# TOWNSHIP OF SOUTH PLANTAGENET

# SITE DEVELOPMENT AND OPERATIONS PLAN

# FOR

# WASTE DISPOSAL SITE

## LOT 3 CONCESSION 14

## PROJECT NO. M-2940

February 1991


Township of South Plantagenet
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# 1.0 INTRODUCTION

The Township of South Plantagenet operates a landfill site located on Part of Lot 3, Concession 14, County of Prescott (Figure 1.0). In 1990, the Township, with the financial assistance from the Waste Management Improvement Program (WMIP) of the Ministry of the Environment, authorized McNeely Engineering Ltd. by resolution of Council dated August 20, 1990, to complete a Waste Management Improvement Study on the South Plantagenet landfill site. This study would consist of a hydrogeological investigation and a site operation and development plan which were to be completed prior to March 1, 1991. The project was undertaken jointly by McNeely Engineering Ltd. and StanCon Groundwater Engineering Ltd.

StanCon Groundwater Engineering Ltd. would be responsible for the hydrogeological and geophysical investigation. McNeely Engineering Ltd. would undertake the survey work, preparation of the existing site plan, development of future landfill, estimate reserve capacity and provide for project coordination and budget control.

# 2.0 BACKGROUND

## 2.1 Location

The Township of South Plantagenet owns and operates only one waste disposal site located on Lot 3, Concession 14, in the south-eastern part of the Township. The disposal site location is shown on the key plan, Figure 1.0, and detailed further on the legal plan, Appendix C.

Access to the current disposal area at the south end of the landfill is via Concession Road #15, a gravel surfaced road which connects to County Road

No. 9, a 2 lane hard top road which traverses the Township on an N-S basis. Most residents in the Township access the present site through this road.

A second Township road called Desforges Road, located near the hamlet of Fournier, provides access to the 15th Concession Road and the landfill site for residents located near the hamlet of Fournier. The 15th Concession road is generally in good condition all year round except for some minor problems with rutting and pot holes during spring thaw.

## 2.2 Population and Service Area

The Township of South Plantagenet's landfill site was initially registered with the Waste Management Branch of the Department of Energy and Resources Management on August 4, 1971. The original application, Appendix A, indicated that the service population was 1840 people. The site was to service only the residents of the Township of South Plantagenet including the hamlets of Fournier, Lemieux, Ste-Rose, Pendleton and Riceville.

Table 1 shows the historical population growth for the period 1961 to 1988. Over this 27 year period, an average negative growth of 1.6 % was measured. One of the major reasons for this decline is due to the economic shift away from agriculture which caused many families to relocate closer to the urban centres for employment. As the Regional Municipality of Ottawa-Carleton expands and the commercial opportunities that it creates for employment shifts eastward, some people will be relocating to the Township of South Plantagenet and the surrounding areas because of the lower cost of living. The Township also lies adjacent to the Highway 417 corridor, a 4 lane commuter highway between Montreal and Ottawa and is near King's Highway 138 which

leads to the United States. These factors in the next 20 years will make the Township an attractive area for urban dwellers willing to live in a rural setting, and willing to commute to larger centers to work.

In order to estimate future population growth, we have reviewed the background report to the Township's Official Plan which predicts a growth of 0.5% over the next few years. If the Township is to experience growth in the next 20 years because of its surroundings to urban centres, we can look for guidance at the growth experienced by the Township of Clarence over the last few years (1971 - 1981) as indictors of growth potential. This community has grown at rates of 2 - 6% per annum.

For the purposes of this study, we have optimistically projected a population growth of 2% for the next twenty years. At this growth rate, Table 2, the Township's population would reach 2440 by the year 2010. The Township's landfill site will continue to serve the same service area as indicated in their original application for a landfill site, 1971.

# TABLE 1

## Historical Population Growth

## Township of South Plantagenet

## 1961 - 1988

| YEAR | NO. OF YEARS | * POPULATION | GROWTH (PERSONS) | ANNUAL GROWTH |
|---|---|---|---|---|
| 1961 | | 2393 | | |
| | 5 | | -553 | -5.4 |
| 1966 | | 1840 | | |
| | 5 | | -115 | -1.3 |
| 1971 | | 1725 | | |
| | 5 | | -17 | -0.2 |
| 1976 | | 1708 | | |
| | 5 | | -116 | -1.4 |
| 1981 | | 1592 | | |
| | 5 | | 44 | 0.5 |
| 1986 | | 1636 | | |
| | 2 | | -57 | -1.8 |
| 1988 | | 1579 | | |
| **Total** | **27** | | **-814** | |
| **Avg.** | | | | **-1.6%/year** |

Average Growth = $\frac{814 \text{ persons}}{27 \text{ years}}$ = -30 persons per year

