25R9093 Part 2	5.51	2.23	Seven Star Investments Inc.	$0	$0	$370	$370
4- 51-253-10		Plan 13 Blk B Pt Lot 4 RP 25R5822 Pt 3	1.70	0.69	Duo Ray Ltd	$0	$0	$132	$132
4- 51-254		Plan 13 Blk B Pt Lot 4 RP 25R3150 Pt 1	1.78	0.72	Duo Ray Ltd	$0	$0	$136	$136
4- 51-255		Plan 13 Blk B Pt Lot 4 RP 25R8734 Pt 1	4.88	1.97	Duo Ray Ltd	$0	$0	$330	$330
4- 51-257		Plan 13 Blk B Pt Lots 4 And 5 RP 25R8734 Part 2 RP 25R9093 Parts 3 To 7 RP 25R8312 Parts 1, 3 & 4	39.75	16.09	1109606 Ontario Ltd	$0	$0	$2,516	$2,516
4- 51-258		Plan 13 Blk B Pt Lot 4 RP 25R5490 Pt 1	4.70	1.90	748104 Ontario Ltd	$0	$0	$319	$319
4- 51-260		Plan 13 Blk B Pt Lot 4 Pt Lot 10 Pt Being RP 25R3489 Part 2	2.50	1.01	Guy J. & Susane Levesque	$0	$0	$80	$80
4- 51-261		Plan 13 Blk B Pt Lot 10	0.96	0.39	Susane Levesque	$0	$0	$46	$46
4- 51-262		Plan 13 Blk B Pt Lot 10	0.89	0.36	Edward A. Young	$0	$0	$45	$45
4- 51-263		Plan 13 Blk B Pt Lot 10	2.00	0.81	Richard R. Larochelle	$0	$0	$70	$70
4- 51-264		Plan 13 Blk B Pt Lot 10	3.00	1.21	PD Properties & Rentals Inc.	$0	$0	$91	$91
4- 51-265		Plan 13 Blk B Pt Lot 10 RP 25R3365 Part 1	12.03	4.87	1109662 Ontario Ltd	$0	$0	$975	$975
4- 51-266		Plan 13 Blk B Pt Lot 10	1.88	0.76	629260 Ontario Limited 1777705 Ontario Inc	$0	$0	$67	$67
4- 51-267		Plan 13 Blk B Pt Lot 10	0.75	0.30	Duo Ray Ltd	$0	$0	$41	$41
4- 51-268		Plan 13 Blk B Pt Lot 10	0.76	0.31	469135 Ontario Limited	$0	$0	$42	$42

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-269		Plan 13 Blk B N Pt Lot 9 S Pt Lot 10	2.00	0.81	469135 Ontario Limited	$0	$0	$70	$70
4- 51-270		Plan 13 Blk B Pt Lot 9	2.00	0.81	2448514 Ontario Inc.	$0	$0	$70	$70
4- 51-271		Plan 13 Blk B Pt Lot 9	1.00	0.40	2274916 Ontario Inc	$0	$0	$47	$47
4- 51-272		Plan 13 Blk B S Pt Lot 9	1.30	0.53	John Healy Care Trustee	$0	$0	$54	$54
4- 51-273		Plan 13 Blk B Pt Lot 9	1.00	0.40	Dean R. Williams	$0	$0	$47	$47
4- 51-274		Plan 13 Blk B Pt Lot 9	1.00	0.40	Jeffery P. Williams	$0	$0	$47	$47
4- 51-275		Plan 13 Blk B Pt Lot 9	3.00	1.21	Dean R. Williams	$0	$0	$91	$91
4- 51-276	3	Plan 13 Blk B Pt Lot 9 Pt Lot 9	2.47	1.00	Jeffery P. Williams	$0	$0	$80	$80
4- 51-277	3	Plan 13 Blk B Pt Lot 9 Pt Lot 9	0.57	0.23	Dean R. Williams	$0	$0	$38	$38
4- 51-278		Plan 13 Blk B Pt Lot 9	2.00	0.81	Lamsar Inc, c/o 608 Mc Gregor Sd Rd	$0	$0	$70	$70
4- 51-286		Plan 13 Blk B S Pt Lot 5	1.86	0.75	1565685 Ontario Limited	$0	$0	$276	$276
4- 51-287		Plan 13 Blk B S Pt Lot 5	5.33	2.16	Harold Marcus Limited	$0	$0	$749	$749
4- 51-289		Plan 13 Blk B S Pt Lot 5 EXC RP 25R2928 Part 4	2.72	1.10	1830370 Ontario Inc	$0	$0	$394	$394
4- 51-290		Plan 13 Blk B Pt Lot 5 EXC RP 25R1605 Part 7 Part 8	35.19	14.24	Curran & Herridge Construction Company Limited	$0	$0	$2,054	$2,054
4- 51-292		Plan 13 Blk B S Pt Lot 5 EXC RP 25R1605 Part 6	1.17	0.47	Imperial Roofing (Sarnia) Ltd	$0	$0	$287	$287
4- 51-293	3	Pt Lot 17 RP 25R7059 Part 5 & Part 6	5.47	2.21	Calanit Inc, c/o Morris Lindenbaum	$0	$0	$1,279	$1,279
4- 51-295	3	Pt Lot 17 RP 25R7059 Part 1 Part 2 EXC RP 25R7793 Part 1	6.86	2.78	Bruce A Bond Petroleum Ltd	$0	$2,444	$1,620	$4,064
4- 51-295-05	3	Pt Lot 17 RP 25R7793 Part 1	2.60	1.05	Delcor Seaway Inc, c/o Cordell Kendel	$0	$2,975	$628	$3,603
4- 51-296	3	Pt Lot 16 RP 25R1214 Pts 1 & 6	2.00	0.81	Kel-Gor Limited, c/o St Clair Valve	$13,188	$1,700	$490	$15,378
4- 51-298	3	Pt Lot 16 RP 25R1214 Pts 2 to 5	3.35	1.36	Kel-Gor Limited	$0	$3,612	$807	$4,419
4- 51-299	3	Pt Lot 16 RP25R5650 Part 1 Part 12 RP 25R6036 Pts 3 To 11 Pt 15 Pt 16 S/T	6.83	2.76	Kel-Gor Limited	$0	$4,002	$1,616	$5,618
4- 51-300	3	Pt Lot 16 RP 25R6036 Parts 1, 2 & 17	1.15	0.47	D S Ashman Industries Inc	$0	$2,479	$298	$2,777
4- 51-302	3	Pt Lots 16 And 17 And RP 25R1485 Part 1	12.47	5.05	Jenron Holdings Ltd	$0	$0	$3,019	$3,019
4- 51-310	3	E Pt Lot 16	1.05	0.42	Randy G. & Patricia J. Varsava, T/A Varsava Trailers	$0	$126	$274	$400
4- 51-311	3	Pt Lot 16	0.50	0.20	Gerald M. Mcauley	$0	$175	$144	$319
4- 51-312	3	Pt Lot 16	0.41	0.17	Gerald M. Mcauley	$0	$175	$126	$301
4- 51-321		Plan 13 Blk A Pt Lot 15 RP 25R2953 Part 1 to Part 12	32.16	13.01	Air Products Canada Ltd	$0	$0	$7,278	$7,278
4- 51-323		Plan 13 Blk A Pt Lot 15	20.79	8.41	Transco Recycling Inc	$0	$0	$4,714	$4,714
4- 51-324		Plan 13 Blk A Pt Lot 15 RP 25R5223 Part 7 to 11	9.92	4.01	408980 Ontario Ltd, c/o Tony Savo	$0	$0	$2,261	$2,261
4- 51-325		Plan 13 Blk A Pt Lot 15 RP 25R5223 Parts 1 to 6	4.13	1.67	852129 Ontario Limited, c/o Lambton Metal	$0	$0	$956	$956
4- 51-340		Plan 13 Blk A Pt Lot 6 RP 25R8484 Parts 1 to 8 &12	4.26	1.72	876652 Ontario Ltd	$0	$0	$984	$984
4- 51-340-50		Plan 13 Blk A Pt Lot 6 RP 25R8484 Pt 9	5.35	2.17	121 Duff Drive Inc	$0	$0	$1,235	$1,235
4- 51-341		Plan 13 Blk A Part Lot 6 RP 25R8073 Part 1	13.21	5.35	Mac Pump Developments Ltd	$0	$0	$3,008	$3,008
4- 51-341-01		Plan 13 Blk A Part Lot 6 RP 25R8073 Part 2	1.14	0.46	2506612 Ontario Ltd.	$0	$0	$281	$281

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-344	2	W Pt Lot 16	1.00	0.40	Randolph A. Elviage	$0	$0	$262	$262
4- 51-345	2	W Pt Lot 16	1.00	0.40	Sarnia Plumbing And Mecha	$0	$0	$262	$262
4- 51-346	2	E Pt Lot 16	0.62	0.25	Auke & Denise Zylstra	$0	$0	$173	$173
4- 51-354	2	Pt Lot 16	0.75	0.30	Kukura Construction Limited, K C L Warehouse	$0	$0	$203	$203
4- 51-355	2	Pt Lot 16	0.41	0.17	Vandenheuvel Auto Sales Ltd.	$0	$115	$127	$242
4- 51-356	2	Pt Lot 16	0.40	0.16	Michael W. Kidd	$0	$153	$121	$274
4- 51-357	2	Pt Lot 16 And RP 25R7067 Part 3 RP 25R9934 Pt 1	0.36	0.15	1600850 Ontario Limited	$0	$235	$115	$350
4- 51-512	2	Pt Lot 15	0.35	0.14	Renald I. Joseph & Brenda L. Blyth	$0	$0	$110	$110
4- 51-513	2	Pt Lot 15	0.35	0.14	William K. & Dianne J. Spencer	$0	$0	$110	$110
4- 51-514	2	Pt Lot 15	0.07	0.03	Carol A. O'Reilly	$0	$0	$43	$43
4- 51-561	2	Pt Lot 15	0.84	0.34	2551030 Ontario Inc.	$0	$0	$231	$231
4- 51-606	2	Pt Lot 15 RP 25R4901 Part 1	1.00	0.40	Mills Land Farms Inc, c/o Mr M Darrell Mills	$0	$147	$267	$414
4- 51-607	2	Pt Lot 15	0.47	0.19	Vink Network Cables Inc.	$0	$207	$140	$347
4- 51-608	2	W Pt Lot 15	0.46	0.19	Nyp, Margaret June	$0	$464	$140	$604
Public Utlity		Ref. #53 on Plan Sheet 2	0.22	0.09	Hydro One Networks Inc.	$0	$0	$27	$27
Public Utlity		Ref. #113 on Plan Sheet 2	4.49	1.82	Hydro One Networks Inc.	$0	$0	$47	$47
Public Utlity		Ref. #121 on Plan Sheet 2	17.10	6.92	Hydro One Networks Inc.	$0	$0	$1,311	$1,311
Public Utlity		Ref. #171 on Plan Sheet 2	37.73	15.27	Hydro One Networks Inc.	$0	$0	$3,107	$3,107
Public Utlity		Ref. #172 on Plan Sheet 2	14.53	5.88	Hydro One Networks Inc.	$0	$447	$1,236	$1,683
Total on Privately-Owned - Non-Agricultural Lands.....						$357,364	$93,262	$87,126	$537,752

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-249		Plan 13 Blk B Pt Lots 4 & 5 RP 25R9267 Pts 1 & 3	44.62	18.06	1109606 Ontario Limited	$0	$0	$3,233	$3,233
4- 51-353	2	Pt Lot 16 and RP 25R7974 Part 1 RP 25R9924 Pt 1	6.38	2.58	Vandenheuvel Auto Sales Ltd.	$0	$0	$1,587	$1,587
4- 51-376	2	Plam 13 Blk A Pt Lot 15 & Pt Lot 16	302.97	122.61	DST Farms Inc., and LMH Farms Inc.	$0	$0	$23,769	$23,769
4- 51-546	2	W Pt Lot 13 EXC RP 25R592 Part 1	1.44	0.58	David A. & Joyce Eileen Crowe	$0	$796	$393	$1,189
4- 51-559	2	W Pt Lot 14 E Pt Lot 15	45.07	18.24	Lloyd D. & Frances J. King	$1,884	$2,594	$3,706	$8,184
4- 51-560	2	Pt Lot 15	24.93	10.09	2299107 Ontario Inc	$0	$0	$1,349	$1,349
4- 51-568	2	W Pt Lot 15	120.98	48.96	1565670 Ontario Limited	$0	$3,221	$10,005	$13,226
4- 51-570	2	Pt Lot 14	9.89	4.00	Donald A. & Catherine R. Cressman	$0	$1,058	$871	$1,929
4- 51-573	2	E Pt Lot 14	9.99	4.04	David H. Payne & Elizabeth J. Parkins	$0	$1,058	$879	$1,937
Total on Privately-Owned - Agricultural Lands.....						$1,884	$8,727	$45,792	$56,403

			Special Benefit	Benefit	Outlet	Total Assessment
TOTAL ASSESSMENT IN THE CITY OF SARNIA.....			**$734,000**	**$239,750**	**$194,594**	**$1,168,344**

	(Acres)	(Ha.)
Total Area (City of Sarnia):	**1,561.95**	**632.07**

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment

ST. CLAIR TOWNSHIP

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Kimball Road	7.22	2.92	County of Lambton	$0	$0	$2,972	$2,972
Plank Road	1.72	0.70	County of Lambton	$0	$0	$741	$741
Waubuno Road	1.00	0.40	St. Clair Township	$0	$0	$267	$267
Total on Municipal Lands				$0	$0	$3,980	$3,980

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-215	1	Pt. Lot 15 RP25R3796, Pt. 1	2.00	0.81	Julie M. Core	$0	$0	$188	$188
Total on Privately-Owned - Non-Agricultural Lands						$0	$0	$188	$188

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-206	1	E Pt. Lot 13	20.00	8.09	James R. Elliott	$0	$0	$1,735	$1,735
4- 50-207	1	W Pt. Lot 13, E Pt Lot 14	96.00	38.85	David A. & Joyce E. Crowe	$0	$0	$8,237	$8,237
4- 50-209	1	W Pt. Lot 13, E Pt Lot 14	44.49	18.00	Charles E. Sands	$0	$0	$3,830	$3,830
4- 50-210	1	E Pt. Lot 14	8.05	3.26	Rodney K. Weese	$0	$0	$714	$714
4- 50-211	1	W Pt. Lot 14	66.41	26.88	Wray Enterprises	$0	$0	$5,705	$5,705
4- 50-212	1	SE 1/4 Lot 15 exc.RP25R5450, Pt. 1	12.53	5.07	Bruce A. & Kelly T. Bond	$0	$0	$1,097	$1,097
4- 50-214	1	W Pt. Lot 15 exc. RP25R3769, Pt. 1	63.68	25.77	Donna M. Fisher	$0	$0	$5,472	$5,472
4- 50-216	1	W Pt. Lot 15	50.28	20.35	James Elliott	$0	$0	$4,327	$4,327
4- 60-111	1	Lot 16	54.83	22.19	DST Farms Inc./ LMH Farms Inc., Tenants in Common	$0	$0	$2,371	$2,371
Total on Privately-Owned - Agricultural Lands						$0	$0	$33,488	$33,488
TOTAL ASSESSMENT IN ST. CLAIR TOWNSHIP						**$0**	**$0**	**$37,656**	**$37,656**

	(Acres)	(Ha.)
Total Area (St. Clair Township):	**428.21**	**173.29**

	Special Benefit	Benefit	Outlet	Total Assessment
GRAND TOTAL - SCHEDULE 'C-1' - (BOTH MUNICIPALITIES)	**$734,000**	**$239,750**	**$232,250**	**$1,206,000**

	(Acres)	(Ha.)
Total Area:	**1990.16**	**805.36**

SCHEDULE 'C-3'
SCHEDULE OF ASSESSMENT
COLE DIVERSION DRAIN BRANCH 'A'
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
McGregor Side Road N	2.37	0.96	City of Sarnia	$14,000	$2,238	$80	$16,318
Total on Municipal Lands				$14,000	$2,238	$80	$16,318

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
		R.O.W.	123.00	49.78	Canadian National Railway Corp.	$0	$17,900	$21,002	$38,902
4- 51-207		Plan 13 Blk B Lot 7 Pt Lots 8&9 Con 3 Pt Lots 16&17 RP 25R1658 Pt 1 RP 25R3255 Pts 1 to 8	138.00	55.85	Plains Midstream Canada U	$33,500	$15,663	$23,563	$72,726
4- 51-212		Plan 13 Blk A Pt Lots 5 & 11 RP 25R3578 Part 2	1.58	0.64	Sandercock Construction Limited, c/o Marjorie Sandercock	$0	$4,475	$54	$4,529
4- 51-213		Plan 13 Pt Lots 5 & 11 RP 25R3578 Pt 1	2.96	1.20	Lambton Hot Mix Ltd	$0	$4,475	$51	$4,526
Total on Privately-Owned - Non-Agricultural Lands						$33,500	$42,513	$44,670	$120,683

S. 26 NON PRORATABLE

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
		R.O.W.			Canadian National Railway Corp.	$26,250	$0	$0	$26,250
					Hydro One Networks Inc.	$3,750	$0	$0	$3,750
Total on Privately-Owned - Non-Agricultural Lands						30,000.00	$0	$0	$30,000
TOTAL ASSESSMENT - BRANCH A						**$77,500**	**$44,750**	**$44,750**	**$167,000**

	(Acres)	(Ha.)
Total Area:	**267.91**	**108.43**

SCHEDULE 'C-4'
SCHEDULE OF ASSESSMENT
COLE DIVERSION DRAIN BRANCH 'B'
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
McGregor Side Road N	2.37	0.96	City of Sarnia	$0	$327	$112	$439
Total on Municipal Lands				$0	$327	$112	$439

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
		R.O.W.	2.00	0.81	Canadian National Railway Corp.	$0	$1,962	$949	$2,911
4- 51-207		Plan 13 Blk B Lot 7 Pt Lots 8&9 Con 3 Pt Lots 16&17 RP 25R1658 Pt 1 RP 25R3255 Pts 1 to 8	38.00	15.38	Plains Midstream Canada U	$0	$5,886	$18,014	$23,900
Total on Privately-Owned - Non-Agricultural Lands						$0	$7,848	$18,963	$26,811

S. 26 NON PRORATABLE

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
		R.O.W.			Canadian National Railway Corp.	$19,375	$0	$0	$19,375
					Hydro One Networks Inc.	$14,375	$0	$0	$14,375
TOTAL ASSESSMENT - BRANCH B						**$33,750**	**$8,175**	**$19,075**	**$61,000**

	(Acres)	(Ha.)
Total Area:	**42.37**	**17.15**

SCHEDULE 'D-1'
DETAILS OF SPECIAL BENEFIT
CUT-OFF DRAIN
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

SPECIAL BENEFIT ASSESSMENT
(GENERAL DESCRIPTION OF SPECIAL BENEFIT)

Roll No.	Owner	Item Description	Estimated Capital Cost	Overhead Costs	Special Benefit
4- 50-888	Arlanxeo Canada Inc.	Concrete Channel Liner Repair (Sta. 1+004 to 1+473) - 95% of cost estimate items #1 & 2.	$921,500	$473,924	$1,395,424
4- 50-888	Arlanxeo Canada Inc.	Bridge No. 1 Repair (Sta. 1+282) - 100% of the cost	$30,000	$26,423	$56,423
4- 50-888	Arlanxeo Canada Inc.	Increased costs of reconsidered report to accommodate alternative concrete channel repair - 100% of the cost	$0	$40,000	$40,000
	Total for Roll No. 50-888		$951,500	$540,347	$1,491,847
4- 50-297	Lanxess Inc.	Bridge No. 5 Removal (1+780) - 100% of the cost	$5,000	$1,287	$6,287
4- 50-008	H.C. Starck	Rehabilitation of concrete paver blocks using gabion stone Station 1+530 to Station 1+702 - 100% of the cost	$15,000	$3,855	$18,855
Total Special Benefit Assessment (Excl. Non Pro-Ratable Costs)			**$971,500**	**$545,489**	**$1,516,989**
		Section 26 (Non Pro-Ratable Costs)			
	City of Sarnia	Cleanout of five (5) existing bridges Bridge Nos. 4, 6, 14, 18 & 19	$12,500	$3,218	$15,718
	City of Sarnia	Bridge No. 17A supply & installation (Sta. 4+415) - 100% of the cost	$52,000	$10,000	$62,000
	Canadian National Railway Corp.	Cleanout of three (3) existing bridges - Bridge Nos. 7, 8 & 13	$4,500	$1,158	$5,658
Total Special Benefit Assessment (Section 26 Non Pro-Ratable Costs)			**$69,000**	**$14,376**	**$83,376**
OVERALL TOTAL SPECIAL BENEFIT ASSESSMENT					**$1,600,365**

SCHEDULE 'D-2'
DETAILS OF SPECIAL BENEFIT
COLE DRAIN
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

SPECIAL BENEFIT ASSESSMENT
(GENERAL DESCRIPTION OF SPECIAL BENEFIT)

Roll No.	Owner	Item Description	Estimated Capital Cost	Overhead Costs	Special Benefit
a) Bridge Replacements - Special Benefits to adjacent owners.					
4- 51-220	Enbridge Pipelines Inc.	-Bridge No. 20 (Sta. 6+431) - 30% of access bridge replacement cost	$13,140	$1,677	$14,817
51-220	Enbridge Pipelines Inc.	-Bridge No. 21 (Sta. 6+492) - 60% of access bridge replacement cost	$51,240	$6,532	$57,772
51-220	Enbridge Pipelines Inc.	-Bridge No. 22 (Sta. 6+662) - 60% of access bridge replacement cost	$27,360	$3,489	$30,849
	Total for Roll No. 51-220		$91,740	$11,698	$103,438
4- 51-235	Sarnia Auto Wreckers Ltd	-Bridge No. 24 (Sta. 7+161) - 30% of access bridge replacement cost	$12,630	$1,611	$14,241
4- 51-236	Lamsar Inc.	-Bridge No. 25 (Sta. 7+324) - 30% of access bridge replacement cost	$11,670	$1,488	$13,158
4- 51-236	Lamsar Inc.	-Bridge No. 26 (Sta. 7+355) - 60% of access bridge replacement cost	$25,140	$3,206	$28,346
	Total for Roll No. 51-236		$36,810	$4,694	$41,504
4- 51-238	612031 Ontario Ltd.	-Bridge No. 27 (Sta. 7+483) - 30% of access bridge replacement cost	$13,830	$1,764	$15,594
4- 51-239	376964 Ontario Ltd. & 612031 Ontario Ltd.	-Bridge No. 28 (Sta. 7+581) - 15% of access bridge replacement cost	$5,775	$737	$6,512
4- 51-240	376964 Ontario Ltd.	-Bridge No. 28 (Sta. 7+581) - 15% of access bridge replacement cost	$5,775	$737	$6,512
4- 51-241	Richard C. Perdeaux	-Bridge No. 29 (Sta. 7+610) - 30% of access bridge replacement cost	$11,400	$1,454	$12,854
4- 51-242	Plank Road Auto Wreckers Ltd.	-Bridge No. 30 (Sta. 7+739) - 15% of access bridge replacement cost	$8,085	$1,031	$9,116
4- 51-242-01	John R. Bernhardt	-Bridge No. 30 (Sta. 7+739) - 15% of access bridge replacement cost	$8,085	$1,031	$9,116
4- 51-244	Paul J. Babcock	-Bridge No. 31 (Sta. 7+794) - 30% of access bridge replacement cost	$12,930	$1,649	$14,579
4- 51-245	1230868 Ontario Ltd.	-Bridge No. 32 (Sta. 7+879) - 30% of access bridge replacement cost	$10,050	$1,282	$11,332
4- 51-246	Gordon Bouma	-Bridge No. 33 (Sta. 7+926) - 60% of access bridge replacement cost	$19,020	$2,425	$21,445
		-Bridge No. 34 (Sta. 7+959) - 60% of access bridge replacement cost	$20,100	$2,563	$22,663

Roll No.	Owner	Item Description	Estimated Capital Cost	Overhead Costs	Special Benefit
		-Bridge No. 35 (Sta. 7+999) - 30% of access bridge replacement cost	$12,900	$1,645	$14,545
	Total for Roll No. 51-246		$52,020	$6,633	$58,653
4- 51-247-01	Acklands-Grainger Inc.	-Bridge No. 36 (Sta. 8+045) - 30% of access bridge replacement cost	$13,290	$1,695	$14,985
4- 51-247	Plank Road Transfer Ltd.	-Bridge No. 37 (Sta. 8+133) - 30% of access bridge replacement cost	$11,370	$1,450	$12,820
4- 51-247-15	Barnim Property Holdings	-Bridge No. 38 (Sta. 8+205) - 30% of access bridge replacement cost	$11,460	$1,461	$12,921
b) Plank Road One Time Assessment - 40% Share of cost of access bridges					
	Plank Road (City of Sarnia)	40% share of the 18 replacement bridges	$311,760	$39,756	$351,516
c) Bridge Widening					
4- 51-296	Kel-Gor Limited	Bridge No. 41 (Sta. 8+587) - 100% of end wall replacement	$10,500	$2,688	$13,188
d) Headwall Repair					
4- 51-559	Lloyd D. & Frances J. King	Bridge No. 48 (Sta. 10+433) - 50% of Headwall Repair	$1,500	$384	$1,884
Total Special Benefit Assessment (Excl. Non Pro-Ratable Costs).....			**$629,010**	**$81,754**	**$710,764**
		Section 26 (Non Pro-Ratable Costs)			
	City of Sarnia	Cleanout of Bridge No. 23 McGregor Road (100%)	$2,500	$640	$3,140
	City of Sarnia	Cleanout of Bridge No. 39 Gladwish Drive (100%)	$2,500	$640	$3,140
	County of Lambton	Cleanout of Bridge No. 45 Churchill Line - County Rd 14 (50%)	$5,000	$1,280	$6,280
	County of Lambton	Cleanout of Bridge No. 45 Kimball Road - County Rd 31 (50%)	$5,000	$1,280	$6,280
	Transportation Ministry	Cleanout of Bridge No. 44 King's Highway No. 40	$3,500	$896	$4,396
Total Special Benefit Assessment (Section 26 Non Pro-Ratable Costs).....			**$18,500**	**$4,736**	**$23,236**
OVERALL TOTAL SPECIAL BENEFIT ASSESSMENT					**$734,000**

SCHEDULE 'D-3'
DETAILS OF SPECIAL BENEFIT
COLE DIVERSION DRAIN BRANCH 'A'
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

SPECIAL BENEFIT ASSESSMENT
(GENERAL DESCRIPTION OF SPECIAL BENEFIT)

Roll No.	Owner	Item Description	Estimated Capital Cost	Overhead Cost	Special Benefit
McGregor Sideroad	City of Sarnia	Road culvert - Bridge No. 3A (35%)	$11,200	$2,800	$14,000
4- 51-207	Plains Midstream Canada U	Sluice Gate, headwall - Bridge No. 3A (65%)	$20,800	$5,200	$26,000
		Cleaning of Bridge No. 5A (100%)	$6,000	$1,500	$7,500
	Total for Roll No. 51-207.		$26,800	$6,700	$33,500
Total Special Benefit Assessment (Excl. Non Pro-Ratable Costs)			$38,000	$9,500	$47,500
		Section 26 (Non Pro-Ratable Costs)			
	Canadian National Railway Corp.	Bridge No. 4A replacement (100%)	$20,500	$5,125	$25,625
		Cleaning of Bridge No. 2A (100%)	$500	$125	$625
	Total for Canadian National Railway Corp.		$21,000	$5,250	$26,250
	Hydro One Networks Inc.	Stone erosion protection for utility pole (100%)	$3,000	$750	$3,750
Total Special Benefit Assessment (Section 26 Non Pro-Ratable Costs)			$24,000	$6,000	$30,000
OVERALL TOTAL SPECIAL BENEFIT ASSESSMENT					**$77,500**

SCHEDULE 'D-4'
DETAILS OF SPECIAL BENEFIT
COLE DIVERSION DRAIN BRANCH 'B'
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

SPECIAL BENEFIT ASSESSMENT
(GENERAL DESCRIPTION OF SPECIAL BENEFIT)

Roll No.	Owner	Item Description	Estimated Capital Cost	Overhead Cost	Special Benefit
		Section 26 (Non Pro-Ratable Costs)			
	Canadian National Railway Corp.	Bridge No. 1B replacement (100%)	$15,500	$3,875	$19,375
	Hydro One Networks Inc.	New Bridge 2B Hydro Pole access (100%)	$3,800	$950	$4,750
	Hydro One Networks Inc.	New Bridge 3B Hydro Pole access (100%)	$3,800	$950	$4,750
	Hydro One Networks Inc.	Supply and place stone erosion protection for utility pole Sation 0+085B - 0+097B (100%)	$3,900	$975	$4,875
	Total for Hydro One Networks Inc.		$11,500	$2,875	$14,375
Total Special Benefit Assessment (Section26 Non Pro-Ratable Costs)			$38,500	$9,625	$33,750
OVERALL TOTAL SPECIAL BENEFIT ASSESSMENT					**$33,750**

SCHEDULE 'E-1'
SCHEDULE OF ASSESSMENT FOR FUTURE MAINTENANCE OF OUTLET
STATION 0+629 TO STATION 1+473
CUT-OFF DRAIN
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

ONTARIO LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Highway 40 (Churchill Rd)	95.47	38.64	Transportation Ministry	$0	$0	$2,915	$2,915
Roll No. 4-51-226 - Plan 13 S Pt Lot 17 RP 25R411 Part 1	7.75	3.14	Environment And Energy Ministry	$0	$0	$47	$47
Roll No. 4-51-309- Plan 13 Blk B Pt Lot 5 RP 25R2928 Pt 4	1.27	0.51	Transportation Ministry	$0	$0	$23	$23
Roll No. 4-51-288- Con 3 E Pt Lot 16 (Roll No.	0.55	0.22	Transportation Ministry	$0	$0	$10	$10
Roll No. 4-51-309- Con 3 Pt Lot 16	3.21	1.30	Transportation Ministry	$0	$0	$20	$20
Roll No. 4-51-313	0.55	0.22	Transportation Ministry	$0	$0	$10	$10
Total on Ontario Lands.....				$0	$0	$3,025	$3,025

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Roll No. 4-50-251- Plan 134 Pt Blk 170 Pt Closed Gas St	0.90	0.36	City of Sarnia	$0	$0	$16	$16
Roll No. 4-51-256- Plan 13 Blk B Pt Lt 4 RP25R2376 Pt 3	1.58	0.64	City of Sarnia	$0	$0	$29	$29
Roll No. 4-49-352 - Plan 122 Range 3 Pt Lot 11 T/W ROW	31.84	12.89	City of Sarnia	$0	$0	$584	$584
Roll No. 4-49-390 - Plan 194 Lot 1 To 26 Plan 155 Lot 1 To 38 Plan 134 Blk 5 Plan 192 Pt Lot 1 Pt Lot 39 Plan 122	26.30	10.64	City of Sarnia	$0	$0	$482	$482
Scott Road	16.20	6.56	City of Sarnia	$0	$0	$496	$496
St. Andrew Street	4.78	1.93	City of Sarnia	$0	$0	$146	$146
Vidal Street	14.21	5.75	City of Sarnia	$0	$0	$434	$434
Imperial Ave	0.26	0.11	City of Sarnia	$0	$0	$8	$8
Kenny Street	3.00	1.21	City of Sarnia	$0	$0	$91	$91
Tashmoo Ave	7.03	2.84	City of Sarnia	$0	$0	$215	$215
Huron Boulevard	3.64	1.47	City of Sarnia	$0	$0	$111	$111
Indian Road S	26.56	10.75	City of Sarnia	$0	$0	$812	$812
McGregor Side Road S	10.93	4.42	City of Sarnia	$0	$0	$334	$334
McGregor Side Road N	2.37	0.96	City of Sarnia	$0	$0	$73	$73
Gladwish Drive	9.42	3.81	City of Sarnia	$0	$0	$288	$288
Plank Road	18.19	7.36	City of Sarnia	$0	$0	$556	$556
Plank Road (County Road 20)	18.44	7.46	County of Lambton	$0	$0	$564	$564
Bill Boulevard	1.43	0.58	City of Sarnia	$0	$0	$44	$44
Duff Drive	1.39	0.56	City of Sarnia	$0	$0	$42	$42
Atkin Ave	0.41	0.17	City of Sarnia	$0	$0	$13	$13
Churchill Line	1.50	0.61	County of Lambton	$0	$0	$46	$46
Union Street	0.82	0.33	City of Sarnia	$0	$0	$25	$25
Kimball Road	7.79	3.15	County of Lambton	$0	$0	$238	$238
William Drive	9.00	3.64	County of Lambton	$0	$0	$275	$275
Roll No. 4-51-111	1.75	0.71	County of Lambton	$0	$0	$54	$54
Total on Municipal Lands.....				$0	$0	$5,976	$5,976

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 49-332		Plan 237 Plan 3 to 5 Hydro Annette Lane Pt, Plan 261 Lot 1-L19 Plan 156 Lot 1-L19 Plan 156	13.54	5.48	St Marys Cement Inc, Attn: Lisa Baldi, Exec Assistant	$0	$0	$248	$248

Description		Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 49-345-01	Plan 122 Range 2 Pt Lts 10 & 11	117.02	47.36	Imperial Oil Limited	$0	$0	$487	$487
4- 49-346	Plan 122 Range 2 Pt Lots 8, 9 & 10	189.02	76.49	Imperial Oil Limited	$0	$0	$740	$740
4- 49-348	Plan 122 Range 3 Lt 9 Pt Lt 8 Pt Lt 10	193.74	78.40	Imperial Oil Limited	$0	$0	$699	$699
4- 49-349	Plan 122 Range 3 Pt Lot 10	9.45	3.82	Owens Corning Canada Gp I	$0	$0	$58	$58
4- 49-350	RCP 725 Pt Lot 16 Plan 122 RG3 Pt Lots 10 & 11, RP 25R7543 Pts 1 &2	48.05	19.45	Dow Chemical Canada Ulc	$0	$0	$294	$294
4- 49-351	RCP 725 Lt 16 RP 25R5727 Pt 12 & PL 122 RGS 2 & 3 Pt Lts 10 & 11 RP 25R7034 Pts 1, 2 &3 RP 25R7412 Pt 1	34.36	13.90	Lanxess Inc	$0	$0	$210	$210
4- 49-353	Plan 122 Range 2 To 3 Lot 12 Pt Lot 13	37.33	15.11	Imperial Oil Limited	$0	$0	$685	$685
4- 49-374	Plan 157 Lot 8	0.09	0.04	Aluma Systems Inc	$0	$0	$2	$2
4- 49-375	Plan 157 Lot 9 Pt Lots 6 To 7 Pt Lots 10 To 12 RP 25R3187 Part 8	0.33	0.13	Matthews Equipment Limited, c/o Hertz Corporation	$0	$0	$6	$6
4- 49-379	Plan 238 Lot 11 To 13 Pt Lane & Plan 157 Pt Lot 1	0.17	0.07	Union Gas Limited, Property Tax Dept	$0	$0	$3	$3
4- 49-380	Plan 238 Pt Plan 157 & Lane RP 25R3187 Pts 1 to 7	1.87	0.76	Matthews Equipment Limited, c/o Hertz Corporation	$0	$0	$34	$34
4- 49-392	Plan 134 Pt St Clair St Plan 192 Lot 34 Pt Lots 5 to 9, 32, 33 & 35	0.43	0.17	Phoenix Safety & Rescue L	$0	$0	$8	$8
4- 49-394	Plan 122 Range 4 Pt Lot 12 Plan 134 Pt St Clair St Plan 192 Lots 21 To 30 Pt Lots 9 To 20 31 32	6.11	2.47	Phoenix Safety & Rescue L	$0	$0	$112	$112
4- 49-395-01	Plan 122 Range 4 Pt Lot 11	2.09	0.85	Imperial Oil Limited	$0	$0	$39	$39
4- 49-395-02	Products Pipeline	0.33	0.13	Imperial Oil Limited	$0	$0	$6	$6
4- 49-396	Plan 122 Range 4 Lot 11 To Pt Lot 12	40.85	16.53	Imperial Oil Limited	$0	$0	$749	$749
4- 49-400	Plan 122 Rngs 4&5 Pt Lots 10 11,12 Plan 192 Lot 38&Blk A& Pt Lots 1,2,39Pt St Clair St	215.68	87.28	Imperial Oil Limited	$0	$0	$1,016	$1,016
4- 49-400-01	Plan 134 Pt Lots 70 To 73 101 To 104 Pt Sombra Ave Pt Bloor Ave Pt Limerick Ave Pt Adelaide	18.33	7.42	Imperial Oil Limited	$0	$0	$336	$336
4- 49-400-02	Plan 134 Pt Lots 73 To 75 99 To 101 Pt Wilton Ave Pt McKinley Ave Pt Warner St RP 25R7699 Parts	14.01	5.67	Imperial Oil Limited	$0	$0	$257	$257
4- 49-402	Plan 122 Range 5 Pt Lot 11 Pt Lot 12	3.49	1.41	Imperial Oil Limited	$0	$0	$64	$64
4- 49-403	Plan 134 Pt Blk 23 & Pt Lane Plan 193 Lt 12&Pt Lts 8,9,11 &Pt Clifford St RP25R2234 Pt 1	0.64	0.26	Aluma Systems Inc	$0	$0	$12	$12
4- 49-404	Plan 134 Pt Blk 23 Plan 194 Pt Lts 1 To 8 Pt Being RP 25R7686 Part 3	1.27	0.51	Imperial Oil Limited	$0	$0	$23	$23
4- 49-406	Plan 240 Lot 16 to Lot 25 Pt Lane	0.51	0.21	829814 Ontario Inc 829815 Ontario Inc, c/o Timothy J Mc Carthy	$0	$0	$10	$10

Description		Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 49-407	Plan 240 Lots 3 To 15 Pt Lots 1 & 2 & Pt Lane RP 25R5241 Part 2	0.68	0.28	Mc Intosh Mechanical Inc	$0	$0	$13	$13
4- 49-408	PL 160 Lots 1-10 PL 195 Lots 1-26 PL 241 Pt Lots 1-7 PL 242 Lots 3-Pt 6 PL 134 Pt 18 & Streets	6.56	2.65	Aluma Systems Inc	$0	$0	$120	$120
4- 50-006	Plan 122 Range River Pt Lots 36 To 44 & Water Lot	6.76	2.74	Imperial Oil Limited	$0	$0	$124	$124
4- 50-007-02	Plan 122 Range R Pt Lot 37 Pt Lot 38	2.04	0.83	Praxair Canada Inc, Attn: Realty Services	$0	$0	$38	$38
4- 50-008	Reg Comp Plan 725 Pt Lots 3 And 4 RP 25R8485 Parts 2 To 12 17 To 20 And 29 To 32 17 To 20 & 29	12.90	5.22	H C Starck Canada Inc	$0	$0	$237	$237
4- 50-008-10	Reg Comp Plan 725 Pt Lot 4 RP 25R5727 Part 3 EXC RP 25R5997 Part 1	18.94	7.66	Styrolution Canada Ltd.	$0	$0	$347	$347
4- 50-161	Plan 122 Range 6 Pt Lot 6 Range 7 Pt Gore Lot C RP 25R8638 Pt 2-7,24,43-97	15.24	6.17	Suncor Energy Products Inc, Taxation Department	$0	$0	$47	$47
4- 50-180	Plan 122 Range 6 Pt Lot 7 RP 25R8638 Part 1,8-23,25-41	63.78	25.81	Suncor Energy Products Inc, Taxation Department	$0	$0	$195	$195
4- 50-198	Plan 122 Range 4 Pt Lot 6	9.58	3.88	1863828 Ontario Ltd	$0	$0	$176	$176
4- 50-244	Plan 134 Pt Lot 83 Pt Quebec St Closed RP 25R4181 Parts 1, 3 & 6	1.02	0.41	1974362 Ontario Ltd.	$0	$0	$19	$19
4- 50-244-01	Plan 134 Pt Lot 84 Pt Quebec St RP 25R4181 Parts 2,4,5,7 EXC RP 25R6852 Pts 1 & 2	1.35	0.55	Istvan S. Feher	$0	$0	$25	$25
4- 50-245	Plan 134 Pt Lot 84 & Pt Quebec St RP 25R1573 Part 2 RP 25R6852 Pt 1 & Pt 2	1.91	0.77	Matrix Service Inc	$0	$0	$35	$35
4- 50-246	Reg Comp Plan 725 Lot 15 RP 25R5727 Part 11	2.53	1.02	Lanxess Inc.	$0	$0	$46	$46
4- 50-247	Plan 134 Blk 85 Pt Closed Warner St	1.26	0.51	Acier Gendron Ltee	$0	$0	$23	$23
4- 50-247-01	Plan 134 Blk 88 Pt Closed Warner St	1.19	0.48	WHM Enterprises (Sarnia) Ltd	$0	$0	$22	$22
4- 50-248	Plan 134 Pt Blk 88,89,167, 168 Pt Ottawa,Murray, Park St	12.83	5.19	1919443 Ontario Ltd.	$0	$0	$235	$235
4- 50-248-04	Plan 134 Pt Blk 167 To 168 Pt Park St	2.85	1.15	Veolia ES Canada Industries	$0	$0	$52	$52
4- 50-248-05	Plan 134 Pt Blks 167 To 169 Pt Closed Kent & Murray Sts RP 25R3606 Parts 1 & 2	1.90	0.77	Total Support Services Ltd	$0	$0	$35	$35
4- 50-248-06	Plan 134 Pt Lot 169 RP 25R5702 Part 2	2.62	1.06	ZBR Investments (Sarnia) Ltd	$0	$0	$48	$48
4- 50-248-07	Plan 134 Pt Lots 170 & 171 Pt Perch St, Petrolia St & Gas St RP 25R5702 Part 1	1.31	0.53	1272054 Ontario Limited, c/o Wayne Brandon	$0	$0	$24	$24
4- 50-249	Plan 134 Pt Lot 170 Pt Lot 171 Pt Gas St Pt Peach St RP 25R3700 Part 1	1.19	0.48	1684616 Ontario Limited, Ayerco	$0	$0	$22	$22

Description			Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-253		Plan 134 Pt Lot 171 Pt Gas St Pt Perch St And RP 25R482 Part 3 RP 25R7511 Pt 2	1.68	0.68	7794703 Canada Inc	$0	$0	$31	$31
4- 50-255		Plan 134 Pt Mitton St	0.24	0.10	Bluewater Power Distribution Corporation	$0	$0	$5	$5
4- 50-296		Plan 149 Plan 150 Plan 170 Plan 198 Plan 199 Plan 232 Plan 134 Pt Blk 99 To 104	32.69	13.23	VIP Rail ULC	$0	$0	$600	$600
4- 50-297		Reg Comp Plan 725 Lot 6 RP 25R5727 Part 4	0.48	0.19	Lanxess Inc	$0	$0	$9	$9
4- 50-298		Plan 134 Pt Blk 106 Pt Boyd St Pt Tashmoo Ave Pt Sombra Ave Pt Lane And Plan 144 Lot 1	2.42	0.98	1777745 Ontario Limited	$0	$0	$44	$44
4- 50-299		Plan 122 Range 5 Lot 10 To Pt Lot 12	3.16	1.28	Imperial Oil Limited	$0	$0	$58	$58
4- 50-317		PL 134 Blk 107A 126-130 PL 135 Lts 1-7 PL 136 Lts 1-4 & 23-26 PL 516 Lt 1 Pt Sts RP 25R4644 Pt 1 25R 7410	24.98	10.11	Cabot Canada Limited	$0	$0	$458	$458
4- 50-336		Reg Comp Plan 725 Lots 7 & 8 RP 25R5727 Part 5 Part 6	30.53	12.36	Lanxess Inc	$0	$0	$560	$560
4- 50-427		Reg Comp PL 725 Lt 11 Pt Lt 10 RP 25R6556 Parts 1-6 RP 25R 8237 Parts 1-2	1.33	0.54	United Rentals Of Canada Inc, c/o Fischer & Company-Uri	$0	$0	$24	$24
4- 50-453		Reg Comp Plan 725 Lot 10 RP 25R5727 Part 7 EXC RP 25R6556 Parts 1 To 4 EXC RP 25R8237 Parts 1	43.03	17.41	Lanxess Inc	$0	$0	$789	$789
4- 50-466		Plan 136 Lots 25 And 26 Pt Lots 1 2 3 23 And 24 Pt McKinley Ave RCP 725 Pt Lot 14 RP 25R6825 Parts	73.52	29.75	Lanxess Inc	$0	$0	$1,349	$1,349
4- 50-467		RCP 725 Pt Lots 13 And 14 RP 25R6825 Parts 1 31 And 32 RP 25R6121 Pt Parts 8 and 10	19.36	7.83	Styrolution Canada Ltd.	$0	$0	$355	$355
4- 50-468		RCP 725 Pt Lots 13 And 14 RP 25R5727 Part 9 RP 25R6825 Parts 2 33 & 34 6825 Parts 2,33,34	34.53	13.97	Styrolution Canada Ltd.	$0	$0	$633	$633
4- 50-469		RCP 725 Pt Lots 13 And 14 Pt Huron Blvd RP 25R5727 Part 10 RP 25R6825 Parts 27, 30 & 35	126.88	51.35	Lanxess Inc	$0	$0	$2,328	$2,328
4- 50-888		Reg Comp Plan 725 Lot 1 Pt Lots 3 And 4 RP 25R6118 Pts 1 To 42 48 To 50 52 To 58 61 See NTE	12.36	5.00	Arlanxeo Canada Inc.	$0	$0	$227	$227
4- 50-888-50		Reg Comp Plan 725	11.24	4.55	LCY Biosciences	$0	$0	$206	$206
4- 51-171	3	Pt Lot 16 RP 25R1658 Part 2 With EXC	12.48	5.05	Plains Midstream Canada U	$0	$0	$229	$229
4- 51-176	3	Pt Lot 16 RP 25R8746 Part 3	5.04	2.04	101073169 Ontario Limited	$0	$0	$92	$92
4- 51-176-30	3	Pt Lot 16 RP 25R8554 Part 3	2.14	0.87	2654583 Ontario Ltd.	$0	$0	$39	$39