* Statistics Canada

## TABLE 2

### Service Population and Waste Quantity Projections South Plantagenet Disposal Site

| Year | Population 2% Growth | Waste Quantity Projection | | Cumulative Waste Quantity @ 2% | |
|---|---|---|---|---|---|
| | | Tonnes | Cubic Meters | Tonnes | Cubic Metres |
| 1988 | 1579 | 790 | 1974 | 790 | 1974 |
| 1989 | 1611 | 805 | 2013 | 1595 | 3987 |
| 1990 | 1643 | 821 | 2053 | 2417 | 6041 |
| 1991 | 1676 | 838 | 2095 | 3255 | 8135 |
| 1992 | 1709 | 855 | 2136 | 4109 | 10272 |
| 1993 | 1743 | 872 | 2179 | 4981 | 12451 |
| 1994 | 1778 | 889 | 2223 | 5870 | 14674 |
| 1995 | 1814 | 907 | 2267 | 6777 | 16941 |
| 1996 | 1850 | 925 | 2313 | 7702 | 19253 |
| 1997 | 1887 | 944 | 2359 | 8645 | 21612 |
| 1998 | 1925 | 962 | 2406 | 9608 | 24018 |
| 1999 | 1963 | 982 | 2454 | 10589 | 26472 |
| 2000 | 2003 | 1001 | 2503 | 11591 | 28976 |
| 2001 | 2043 | 1021 | 2553 | 12612 | 31529 |
| 2002 | 2083 | 1042 | 2604 | 13654 | 34133 |
| 2003 | 2125 | 1063 | 2656 | 14716 | 36790 |
| 2004 | 2168 | 1084 | 2710 | 15800 | 39499 |
| 2005 | 2211 | 1105 | 2764 | 16906 | 42263 |
| 2006 | 2255 | 1128 | 2819 | 18033 | 45082 |
| 2007 | 2300 | 1150 | 2875 | 19183 | 47957 |
| 2008 | 2346 | 1173 | 2933 | 20356 | 50890 |
| 2009 | 2393 | 1197 | 2992 | 21553 | 53882 |
| 2010 | 2441 | 1221 | 3051 | 22774 | 56933 |

## 2.3 Geology and Topography

The waste disposal site is located on an area of flat land, Figure 2.0 which varies from geodetic elevation 65 to 66 metres, except for three drainage ditches (#1, #2 and #3) which cross the site. The ditch bottom elevation for all three ditches is 2 - 3 metres below that above.

The two most southerly drainage ditches (#1 and #2) drain eastwards into Beaver Creek which then drains into the Scotch River and into the South Nation River. Beaver Creek is a 3 to 5 metre wide creek with normally a 0.3 to 0.6 metres depth of water which flows year round. Beaver Creek is located directly south of the landfill site. The water level in Beaver Creek rises dramatically during spring runoff. Ditch #3 is a 7 to 15 metres wide gully that flows westward across the landfill site and then northward towards the South Nation River. This gully has little to no flow through it for most of the year and beavers have built a dam on it near the landfill's west perimeter. The backwater from the dam forms a small pond/swamp some 15 metres wide within the landfill.

All three ditches drain agricultural land on either side of the landfill site.

The overburden material at the site consist of 4 to 10 metre thick sequence of fine grained deltaic and estuarine sands. Below this, a stiff brown/grey silty clay some 20 to 30 metres thick overlies a black gravel some 0 to 10 metres thick. The total overburden thickness is estimated to be between 24 and 50 metres. Shale and limestone bedrock of the Eastview and Ottawa Formations underlie the black gravel deposit. Two representative soil samples, collected at the site during the hydrogeological work confirmed the upper overburden horizons to be a fine sand/silt material.

## 2.4 Hydrology and Hydrogeology

Due to the flat land, surface water runoff is gradual and poses few erosional problems. The drainage boundary lines shown in Figure 2.0 indicate the direction of drainage over the landfill site area. All surface water runoff from the site eventually reaches the South Nation River some 1 - 1.5 kilometres to the north of the landfill site. (Figure 1.0). Drainage ditches #1 and #2 flow eastward through the site to discharge into Beaver Creek some 500 metres to the east and into the Scotch River some 4 kms downstream. Two water quality samples (S4 and S6) were taken in Beaver Creek and indicate poor water quality. Similar results were obtained for water samples taken from ditch 1 and ditch 3. Results of the sampling are contained in StanCon Groundwater Engineering's hydrogeological investigation, 1990.

The following points summarize the results of StanCon's hydrogeological investigation:

- six piezometers were installed on the landfill site to determine hydrogeological conditions.
- groundwater flow at the south end of the site within the surficial sand aquifer is in a southeast direction towards Beaver Creek.
- groundwater flow at the north end of the site within the same aquifer is in a northwest direction.
- hydraulic gradients at both the current and past fill areas are low, 0.3 to 0.6%.
- the groundwater table during the fall of 1990 was between 1 and 1.75 metres below ground surface.
- the surficial sand is very fine in size.
- hydraulic conductivity is in the order of $1 \times 10^{-6}$ metres/second.

Results of the groundwater sampling are summarized in the Annual Report, Appendix E. At present, groundwater monitoring indicates that neither the current fill area or the past fill area are negatively impacting domestic wells in the area and that leachate migration within the surficial aquifer has not progressed beyond the site boundaries.