Description			Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-176-50	3	Pt Lot 16 RP 25R8746 Part 1	7.44	3.01	Capuchye Management Limit	$0	$0	$136	$136
4- 51-177-14	3	Pt Lot 16 RP 25R8280 Part 2	0.91	0.37	Jenron Holdings Ltd	$0	$0	$17	$17
4- 51-177-15	3	Part Lot 16 RP 25R8280 Part 1	0.89	0.36	Modig Properties Inc	$0	$0	$16	$16
4- 51-187	3	Pt Lot 16 RP 25R5224 Part 1 EXC RP 25R7789 Part 1 EXC RP 25R7789 Part 1	1.97	0.80	9056297 Canada Inc.	$0	$0	$36	$36
4- 51-187-02	3	Pt Lot 16 Plan 753 Blks 5 & 10	1.14	0.46	876652 Ontario Limited	$0	$0	$21	$21
4- 51-188	3	SPt Lot 16 RP 25R4574 Part 2 EXC RP 25R7789 Part 2 EXC RP 25R7789 Part 2	0.92	0.37	876652 Ontario Limited	$0	$0	$17	$17
4- 51-188-01		Plan 753 Pt Blks 1 & 6 RP 25R8010 Parts 1 & 2	1.54	0.62	Helmut Sauerbeck c/o Montvest Realty Ltd	$0	$0	$28	$28
4- 51-188-10	3	Part Lot 16 Plan 753 Blks 1 & 6	3.99	1.61	Jenron Holdings Ltd	$0	$0	$73	$73
4- 51-188-15		Plan 753 Pt Blks 3 & 8 RP 25R7863 Pt 1	3.14	1.27	Blattner Investments Inc	$0	$0	$58	$58
4- 51-188-20		Plan 753 Blks 3 & 8 EXC RP 25R7863 Part 1 EXC RP 25R8076 Part 1 S/T Easement	2.76	1.12	1016746 Ontario Limited, O/A J D Lawn Service	$0	$0	$51	$51
4- 51-188-25		Plan 753 Part Blks 3 & 8 RP 25R8076 Part 1 S/T Ease.	0.74	0.30	1016746 Ontario Limited	$0	$0	$14	$14
4- 51-188-80		Plan 753 Pt Blks 2 And 7 RP 25R8516 Parts 1 And 2 RP 25R8702 Pts 1 & 2	0.69	0.28	JHARC Holdings Inc.	$0	$0	$13	$13
4- 51-189	3	S Pt Lot 16 RP 25R1128 Part 1	3.11	1.26	Kel-Gor Limited	$0	$0	$57	$57
4- 51-190	3	S Pt Lot 16	1.67	0.68	Kel-Gor Limited	$0	$0	$31	$31
4- 51-191	3	S Pt Lot 16	2.11	0.85	Marcotte Disposal Inc	$0	$0	$39	$39
4- 51-192	3	Pt Lot 17 RP 25R5580 Part 1	1.99	0.81	Lindross Holdings (Sarnia) Limited	$0	$0	$37	$37
4- 51-193	3	Pt Lot 16 RP 25R7157 Part 1	3.64	1.47	Gregmill Investments Ltd	$0	$0	$67	$67
4- 51-201		Plan 13 Blk B Pt Lot 4 Pt Lot 10	4.14	1.68	Dorothy A. McElhone	$0	$0	$76	$76
4- 51-202		Plan 13 Blk B Pt Lot 10 RP 25R4911 Pt 1	0.67	0.27	At-Tec Heavy Equipment Ltd	$0	$0	$12	$12
4- 51-203		Plan 13 Blk B Pt Lots 9 And 10 RP 25R8475 Part 2 and Pt Part 1	9.69	3.92	Superior Tire Services Sarnia Inc	$0	$0	$178	$178
4- 51-203-50		Plan 13 Blk B Pt Lot 10 RP 25R8801 Pt 1	2.50	1.01	Tek Holdings Limited	$0	$0	$46	$46
4- 51-204		Plan 13 Blk B W Pt Lot 9 E Pt Lot 10	1.45	0.59	1863960 Ontario Inc	$0	$0	$27	$27
4- 51-205		Plan 13 Blk B Pt Lot 9 Pt Lot 10	2.81	1.14	1863960 Ontario Inc	$0	$0	$52	$52
4- 51-206		Plan 13 Blk B Pt Lot 9 Pt Lot 10 RP 25R5620 Part 1 RP 25R5620 Pt 1	5.74	2.32	Huron Alloys Incorporated	$0	$0	$105	$105
4- 51-207		Plan 13 Blk B Lot 7 Pt Lots 8&9 Con 3 Pt Lots 16&17 RP 25R1658 Pt 1 RP 25R3255 Pts 1 to 8	288.43	116.72	Plains Midstream Canada U	$0	$0	$2,787	$2,787
4- 51-207-01		Plan 13 Part Lot 8 Blk B RP 25R7049 Part 7 T/W Ease. Over RP25R7049 Parts 1 to 3	0.46	0.19	Union Gas Limited, Property Tax Dept	$0	$0	$9	$9
4- 51-210		Plan 13 Lot A Pt Lot 11 RP 25R3578 Pt Part 4	4.25	1.72	Lenie N. Severin	$0	$0	$78	$78

Description		Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-211	Plan 13 Pt Lot 11 RP 25R3578 Part 3 RP 25R4129 Part 1 RP 25R5854 Part 1 RP 25R7483	4.53	1.83	CMM Properties Inc	$0	$0	$83	$83
4- 51-212	Plan 13 Blk A Pt Lots 5 & 11 RP 25R3578 Part 2	1.58	0.64	Sandercock Construction Limited, c/o Marjorie Sandercock	$0	$0	$29	$29
4- 51-213	Plan 13 Pt Lots 5 & 11 RP 25R3578 Pt 1	2.96	1.20	Lambton Hot Mix Ltd	$0	$0	$54	$54
4- 51-220	Plan 13 Blk B S Pt Lot 11 N Pt Lot 17 Lot A RP 25R8474 Parts 1 & 4	122.21	49.46	Enbridge Pipelines Inc, c/o Property Tax Manager	$0	$0	$747	$747
4- 51-220-10	Plan 13 Pt Blk 3 and Pt Lot 17 RP 25R8474 Pts 2 & 3	5.23	2.12	1432334 Ontario Inc T/A Preferred Towing	$0	$0	$96	$96
4- 51-223	Plan 13 Blk B Pt Lot 16 Pt Lot 17	106.45	43.08	Imperial Oil Limited	$0	$0	$553	$553
4- 51-224	Plan 13 Blk B Pt Lot 17 RP 25R4582 Parts 1,3,4 & 5	5.00	2.02	Marcus Terminals Inc, c/o Harold Marcus Ltd	$0	$0	$92	$92
4- 51-225	Plan 13 Blk B Pt Lot 17 RP 25R4582 Part 2	0.34	0.14	Imperial Oil Limited	$0	$0	$6	$6
4- 51-235	Plan 13 Blk B Pt Lot 9	2.90	1.17	Sarnia Auto Wreckers Ltd	$0	$0	$53	$53
4- 51-236	Plan 13 Blk B Pt Lots 9 And 10 RP 25R2677 Part 1 RP 25R4513 Pt 1	9.40	3.80	Lamsar Inc	$0	$0	$172	$172
4- 51-238	Plan 13 Blk B Pt Lots 9 & 10 RP 25R2728 Pts 1 to 3	5.52	2.23	612031 Ontario Ltd	$0	$0	$101	$101
4- 51-239	Blk B Plan 13 Pt Lot 9 Pt Lot 10 RP 25R2728 Part 4	0.36	0.15	376964 Ontario Ltd/612031 Ontario Ltd, Trijan Industries	$0	$0	$7	$7
4- 51-240	Plan 13 Blk B Pt Lot 9 Pt Lot 10 RP 25R5026 Part 1	4.08	1.65	3769694 Ontario Limited	$0	$0	$75	$75
4- 51-241	Plan 13 Blk B Part Lot 10	1.44	0.58	Richard C. Perdeaux	$0	$0	$26	$26
4- 51-242	Plan 13 Blk B Pt Lot 10	11.35	4.59	Plank Road Auto Wreckers Ltd	$0	$0	$208	$208
4- 51-242-01	Plan 13 Blk B Pt Lot 10	1.22	0.49	John R. Bernhardt	$0	$0	$22	$22
4- 51-244	Plan 13 Blk B Pt Lot 10	1.01	0.41	Paul J. Babcock, c/o Babcock & Sons Welding	$0	$0	$19	$19
4- 51-245	Plan 13 Blk B Pt Lot 10 RP 25R9320 Parts 1 & 3	2.24	0.91	1230868 Ontario Limited, c/o Paul J Babcock Jr	$0	$0	$41	$41
4- 51-246	Plan 13 Blk B Pt Lots 4 And 10 And RP 25R5694 Parts 1 And 2 RP 25R9320 Parts 2 &4	2.22	0.90	Bouma, Gordon	$0	$0	$41	$41
4- 51-247	Plan 13 Block B Pt Lot 4 RP 25R8306 Pts 3 4 & 7 To 13 S/S Plank Rd	19.29	7.81	Plank Road Transfer Inc	$0	$0	$354	$354
4- 51-247-01	Plan 13 Blk B Pt Lot 4 RP 25R8306 Pts 1 & 2 S/S Plank Rd	2.54	1.03	Acklands-Grainger Inc	$0	$0	$47	$47
4- 51-247-15	Plan 13 Blk B Pt Lot 4 RP 25R8306 Pts 5 & 6	3.51	1.42	Barnim Property Holdings	$0	$0	$64	$64
4- 51-248 3	Pt Lot 17 RP 25R7059 Part 3 Part 4	9.93	4.02	Franco Vozza	$0	$0	$182	$182
4- 51-250	Plan 13 Blk B Pt Lot 5 RP 25R5598 Pt1	10.69	4.33	Mario & Antonio B. DeCarolis	$0	$0	$196	$196
4- 51-251	Plan 13 Blk B Pt Lot 5 RP 25R5991 Pt 2	1.21	0.49	451547 Ontario Limited	$0	$0	$22	$22
4- 51-251-01	Plan 13 Blk B Part Lot 5 RP 25R5991 Part 1	1.01	0.41	Lambton Construction Company Limited, c/o Antoine Van Crey	$0	$0	$19	$19
4- 51-252	Plan 13 Blk B N Pt Lot 5 RP 25R2835 Part 1	2.40	0.97	Lambton Woodworks Division Of Lambton	$0	$0	$44	$44

Description			Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-253		Plan 13 Blk B Pt Lots 4 And 5 RP 25R5822 Parts 1 And 2 And RP 25R9093 Part 2	5.51	2.23	Seven Star Investments Inc.	$0	$0	$101	$101
4- 51-253-10		Plan 13 Blk B Pt Lot 4 RP 25R5822 Pt 3	1.70	0.69	Duo Ray Ltd	$0	$0	$31	$31
4- 51-254		Plan 13 Blk B Pt Lot 4 RP 25R3150 Pt 1	1.78	0.72	Duo Ray Ltd	$0	$0	$33	$33
4- 51-255		Plan 13 Blk B Pt Lot 4 RP 25R8734 Pt 1	4.88	1.97	Duo Ray Ltd	$0	$0	$89	$89
4- 51-257		Plan 13 Blk B Pt Lots 4 And 5 RP 25R8734 Part 2 RP 25R9093 Parts 3 To 7 RP 25R8312 Parts 1, 3 & 4	39.75	16.09	1109606 Ontario Ltd	$0	$0	$729	$729
4- 51-258		Plan 13 Blk B Pt Lot 4 RP 25R5490 Pt 1	4.70	1.90	748104 Ontario Ltd	$0	$0	$86	$86
4- 51-260		Plan 13 Blk B Pt Lot 4 Pt Lot 10 Pt Being RP 25R3489 Part 2	2.50	1.01	Guy J. & Susanne Levesque	$0	$0	$46	$46
4- 51-261		Plan 13 Blk B Pt Lot 10	0.96	0.39	Susane Levesque	$0	$0	$18	$18
4- 51-262		Plan 13 Blk B Pt Lot 10	0.89	0.36	Edward A. Young	$0	$0	$16	$16
4- 51-263		Plan 13 Blk B Pt Lot 10	2.00	0.81	Richard R. Larochelle	$0	$0	$37	$37
4- 51-264		Plan 13 Blk B Pt Lot 10	3.00	1.21	PD Properties & Rentals Inc.	$0	$0	$55	$55
4- 51-265		Plan 13 Blk B Pt Lot 10 RP 25R3365 Part 1	12.03	4.87	1109662 Ontario Ltd	$0	$0	$221	$221
4- 51-266		Plan 13 Blk B Pt Lot 10	1.88	0.76	629260 Ontario Limited 1777705 Ontario Inc	$0	$0	$34	$34
4- 51-267		Plan 13 Blk B Pt Lot 10	0.75	0.30	Duo Ray Ltd	$0	$0	$14	$14
4- 51-268		Plan 13 Blk B Pt Lot 10	0.76	0.31	469135 Ontario Limited	$0	$0	$14	$14
4- 51-269		Plan 13 Blk B N Pt Lot 9 S Pt Lot 10	2.00	0.81	469135 Ontario Limited	$0	$0	$37	$37
4- 51-270		Plan 13 Blk B Pt Lot 9	2.00	0.81	2448514 Ontario Inc.	$0	$0	$37	$37
4- 51-271		Plan 13 Blk B Pt Lot 9	1.00	0.40	2274916 Ontario Inc	$0	$0	$18	$18
4- 51-272		Plan 13 Blk B S Pt Lot 9	1.30	0.53	John Healey Care Trustee	$0	$0	$24	$24
4- 51-273		Plan 13 Blk B Pt Lot 9	1.00	0.40	Dean R. Williams	$0	$0	$18	$18
4- 51-274		Plan 13 Blk B Pt Lot 9	1.00	0.40	Jeffery P. Williams	$0	$0	$18	$18
4- 51-275		Plan 13 Blk B Pt Lot 9	3.00	1.21	Dean R. Williams	$0	$0	$55	$55
4- 51-276	3	Plan 13 Blk B Pt Lot 9 Pt Lot 9	2.47	1.00	Jeffery P. Williams	$0	$0	$45	$45
4- 51-277	3	Plan 13 Blk B Pt Lot 9 Pt Lot 9	0.57	0.23	Dean R. Williams	$0	$0	$10	$10
4- 51-278		Plan 13 Blk B Pt Lot 9	2.00	0.81	Lamsar Inc, c/o 608 Mc Gregor Sd Rd	$0	$0	$37	$37
4- 51-286		Plan 13 Blk B S Pt Lot 5	1.86	0.75	1565685 Ontario Limited	$0	$0	$34	$34
4- 51-287		Plan 13 Blk B S Pt Lot 5	5.33	2.16	Harold Marcus Limited	$0	$0	$98	$98
4- 51-289		Plan 13 Blk B S Pt Lot 5 EXC RP 25R2928 Part 4	2.72	1.10	1830370 Ontario Inc	$0	$0	$50	$50
4- 51-290		Plan 13 Blk B Pt Lot 5 EXC RP 25R1605 Part 7 Part 8	35.19	14.24	Curran & Herridge Construction Company Limited	$0	$0	$215	$215
4- 51-292		Plan 13 Blk B S Pt Lot 5 EXC RP 25R1605 Part 6	1.17	0.47	Imperial Roofing (Sarnia) Ltd	$0	$0	$21	$21
4- 51-293	3	Pt Lot 17 RP 25R7059 Part 5 & Part 6	5.47	2.21	Calanit Inc, c/o Morris Lindenbaum	$0	$0	$100	$100
4- 51-295	3	Pt Lot 17 RP 25R7059 Part 1 Part 2 EXC RP 25R7793 Part 1	6.86	2.78	Bruce A Bond Petroleum Ltd	$0	$0	$126	$126
4- 51-295-05	3	Pt Lot 17 RP 25R7793 Part 1	2.60	1.05	Delcor Seaway Inc, c/o Cordell Kendel	$0	$0	$48	$48
4- 51-296	3	Pt Lot 16 RP 25R1214 Pts 1 & 6	2.00	0.81	Kel-Gor Limited, c/o St Clair Valve	$0	$0	$37	$37

Description			Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-298	3	Pt Lot 16 RP 25R1214 Pts 2 to 5	3.35	1.36	Kel-Gor Limited	$0	$0	$62	$62
4- 51-299	3	Pt Lot 16 RP25R5650 Part 1 Part 12 RP 25R6036 Pts 3 To 11 Pt 15 Pt 16 S/T	6.83	2.76	Kel-Gor Limited	$0	$0	$125	$125
4- 51-300	3	Pt Lot 16 RP 25R6036 Parts 1, 2 & 17	1.15	0.47	D S Ashman Industries Inc	$0	$0	$21	$21
4- 51-302	3	Pt Lots 16 And 17 And RP 25R1485 Part 1	12.47	5.05	Jenron Holdings Ltd.	$0	$0	$229	$229
4- 51-310	3	E Pt Lot 16	1.05	0.42	Randy G. & Patricia J. Varsava T/A Varsava Trailers	$0	$0	$19	$19
4- 51-311	3	Pt Lot 16	0.50	0.20	Gerald M. Mcauley	$0	$0	$9	$9
4- 51-312	3	Pt Lot 16	0.41	0.17	Gerald M. Mcauley	$0	$0	$8	$8
4- 51-321		Plan 13 Blk A Pt Lot 15 RP 25R2953 Part 1 to Part 12	32.16	13.01	Air Products Canada Ltd	$0	$0	$590	$590
4- 51-323		Plan 13 Blk A Pt Lot 15	20.79	8.41	Transco Recycling Inc	$0	$0	$381	$381
4- 51-324		Plan 13 Blk A Pt Lot 15 RP 25R5223 Part 7 to 11	9.92	4.01	408980 Ontario Ltd, c/o Tony Savo	$0	$0	$182	$182
4- 51-325		Plan 13 Blk A Pt Lot 15 RP 25R5223 Parts 1 to 6	4.13	1.67	852129 Ontario Limited, c/o Lambton Metal	$0	$0	$76	$76
4- 51-340		Plan 13 Blk A Pt Lot 6 RP 25R8484 Parts 1 to 8 &12	4.26	1.72	876652 Ontario Ltd	$0	$0	$78	$78
4- 51-340-50		Plan 13 Blk A Pt Lot 6 RP 25R8484 Pt 9	5.35	2.17	121 Duff Drive Inc	$0	$0	$98	$98
4- 51-341		Plan 13 Blk A Part Lot 6 RP 25R8073 Part 1	13.21	5.35	Mac Pump Developments Ltd	$0	$0	$243	$243
4- 51-341-01		Plan 13 Blk A Part Lot 6 RP 25R8073 Part 2	1.14	0.46	2506612 Ontario Ltd.	$0	$0	$21	$21
4- 51-344	2	W Pt Lot 16	1.00	0.40	Randolf A. Elviage	$0	$0	$18	$18
4- 51-345	2	W Pt Lot 16	1.00	0.40	Sarnia Plumbing And Mecha	$0	$0	$18	$18
4- 51-346	2	E Pt Lot 16	0.62	0.25	Auke & Denise Zylstra	$0	$0	$11	$11
4- 51-353	2	Pt Lot 16 and RP 25R7974 Part 1 RP 25R9924 Pt 1	6.38	2.58	Vandenheuval Auto Sales Ltd.	$0	$0	$117	$117
4- 51-354	2	Pt Lot 16	0.75	0.30	Kukura Construction Limited, K C L Warehouse	$0	$0	$14	$14
4- 51-355	2	Pt Lot 16	0.41	0.17	Vandenheuvel Auto Sales Ltd.	$0	$0	$8	$8
4- 51-356	2	Pt Lot 16	0.40	0.16	Michael W. Kidd	$0	$0	$7	$7
4- 51-357	2	Pt Lot 16 And RP 25R7067 Part 3 RP 25R9934 Pt 1	0.36	0.15	1600850 Ontario Limited	$0	$0	$7	$7
4- 51-512	2	Pt Lot 15	0.35	0.14	Renald I. Joseph & Brenda L. Blyth	$0	$0	$6	$6
4- 51-513	2	Pt Lot 15	0.35	0.14	William K. & Dianne J. Spencer	$0	$0	$6	$6
4- 51-514	2	Pt Lot 15	0.07	0.03	Carol A. O'Reilly	$0	$0	$1	$1
4- 51-561	2	Pt Lot 15	0.84	0.34	2551030 Ontario Inc.	$0	$0	$15	$15
4- 51-606	2	Pt Lot 15 RP 25R4901 Part 1	1.00	0.40	Mills Land Farms Inc, c/o Mr M Darrell Mills	$0	$0	$18	$18
4- 51-607	2	Pt Lot 15	0.47	0.19	Vink Network Cables Inc.	$0	$0	$9	$9
4- 51-608	2	W Pt Lot 15	0.46	0.19	Margaret J. Nyp	$0	$0	$9	$9
Railway		Ref's #2, #8, #10, #21, #36, #176, and #185 on Plan Sheet 1 and 2	291.58	118.00	Canadian National Railway Corp.	$0	$0	$5,349	$5,349
Railway		Ref #186 on Plan Sheet 1	5.06	2.05	Chesapeake and Ohio Railway	$0	$0	$93	$93
4- 49-321		Plan 134 Pt Blk 15	6.87	2.78	Hydro One Networks Inc.	$0	$0	$42	$42

Description		Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-195	Plan 122 Range 2	2.19	0.89	Hydro One Networks Inc.	$0	$0	$7	$7
4- 50-231	Plan 122 Range 2 To 3 Lot 5 to Pt Lot 7	34.98	14.16	Hydro One Networks Inc.	$0	$0	$107	$107
Public Utlity	Ref. #15 on Plan Sheet 1	1.75	0.71	Hydro One Networks Inc.	$0	$0	$11	$11
Public Utlity	Ref. #17 on Plan Sheet 1	1.23	0.50	Hydro One Networks Inc.	$0	$0	$8	$8
Public Utlity	Ref. #18 on Plan Sheet 1	0.22	0.09	Hydro One Networks Inc.	$0	$0	$1	$1
Public Utlity	Ref. #20 on Plan Sheet 1	0.40	0.16	Hydro One Networks Inc.	$0	$0	$2	$2
Public Utlity	Ref. #22 on Plan Sheet 1	1.75	0.71	Hydro One Networks Inc.	$0	$0	$11	$11
Public Utlity	Ref. #24 on Plan Sheet 1	5.12	2.07	Hydro One Networks Inc.	$0	$0	$31	$31
Public Utlity	Ref. #25 on Plan Sheet 1	15.05	6.09	Hydro One Networks Inc.	$0	$0	$92	$92
Public Utlity	Ref. #32 on Plan Sheet 1	0.10	0.04	Hydro One Networks Inc.	$0	$0	$1	$1
Public Utlity	Ref. #53 on Plan Sheet 2	0.22	0.09	Hydro One Networks Inc.	$0	$0	$1	$1
Public Utlity	Ref. #113 on Plan Sheet 2	4.49	1.82	Hydro One Networks Inc.	$0	$0	$28	$28
Public Utlity	Ref. #115 on Plan Sheet 1	4.77	1.93	Hydro One Networks Inc.	$0	$0	$29	$29
Public Utlity	Ref. #121 on Plan Sheet 2	17.10	6.92	Hydro One Networks Inc.	$0	$0	$105	$105
Public Utlity	Ref. #171 on Plan Sheet 2	37.73	15.27	Hydro One Networks Inc.	$0	$0	$231	$231
Public Utlity	Ref. #172 on Plan Sheet 2	14.53	5.88	Hydro One Networks Inc.	$0	$0	$89	$89
Public Utlity	Ref. #173 on Plan Sheet 1	2.20	0.89	Hydro One Networks Inc.	$0	$0	$13	$13
Public Utlity	Ref. #174 on Plan Sheet 1	19.64	7.95	Hydro One Networks Inc.	$0	$0	$120	$120
Total on Privately-Owned - Non-Agricultural Lands.....					$0	$0	$34,780	$34,780

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-249		Plan 13 Blk B Pt Lots 4 & 5 RP 25R9267 Pts 1 & 3	44.62	18.06	1109606 Ontario Limited	$0	$0	$273	$273
4- 51-376			302.97	122.61	DST Farms Inc., and LMH Farms Inc.	$0	$0	$1,853	$1,853
4- 51-546	2	W Pt Lot 13 EXC RP 25R592 Part 1	1.44	0.58	David A. & Joyce E. Crowe	$0	$0	$9	$9
4- 51-559	2	W Pt Lot 14 E Pt Lot 15	45.07	18.24	Lloyd D. & Frances J. King	$0	$0	$276	$276
4- 51-560	2	Pt Lot 15	24.93	10.09	2299107 Ontario Inc	$0	$0	$152	$152
4- 51-568	2	W Pt Lot 15	120.98	48.96	1565670 Ontario Limited	$0	$0	$740	$740
4- 51-570	2	Pt Lot 14	9.89	4.00	Donald A. & Catherine R. Cressman	$0	$0	$60	$60
4- 51-573	2	E Pt Lot 14	9.99	4.04	David H. Payne & Elizabeth J. Parkins	$0	$0	$61	$61
Total on Privately-Owned - Agricultural Lands.....						$0	$0	$3,424	$3,424
TOTAL ASSESSMENT IN THE CITY OF SARNIA.....						**$0**	**$0**	**$47,205**	**$47,205**

	(Acres)	(Ha.)
Total Area (City of Sarnia):	**3,903.87**	**1,579.80**

ST. CLAIR TOWNSHIP

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Kimball Road	7.22	2.92	County of Lambton	$0	$0	$221	$221
Plank Road	1.72	0.70	County of Lambton	$0	$0	$53	$53

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Waubuno Road	1.00	0.40	St. Clair Township	$0	$0	$18	$18
Total on Municipal Lands				$0	$0	$292	$292

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-215	1	Pt. Lot 15 RP25R3796, Pt. 1	2.00	0.81	Julie M. Core	$0	$0	$12	$12
Total on Privately-Owned - Non-Agricultural Lands						$0	$0	$12	$12

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-206	1	E Pt. Lot 13	20.00	8.09	James R. Elliott	$0	$0	$122	$122
4- 50-207	1	W Pt. Lot 13, E Pt Lot 14	96.00	38.85	David A. Jr. & Joyce E. Crowe	$0	$0	$558	$558
4- 50-209	1	W Pt. Lot 13, E Pt Lot 14	44.49	18.00	Charles E. Sands	$0	$0	$272	$272
4- 50-210	1	E Pt. Lot 14	8.05	3.26	Rodney K. Weese	$0	$0	$49	$49
4- 50-211	1	W Pt. Lot 14	66.41	26.88	Wray Enterprises	$0	$0	$382	$382
4- 50-212	1	SE 1/4 Lot 15 exc.RP25R5450, Pt. 1	12.53	5.07	Bruce A. & Kelly T. Bond	$0	$0	$77	$77
4- 50-214	1	W Pt. Lot 15 exc. RP25R3769, Pt. 1	63.68	25.77	Donna M. Fisher	$0	$0	$389	$389
4- 50-216	1	W Pt. Lot 15	50.28	20.35	James Elliott	$0	$0	$307	$307
4- 60-111	1	Lot 16	54.83	22.19	DST Farms Inc./ LMH Farms Inc., Tenants in Common	$0	$0	$335	$335
Total on Privately-Owned - Agricultural Lands						$0	$0	$2,491	$2,491
TOTAL ASSESSMENT IN ST. CLAIR TOWNSHIP						**$0**	**$0**	**$2,795**	**$2,795**

	(Acres)	(Ha.)
Total Area (St. Clair Township):	**428.21**	**173.29**

GRAND TOTAL - SCHEDULE 'C-1' - (BOTH MUNICIPALITIES)				**$0**	**$0**	**$50,000**	**$50,000**

	(Acres)	(Ha.)
Total Area:	**4332.08**	**1753.09**

SCHEDULE 'E-2'
SCHEDULE OF ASSESSMENT FOR FUTURE MAINTENANCE OF ACCESS BRIDGES
COLE DRAIN
RECONSIDERED REPORT

CORPORATION OF THE CITY OF SARNIA

ONTARIO LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Highway 40 (Churchill Rd)	95.47	38.64	Transportation Ministry	$0	$0	$1,362	$1,362
Roll No. 4-51-309- Plan 13 Blk B Pt Lot 5 RP 25R2928 Pt 4	1.27	0.51	Transportation Ministry	$0	$0	$11	$11
Roll No. 4-51-288- Con 3 E Pt Lot 16	0.55	0.22	Transportation Ministry	$0	$0	$5	$5
Roll No. 4-51-309- Con 3 Pt Lot 16	3.21	1.30	Transportation Ministry	$0	$0	$9	$9
Roll No. 4-51-313- Con 3 Pt Lot 16	0.55	0.22	Transportation Ministry	$0	$0	$5	$5
Total on Ontario Lands				$0	$0	$1,392	$1,392

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
McGregor Side Road S	10.93	4.42	City of Sarnia	$0	$0	$156	$156
Gladwish Drive	9.42	3.81	City of Sarnia	$0	$0	$134	$134
Plank Road	18.19	7.36	City of Sarnia	$0	$0	$260	$260
Plank Road (County Road 20)	18.44	7.46	County of Lambton	$0	$0	$263	$263
Bill Boulevard	1.43	0.58	City of Sarnia	$0	$0	$20	$20
Duff Drive	1.39	0.56	City of Sarnia	$0	$0	$20	$20
Atkin Ave	0.41	0.17	City of Sarnia	$0	$0	$6	$6
Churchill Line (County Road 14)	1.50	0.61	County of Lambton	$0	$0	$22	$22
Kimball Road (County Road 31)	7.79	3.15	County of Lambton	$0	$0	$111	$111
Roll No. 51-256- Plan 13 B0lk B Pt Lt 4 RP25R2376 Pt 3	1.58	0.64	City of Sarnia	$0	$0	$23	$23
Roll No. 4-51-511	1.75	0.71	County of Lambton	$0	$0	$25	$25
Total on Municipal Lands				$0	$0	$1,039	$1,039

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-171	3	Pt Lot 16 RP 25R1658 Part 2 With EXC	12.48	5.05	Plains Midstream Canada U	$0	$0	$107	$107
4- 51-176	3	Pt Lot 16 RP 25R8746 Part 3	5.04	2.04	10173169 Canada Limited	$0	$0	$43	$43
4- 51-176-30	3	Pt Lot 16 RP 25R8554 Part 3	2.14	0.87	2654583 Ontario Ltd.	$0	$0	$18	$18
4- 51-176-50	3	Pt Lot 16 RP 25R8746 Part 1	7.44	3.01	Capuchye Management Limit	$0	$0	$64	$64
4- 51-177-14	3	Pt Lot 16 RP 25R8280 Part 2	0.91	0.37	Jenron Holdings Ltd	$0	$0	$8	$8
4- 51-177-15	3	Part Lot 16 RP 25R8280 Part 1	0.89	0.36	Modig Properties Inc	$0	$0	$8	$8
4- 51-187	3	Pt Lot 16 RP 25R5224 Part 1 EXC RP 25R7789 Part 1 EXC RP 25R7789 Part 1	1.97	0.80	9056297 Canada Inc.	$0	$0	$17	$17
4- 51-187-02	3	Pt Lot 16 Plan 753 Blks 5 & 10	1.14	0.46	876652 Ontario Limited	$0	$0	$10	$10

Description			Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-188	3	SPt Lot 16 RP 25R4574 Part 2 EXC RP 25R7789 Part 2 EXC RP 25R7789 Part 2	0.92	0.37	876652 Ontario Limited	$0	$0	$8	$8
4- 51-188-01		Plan 753 Pt Blks 1 & 6 RP 25R8010 Parts 1 & 2	1.54	0.62	Helmut Sauerbeck C/O Montvest Realty Ltd	$0	$0	$13	$13
4- 51-188-10	3	Part Lot 16 Plan 753 Blks 1 & 6	3.99	1.61	Jenron Holdings Ltd	$0	$0	$34	$34
4- 51-188-15		Plan 753 Pt Blks 3 & 8 RP 25R7863 Pt 1	3.14	1.27	Blattner Investments Inc	$0	$0	$27	$27
4- 51-188-20		Plan 753 Blks 3 & 8 EXC RP 25R7863 Part 1 EXC RP 25R8076 Part 1 S/T Easement	2.76	1.12	1016746 Ontario Limited, O/A J D Lawn Service	$0	$0	$24	$24
4- 51-188-25		Plan 753 Part Blks 3 & 8 RP 25R8076 Part 1 S/T Ease.	0.74	0.30	1016746 Ontario Limited	$0	$0	$6	$6
4- 51-188-80		Plan 753 Pt Blks 2 And 7 RP 25R8516 Parts 1 And 2 RP 25R8702 Pts 1 & 2	0.69	0.28	JHARC Holdings Inc.	$0	$0	$6	$6
4- 51-189	3	S Pt Lot 16 RP 25R1128 Part 1	3.11	1.26	Kel-Gor Limited	$0	$0	$27	$27
4- 51-190	3	S Pt Lot 16	1.67	0.68	Kel-Gor Limited	$0	$0	$14	$14
4- 51-191	3	S Pt Lot 16	2.11	0.85	Marcotte Disposal Inc	$0	$0	$18	$18
4- 51-192	3	Pt Lot 17 RP 25R5580 Part 1	1.99	0.81	Lindross Holdings (Sarnia) Limited	$0	$0	$17	$17
4- 51-193	3	Pt Lot 16 RP 25R7157 Part 1	3.64	1.47	Gregmill Investments Ltd	$0	$0	$31	$31
4- 51-201		Plan 13 Blk B Pt Lot 4 Pt Lot 10	4.14	1.68	Dorothy A. Mc Elhone	$0	$0	$36	$36
4- 51-202		Plan 13 Blk B Pt Lot 10 RP 25R4911 Pt 1	0.67	0.27	At-Tec Heavy Equipment Ltd	$0	$0	$6	$6
4- 51-203		Plan 13 Blk B Pt Lots 9 And 10 RP 25R8475 Part 2 and Pt Part 1	9.69	3.92	Superior Tire Services Sarnia Inc	$0	$0	$83	$83
4- 51-203-50		Plan 13 Blk B Pt Lot 10 RP 25R8801 Pt 1	2.50	1.01	Tek Holdings Limited	$0	$0	$21	$21
4- 51-204		Plan 13 Blk B W Pt Lot 9 E Pt Lot 10	1.45	0.59	1863960 Ontario Inc	$0	$0	$12	$12
4- 51-205		Plan 13 Blk B Pt Lot 9 Pt Lot 10	2.81	1.14	1863960 Ontario Inc	$0	$0	$24	$24
4- 51-206		Plan 13 Blk B Pt Lot 9 Pt Lot 10 RP 25R5620 Part 1 RP 25R5620 Pt 1	5.74	2.32	Huron Alloys Incorporated	$0	$0	$49	$49
4- 51-207		Plan 13 Blk B Lot 7 Pt Lots 8&9 Con 3 Pt Lots 16&17 RP 25R1658 Pt 1 RP 25R3255 Pts 1 to 8	150.43	60.88	Plains Midstream Canada U	$0	$0	$335	$335
4- 51-207-01		Plan 13 Part Lot 8 Blk B RP 25R7049 Part 7 T/W Ease. Over RP25R7049 Parts 1 to 3	0.46	0.19	Union Gas Limited, Property Tax Dept	$0	$0	$4	$4
4- 51-210		Plan 13 Lot A Pt Lot 11 RP 25R3578 Pt Part 4	4.25	1.72	Lenie N. Severin	$0	$0	$36	$36
4- 51-211		Plan 13 Pt Lot 11 RP 25R3578 Part 3 RP 25R4129 Part 1 RP 25R5854 Part 1 RP 25R7483	4.53	1.83	CMM Properties Inc	$0	$0	$39	$39

Description		Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-220	Plan 13 Blk B S Pt Lot 11 N Pt Lot 17 Lot A RP 25R8474 Parts 1 & 4	70.00	28.33	Enbridge Pipelines Inc, C/O Property Tax Manager	$0	$0	$200	$200
4- 51-223	Plan 13 Blk B Pt Lot 16 Pt Lot 17	53.00	21.45	Imperial Oil Limited	$0	$0	$98	$98
4- 51-235	Plan 13 Blk B Pt Lot 9	2.90	1.17	Sarnia Auto Wreckers Ltd	$0	$0	$25	$25
4- 51-236	Plan 13 Blk B Pt Lots 9 And 10 RP 25R2677 Part 1 RP 25R4513 Pt 1	9.40	3.80	Lamsar Inc	$0	$0	$80	$80
4- 51-238	Plan 13 Blk B Pt Lots 9 & 10 RP 25R2728 Pts 1 to 3	5.52	2.23	612031 Ontario Ltd	$0	$0	$47	$47
4- 51-239	Blk B Plan 13 Pt Lot 9 Pt Lot 10 RP 25R2728 Part 4	0.36	0.15	376964 Ontario Ltd/612031 Ontario Ltd, Trijan Industries	$0	$0	$3	$3
4- 51-240	Plan 13 Blk B Pt Lot 9 Pt Lot 10 RP 25R5026 Part 1	4.08	1.65	3769694 Ontario Limited	$0	$0	$35	$35
4- 51-241	Plan 13 Blk B Part Lot 10	1.44	0.58	Richard C. Perdeaux	$0	$0	$12	$12
4- 51-242	Plan 13 Blk B Pt Lot 10	11.35	4.59	Plank Road Auto Wreckers Ltd	$0	$0	$97	$97
4- 51-242-01	Plan 13 Blk B Pt Lot 10	1.22	0.49	John R. Bernhardt	$0	$0	$10	$10
4- 51-244	Plan 13 Blk B Pt Lot 10	1.01	0.41	Paul J. Babcock, C/O Babcock & Sons Welding	$0	$0	$9	$9
4- 51-245	Plan 13 Blk B Pt Lot 10 RP 25R9320 Parts 1 & 3	2.32	0.94	1230868 Ontario Limited, c/o Paul J Babcock Jr	$0	$0	$20	$20
4- 51-246	Plan 13 Blk B Pt Lots 4 And 10 And RP 25R5694 Parts 1 And 2 RP 25R9320 Parts 2 &4	2.14	0.87	Gordon Bouma	$0	$0	$18	$18
4- 51-247	Plan 13 Block B Pt Lot 4 RP 25R8306 Pts 3 4 & 7 To 13 S/S Plank Rd	19.29	7.81	Plank Road Transfer Inc	$0	$0	$165	$165
4- 51-247-01	Plan 13 Blk B Pt Lot 4 RP 25R8306 Pts 1 & 2 S/S Plank Rd	2.54	1.03	Acklands-Grainger Inc	$0	$0	$22	$22
4- 51-247-15	Plan 13 Blk B Pt Lot 4 RP 25R8306 Pts 5 & 6	3.51	1.42	Barnim Property Holdings	$0	$0	$30	$30
4- 51-248 3	Pt Lot 17 RP 25R7059 Part 3 Part 4	9.93	4.02	Franco Vozza	$0	$0	$85	$85
4- 51-250	Plan 13 Blk B Pt Lot 5 RP 25R5598 Pt1	10.69	4.33	Mario & Antonio B. DeCarolis	$0	$0	$92	$92
4- 51-251	Plan 13 Blk B Pt Lot 5 RP 25R5991 Pt 2	1.21	0.49	451547 Ontario Limited	$0	$0	$10	$10
4- 51-251-01	Plan 13 Blk B Part Lot 5 RP 25R5991 Part 1	1.01	0.41	Lambton Construction Company Limited, C/O Antoine Van Crey	$0	$0	$9	$9
4- 51-252	Plan 13 Blk B N Pt Lot 5 RP 25R2835 Part 1	2.40	0.97	Lambton Woodworks Division Of Lambton	$0	$0	$21	$21
4- 51-253	Plan 13 Blk B Pt Lots 4 And 5 RP 25R5822 Parts 1 And 2 And RP 25R9093 Part 2	5.51	2.23	Seven Star Investments Inc.	$0	$0	$47	$47
4- 51-253-10	Plan 13 Blk B Pt Lot 4 RP 25R5822 Pt 3	1.70	0.69	Duo Ray Ltd	$0	$0	$15	$15
4- 51-254	Plan 13 Blk B Pt Lot 4 RP 25R3150 Pt 1	1.78	0.72	Duo Ray Ltd	$0	$0	$15	$15

Description			Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-255		Plan 13 Blk B Pt Lot 4 RP 25R8734 Pt 1	4.88	1.97	Duo Ray Ltd	$0	$0	$42	$42
4- 51-257		Plan 13 Blk B Pt Lots 4 And 5 RP 25R8734 Part 2 RP	39.75	16.09	1109606 Ontario Ltd	$0	$0	$340	$340
4- 51-258		Plan 13 Blk B Pt Lot 4 RP 25R5490 Pt 1	4.70	1.90	748104 Ontario Ltd	$0	$0	$40	$40
4- 51-260		Plan 13 Blk B Pt Lot 4 Pt Lot 10 Pt Being RP 25R3489 Part 2	2.50	1.01	Guy J. & Susane Levesque	$0	$0	$21	$21
4- 51-261		Plan 13 Blk B Pt Lot 10	0.96	0.39	Susane Levesque	$0	$0	$8	$8
4- 51-262		Plan 13 Blk B Pt Lot 10	0.89	0.36	Edward A. Young	$0	$0	$8	$8
4- 51-263		Plan 13 Blk B Pt Lot 10	2.00	0.81	Richard R. Larochelle	$0	$0	$17	$17
4- 51-264		Plan 13 Blk B Pt Lot 10	3.00	1.21	PD Properties & Rentals Inc.	$0	$0	$26	$26
4- 51-265		Plan 13 Blk B Pt Lot 10 RP 25R3365 Part 1	12.03	4.87	1109662 Ontario Ltd	$0	$0	$103	$103
4- 51-266		Plan 13 Blk B Pt Lot 10	1.88	0.76	629260 Ontario Limited 1777705 Ontario Inc	$0	$0	$16	$16
4- 51-267		Plan 13 Blk B Pt Lot 10	0.75	0.30	Duo Ray Ltd	$0	$0	$6	$6
4- 51-268		Plan 13 Blk B Pt Lot 10	0.76	0.31	469135 Ontario Limited	$0	$0	$7	$7
4- 51-269		Plan 13 Blk B N Pt Lot 9 S Pt Lot 10	2.00	0.81	469135 Ontario Limited	$0	$0	$17	$17
4- 51-270		Plan 13 Blk B Pt Lot 9	2.00	0.81	2448514 Ontario Inc.	$0	$0	$17	$17
4- 51-271		Plan 13 Blk B Pt Lot 9	1.00	0.40	2274916 Ontario Inc	$0	$0	$8	$8
4- 51-272		Plan 13 Blk B S Pt Lot 9	1.30	0.53	John Healy Care Trustee	$0	$0	$11	$11
4- 51-273		Plan 13 Blk B Pt Lot 9	1.00	0.40	Dean R. Williams	$0	$0	$8	$8
4- 51-274		Plan 13 Blk B Pt Lot 9	1.00	0.40	Jeffery P. Williams	$0	$0	$8	$8
4- 51-275		Plan 13 Blk B Pt Lot 9	3.00	1.21	Dean R. Williams	$0	$0	$26	$26
4- 51-276	3	Plan 13 Blk B Pt Lot 9 Pt Lot 9	2.47	1.00	Jeffery P. Williams	$0	$0	$21	$21
4- 51-277	3	Plan 13 Blk B Pt Lot 9 Pt Lot 9	0.57	0.23	Dean R. Williams	$0	$0	$5	$5
4- 51-278		Plan 13 Blk B Pt Lot 9	2.00	0.81	Lamsar Inc, C/O 608 Mc Gregor Sd Rd	$0	$0	$17	$17
4- 51-286		Plan 13 Blk B S Pt Lot 5	1.86	0.75	1565685 Ontario Limited	$0	$0	$16	$16
4- 51-287		Plan 13 Blk B S Pt Lot 5	5.33	2.16	Harold Marcus Limited	$0	$0	$46	$46
4- 51-289		Plan 13 Blk B S Pt Lot 5 EXC RP 25R2928 Part 4	2.72	1.10	1830370 Ontario Inc	$0	$0	$23	$23
4- 51-290		Plan 13 Blk B Pt Lot 5 EXC RP 25R1605 Part 7 Part 8	35.19	14.24	Curran & Herridge Construction Company Limited	$0	$0	$100	$100
4- 51-292		Plan 13 Blk B S Pt Lot 5 EXC RP 25R1605 Part 6	1.17	0.47	Imperial Roofing (Sarnia) Ltd	$0	$0	$10	$10
4- 51-293	3	Pt Lot 17 RP 25R7059 Part 5 & Part 6	5.47	2.21	Calanit Inc, C/O Morris Lindenbaum	$0	$0	$47	$47
4- 51-295	3	Pt Lot 17 RP 25R7059 Part 1 Part 2 EXC RP 25R7793 Part 1	6.86	2.78	Bruce A Bond Petroleum Ltd	$0	$0	$59	$59
4- 51-295-05	3	Pt Lot 17 RP 25R7793 Part 1	2.60	1.05	Delcor Seaway Inc, C/O Cordell Kendel	$0	$0	$22	$22
4- 51-296	3	Pt Lot 16 RP 25R1214 Pts 1 & 6	2.00	0.81	Kel-Gor Limited, C/O St Clair Valve	$0	$0	$17	$17
4- 51-298	3	Pt Lot 16 RP 25R1214 Pts 2 to 5	3.35	1.36	Kel-Gor Limited	$0	$0	$29	$29

Description			Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 51-299	3	Pt Lot 16 RP25R5650 Part 1 Part 12 RP 25R6036 Pts 3 To 11 Pt 15 Pt 16 S/T	6.83	2.76	Kel-Gor Limited	$0	$0	$58	$58
4- 51-300	3	Pt Lot 16 RP 25R6036 Parts 1, 2 & 17	1.15	0.47	D S Ashman Industries Inc	$0	$0	$10	$10
4- 51-302	3	Pt Lots 16 And 17 And RP 25R1485 Part 1	12.47	5.05	Jenron Holdings Ltd	$0	$0	$107	$107
4- 51-310	3	E Pt Lot 16	1.05	0.42	Randy G. & Patricia J. Varsava, T/A Varsava Trailers	$0	$0	$9	$9
4- 51-311	3	Pt Lot 16	0.50	0.20	Gerald M. Mcauley	$0	$0	$4	$4
4- 51-312	3	Pt Lot 16	0.41	0.17	Gerald M. Mcauley	$0	$0	$4	$4
4- 51-321		Plan 13 Blk A Pt Lot 15 RP 25R2953 Part 1 to Part 12	32.16	13.01	Air Products Canada Ltd	$0	$0	$275	$275
4- 51-323		Plan 13 Blk A Pt Lot 15	20.79	8.41	Transco Recycling Inc	$0	$0	$178	$178
4- 51-324		Plan 13 Blk A Pt Lot 15 RP 25R5223 Part 7 to 11	9.92	4.01	408980 Ontario Ltd, C/O Tony Savo	$0	$0	$85	$85
4- 51-325		Plan 13 Blk A Pt Lot 15 RP 25R5223 Parts 1 to 6	4.13	1.67	852129 Ontario Limited, C/O Lambton Metal	$0	$0	$35	$35
4- 51-340		Plan 13 Blk A Pt Lot 6 RP 25R8484 Parts 1 to 8 &12	4.26	1.72	876652 Ontario Ltd	$0	$0	$36	$36
4- 51-340-50		Plan 13 Blk A Pt Lot 6 RP 25R8484 Pt 9	5.35	2.17	121 Duff Drive Inc	$0	$0	$46	$46
4- 51-341		Plan 13 Blk A Part Lot 6 RP 25R8073 Part 1	13.21	5.35	Mac Pump Developments Ltd	$0	$0	$113	$113
4- 51-341-01		Plan 13 Blk A Part Lot 6 RP 25R8073 Part 2	1.14	0.46	2506612 Ontario Ltd.	$0	$0	$10	$10
4- 51-344	2	W Pt Lot 16	1.00	0.40	Randolph A. Elviage	$0	$0	$8	$8
4- 51-345	2	W Pt Lot 16	1.00	0.40	Sarnia Plumbing And Mecha	$0	$0	$8	$8
4- 51-346	2	E Pt Lot 16	0.62	0.25	Auke & Denise Zylstra	$0	$0	$5	$5
4- 51-354	2	Pt Lot 16	0.75	0.30	Kukura Construction Limited, K C L Warehouse	$0	$0	$6	$6
4- 51-355	2	Pt Lot 16	0.41	0.17	Vandenheuvel Auto Sales Ltd.	$0	$0	$4	$4
4- 51-356	2	Pt Lot 16	0.40	0.16	Michael W. Kidd	$0	$0	$3	$3
4- 51-357	2	Pt Lot 16 And RP 25R7067 Part 3 RP 25R9934 Pt 1	0.36	0.15	1600850 Ontario Limited	$0	$0	$3	$3
4- 51-512	2	Pt Lot 15	0.35	0.14	Renald I. Joseph & Brenda L. Blyth	$0	$0	$3	$3
4- 51-513	2	Pt Lot 15	0.35	0.14	William K. & Dianne J. Spencer	$0	$0	$3	$3
4- 51-514	2	Pt Lot 15	0.07	0.03	Carol A. O'Reilly	$0	$0	$1	$1
4- 51-561	2	Pt Lot 15	0.84	0.34	2551030 Ontario Inc.	$0	$0	$7	$7
4- 51-606	2	Pt Lot 15 RP 25R4901 Part 1	1.00	0.40	Mills Land Farms Inc, c/o Mr M Darrell Mills	$0	$0	$8	$8
4- 51-607	2	Pt Lot 15	0.47	0.19	Vink Network Cables Inc.	$0	$0	$4	$4
4- 51-608	2	W Pt Lot 15	0.46	0.19	Margaret J. Nyp	$0	$0	$4	$4
Public Utlity		Ref. #53 on Plan Sheet 2	0.22	0.09	Hydro One Networks Inc, Ass'mt & Tax'n Real Est Serv'cs & Scr'ty	$0	$0	$1	$1

Description			Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Public Utlity		Ref. #113 on Plan Sheet 2	4.49	1.82	Hydro One Networks Inc, Ass'mt & Tax'n Real Est Serv'cs & Scr'ty	$0	$0	$8	$8
Public Utlity		Ref. #121 on Plan Sheet 2	17.10	6.92	Hydro One Networks Inc, Ass'mt & Tax'n Real Est Serv'cs & Scr'ty	$0	$0	$49	$49
Public Utlity		Ref. #171 on Plan Sheet 2	37.73	15.27	Hydro One Networks Inc, Ass'mt & Tax'n Real Est Serv'cs & Scr'ty	$0	$0	$108	$108
Public Utlity		Ref. #172 on Plan Sheet 2	14.53	5.88	Hydro One Networks Inc, Ass'mt & Tax'n Real Est Serv'cs & Scr'ty	$0	$0	$41	$41
4- 51-249		Plan 13 Blk B Pt Lots 4 & 5 RP 25R9267 Pts 1 & 3	44.62	18.06	1109606 Ontario Limited	$0	$0	$127	$127
4- 51-353	2	Pt Lot 16 and RP 25R7974 Part 1 RP 25R9924 Pt 1	6.38	2.58	Vandenheuvel Auto Sales Ltd.	$0	$0	$55	$55
4- 51-376	2	Plam 13 Blk A Pt Lot 15 & Pt Lot 16	302.97	122.61	DST Farms Inc., and LMH Farms Inc.	$0	$0	$847	$847
4- 51-546	2	W Pt Lot 13 EXC RP 25R592 Part 1	1.44	0.58	David A. & Joyce Eileen Crowe	$0	$0	$12	$12
4- 51-559	2	W Pt Lot 14 E Pt Lot 15	45.07	18.24	Lloyd D. & Frances J. King	$0	$0	$129	$129
4- 51-560	2	Pt Lot 15	24.93	10.09	2299107 Ontario Inc	$0	$0	$46	$46
4- 51-568	2	W Pt Lot 15	120.98	48.96	1565670 Ontario Limited	$0	$0	$345	$345
4- 51-570	2	Pt Lot 14	9.89	4.00	Donald A. & Catherine R. Cressman	$0	$0	$28	$28
4- 51-573	2	E Pt Lot 14	9.99	4.04	David H. Payne & Elizabeth J. Parkins	$0	$0	$28	$28
Total on Privately-Owned - Agricultural Lands						$0	$0	$6,318	$6,318
TOTAL ASSESSMENT IN THE CITY OF SARNIA						**$0**	**$0**	**$8,749**	**$8,749**

ST. CLAIR TOWNSHIP

MUNICIPAL LANDS:

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
Kimball Road	7.22	2.92	County of Lambton	$0	$0	$103	$103
Plank Road	1.72	0.70	County of Lambton	$0	$0	$25	$25
Waubuno Road	1.00	0.40	St. Clair Township	$0	$0	$8	$8
Total on Municipal Lands				$0	$0	$136	$136

PRIVATELY-OWNED - NON-AGRICULTURAL LANDS:

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-215	1	Pt. Lot 15 RP25R3796, Pt. 1	2.00	0.81	Julie M. Core	$0	$0	$6	$6
Total on Privately-Owned - Non-Agricultural Lands						$0	$0	$6	$6

Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment

PRIVATELY-OWNED - AGRICULTURAL LANDS

Roll No.	Con.	Description	Area Affected (Acres)	(Ha.)	Owner	Special Benefit	Benefit	Outlet	Total Assessment
4- 50-206	1	E Pt. Lot 13	20.00	8.09	James R. Elliott	$0	$0	$57	$57
4- 50-207	1	W Pt. Lot 13, E Pt Lot 14	96.00	38.85	David A. & Joyce E. Crowe	$0	$0	$274	$274
4- 50-209	1	W Pt. Lot 13, E Pt Lot 14	44.49	18.00	Charles E. Sands	$0	$0	$127	$127
4- 50-210	1	E Pt. Lot 14	8.05	3.26	Rodney K. Weese	$0	$0	$23	$23
4- 50-211	1	W Pt. Lot 14	66.41	26.88	Wray Enterprises	$0	$0	$190	$190
4- 50-212	1	SE 1/4 Lot 15 exc.RP25R5450, Pt. 1	12.53	5.07	Bruce A. & Kelly T. Bond	$0	$0	$36	$36
4- 50-214	1	W Pt. Lot 15 exc. RP25R3769, Pt. 1	63.68	25.77	Donna M. Fisher	$0	$0	$182	$182
4- 50-216	1	W Pt. Lot 15	50.28	20.35	James Elliott	$0	$0	$144	$144
4- 60-111	1	Lot 16	54.83	22.19	DST Farms Inc./ LMH Farms Inc., Tenants in Common	$0	$0	$78	$78
Total on Privately-Owned - Agricultural Lands						$0	$0	$1,110	$1,110
TOTAL ASSESSMENT IN ST. CLAIR TOWNSHIP						**$0**	**$0**	**$1,252**	**$1,252**
GRAND TOTAL - SCHEDULE 'C-1' - (BOTH MUNICIPALITIES)						**$0**	**$0**	**$10,000**	**$10,000**

	(Acres)	(Ha.)
Total Area:	**1990.16**	**805.36**

"SCHEDULE F"
RECONSIDERED DRAINAGE REPORT FOR THE
COLE DRAIN, CUT-OFF DRAIN & COLE DIVERSION DRAIN BRANCH A & B
CORPORATION OF THE
CITY OF SARNIA

SPECIAL PROVISIONS – GENERAL

1.0 GENERAL SPECIFICATIONS

The General Specifications attached hereto is part of Schedule F." It also forms part of this specification and is to be read with it, but where there is a difference between the requirements of the General Specifications and those of the Special Provisions which follow, the Special Provisions will take precedence.

2.0 DESCRIPTION OF WORK

The work to be carried out under this Contract includes, but is not limited to, the supply of all **labour, equipment and materials** to complete the following items:

CUT-OFF DRAIN – ARLANXEO PROPERTY (STATION 1+004 to 1+473)

- Contractor must be certified and pre-approved to undertake construction activities within the Arlanxeo property. Safety and technical requirements are as defined by Arlanxeo Canada Inc.
- Concrete channel Rehabilitation (Station 1+004 to Station 1+473). The work includes the supply and installation of Concrete Canvas over the existing concrete channel. The work also includes stabilizing the existing concrete side walls by means of concrete mortar of cracks and parging of spalled areas on side walls of existing channel.
    - Mobilization, demobilization, staging area for construction materials, traffic control as required, safety training, etc.
    - Removal and disposal of concrete debris, sediment, brush and vegetation from drain channel. Hydro flushing and vac truck equipment to be considered for sediment removal.
    - Removal and re-installation of concrete barrier along south side of Cut-Off Drain (approx. 425 m length) to permit equipment access to working corridor.
    - Sta. 1+004 to Sta. 1+259, Sta. 1+294 to Sta. 1+402 Concrete Canvas (CC8) geosynthetic cementitious composite mat 8 mm thickness (approx. 4,150 m^2). Work to include surface preparation with concrete mortar filling of cracks and parging of all spalled and damaged channel surfaces (approx. 1,500 m^2) troweled to a smooth uniform surface over the existing concrete channel. Concrete Canvas to be anchored and fastened to existing concrete channel as per Specifications outlined herein (all labour and supply of materials to be included). Prior to canvas liner placement, Concrete Canvas (CC5) geosynthetic cementitious composite mat 5 mm thickness (approx. 80 m^2) to be used to prepare donut gaskets to be placed over existing lateral pipe outlets (approx. 26 pipes @ 600 mm dia. or smaller) protruding through concrete channel wall. Channel liner overlay cut to suit for pipe openings and to be affixed with sealant and masonry screws as per Specifications outlined herein. Canvas edges along the top of the channel to be sealed with a commercial grade concrete grout (200 mm wide x 25 mm thickness) with a concrete bonding adhesive underlay pre applied.

- Sta. 1+259 to Sta. 1+271 and Sta. 1+402 to Sta. 1+473. Concrete Canvas (CC13) geosynthetic cementitious composite mat 13 mm thickness (approx. 950 m^2). Work to include surface preparation with concrete mortar filling of cracks and parging of all spalled and damaged surfaces (approx. 200 m^2) troweled to a smooth uniform surface over existing concrete channel. Concrete Canvas to be anchored and fastened to existing concrete channel as per Specifications outlined herein (all labour and supply of materials to be included). Prior to canvas liner placement, Concrete Canvas (CC5) geosynthetic cementitious composite mat 5 mm thickness (approx. 40 m^2) to be used to prepare donut gaskets to be placed over existing lateral pipe outlets (approx. 9 pipes @ 600 mm dia. or smaller) protruding through concrete channel wall. Channel liner overlay cut to suit for pipe openings and to be affixed with sealant and masonry screws as per Specifications outlined herein. Canvas edges along the top of the channel to be sealed with a commercial grade concrete grout (200 mm wide x 25 mm thickness) with a concrete bonding adhesive underlay pre applied.
- Water Management (temporary diversion of process waters during channel re-construction). Implement suitable water management strategy to facilitate the completion of the work throughout this reach. Water management techniques to consist of redirecting and maintaining base flows while accommodating unobstructed provisions for rainfall events without creating any backwater effects upstream. Of specific note, a suitable water management strategy must be implemented during construction to accommodate on-going process water flows originating from the outfall sewer exiting the HC Starck property at Station 1+260. Contractor is responsible to coordinate this activity with HC Starck in order to limit any disruption to their operations.

- Temporarily remove and reinstall existing trash screen and walkway at Station 1+428 to permit installation of Concrete Canvas (CC13) liner.
- Bridge No. 1 Sta. 1+271 to Sta. 1+294. Remediate twin 23 m long, 2440 mm diameter CSP culverts with Concrete Canvas (CC8) overlay on inside bottom half surface of pipes (approx. 200 m^2). Prior to canvas placement, prep work requires PVA adhesive and bonding agent application to inner pipe walls followed by semi dry grout to fill corrugations troweled to a smooth round surface. Concrete Canvas to be anchored and fastened to existing concrete channel as per Specifications outlined herein (all labour and material included). Work includes first cleaning, drying and removing any loose pipe surface materials prior to applying bonding agent.
- Rehabilitation of concrete paver blocks on side slopes from Station 1+530 to 1+702 (approximately 100 m^2). The work includes the removal, repair and replacement with gabion stone and filter fabric underlay.
- Clearing and brushing including disposal off-site. (Stations 1+473 to 6+275).

  Contractor must be certified and pre-approved to undertake construction activities within Imperial Oil property. Safety and technical requirements are defined by Imperial Oil.

  Contractor must be certified and pre-approved to undertake construction activities within CN property. Safety and technical requirements are defined by CN.
- Open drain excavation and hauling of spoils off-site – approximately 2,100 m^3 (Station 1+473 to 6+275).

  In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed

on the basis of satisfying both Municipal and Ministry of the Environment, Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location.

- Soils characterization sampling program
- Cleanout of ten (10) existing private access bridges:
    - Bridge No. 2 - Station 1+583 (Roll No. 4-50-008) - Clean drain through existing 9.2 m span x 2.9 m rise rectangular concrete open bottom bridge.
    - Bridge No. 3 - Station 1+679 (Roll No. 4-50-008) - Clean drain through existing 9.0 m span x 2.75 m rise rectangular concrete open bottom bridge.
    - Bridge No. 5 - Station 1+782 (Roll No. 4-50-297) - Clean drain through existing 6.5 m span by 2.5 m rise concrete bridge.
    - Bridge No. 9 (Roll No. 4-49-400) - Station 2+725 - Clean drain through existing 11.3 m span x 1.9 m rise concrete bridge.
    - Bridge No. 10 (Roll No. 4-49-400) - Station 2+997 - Clean drain through existing 13.4 m span x 1.66 m rise concrete pipe bridge.
    - Bridge No. 11 (Roll No. 4-49-400) - Station 3+008 - Clean drain through existing 5300 mm x 3000 mm CSP arch culvert.
    - Bridge No. 12 (Roll No. 4-49-400) - Station 3+266 - Clean drain through existing 6.1 m span x 2.3 m rise open bottom rectangular concrete bridge.
    - Bridge No. 15 (Roll No. 4-46-353) - Station 3+928 - Clean drain through existing 10.4 m span by 2.7 m rise wooden rail bridge (abandoned).
    - Bridge No. 16 (Roll No. 4-49-353) - Station 4+002 - Clean drain through existing 4.2 m span x 2.5 m rise rectangular concrete open bottom bridge.
    - Bridge No. 17 (Roll No. 4-49-353) - Station 4+225 - Clean drain through existing 4.4 m span x 1.65 m rise steel bridge
- Cleanout of three (3) existing CN railway bridges:
    - Bridge No. 7 (Canadian National Railway Corporation) - Station 2+651 - Clean drain through existing 5 m wide wooden rail bridge.
    - Bridge No. 8 (Canadian National Railway Corporation) - Station 2+665 - Clean drain through existing 5 m wide wooden rail bridge.
    - Bridge No. 13 (Canadian National Railway Corporation) - Station 3+678 - Clean drain through existing 5.5 m span x 3.1 m rise metal rail bridge.
- Cleanout of five (5) existing road bridges:
    - Bridge No. 4 - Station 1+731 (Vidal Street) - Clean drain through existing 30 m long, 9.6 m span by 2.9 m rise rectangular open bottom concrete bridge.
    - Bridge No. 6 - Station 2+285 (Imperial Avenue) - Clean drain through existing 5200 mm x 3300 mm CSP arch bridge on concrete footings.
    - Bridge No. 14 - Station 3+869 (Scott Road) - Clean drain through existing 12 m long, 6.1 m span x 2.8 m rise open bottom concrete bridge.

- Bridge No. 18 - Station 6+010 (Indian Road South) - Clean drain through existing 6800 mm x 4000 mm CSP arch culvert.
- Bridge No. 19 - Station 6+262 (Plank Road) - Clean drain through existing 3.0 m span by 2.4 m rise concrete bridge.

- Repair undermined concrete channel with rip-rap approximately 50 m^2 (Stations 2+628 to 2+646)
- Bridge No. 5 (Roll No. 4-50-297) - Station 1+782 - Removal of existing 6.5 m span x 2.5 m rise concrete bridge deck and jersey barriers, as required. Abutments, headwalls and footings to remain.
- Remove partial obstructions (fencing and swing gate materials) from within drain (Station 2+678, 3+411, 3+639, 3+893, 4+375)
- Removal and disposal of lower portion of existing fence pivoting within drain below top of drain banks which is attached to chain link fence crossing drain above at the following locations: Station 2+678, 3+411, 3+639, 3+893, and 4+375. Remaining portion of fence extending across top of drain to remain in place.
- Temporary silt control measures
- Hydroseeding of drain banks where disturbed from drain bottom widening (approximately 4,500 m^2)
- Bridge 17A (Station 4+415 – Hydro One Networks Inc.) – Supply and install a new 18 m long, 4370 mm x 2890 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 100 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 500 tonnes), granular 'A' driveway material (approx. 70 tonnes), and stone erosion protection on drain banks (approx. 65 m2).

COLE DRAIN (Station 6+275 to 11+225)

- Open Drain
  - Excavation and hauling of excavated drain spoils off-site –approx. 2,500 m^3 (Station 6+275 to 9+550).

    In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.
  - Excavation and levelling of drain spoils on-site – approx. 400 m^3 (Station 9+550 to 11+225)
- Cleanout of ten (10) existing private access crossings:
  - Bridge No. 40 (Roll No. 4-51-295-05) - Station 8+526 - Clean drain through existing 2200 mm CSP culvert.

- Bridge No. 41 (Roll No. 4-51-296) - Station 8+588 - Clean drain through existing 2500 mm x 1830 mm CSP arch culvert.
- Bridge No. 42 (Roll No. 4-51-298) - Station 8+696 - Clean drain through existing 2400 mm CSP culvert.
- Bridge No. 43 (Roll No. 4-51-299) - Station 8+798 - Clean drain through existing 2500 mm x 1830 mm CSP arch culvert.
- Bridge No. 46 (Roll No. 4-51-607) - Station 9+499 - Clean drain through existing 1650 mm concrete culvert.
- Bridge No. 47 (Roll No. 4-51-568) - Station 9+924 - Clean drain through existing 1500 mm CSP culvert.
- Bridge No. 48 (Roll No. 4-51-559) - Station 10+433 - Clean drain through existing 1500 mm CSP culvert.
- Bridge No. 49 (Roll No. 4-51-570) - Station 10+743 - Clean drain through existing 1500 mm CSP culvert.
- Bridge No. 50 (Roll No. 4-51-573) - Station 11+001 - Clean drain through existing 900 mm CSP culvert.
- Bridge No. 51 (Roll No. 4-51-573) - Station 11+068 - Clean drain through existing 900 mm CSP culvert.

- Cleanout of two (2) existing City of Sarnia road crossing
  - Bridge No. 23 (McGregor Road) - Station 6+826 - Clean drain through existing 3000 mm x 2300 mm rectangular concrete bridge with open bottom.
  - Bridge No. 39 (Gladwish Drive) - Station 8+390 - Clean drain through existing 3000 mm x 2000 mm concrete box culvert.
- Cleanout of two (2) existing County of Lambton road crossings:
  - Bridge No. 45 (Churchill Line, Kimball Road) - Station 9+355 - Clean drain through existing 2000 mm upstream and 1800 mm downstream CSP culvert.
- Cleanout of one (1) existing highway crossing:
  - Bridge No. 44 (Highway 40) - Station 9+026 - Clean drain through existing 2400 mm x 1800 mm rectangular concrete bridge with open bottom.
- Clearing and brushing including disposal off-site. (Stations 6+275 to 11+225)
- Bridge widening/repairs as follows:
  - Bridge 41 (Station 8+587-Kel-Gor Limited) – Remove existing slope stone treatment on culvert ends. Supply and place interlocking concrete block headwalls (26 full blocks, 16 half-high blocks, 4 half blocks) on culvert ends including backfill of the drain between headwalls and driveway edge with native materials compacted up to underside of granular driveway surface (approx. 20 m^3). Supply and place granular 'A' driveway surface minimum 300 mm thickness (approx. 40 tonnes) over filled drain portion both sides beyond existing driveway Work to includes placement of stone erosion protection on drain banks (approx. 15 m^2) and relocation of existing steel guard rails. Any excess stone salvaged from existing culvert end treatment to be disposed of off-site. Any damage to the existing culvert as a result of construction shall be repaired or replaced at the contractor's expense as determined by the Engineer and/or Drainage Superintendent.

- Bridge No. 48 (Station 10+433-Lloyd D. & Frances J. King) – Remove and re-install westerly concrete block headwall.

- Access Bridge replacements, as follows:
  - Bridge 20 (Station 6+431 – Enbridge Pipelines Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3890 mm x 2690 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 65 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 175 tonnes), granular 'A' driveway sub-base (approx. 80 tonnes), 6 block rows high interlocking concrete block headwall (36 full blocks, 4 half blocks, 20 half-high blocks), stone erosion protection on drain banks (approx. 45 m^2), restoration of asphalt driveway (approx. 20 tonnes), and remove and dispose of steel pipe guiderails to be replaced by block headwalls.
  - Bridge 21 (Station 6+492 – Enbridge Pipelines Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 29.5 m long, 3890 mm x 2690 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 160 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 470 tonnes), granular 'A' driveway (approx. 230 tonnes), 6 block rows high interlocking concrete block headwall (36 full blocks, 8 half blocks, 18 half-high blocks, 4 half-high half blocks), and stone erosion protection on drain banks (approx. 75 m^2). Reshape south drain bank on upstream and downstream end to 1:1 side slope. Re-install steel pipe guiderails on top surface of concrete block headwall and reinstate chain-link fence as required.
  - Bridge 22 (Station 6+662 – Enbridge Pipelines Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3890 mm x 2690 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 65 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 180 tonnes), granular 'A' driveway sub-base (approx. 90 tonnes), 6 block rows high interlocking concrete block headwall (36 full blocks, 8 half blocks, 18 half-high blocks, 4 half-high half blocks), stone erosion protection on drain banks (approx. 70 m^2), restoration of asphalt driveway (approx. 30 tonnes), Reshape south drain bank on upstream and downstream end to 1:1 side slope. Remove and dispose of steel pipe guiderails to be replaced by concrete block headwalls and reinstate chain-link fence as required.
  - Bridge 24 (Station 7+161 – Sarnia Auto Wreckers) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 165 tonnes), granular 'A' driveway sub-base (approx. 45 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 45 m^2), restoration of concrete driveway (approx. 20 m^3), and re-fabricate existing steel guiderails to be straight and mounted on top surface of block headwall.

- Bridge 25 (Station 7+324 – Lamsar Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 155 tonnes), granular 'A' driveway sub-base (approx. 75 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 55 m^2), restoration of asphalt driveway (approx. 25 tonnes), and re-install steel pipe guiderails on top surface of block head wall.
- Bridge 26 (Station 7+355 – Lamsar Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 12.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 65 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 215 tonnes), granular 'A' driveway sub-base (approx. 85 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 50 m^2), restoration of asphalt driveway (approx. 30 tonnes).
- Bridge 27 (Station 7+483 – 612031 Ontario Ltd.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 14.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 75 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 205 tonnes), granular 'A' driveway sub-base (approx. 95 tonnes), 5½ block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), stone erosion protection on drain banks (approx. 55 m^2), restoration of asphalt driveway (approx. 35 tonnes).
- Bridge 28 (Station 7+581 – 376964 Ontario Ltd.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 170 tonnes), granular 'A' driveway sub-base (approx. 75 tonnes), 5 block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), stone erosion protection on drain banks (approx. 50 m^2), restoration of asphalt driveway (approx. 25 tonnes), and re-instate chain-link fence as required.
- Bridge 29 (Station 7+610 – Richard C. Perdeaux) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 150 tonnes), granular 'A' driveway sub-base (approx. 75 tonnes), 5½ block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), stone erosion protection on drain banks (approx. 50 m^2) and restoration of asphalt driveway (approx. 25 tonnes).
- Bridge 30 (Station 7+739 – John R. Bernhardt) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 20.0 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 100 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 365 tonnes), granular 'A' driveway (approx. 130 tonnes), 5 block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), and stone erosion protection on drain banks (approx. 45 m^2).

- Bridge 31 (Station 7+794 – Paul J. Babcock) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 15.0 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 75 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 245 tonnes), granular 'A' driveway (approx. 105 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 50 m^2), and relocation of existing steel gate.
- Bridge 32 (Station 7+879 – 1230868 Ontario Ltd.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 165 tonnes), granular 'A' driveway (approx. 75 tonnes), 5 block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), and stone erosion protection on drain banks (approx. 45 m^2).
- Bridge 33 (Station 7+928 – Gordon Bouma) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 9.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 50 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 125 tonnes), granular 'A' driveway sub-base (approx. 40 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 40 m^2). Reshape south drain bank on upstream and downstream end to 1:1 side slope and restoration of concrete driveway (approx. 11 m^3).
- Bridge 34 (Station 7+959 – Gordon Bouma) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 9.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 50 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 125 tonnes), granular 'A' driveway sub-base (approx. 40 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 75 m^2). Reshape south drain bank on upstream and downstream end to 1:1 side slope and restoration of concrete driveway (approx. 11 m^3).
- Bridge 35 (Station 7+999 – Gordon Bouma) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 14 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 70 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 180 tonnes), granular 'A' driveway sub-base (approx. 60 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 75 m^2). Reshape south drain bank on upstream and downstream end to 1:1 side slope and restoration of concrete driveway (approx. 18 m^3).

- Bridge 36 (Station 8+045 – Acklands Grainger Inc.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 14.0 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 70 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 170 tonnes), granular 'A' driveway sub-base (approx. 90 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 55 m^2). Reshape south drain bank on downstream end to 1:1 side slope and restoration of asphalt driveway (approx. 30 tonnes).
- Bridge 37 (Station 8+133 – Plank Road Transfer Ltd.) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway (approx. 210 tonnes), granular 'A' driveway (approx. 70 tonnes), 5 block rows high interlocking concrete block headwall (16 full blocks, 4 half blocks, 24 half-high blocks, 4 half-high half blocks), and stone erosion protection on drain banks (approx. 45 m^2).
- Bridge 38 (Station 8+205 – Barnim Property Holdings) – Remove and dispose of existing culvert including driveway and endwall materials. Supply and install a new 11.5 m long, 3650 mm x 2280 mm CSP arch culvert complete with clearstone bedding up to pipe springline (approx. 60 tonnes), granular 'B' backfill up to granular 'A' driveway sub-base (approx. 165 tonnes), granular 'A' driveway sub-base (approx. 75 tonnes), 5½ block rows high interlocking concrete block headwall (28 full blocks, 6 half blocks, 12 half-high blocks, 2 half-high half blocks), stone erosion protection on drain banks (approx. 45 m^2), restoration of asphalt driveway (approx. 25 tonnes).

- Supply and install stone erosion protection to repair drain banks @ Station 10+610 and repair end of 300 mm diameter outlet pipe @ Station 8+079, approximately 20 m^2.
- Hydro seeding of drain banks where disturbed from drain bottom widening (approximately 9,000 m^2)
- Temporary silt control measures

COLE DIVERSION DRAIN BRANCH 'A' (Sta. 0+000A to 1+450A)

- Contractor must be certified and approved to undertake construction activities within CN and Plains Midstream Canada U property. Safety and technical requirements are defined by CN and Plains Midstream Canada.
- Clearing and brushing including disposal off-site. (Station 0+000A to 1+450A)
- Drain bottom excavation and hauling of excavated material off-site approx. 320 m^3 Station 0+000A to 1+450A.

  In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.

- Drain widening excavation (north bank only) and hauling of excavated material off-site approx. 170 m^3 from Station 0+125A to 0+236A and Station 0+775A to 0+875A.
- Hydro seeding drain banks where disturbed (approx. 2,000 m^2).
- Supply and placement of stone erosion protection on north drain bank Station 0+849A to Station 0+859A (approx. 30 m^2).
- Cleanout of three (3) existing private access bridges:
    - Bridge No. 1A (Canadian National Railway Corporation) - Station 0+000A - Clean drain through the existing twin 20 m long 900 mm CSP culvert structures.
    - Bridge No. 2A (Canadian National Railway Corporation) - Station 0+232A - Clean drain through the existing 6 m long 1100 mm concrete culvert structure.
    - Bridge No. 5A (Plains Midstream Canada U) - Station 1+150A - Clean drain through the existing 140 m long 600 mm CSP culvert structure.
- Road Bridge Replacement / Sluice Gate Arrangement, as follows:
    - Bridge No. 3A – Station 0+407.5A - Remove and replace existing culvert. Supply and install a new 15 m long, 900 mm diameter high density polyethylene (HDPE Boss 2000) culvert complete with clearstone bedding (approx. 10 tonnes), full granular 'A' backfill (approx. 90 tonnes), pre-cast concrete headwall as per OPSD 804.03 (east end) and sloping stone endwall (approx. 30 m^2 on west end). Supply and installation of a 914 mm medium duty sluice gate to the concrete headwall as per Armtec Model 20-C or approved equal, complete with 2 m extension rod and turn wheel.
- Railway Bridge Replacement, as follows:
    - Bridge No. 4A – Station 0+718A - Remove and replace existing culvert. Supply and install a new 32 m long, 600 mm diameter high density polyethylene (HDPE Boss 2000) culvert complete with clearstone bedding (approx. 20 tonnes), full granular 'A' backfill (approx. 240 tonnes), sloping stone endwalls (approx. 60 m^2) and restoration of asphalt driveway 100 mm thickness (approx. 15 tonnes).
- Implementation of silt control and water management measures in the channel throughout construction.

COLE DIVERSION DRAIN BRANCH 'B' (Sta. 0+000B to 0+170B)

- Contractor must be certified and approved to undertake construction activities within CN and Plains Midstream Canada U property. Safety and technical requirements are defined by CN and Plains Midstream Canada.
- Clearing and brushing including disposal off-site. (Stations 0+000B to 0+170B).
- Drain bottom excavation and hauling of excavated material off-site (approx. 110 m^3) Station 0+000B to 0+170B including widening of north bank from Station 0+097B to 0+130B.

In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and

Excess Soil Management.

- Supply and place stone erosion protection on north bank (approx. 80 m^2) Station 0+044B to 0+085B.
- Supply and place stone erosion protection on both banks (approx.165 m^2) Station 0+020B - 0+035B, 0+085B - 0+097B
- Hydroseeding drain banks where disturbed (approx. 200 m^2).
- Private bridge replacement, as follows:
    - Bridge No. 1B – Station 0+010B - Remove and replace existing culvert. Supply and install a new 20 m long, 750 mm diameter high density polyethylene (HDPE Boss 2000) culvert complete with clearstone bedding (approx. 15 tonnes), full granular 'A' backfill (approx. 150 tonnes), sloping stone endwalls (approx. 40 m^2) and restoration of asphalt driveway 100 mm thickness (approx. 15 tonnes).
- New hydro pole access bridges, as follows:
    - Bridge No. 2B – Station 0+040B - Supply and install a new 9 m long, 600 mm diameter HDPE Boss 2000 culvert complete with clearstone bedding (approx. 5 tonnes), native backfill and sloping stone endwalls (approx. 20 m^2).
    - Bridge No. 3B – Station 0+0135B - Supply and install a new 9 m long, 600 mm diameter density (HDPE Boss 2000) culvert complete with clearstone bedding (approx. 5 tonnes), native backfill and sloping stone endwalls (approx. 20 m^2).

3.0 ACCESS TO THE WORK

Access to the drain shall be from the public road corridor including Vidal Street, Scott Road, and Plank Road and from private access allowances only as specified below specific to the Arlanxeo Canada Inc., Imperial Oil and CN Railway properties. The Contractor shall make its own arrangements for any additional access for his/her convenience. All road areas and grass lawn areas disturbed shall be restored to original conditions at the Contractor's expense.

4.0 WORKING AREA

The Contractor shall restrict his equipment to the Primary and Secondary working corridors as specified below. Any damage resulting from non-compliance with this section shall be borne by the Contractor. The work shall not cause disruption to the operations of adjacent industrial processes. The working corridor shall be measured 9 meters from the top of the drain bank and shall be as follows. Any deviation from the prescribed working corridor shall be determined in the field by the Drainage Superintendent

The working area for bridge construction shall be restricted to a radius of 20 metres from the center of the bridge location. Any damages to lands and/or roads from the Contractor's work within the working area for the bridge sites shall be rectified to pre-existing conditions at the Contractor's expense.

FROM STA.	TO STA.	PRIMARY (See Note 1)	SECONDARY (See Note 2)
		Cut-Off Drain	
1+000	1+450	Arlanxeo Canada Inc. (S bank)	

FROM STA.	TO STA.	PRIMARY (See Note 1)	SECONDARY (See Note 2)
1+450	1+747	Vidal St (E bank)	
1+747	1+775	Arlanxeo Canada Inc. (S bank)	
1+775	2+015	1777745 Ont Inc. (W bank)	
2+015	2+298	Imperial Oil (W bank)	
2+298	2+640	CN Railway (E bank)	
2+640	2+677	CN Railway (S bank)	CN Railway(N bank)
2+677	3+014	Imperial Oil (N bank)	Imperial Oil (S bank)
3+014	3+646	Imperial Oil (S bank)	Imperial Oil – (N bank)
3+646	3+850	Imperial Oil – (S bank)	Imperial Oil – (N bank)
3+875	3+900	Imperial Oil (W bank)	
3+900	4+372	Imperial Oil (E bank)	
4+372	5+075	Hydro One (S bank)	CN Railway (S bank)
5+075	5+500	CN Railway (N bank)	Hydro One (S bank)
5+500	5+800	CN Railway (N bank)	CN Railway (S bank)
5+800	5+975	CN Railway (S bank)	CN Railway (N bank)
6+025	6+275	CN Railway (S bank)	CN Railway (N bank)
		Cole Drain	
6+275	9+550	Plank Road (N bank)	
9+550	11+225	Various Agricultural Lands (S bank) – 9 m wide	

FROM STA.	TO STA.	PRIMARY (See Note 1)	SECONDARY (See Note 2)
		Cole Diversion Branch A	
0+000A	0+400A	CN Railway (N bank)	
0+420A	0+750A	CN Railway (S bank)	
0+750A	1+450A	CN railway (N bank)	
		Cole Diversion Branch B	
0+000B	0+170B	CN Railway (N bank)	

Note 1: Primary working corridor indicates the access corridor along the side of the drain where excavation, hauling and/or levelling of materials is recommended (unless noted otherwise below and/or in the Specifications, as well as all purposes listed for Secondary Working Corridors).

Note 2: Secondary working corridor indicates the access corridor along the side the drain where construction equipment may travel for the purpose of excavating only, trucking, brushing, drain bank repairs, tile inlet repairs, surface water inlet repairs and other miscellaneous works. **No disposal of fill or levelling of materials shall be permitted within a secondary working corridor. As further specified, use of this secondary working corridor may be further restricted due to site conditions. Read all specifications, drawings and/or notes before completing works.**

5.0 BRUSHING

Brushing shall be carried out on the entire drain within the above identified sections of the drain where required and as specified herein. **All** brush and trees located within the drain side slopes shall be cut parallel to the side slopes, as close to the ground as practicable.

Tree branches that overhang the drain shall be trimmed. Small branches, limbs along with other vegetative brush, such as phragmites and cattails may be first ground up finer using a grinder attachment on an excavator to make it easier for disposal by the Contractor at the same time the drain bottom is excavated to remove and dispose of drain spoils off-site where specified herein. The Contractor shall make every effort to preserve mature trees which are beyond the drain side slopes, and the working corridors. If requested to do so by the Drainage Superintendent, the Contractor shall preserve certain mature trees within the designated working corridors (see Section 4.0).

Except as specified herein, all brush and trees shall be hauled off-site and disposed of. All brush, timber, logs, stumps, large stones or other obstructions and deleterious materials that interfere with the construction of the drain, as encountered along the course of the drain are to be removed from the drain by the Contractor.

Following completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which remain standing, disposing of the branches cut off along with other brush and leaving the trees in a neat and tidy condition. Brush and trees removed from the working area are to be hauled away to

an approved dump site. Since the trees and brush that are cut off flush with the earth surface may sprout new growth later, it is strongly recommended that the City make arrangements for spraying this new growth at the appropriate time so as to kill the trees and brush.

As part of this work, the Contractor shall remove any loose timber, logs, stumps, large stones or other debris from the drain bottom and from the side slopes. **Timber, logs, stumps, large stones or other debris shall be disposed of off-site.**

6.0 EXCAVATION AND LEVELLING OF EXCAVATED MATERIALS

6.1 Excavation of Drain Channel

In all cases, the Contractor shall use the benchmarks to establish the proposed grade. However, for convenience, the drawings provide the approximate depth (mm) from the surface of the ground and from the existing drain bottom to the proposed grades. **THE CONTRACTOR SHALL NOT EXCAVATE DEEPER THAN THE GRADELINES SHOWN ON THE DRAWINGS.** Should over-excavation of the drain bank occur, the Contractor will **not** be permitted to repair with native material packed into place by the excavator and re-shaped. Should over-excavation occur, the Contractor will be required to have a bank repair detail engineered by a Professional Engineer (hired by the Contractor), to ensure long term stability of the bank is maintained. Such repairs shall be subject to approval by the Engineer and will be at no extra cost to the item.

All excavated material shall be handled as specified in Sections 6.2 and 6.3. Materials deposited on the farmlands shall be within the working corridors, at least 1.0 m from the top of the drain bank, or as specified on the drawings. Upon allowing drying of excavated materials (if necessary) and as approved by the Drainage Superintendent, the Contractor shall level excavated materials in accordance with Section 6.2. Excavated material shall not be placed on dykes, in ditches, tiles or depressions intended to conduct water into the drain.

Where the Cole Drain is being deepened from Station 6+275 to Station 6+850 and from Station 7+150 to Station 8+100, the lower portion of the drain will require reshaping at 1:1 sideslope to accommodate the reduced bottom width. Hydro seeding of the disturbed drain banks shall be completed immediately following drain construction and as specified in Section 8.

All excavation work shall be done in such a manner as to not harm any vegetation or trees, not identified in this report or by the Drainage Superintendent for clearing. Any damages to trees or vegetation caused by the Contractors work shall be rectified to the satisfaction of the Drainage Superintendent. The Contractor shall exercise caution around existing tile inlets and shall confirm with the property owners that all tiles have been located and tile ends repaired as specified.

6.2 Levelling of Excavated Materials (Cole Drain - Station 9+550 to Station 11+225)

Excavation of the drain bottom shall be completed as specified in Section 6.1, above and also as specified below and as shown on the drawings.

Excavated drain materials shall be spread to a depth not to exceed 300 mm, unless specified otherwise on the drawings. The material shall be sufficiently leveled to allow further working by agricultural implements. All stones and other debris removed from the drain, which may interfere with agricultural implements, shall be disposed of off-site. Excavated material shall not be placed on dykes, in ditches, tiles or depressions intended to conduct water into the drain.

6.3 Trucking of Excavated Materials (Cole Drain - Station 6+275 to Station 9+550)

Unless otherwise stated, all material excavated from the drain abutting the public road allowance (Plank Road) where no agricultural lands are present shall be hauled and disposed of off-site at an approved location.

Where applicable, the Contractor shall be solely responsible for acquiring any and all permits and approvals required prior to hauling and disposal of materials off-site. Ontario Regulation 406/19 for On-Site and Excess Soil Management must be adhered to when considering a re-use

site for disposal other than a waste management landfill. Soils to be tested to determine soil classification (Soils Characterization Program) and to confirm Class 2 soils exist to permit the temporary soil storage sites for volumes under 10,000 m^3. Where the soils do not meet the above requirements, a contingency allowance would be used for the increased disposal costs to a local waste facility.

6.4 Trucking of Excavated Materials (Cut-Off Drain - Station 1+473 to Station 6+275)

Unless otherwise stated, all material excavated from the drain across or abutting public road allowances and across the lands of Imperial Oil and CN Railway will be hauled and disposed of off-site at an approved location.

Where applicable, the Contractor shall be solely responsible for acquiring any and all permits and approvals required prior to hauling and disposal of materials off-site. Ontario Regulation 406/19 for On-Site and Excess Soil Management must be adhered to when considering a re-use site for disposal other than a waste management landfill. Soils to be tested to determine soil classification (Soils Characterization Program) and to confirm Class 2 soils exist to permit the temporary soil storage sites for volumes under 10,000 m^3. Where the soils do not meet the above requirements, a contingency allowance would be used for the increased disposal costs to a local waste facility.

The Contractor shall restore any such areas which are damaged by his operations, to original or better condition. The Contractor will be held liable for damages to roads, sodded areas and gardens, resulting from his non-compliance with these Specifications.

7.0 GRADED STONE RIP-RAP EROSION PROTECTION MATERIAL

The Contractor shall supply and install the required quantities of graded stone rip-rap erosion protection materials where specified. All stone to be used for erosion protection shall be 125 - 250 mm clear **quarried rock** or OPSS 1001 placed over a non-woven filter fabric Terrafix 270R or approved equivalent. **Concrete rip-rap will not be permitted.** The minimum thickness requirement of the erosion stone layer is 300 mm with no portion of the filter fabric to be exposed.

8.0 HYDRO SEEDING OF DRAIN BANKS

All existing drain banks and grassed areas disturbed by construction shall be hydro seeded using a Bonded Fibre matrix hydro mulch as specified herein. The existing ground surface to be seeded shall be loosened to a depth of 25 mm and shall be rendered uniformly loose for that 25 mm depth. The surface shall be predominantly fine and free from weeds and other unwanted vegetation. All other loose surface litter shall be removed and disposed of.

Bonded Fibre Matrix shall consist of thermally refined wood fibers and 10% cross-linked hydro-colloidal tackifiers. It should be 100% biodegradable. The curing period shall be not more than 48 hours. Bonded Fibre Matrix shall be hydraulically applied and after application be capable of adhering to the soil. In a dry state, shall be comprised of not less than 70% by weight of long, stranded wood fibres held together by organic or mineral bonding agents or both.

Bonded Fibre Matrix shall be applied at a minimum rate of 3,700 kg of dry product per 10,000 m^2. It shall be thoroughly mixed with water in a hydraulic seeder and mulcher at a rate of 20-30 kg of dry product to 500-600 litres of water to form a homogeneous slurry. Refer to OPSS.PROV 804 for specifications.

Seeding and mulching shall be a one step process in which the seed, fertilizer and hydraulic mulch are applied simultaneously in a water slurry via the hydraulic seeder/mulcher. The materials shall be added to the supply tank while it is being loaded with water. The materials shall be thoroughly mixed into a homogeneous water slurry and shall be distributed uniform, cohesive mat over the prepared surface. The materials shall be measured by mass or by a mass-calibrated volume measurement, acceptable to the Drainage Superintendent.

The hydraulic seeder/mulcher shall be equipped with mechanical agitation equipment capable of mixing the materials into a homogenous state until applied. The discharge pumps and gun nozzles shall be capable of applying the material uniformly. Grass seed shall be Canada No. 1 grass seed mixture meeting the requirements of a Waterway Slough Mixture as supplied by Growmark or approved equal, as follows:

Creeping Red Fescue	*20%*
Meadow Fescue	*30%*
Tall Fescue	*30%*
Timothy	*10%*
White Clover	*10%*

Bags shall bear the label of the supplier indicating the content by species, grade and mass. Seed shall be applied at a rate of 200 kg per 10,000 m². Fertilizer shall be 8-32-16 applied at 350 kg per 10,000 m². It shall be in granular form, dry, free from lumps and in bags bearing the label of the manufacturer, indicating mass and analysis.

The seeding shall be deemed "Completed by the Contractor" when the seed has established in all areas to the satisfaction of the Engineer. Re-seeding and/or other methods required to establish the grass will be given consideration to achieve the end result and the costs shall be incidental to the works.

9.0 REMEDIATION OF CONCRETE-LINED CHANNEL

9.1 Geosynthetic cementitious composite mat (GCCM)

The existing concrete channel from Station 1+004 to 1+473 is to be remediated by lining it with a geosynthetic cementitious composite mat (GCCM), product name and manufacturer being Concrete Canvas Ltd., including anchoring with both perimeter and intermediate fixings. Installation of the Concrete Canvas shall be done in accordance with these specifications and project drawings, and to the safety requirements as required by Arlanxeo Canada Inc. All materials shall meet or exceed the requirements of this specification and shall conform to all applicable national and international standards. The GCCM Manufacturer shall operate a Quality Assurance system independently certified under ISO9001. The Manufacturer shall provide to the Engineer a copy of their ISO9001 Registration Certificate together with a summary of quality control procedures undertaken by the Manufacturer at the production facility. The summary shall include the parameters checked and the frequency of the checks.

The material must have a valid British Board of Agrement (BBA) certificate for GCCM use in erosion control and weed suppression applications (including remediation of concrete structures affected by environmental degradation and cracking and culvert lining) with a durability of 120 years. The GCCM shall be manufactured by Concrete Canvas Ltd. or another manufacturer who manufactures the GCCM under legal licence from Concrete Canvas Ltd.

The GCCM shall be delivered, handled and stored in accordance with the Manufacturer's recommendations taking care to protect the material from damage and contamination. Each roll of GCCM delivered to site shall have instructions on the correct hydration procedure attached to it. The installer shall be responsible for collecting from the Manufacturer and supplying to the Engineer a Manufacturer's quality control certificate for each batch of material delivered to site. The GCCM shall be stored in the Manufacturer's packaging and only removed when the material is ready to be incorporated into the works. Once the packaging has been opened the GCCM shall be kept dry and used within one week. The on-site storage for the GCCM shall be clean, dry, under a cover, away from direct sunlight and shall protect the material from puncture, abrasion and excessive dirt and moisture. The GCCM shall not be stored in shipping containers where temperatures may exceed 40 degrees C for prolonged periods.

9.2 Existing Concrete Panel Surface Preparation

In preparation for the placement of concrete canvas liner, the Contractor shall carry out localized

concrete patches using a flexible cementitious mortar to fill any cracks and voids in the concrete including any spalling concrete surfaces. Form and injection methods may be used in specific areas where large voids and cracks are evident and as directed by the Engineer. The repair areas including cracks and spalled concrete surfaces are first to be pressure washed to clean and remove any dirt, sediment, and vegetation. Any loose concrete pieces are to be removed and voids filled with concrete. Hammer sounding shall be applied to detect any hollow sounds and deteriorated concrete in vicinity of spalled sections.

Where the depth of the concrete surface spalling is less than 38mm (1.5 inches) a bonding adhesive (Quikrete or approved equal) shall first be applied as a slurry to the cleaned surface prior to concrete mortar placement consisting of approximately 2 parts Portland cement to 1 part concrete bonding adhesive, or alternatively a vinyl resin based mortar mix is applied without the prior application of a bonding adhesive. Where a bonding adhesive is used, the Contractor shall apply a thin layer by trowel or brush to thoroughly cover surface at a maximum coverage rate of 7 m^2 for each US gallon of adhesive used. Once the bonding adhesive is dry to the touch or within a maximum 48 hours following its placement, the sealing non-shrink concrete grout topping shall be applied.

For deeper repairs beyond a 38 mm depth, a fast setting concrete mortar mix may be applied without first applying a bonding adhesive. However, it is imperative that the trapezoidal channel geometry is maintained to the original surface elevation and troweled for a uniform level surface traversing the channel prior to the placement of the concrete canvas to ensure intimate contact between the Concrete Canvas and the concrete substrate. A minimum 48 hours concrete curing time shall be provided for concrete repair work before the placement of the concrete canvas.

9.3 Lean Concrete Injection

In preparation for the placement of concrete canvas, inject 25 MPa lean concrete mixture to fill any voids existing that expose the underside of the existing concrete channel where it meets the top of drain bank (south side). This work to be completed prior to the placement of concrete canvas in order to stabilize and restore the integrity of concrete channel. A minimum 48 hours concrete curing time shall be provided for concrete repair work before the placement of concrete canvas.

9.4 Concrete Material

Concrete shall comply with the requirements of OPSS 1350 and the following specific requirements:

Class of Concrete:	25 MPa at 28 days
Course of Aggregate:	19 mm nominal max. size
Air Content:	7% + 1.5%
Maximum Slump:	60 mm

The ready mix supplier must certify that the plant, trucks and materials conform to CSA A23.1.

9.5 Canvas Placement and Precautionary Measures

Placing of the canvas shall be in accordance with the Installation Method Statement approved by the Engineer. The Installation Method Statement shall be written in accordance with the Manufacturer's installation guides including but not limited to:

- Surface preparation
- Layout drawings
- Proposed panel layout plan showing sequence of GCCM placement
- A simple and logical number/code for each panel which shall be recorded on the record sheets
- Termination details of the GCCM around the perimeter of the lined area
- Methods of jointing
- Methods of jointing around penetrations and upstands
- Methods of anchoring
- Hydration methodology

The Contractor shall visually inspect each roll of the GCCM during placing for imperfections and mark faulty or suspect areas. The canvas placement must be on a prepared subgrade free from angular rocks, roots, grass and vegetation. All foreign materials and protrusions must be removed, and all cracks and voids must be filled and the surface made level or uniformly sloped. The prepared surface must be free from loose earth, rocks, rubble and other foreign matter.

The installer must unroll the canvas using methods that will not damage it, and will protect the underlying surface from damage, for example use of a spreader bar for bulk and wide rolls. The Contractor shall take care not to over tension the GCCM during the laying process in order to avoid stretch marks or wrinkles. The material must be 'relaxed' to relieve any tension generated during deployment. This is achieved by lifting the GCCM by hand and repositioning. The installer may require temporary ballast by means of sandbags to hold down leading edge to prevent wind uplift. The installer must arrange the Concrete Canvas layers so that joints are aligned in accordance with the design drawings, and for hydraulic reasons, should be overlapped (shingled) in the direction of water flow, so water flows over the joints. This is facilitated by starting at the downstream end and working towards the source of the water flow. Personnel shall avoid walking on the liner with wet shoes prior to hydration to avoid stains, otherwise foot track is permissible. Smoking or the use of flame or torch anywhere near the product must be avoided at all times.

The installer shall be responsible for the GCCM at all times during the contract and shall adopt whatever measures are necessary to ensure its stability and protect it from damage. These measures shall include use of sandbags or other weights without sharp objects place on the GCCM immediately after laying and before seaming to prevent slipping and damage by wind. The installer shall ensure adequate restraint at free edges of the material before anchoring or fixing to the adjacent joint. Any damage to the GCCM or failures of joints rising from the installer's failure to secure the GCCM adequately during the works shall be remedied at the installer's expense.

9.6 Clamping Bar along top of channel both sides (Perimeter Fixings)

Perimeter fixings shall be installed in conformance with the Engineer's design details and the following requirements. Concrete canvas shall be secured with perimeter fixings for both sides of the existing concrete top flat portion of the concrete channel using stainless steel concrete anchor screws to secure down a stainless steel clamping bar to prevent movement of the canvas and to eliminate water and wind ingress which can result in material uplift. These fixings, as specified by the Engineer, have sufficient load bearing capacity and durability to resist shear and uplift forces to satisfy the product requirements. They shall comprise of heavy duty stainless steel SS316 hex-head concrete screw anchors, 3/8" x 4" length located at a minimum 500 mm spacing for both the CC8 and CC13 concrete canvas. The existing concrete channel shall have pre-drilled pilot holes using a hammer drill with 5/16" masonry drill bit for the setting of each anchor ensuring the depth of the drilled hole slightly exceeds the embedment of the anchor. All dust and debris to be removed from drilled holes prior to driving in each anchor.

The stainless steel clamping bar shall comprise of a T304 stainless steel flat bar 3/16" (5 mm) thickness x 1 1/4" (30 mm) width provided in 12 foot (3.6 m) lengths to be butted up against each piece of flat bar so to be continuous for the straight channel portion. For the curved channel segments, the clamping bar shall be cut into appropriate lengths, as required, to still ensure flat bar pieces butt together and form a continuous length that will fully be covering the concrete surface at the top of the existing channel. The location of the clamping bar shall be placed a minimum 100 mm away from the edge of the concrete canvas strips. Between the horizontal clamping bar and the concrete canvas, a continuous 10 mm thick neoprene rubber gasket, complete with an adhesive strip, shall be placed before fastening the clamping bar to the existing concrete channel. For the sections of concrete canvas where the clamping bar is to be fastened on a vertical concrete wall face, in lieu of the neoprene rubber gasket, an approved Concrete Canvas sealant such as SoudaSeal 250XF may be used. Perimeter fixings shall be secured prior to hydration of the concrete canvas.

9.7 Jointing (Intermediate Fixings)

The Engineer shall specify the jointing method taking into account joint strength, permeability and substrate composition in accordance with the Manufacturer guidelines appropriate to the application. The specified jointing method shall be incorporated into the Installer's Method Statement which shall be approved by the Engineer prior to commencement of installation. On large projects, the installer must cover the last strip of un-hydrated Concrete Canvas with use of a waterproof tarpaulin and raise it above ground at the end of each day to protect it from moisture or rainfall which may cause partial hardening and impinge on the next phase of jointing work.

Two product types of concrete canvas have been selected in the design of the channel lining application. CC8 (8 mm thickness) and CC13 (13 mm thickness) are both supplied in 1.1 m wide bulk rolls and can be cut to the required length (estimated to be 10.4 m long) to fully span the channel cross section. The thicker canvas (CC13) to be used, where specified, on the curved portion of the channel to resist hydraulic shear forces and in other areas along the straight channel where there is a greater potential for scour resulting from higher velocity flows. The 1.1 m wide canvas strips are to be shingled to provide a minimum 100 mm wide overlap, therefore each strip representing a 1 metre longitudinal distance covered. The overlaps are to be made in the direction of flows to prevent uplift. Intermediate fixings to secure the concrete canvas to the existing channel shall comprise of tapcon masonry anchor screws and adhesive sealants as specified herein.

Installation of stainless steel tapcon hex-head masonry screws, 1/4" x 2-3/4" length, , as the intermediate fixings securing the concrete canvas strip overlaps into the existing concrete channel, to be located as follows:

- Every 100 mm on centres for the CC13 canvas on the curved portion of channel, each accompanied with a 2" diameter stainless steel lever washer.
- Every 500 mm on centres for the CC8 and CC13 canvas on the straight portion of channel, each accompanied with a 5/8" diameter stainless steel washer.

To prevent water ingress, a continuous bead of SoudaSeal 250XF sealant to be first applied by caulking gun laterally to the underside of and near the edge of the canvas overlap joint. This is applied as a single 8 mm bead within 50 mm to 70 mm from the lap joint edge. The screws are inserted into the sealant where possible to minimize leakage. An 8 mm bead is equivalent to a 600 ml cartridge of sealant used per maximum 12 m joint length. ***It is important to hydrate the overlap prior to applying the adhesive sealant in order to remove excess dust, ensuring contact with the fibrous top surface of the bottom concrete canvas layer and to provide moisture for curing.***

The existing concrete channel shall have pre-drilled pilot holes using a hammer drill with 3/16" masonry drill bit for the setting of each anchor ensuring depth of drilled hole slightly exceeds the embedment of the anchor. All dust and debris to be removed from drilled holes prior to driving in each anchor.

The Contractor is responsible for the supply and installation of all material necessary to remediate the existing concrete-lined channel. The placement of the concrete canvas liner shall be undertaken from the south side of the existing concrete channel. Contractor is to take extreme care while working in close proximity to the process piping along the north drain bank in completing the installation of the concrete canvas liner. Contractor shall submit a detailed placement plan to the Engineer and City of Sarnia for their review and approval at least two weeks in advance of implementing the work.

9.8 Lateral pipe penetrations through channel side slopes

Following the existing channel repairs by parging of spalled and cracked concrete, a Concrete Canvas (CC5) is to be fully wrapped around all the existing lateral pipes circumference. It is recommended the concrete canvas be cut to suit to form a donut gasket from the 1.1 m wide roll to slip over the pipe diameter and allowing for a minimum 100 mm wide overlap onto pipe and concrete channel. This work shall be done prior to the placement of the Concrete Canvas overlay across the concrete channel.

A continuous 8 mm bead of SoudaSeal 250XF sealant to be applied to both the overlap on pipe and concrete channel. The donut gasket canvas layer to be wetted just prior to fixing down channel canvas overlay with fixing screws.

The concrete canvas for the channel overlay shall have a hole cut precisely to pipe diameter and location such that it will drape over pipe protrusion. Another continuous 8 mm bead of SoudaSeal 250XF sealant to be applied to underside of concrete canvas overlay and then fastened down to the concrete channel using stainless steel tapcon hex-head masonry screws, ¼" x 2 3/4" length into pre-drilled holes around the pipe perimeter and evenly spaced at a minimum 200 mm distance. Where the shingled overlap joints of the concrete canvas overlay are in same location as the lateral pipes, the Contractor shall measure and precut, as required, to ensure at least 100 mm clearance is provided between the lap joint on the channel wall and the side of the pipe.

9.9 Hydration

A stiff brush may be used to clean the surface of the product prior to hydration, in order to remove footprints and dust accumulation and to prevent staining of the set material. Hydration of Concrete Canvas must be undertaken by the installer in accordance with the Certificate Holder's Hydration Guidelines. After fixing and jointing, gently spray the Concrete Canvas with water to hydrate and ensure all areas are applied as evenly as possible. Do not use a pressure washer to apply water directly as this may displace and distort internal cementing materials making repairs challenging.

Spray the fibre surface with water until it feels wet to touch for several minutes after spraying. An excess of water is always recommended. The GCCM will set underwater. Re-spray the GCCM again after 1 hour if installing canvas on a steep surface. A spray nozzle shall be used. GCCM has a working time of 1-2 hours after hydration and shall not be moved or trafficked once it has begun to set. The GCCM will set hard within 24 hours but will continue to gain strength over time. The minimum amount of water must be equal to 50% of the material weight.

For CC8 canvas this equates to minimum 6 litres of water per square metre and for CC13 canvas this equates to minimum 9.5 litres per square metre. A quick check for adequate hydration is to make small thumb depression in canvas surface and if water is visible in the depression, then it has been sufficiently hydrated. There is approximately a working time of 1 to 2 hours before concrete sets after hydration and after 24 hours the concrete is expected to obtain 80% of its full strength. Monitor for first 5 hours and respray as soon as the surface ceases to be wet to the touch.

9.10 Delivery and site handling

A bulk roll weighs approximately 1500 kg to 1600 kg each and comes packed in a polyethylene bag that is vacuumed and thermally sealed and placed on a pallet wrapped in shrink-wrap. Concrete Canvas must be stored under cover in dry conditions away from direct sunlight and left in the manufacturer's sealed packaging until ready to use. All product bundles and rolls must be handled with care to avoid damage to coatings, and require suitable mechanical equipment for lifting. An assessment shall be made to determine the appropriate number of people to lift and satisfy health and safety requirements for manual lifting. For example, a typical 10.4 m long x 1.1 m wide pre-cut CC13 section from a bulk roll weighs approximately 220 kg and same CC8 section weighing 140 kg. Provincial guidelines suggest repetitive lifting should not exceed 23 kg per person, which equates to minimum 7 to 10 workers required to lift the canvas dependent on product thickness. A spreader bar is provided as a rental from the concrete canvas supplier to attach each bulk roll of canvas to and hoisted by appropriate lifting equipment (i.e. excavator) to minimize the amount of manual lifting and work crew size where required.

9.11 Inspection and Evaluation

The GCCM and its joints shall be visually inspected by the installer for defects, holes or damage due to weather conditions or construction activities. A daily inspection report will note the area of inspection time, date and who inspected the area, when the GCCM was installed and when it was fully

hydrated recording weather conditions at the time (temperature and precipitation). Inspection shall be completed prior to and after hydration. Repair and replace any torn or damaged GCCM. Perform repairs in accordance with Manufacturer's requirements. Remove and replace GCCM rolls which cannot be repaired.

9.12 Site Access

The Contractor shall complete the installation of the Concrete Canvas from the south side of the existing concrete channel. The existing concrete barrier and steel cable fence shall be temporarily relocated if necessary to complete the drainage improvements and then returned to its original location thereafter following completion of the channel repair works. The existing gravel laneway where disturbed shall be restored to original conditions.

9.13 Temporary Rerouting of Industrial Process Water Flows

Of specific note, the strategy is to take into consideration the high volume spillway flow at Station 1+410 (LCY Biosciences), at a maximum continuous flow rate of approximately 0.72 m^3/s, and the high volume pipe discharge from the outlet structure at Station 1+260 (H.C. Starck), with continuous approximate average flow volumes of 0.10 m^3/s in Spring/Fall/Winter and 0.125 m^3/s in summer. The Contractor is responsible to coordinate management of flows from these sources while minimizing disruption to these sources in performing work downstream within limits of channel. This may include the provision of overland piping to temporarily divert flows to enter the concrete channel downstream of the repair works. No external flows shall be permitted into the repaired channel for at least 7 days following placement of the Concrete Canvas. A flow management strategy plan including the design of any piped conveyance systems shall be the Contractor's responsibility to submit at least two weeks prior for review and approval of the Engineer and Arlanxeo Canada In. before implementation.

For existing base flows and storm flows for the Cut-off Drain that enter within the work area or are being received from upstream of the works, the Contractor shall provide temporary flow dams, a continuous pumping system with a piped conveyance system to divert flows around the work area. Dams consisting of sand bagging or by other means shall not exceed 1 metre in height. The Contractor shall be required to remove the temporary dams at the end of each work day unless prior approval has been granted to have standby pumps in continuous operation along with full time supervision during off work hours. The Contractor shall not undertake any channel repair work or concrete placement within 48 hours of any probable storm runoff event to ensure that no recently placed section of Concrete Canvas is subjected to drainage flows. Any damage caused to the Concrete Canvas by drainage flows or other causes shall be the responsibility of the Contractor to fully rectify. A flow management strategy plan including the design of any piped conveyance systems shall be the Contractor's responsibility to submit at least two weeks prior for review and approval of the Engineer and Arlanxeo Canada In. before implementation.

10.0 HOT MIX, HOT LAID ASPHALTIC CONCRETE

OPSS Form 310 shall apply and govern the work except as amended or extended herein. This item covers asphalt driveway travelled surface restoration.

The Contractor shall supply and place hot mix, hot laid asphaltic concrete (HL4 binder and HL3 surface) as detailed on the Contract Drawings, including the use of the specified performance grades of asphalt cement, as shown on the Contract Drawings. The Contractor shall retain a qualified material testing company, at his expense, to design the mixes. The mix designs shall be submitted to the Contract Administrator for review prior to carrying out any asphalt placement. The maximum percentage of recycled asphalt in the mix design shall be 15 percent.

Prior to placing the finish course asphalt, the Contractor shall mill headers if directed by the Contract Administrator, clean existing pavements of all dirt, loose sand or other foreign material, which may prevent proper bonding. A tack coat shall be applied if existing pavement cannot be adequately cleaned.

No asphalt shall be placed on a wet or damp surface or one which is not properly brushed to remove loose gravel etc. The pavers shall be operated at whatever speed is necessary to match the output of the plant to ensure continuous operation of the pavers but conditional on a consistent and satisfactory mat being laid and compacted.

11.0 CLEANING OF PRIVATE ACCESS BRIDGES, ROAD BRIDGES AND RAIL BRIDGES

At the locations specified, the Contractor shall clean the existing pipes, bridges or bridges to their full capacity and cross section or width. The operation may be carried out by mechanical means or by flushing. Any damage resulting from the Contractor's operation shall be rectified at his expense. All material removed from the pipes, bridges or bridges shall be transported off-site to an approved location arranged by the Contractor. The Contractor shall be solely responsible for acquiring all permits required for the dump site. The Contractor shall take precautions during the construction period to avoid re-sedimentation of the pipes and bridges. Any sediment deposited as a result of construction activities shall be removed at the Contractor's expense.

12.0 REHABILITATION OF CSP PIPE (BRIDGE No. 1)

The existing twin 2440 mm diameter CSP culverts located at Station 1+283 shall be remediated using Concrete Canvas (CC8) inside the bottom half of the pipes. Prior to canvas liner placement, the culverts shall be first thoroughly cleaned to remove any sediment and debris. A bonding agent or general purpose PVA adhesive shall be applied to the corrugations of the pipes prior to filling them with a concrete grout mix to provide a suitable fixing surface and to minimize void spaces underneath the Concrete Canvas once it is applied. Once the concrete grout has been given a minimum 48 hours to set, the canvas overlay may proceed.

The canvas sections shall be cut from a 1.1 m wide bulk roll and placed by hand due to restricted access. Similar to the concrete channel repair, the concrete canvas (approximately 3.5 m length) shall be laid transversely across the width of the pipe. The said section of canvas weighing approximately 46 kg and requiring a minimum of two persons to manually lift into place safely in accordance with Health and Safety guidelines. The adjacent canvas layers shall be overlapped by 100 mm and shingled in the direction of flow. The canvas overlaps shall be screwed together into the grout filled corrugations using stainless steel tapcon hex-head screws 1/4" x 1-1/4" long at 200 mm centres and left unsealed thereby creating weep paths to prevent buildup of any hydrostatic pressure behind the canvas. The grout filled corrugations shall have pre-drilled pilot holes using a hammer drill and 3/16" masonry drill bit for the setting of each masonry screw ensuring the depth of drilled hole slightly exceeds the embedment of the masonry screw. All dust and debris to be removed from drilled holes prior to inserting each screw. The top edges of the Concrete Canvas shall be sealed using a steel/concrete epoxy grout (Loctite Fixmaster Deep Pour Grout or approval equal) to be applied liberally by brushing over the steel pipe and concrete canvas a minimum 100 mm width to seal and prevent water ingress behind the material. On the upstream side of the culvert pipes the Concrete Canvas edges shall also be sealed in a similar fashion. Once the grout has cured after a minimum 24 hours, the Concrete Canvas shall then be hydrated to the same specifications as described in Special Provision No. 9.9.

13.0 ACCESS BRIDGES (COLE DRAIN)

13.1 Location of New Access Bridges

The new bridges shall be installed as shown on the drawings attached hereto. The centerline of the new bridges shall be located to align with the existing driveways.

13.2 Removal of Existing Private Access Bridges

The Contractor shall exercise caution when removing these materials as to minimize damage to the drain banks. Any damage to the drain shall be restored to original conditions at the expense of the Contractor. The removed materials (existing culvert debris and end wall materials) shall be hauled away off-site and disposed at an approved site.

13.3 Pavement Removal (All Types)

Pavement removal includes the removal and disposal of identified driveways, as shown on the drawings or as directed by the Contract Administrator. Concrete driveways shall be removed to a control joint or as directed by the Contract Administrator. OPSS Form 210 shall apply and govern except as extended or amended herein.

13.4 Bridge Materials

Culvert Pipe

Bridge No. 20 – Station 6+431: *New 11.5 m long, 3890 mm x 2690 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 21 – Station 6+492: *New 29.5 m long, 3890 mm x 2690 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 22 – Station 6+662: *New 11.5 m long, 3890 mm x 2690 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 24 – Station 7+161: *New 11.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 25 – Station 7+324: *New 11.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 26 – Station 7+355: *New 12.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 27 – Station 7+483: *New 14.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 28 – Station 7+581: *New 11.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 29 – Station 7+610: *New 11.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 30 – Station 7+739: *New 20.0 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 31 – Station 7+795: *New 15.0 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.*

Bridge No. 32 – Station 7+879: *New 11.5 m long, 3650 mm x*

	2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends. **Bridge No. 33 – Station 7+926:** *New 9.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.* **Bridge No. 34 – Station 7+959:** *New 9.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.* **Bridge No. 35 – Station 7+999:** *New 14 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.* **Bridge No. 36 – Station 8+045:** *New 14 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.* **Bridge No. 37 – Station 8+045:** *New 11.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.* **Bridge No. 38 – Station 8+205:** *New 11.5 m long, 3650 mm x 2280 mm aluminized Type II corrugated steel pipe arch (CSPA) wall thickness of 3.5 mm and 125 x 25 mm corrugations with rerolled ends.* *New culvert shall be joined with annular aluminized corrugated wide bolt and angle couplers (minimum of 8 corrugation overlap and 2.8 mm wall thickness) and no single pipe less than 6.0 m in length. All pipes connected with couplers shall abut to each other with no more than a 25 mm gap between pipes prior to installation of the coupler and wrapped with filter fabric.*
Pipe Bedding Below Pipe up to pipe springline	*19 mm clear stone conforming to OPSS Division 10.*
Backfill up to Underside of Driveway Surface Materials	*Granular 'B' made from crushed limestone conforming to OPSS Division 10.*
Gravel Driveway Surface	*Granular 'A' made from crushed limestone conforming to OPSS Division 10. Minimum 300 mm thickness.*
Backfill up to underside of Concrete Driveway Surface	*Granular 'A' made from crushed limestone conforming to OPSS Division 10. Minimum 200 mm thickness.*
Backfill up to underside of Asphalt Driveway Surface	*Granular 'A' made from crushed limestone conforming to OPSS Division 10. Minimum 300 mm thickness.*
Concrete Driveway Surface	*30MPa Concrete surface. Minimum 200 mm thickness.*

Asphalt Driveway Surface	*Premium HL3 surface and HL4 base hot mix asphalt surface, minimum 50 mm thickness.*
Erosion Stone	*All stone to be used for erosion protection shall be 125 - 250 mm clear quarried rock or OPSS 1004, minimum 300 mm thickness.*
Pre-Cast Concrete Blocks	*New Concrete lock blocks, 600 mm x 600 mm x 1200 mm (full block), 600 mm x 600 mm x 600 mm (half length block), 600 mm x 300 mm x 1200 mm (half height block), 600 mm x 300 mm x 600 mm (half height, half length block) with filter fabric underlay.*
Buffer Strips	*Dry native material free of topsoil, organic matter, broken concrete, steel, wood and deleterious substances.*
Filter Fabric	*"Non-Woven" geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 4546, Mirafi 140NC or approved equivalent.*

13.5 Bridge Installation

Suitable dykes shall be constructed in the drain so that the installation of the pipe can be accomplished in the dry. The drain bottom shall be cleaned, prepared, shaped and compacted to suit the new culvert configuration, as shown on the drawings. Granular materials shall be compacted to 100% of their maximum dry density; imported clean native materials shall be supplied, placed and compacted to 95% of their maximum dry density.

13.6 Vertical Concrete Lock Block End Walls

End walls shall be constructed of interlocking concrete blocks as shown on the attached drawings using 600 mm wide x 600 mm high x 1200 mm long blocks. Where specified, the contractor shall make use of half blocks (600 mm x 600 mm x 600 mm), half-high blocks (600 mm x 300 mm x 1200 mm), and half-high, half blocks (600 mm x 300 mm x 600 mm). Each end wall shall extend from the invert of the new culvert to the top of the proposed driveway. The concrete block end walls shall be set at a 10:1(V:H) batter. Each layer of blocks for each endwall shall be tied back with uniaxial high strength geogrid (Stratagrid SG 550) minimum 4.5 m long within reinforcement zone backfilled with granular 'B' compacted to minimum 98% S.P.D. The concrete block end walls shall be keyed into the existing drain banks and provided with a filter fabric backing to separate the backfill materials from the concrete blocks. All void space between the culvert and the concrete blocks shall be filled with concrete minimum 30 MPa compressive strength.

Other styles and sizes of concrete blocks may be considered for the construction of the end walls. If the Contractor wishes to use concrete blocks that vary from the style or size specified, he/she shall submit the manufacturers block Specifications and an intended block layout plan to the Drainage Superintendent and/or the Engineer prior to commencing construction. Any additional costs incurred from the use of alternative blocks shall be the Contractors responsibility.

13.7 Granular 'A' Driveway

The Contractor shall restore the driveway surface affected by the replacement of the bridge with a maximum 3% longitudinal grade approach over the new culvert providing a minimum cover as per OPSD 805.020. This work includes the installation of a minimum 200 mm thickness of compacted Granular 'A' (crushed limestone) surface. The minimum top width of the driveway shall be as shown on the drawings.

13.8 Concrete Driveway

The Contractor shall restore the concrete driveway surface affected by the replacement of the bridge with a maximum 3% longitudinal grade approach over the new culvert providing a minimum cover as per OPSD 805.020. This work includes the installation of a minimum 300 mm thickness of compacted Granular 'A' (crushed limestone) surface, and a minimum 200 mm thickness of concrete driveway surface. The minimum top width of the driveway shall be as shown on the drawings.

13.9 Asphalt Driveway

The Contractor shall restore the asphalt driveway surface affected by the replacement of the bridge with a maximum 3% longitudinal grade approach over the new culvert providing a minimum cover as per OPSD 805.020. The asphalt hot mix thickness (compacted) shall be a minimum 80 mm to be properly leveled and compacted using mechanical steel drum compaction equipment. A minimum Mix Marshall Stability reading of 5,800 shall apply and be conformed to when using HL3 hot mix asphalt for low traffic volumes such as driveway applications. The minimum top width of the driveway shall be as shown on the drawings.

13.10 Guiderail Re-Installations

The Contractor shall salvage existing guide rails with care as to not damage the guide rails. Guide rails are to be re-affixed on the top surface of the concrete block headwall.

Where guide rails are not straight or in alignment with the block headwall, the guide rail is to be re-fabricated as to be able to be affixed to the top surface of the concrete block headwall.

13.11 Lateral Tile Drains

Should the Contractor encounter any lateral tiles within the proposed culvert limits not shown on attached drawings, the Contractor shall re-route the outlet tile drain(s) in consultation with the Drainage Superintendent, as required, to accommodate the new culvert. **Tile drain outlets through the wall of the new culvert pipe will not be permitted.** All costs associated with re-routing lateral tile drains (if any) shall be at the Contractor's expense. Care must be taken in handling plastic drain pipe in cold weather to avoid causing damage. Plastic drain pipe shall be held in position on planned grade immediately after installation by careful placement of backfill material.

15.0 CLOSED-CIRCUIT TELEVISION INSPECTION – FUTURE MAINTENANCE

The future maintenance of the enclosed outfall structure will require periodic closed-circuit television inspection which will be coordinated between Arlanxeo Canada Inc. and the City of Sarnia. OPSS Form 409 shall apply and govern except as amended or extended herein. The closed drain will be inspected from Station 0+628 to 1+000.

16.0 SLUICE GATE ARRANGEMENT, CULVERT & CONCRETE HEADWALL

The existing culvert across McGregor Drive at Station 0+407.5A (Bridge No. 3A on the Cole Diversion Drain Branch 'A') shall be removed and replaced with a 15 m length of 900 mm diameter Armtec Boss 2000 high density polyethylene (HDPE) culvert, minimum 320 kPa stiffness. All other materials and installation will be in accordance with Section 13.4 to 13.10 herein.

A concrete headwall will be constructed in accordance with OPSD 804.030 at the east end of the culvert. The inlet end of the pipe shall be fitted with a medium duty sluice gate mounted to the concrete headwall.

16.1 Sluice Gate

A medium duty sluice gate will be used to control flow through the branch drain. The sluice gate must be a stainless steel medium duty sluice gate and have a gate diameter of 914 mm (Armtec Model 20-10C Standard or approved equal). The sluice gate must be installed on the concrete headwall in accordance with manufacturer's recommendations.

16.2 Concrete Headwall

Precast concrete headwall as per OPSD 804.030 shall be installed at Station 0+405A on the east end of the 900 mm diameter culvert in conjunction with the installation of the sluice gate. OPSS Form 407 shall apply and govern except as amended or extended herein.

Backfill shall be approved OPSS Granular "B", Type I uniformly, mechanically compacted to 98 percent of the Standard Proctor Maximum Dry Density. Hand held mechanical compaction equipment shall be used where other conventional compaction equipment cannot be used.

16.2.1 Excavation

Excavation will be undertaken as necessary to construct the concrete headwall. The excavation will be governed by OPSS 182, 902 and 507 except as extended or amended herein. The Contractor shall excavate neat to the lines and grades specified on the drawings. All excavations shall be kept dry during the construction period. No equipment shall be allowed in the excavation prior to the placing of the working mat. The Contractor shall excavate for the construction of the proposed footing, including grading and shaping of the proposed subgrade and all necessary work to the limits shown on the Contract Drawings.

16.2.2 Concrete

The concrete headwall will be constructed in place. OPSS 904, 905 and 919 shall apply and govern except as extended or amended herein. This includes the supply, placing and finishing of all concrete in the structure, including footings as shown on the drawings or as specified herein. Mass concrete shall be placed within 4 hours of excavation.

Concrete, except mass concrete, shall be designed to provide minimum compressive strength of 35 MPa at 28 days with not less than the minimum cement content nor more than the maximum water content as outlined in OPSS 1350 (municipal). The maximum water-cement ratio shall be 0.4. Maximum water content shall include free water in aggregates. The mix shall be designed to provide a maximum slump of 100 mm for all concrete on the project unless ordered otherwise in writing by the Contract Administrator. Concrete shall be finished as outlined in OPSS 904. The Contractor to make all provisions for hot and cold weather concreting as may be required. No extra payment shall be made for hot and cold weather concreting.

17.0 BRIDGE DECK REMOVAL (Station 1+782)

The Contractor shall remove and dispose of the deck of the structure located at Station 1+782. Abutments, footings and pilings (if any) may remain in place. Extreme care must be taken when removing the bridge to ensure no material falls into the drain. All material falling into the drain shall be promptly removed.

Burying of broken concrete or other debris at the site will not be allowed. All materials removed from the site shall be disposed of in accordance with all local, provincial and federal regulations.

The Contractor shall note the existence of utilities in the vicinity of the structures. Extreme care shall be exercised when working adjacent to utilities.

OPSS Form 182, 510, 517 and 518 shall apply and govern except as extended or amended herein.

18.0 FLOW MANAGEMENT

Flow management is to be undertaken during project implementation to manage water level within the drain to facilitate construction. The Contractor will develop a strategy for management of flow. The strategy will be submitted for review and approval 30 days prior to execution. The flow management strategy is to approach flow management in staged format in order to ensure the overall performance of the work is not compromised.

Of specific note, the strategy is to take into consideration the high volume flow at Station 1+410, at a maximum continuous flow rate of approximately 0.72 m^3/s, and the high volume from the outlet structure at 1+260, with continuous approximate average flow volumes of 0.10 m^3/s in Spring/Fall/Winter and 0.125 m^3/s in summer. The Contractor is responsible to coordinate management of flow from these sources while minimizing disruption to these sources in performing work downstream within limits of channel.

19.0 DEWATERING & SEDIMENT CONTROL

OPSS Form 182, 517, 518, 577 and 902 shall apply and govern except as extended or amended herein. The St. Clair Region Conservation Authority (SCRCA) shall be notified at least 24 hours prior

to initiation of any construction and be notified no more than 24 hours following completion of the work. No in-stream work or construction activity shall occur from March 15th to June 30th without specific written permission form the SCRCA.

The Contractor shall determine and select his/her own method for completing the work in the dry, including installation and subsequent removal of any cofferdams, earth walls, sheet piling, or drain by-passes, etc. Flow through and into the drain must be maintained at all times. The overall method of flow control shall not retard flows from large storm events causing potential upstream damage. The method of maintaining the flow in the drain shall be provided to the Engineer, along with all drawings and shop drawings for review, thirty (30) days prior to commencement of the work. The Contractor shall note that the drain services a large amount of upstream land and is prone to rapid water level changes during rainfall periods.

Sediment and erosion control measures shall be implemented prior to and regularly inspected and maintained during the construction phase, to prevent entry of sediment into the water. All activities, including maintenance procedures, should be controlled to prevent the entry of petroleum products, debris, rubble, concrete or other deleterious substances into the water. Vehicular re-fuelling and maintenance should be conducted away from the water. Any part of equipment entering the water should be free of fluid leaks and externally cleaned/degreased to prevent any deleterious substances from entering the water. Any stockpiled materials should be stored and stabilized away from the water. Only clean material free of fine particulate matter should be placed in the water.

As part of this item, the Contractor shall supply, place and remove a 600 mm high silt fence around the site where required, to ensure all surface runoff is treated prior to entering the drain. The Contractor shall install straw bale check dams as required.

Prior to commencing dewatering from the cofferdam, the Contractor shall carefully capture all wildlife and fish from within the cofferdam to be immediately released downstream of the structure.

All required dewatering efforts shall be undertaken by the Contractor, to ensure all work is completed in the dry. All sediment laden runoff from the site shall be filtered prior to entering the drain, using suitable methods, as approved by the Engineer.

After all construction is complete and vegetation has been established, remove silt build-up in front of silt fence, check flow and remove silt fence.

20.0 ACCESS TO WORK AREA, WORK PLATFORMS AND SCAFFOLDING

Construction of the project will be done with the following stipulations regarding access to the working area, working platforms and scaffolding (as applicable).

OPSS.MUNI 928 shall apply and govern except as amended or extended herein.

Section 928.01 of OPSS.MUNI 928 is amended by the addition of the following:

- This specification covers the requirements for temporary access required to carry out the work as indicated on the Contract Drawings.
- This specification also covers the work required to provide protection systems to prevent concrete and any other materials from falling into the water during removal and construction works.
- As part of this specification, the Contractor will be responsible for erecting and maintaining any temporary supports necessary as part of the dewatering and flow diversion measures.

  Clause 928.04.02.01 of OPSS.MUNI 928 is amended by the addition of the following:

- The Contractor shall give the Contract Administrator written notice a minimum of 3 weeks prior to the date that permission is required to proceed with any concrete removal or concrete saw cutting.
- The notice shall include six (6) copies of written descriptions, working drawings and schedules

that provide the following:

- The sequence and method of control measures during:
  - Removal of concrete.
  - Structure repair including concrete placement.
  - Concrete saw cutting.
- The details of any construction loads imposed on the existing structure by the control measures.

- Permission to proceed with the above will be provided if the Contract Administrator determines that the details of notice meet the requirements of this specification and OPSS.MUNI 928.
- Any working platform used for the above shall contain the seal and signature of the Design Engineer and the Design Check Engineer.

Construction

Subsection 928.07.03 of OPSS.MUNI 928 is amended by the addition of the following:

- The Contractor shall take such measures and provide such protection system or systems to prevent entry of the following materials into the water or onto the land below:
  - Materials resulting from concrete removal.
  - Materials resulting from structure repair.
  - Effluent from saw cutting.
- All effluent from the saw cutting operation shall be collected to prevent contamination of the environment.
- Excess materials resulting from concrete removal and structure repair, and effluent from saw cutting shall be managed as specified elsewhere in the Contract.

21.0 BUSINESS INFORMATION SIGNS

Based on the Contractor's intended construction phasing plan, the Contractor is required to erect and post notification signs throughout the area which notifies the pedestrian and vehicular traffic of entrance changes for businesses throughout the commercial area of the project, and any requirements for alternate access points, and the expected duration of this detour. All sign locations are to be coordinated with the Owner and the Contract Administrator prior to the placement of these signs. All signs are to be prepared by the Contractor. The Contractor shall supply all labour, equipment and materials to build the sign base that the sign board will be attached to. The Contractor is responsible for maintenance of the business information signs throughout the project. The signs shall be 1.22 m x 1.22 m (4'x4').

22.0 UTILITY CO-ORDINATION

This item is intended to cover the cost associated with the co-ordination of all utilities that need to be relocated, supported, moved, exposed, flagged and adjusted by the utility companies, or other obstructions as noted herein that need to be exposed by the Contractor during construction.

There are many instances of utilities crossing and directly adjacent to the Cole, Cut-Off and Cole Diversion Branch A & B Drains, including buried, above grade and overhead. Notification to each utility that work is being conducted in the location of the crossing is required a minimum of 48-hours, or as stipulated by each utility. All utilities within the construction limits of this project shall be located prior to construction. The Contractor shall arrange for locates of all utilities prior to commencing any work. The Contractor shall co-ordinate their schedule with any relocation works required and shall temporarily support utilities as required to complete the contract works.

The Contractor should note that additional coordination efforts will be required with utilities for multiple piped utility crossings below, at and above grade on channel profile. Utilities will be support as directed by the utility in question.

23.0 TEMPORARY EROSION CONTROL

The contractor shall prepare and submit an Erosion and Sediment Control Plan to the Contract Administrator for review. The Contractor's Sediment and Erosion Control Plan shall include the installation of heavy duty silt barriers, erosion control blankets, etc. all to be implemented prior to any work commencing. Work under this item includes all necessary measures during construction to preserve and protect the site and prevent erosion. OPSS Drawings shall apply and govern except as amended and extended herein.

24.0 CHANNEL LINER MODIFICATIONS AT EXISTING TRASH SCREEN & WALKWAY

Contractor to modify existing and new channel liner around existing steel walkway and trash screen at Station 1+428 to allow trash screen to move and operate freely in the re-configured channel profile. The Contractor shall submit a plan to the Drainage Superintendent for review and approval prior to making the necessary modifications.

GENERAL SPECIFICATIONS

1.0 AGREEMENT AND GENERAL CONDITIONS

The part of the Specifications headed "Special Provisions" which is attached hereto forms part of this Specification and is to be read with it. Where there is any difference between the requirements of this General Specification and those of the Special Provisions, the Special Provisions shall govern. Where the word "Drainage Superintendent" is used in this specification, it shall mean the person or persons appointed by the Council of the City having jurisdiction to superintend the work.

Tenders will be received and contracts awarded only in the form of a lump sum contract for the completion of the whole work or of specified sections thereof. The Tenderer agrees to enter into a formal contract with the City upon acceptance of the tender. The General Conditions of the contract and Form of Agreement shall be those of the Stipulated Price Contract CCDC2-Engineers, 1994 or the most recent revision of this document.

2.0 EXAMINATION OF SITE, PLANS AND SPECIFICATIONS

Each tenderer must visit the site and review the plans and specifications before submitting his/her tender and must satisfy himself/herself as to the extent of the work and local conditions to be met during the construction. Claims made at any time after submission of his/her tender that there was any misunderstanding of the terms and conditions of the contract relating to site conditions, will not be allowed. The Contractor will be at liberty, before bidding to examine any data in the possession of the City or of the Engineer. The quantities shown or indicated on the drawings or in the report are estimates only and are for the sole purpose of indicating to the tenderers the general magnitude of the work. The tenderer is responsible for checking the quantities for accuracy prior to submitting his/her tender.

3.0 MAINTENANCE PERIOD

The successful Tenderer shall guarantee the work for a period of one (1) year from the date of acceptance thereof from deficiencies that, in the opinion of the Engineer, were caused by faulty workmanship or materials. The successful Tenderer shall, at his/her own expense, make good and repair deficiencies and every part thereof, all to the satisfaction of the Engineer. Should the successful Tenderer for any cause, fail to do so, then the City may do so and employ such other person or persons as the Engineer may deem proper to make such repairs or do such work, and the whole costs, charges and expense so incurred may be deducted from any amount due to the Tenderer or may be collected otherwise by the City from the Tenderer.

4.0 GENERAL CO-ORDINATION

The Contractor shall be responsible for the coordination between the working forces of other organizations and utility companies in connection with this work. The Contractor shall have no cause of action against the City or the Engineer for delays based on the allegation that the site of the work was not made available to him by the City or the Engineer by reason of the acts, omissions, misfeasance or non-feasance of other organizations or utility companies engaged in other work.

5.0 RESPONSIBILITY FOR DAMAGES TO UTILITIES

The Contractor shall note that overhead and underground utilities such as hydro, gas, telephone and water are not necessarily shown on the drawings. It is the Contractor's responsibility to contact utility companies for information regarding utilities, to exercise the necessary care in construction operations and to take other precautions to safeguard the utilities from damage. All work on or adjacent to any utility, pipeline, railway, etc., is to be carried out in accordance with the requirements of the utility, pipeline, railway, or other, as the case may be, and its specifications for such work are to be followed as if they were part of this specification. The Contractor will be liable for any damage to utilities.

6.0 CONTRACTOR'S LIABILITY

The Contractor, his/her agents and all workmen or persons under his/her control including sub-contractors, shall use due care that no person or property is injured and that no rights are infringed in the prosecution of the work. The Contractor shall be solely responsible for all damages, by whomsoever claimable, in respect to any injury to persons or property of whatever description and in respect of any infringement of any right, privilege or easement whatever, occasioned in the carrying on of the work, or by any neglect on the Contractor's part.

The Contractor, shall indemnify and hold harmless the City and the Engineer, their agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of or attributable to the Contractor's performance of the contract.

7.0 PROPERTY BARS AND SURVEY MONUMENTS

The Contractor shall be responsible for marking and protecting all property bars and survey monuments during construction. All missing, disturbed or damaged property bars and survey monuments shall be replaced at the Contractor's expense, by an Ontario Land Surveyor.

8.0 MANAGEMENT OF FLOW

The Contractor shall develop a strategy providing details for management of flow within the drain during construction, to be addressed in stages, for review and approval.

9.0 ONTARIO PROVINCIAL STANDARDS

Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD) shall apply and govern at all times unless otherwise amended or extended in these Specifications or on the Drawing. Access to the electronic version of the Ontario Provincial Standards is available online through the MTO website, free of charge to all users. To access the electronic standards on the Web go to http://www.mto.gov.on.ca/english/transrd/. Under the title Technical Manuals is a link to the Ontario Provincial Standards. Users require Adobe Acrobat to view all pdf files.

10.0 APPROVALS, PERMITS AND NOTICES

The construction of the works and all operations connected therewith are subject to the approval, inspection, by-laws and regulations of all Municipal, Provincial, Federal and other authorities having jurisdiction in respect to any matters embraced in this Contract. The Contractor shall obtain all approvals and permits and notify the affected authorities when carrying out work in the vicinity of any public utility, power, underground cables, railways, etc.

11.0 SUBLETTING

The Contractor shall keep the work under his/her personal control, and shall not assign, transfer, or sublet any portion without first obtaining the written consent of the City.

12.0 TIME OF COMPLETION

The Contractor shall complete all work on or before the date fixed at the time of tendering. The Contractor will be held liable for any damages or expenses occasioned by his/her failure to complete the work on time and for any expenses of inspection, superintending, re-tendering or re-surveying, due to their neglect or failure to carry out the work in a timely manner.

13.0 TRAFFIC CONTROL

The Contractor will be required to control vehicular and pedestrian traffic along roads at all times and shall, at his/her own expense, provide for placing and maintaining such barricades, signs, flags, lights and flag persons as may be required to ensure public safety. The Contractor will be solely responsible for controlling traffic and shall appoint a representative to maintain the signs and warning lights at night, on weekends and holidays and at all other times that work is not in progress. All traffic control

during construction shall be strictly in accordance with the **Occupational Health and Safety Act** and the current version of the **Ontario Traffic Manuals**. Access to the electronic version of the **Ontario Traffic Manual** is available online through the MTO website, free of charge to all users. To access the electronic standards on the Web go to http://www.mto.gov.on.ca/english/transrd/, click on "Library Catalogue," under the "Title," enter "Ontario Traffic Manual" as the search. Open the applicable "Manual(s)" by choosing the "Access Key," once open look for the "Attachment," click the pdf file. Users require Adobe Acrobat to view all pdf files.

Contractors are reminded of the requirements of the Occupational Health and Safety Act pertaining to Traffic Protection Plans for workers and Traffic Control Plan for Public Safety.

14.0 SITE CLEANUP AND RESTORATION

As part of the work and upon completion, the Contractor shall remove and dispose of, off-site any loose timber, logs, stumps, large stones, rubber tires, cinder blocks or other debris from the drain bottom and from the side slopes. Where the construction works cross a lawn, the Contractor shall take extreme care to avoid damaging the lawn, shrubs and trees encountered. Upon completion of the work, the Contractor shall completely restore the area by the placement and fine grading of topsoil and seeding or sodding the area as specified by the Engineer or Drainage Superintendent.

15.0 UTILITY RELOCATION WORKS

In accordance with Section 26 of the Drainage Act, if utilities are encountered during the installation of the drainage works that conflict with the placement of the new culvert, the operating utility company shall relocate the utility at their own costs. The Contractor however will be responsible to co-ordinate these required relocations (if any) and their co-ordination work shall be considered incidental to the drainage works.

16.0 FINAL INSPECTION

All work shall be carried out to the satisfaction of the Drainage Superintendent for the City, in compliance with the specifications, drawings and the Drainage Act. Upon completion of the project, the work will be inspected by the Engineer and the Drainage Superintendent. Any deficiencies noted during the final inspection shall be immediately rectified by the Contractor.

Final inspection will be made by the Engineer within 20 days after the Drainage Superintendent has received notice in writing from the Contractor that the work is completed, or as soon thereafter as weather conditions permit.

17.0 FISHERIES CONCERNS

Standard practices to be followed to minimize disruption to fish habitat include embedment of the culvert a minimum 10% below grade, constructing the work 'in the dry' and cutting only trees necessary to do the work (no clear-cutting). No in-water work is to occur during the timing window unless otherwise approved by the appropriate authorities.