## 2.5 Waste Characteristics and Volume

a) Existing Waste Characteristics

From an inspection of the site and from discussions with the Municipality and the site custodian, the wastes currently accepted for disposal at the site are from domestic and commercial sources.

The present Certificate of Approval #A-471801 permits the disposal of the following types of waste.

| Description | MOE Waste Disposal Site Inventory | Township Application 1971 |
|---|---|---|
| Domestic | 70 | 98 % |
| Commercial | 5 | 2 % |
| Other | 25 | 0 % |

Although it was not possible to determine the waste composition for the Township, observations made during several inspections reveal that a high percentage of the waste stream comes from domestic sources and includes newspapers, cardboard and organics. The high organic content is likely due to the fact that there are many single family homes with large estate lots that generate waste through grass cutting in the summer, raking leaves and garden cleanup in the fall, and brush/tree trimmings around lots.

A recent report completed for the Ministry of the Environment in January 1991 for three various municipalities within the province of Ontario identified the composition of the waste stream (Table 3) to be:

**TABLE 3**

**WASTE COMPOSITION**

| Type | Percent Composition Total Waste Stream |
|---|---|
| (1) Paper & Newsprint | 30.01% |
| (2) Organic | 26.07% |
| (3) Plastics | 8.52% |
| (4) Glass & Containers | 6.86% |
| (5) Ferrous | 6.08% |
| (6) Diapers | 5.02% |
| (7) Non-Ferrous | 0.95% |
| (8) Others | 16.59% |

It was not possible to determine the waste composition for the Township of South Plantagenet but it is assumed that the domestic waste portion would likely be similar to that above.

Table 4 identifies the volumes of other wastes measured at the site.

**TABLE 4**

**OTHER WASTES**

| Types of Waste | Quantity |
|---|---|
| Metal Stockpile | < 20 square metres |
| Wood/Cardboard | < 5 cubic metres |
| Tires | < 100 |

## 2.5(b) Waste Volumes

The total volume of waste including cover material placed between the start of waste placement and 1990 over the past and current fill area is calculated to be 24,000 cubic metres. The following are the calculated volumes for each area:

| | | | |
|---|---|---|---|
| (1) | Past fill area | | 9,000 cubic metres |
| (2) | Current fill area | - east of road | 5,000 cubic metres |
| | | - west of road | 10,000 cubic metres |

Since domestic waste was burned till 1973 which resulted in waste volume reduction, it is not meaningful to use historical volumes or past waste generation rates to predict future volumes for the South Plantagenet site.

A waste generation of 0.5 tonnes/capita/year or 1.25 cubic metres/cap/year was used to forecast waste volumes for the next 20 years, as shown in Table 2. This rate is slightly less than the national average of 1.7 kg/c/d and is slightly more than the quantity of 0.93 kg/c/day measured for the three municipalities studied by the Ministry of the Environment (Residential Waste Composition Study, Volume 1, January 1991). This rate (0.5 tonnes/cap/year) will overestimate the volume of waste generated over the next 20 years since it does not account for significant reductions which will be achieved through composting, recycling initiatives and better compaction of the wastes.

Table 2 shows that the Township of South Plantagenet would generate 57,000 cubic metres of waste by the year 2010 assuming that:

- waste generation rate remains at 0.5 t/c/year
- population growth remains at 2%/year or less
- waste compaction achieves 0.4 tonnes/cubic metres at landfill

If an allowance of 25% is made to account for interim cover material, the landfill site needs to be developed to provide a capacity of 76,000 cubic metres. The following sections demonstrate how the site can be developed to accommodate this volume.

## 2.6 Life Expectancy of the Site

The landfill site life can be safely extended to the year 2025 by developing Stages 1, 1A & 2 of the site according to the sections shown in Figures 3.0. This assumes that waste generation rates remain constant, adequate compaction is provided, population increase maintained below 2% and no significant increase in commercial or agriculture users. The site can be developed further into Stages 2A, 3, 3A and 4, following completion of Stage 2 in future years.

# 3.0 SITE DEVELOPMENT AND OPERATIONS

## 3.1 Past Operation, Prior to 1990 (Past Fill Area)

The Township began disposing of their waste at the north end of the landfill site in the area identified as "Past Fill Area" Figure 3.0. This area, some 30 metres wide by 150 metres long, served the Township's disposal needs till the year 1981/82. During 1982, a thin layer of soil was spread over the waste pile and a new disposal area to the south end of the landfill opened. The past fill area has now re-established a vegetative cover of grasses and weeds and its surface shows no signs of settlement or erosion. It has adequate slope (2-5%) on the cover to promote surface runoff. The results of the surface water sampling undertaken at the beaver pond area directly south of the fill area shows no signs of leachate impact. Similarly, the geophysical survey undertaken by Geoterrex, as part of the hydrogeological investigation, shows that a leachate plume has formed and migrated to the north of the past fill area for a distance of 10 - 30 metres. Knowing that the hydraulic conductivity of the sand is in the order of $10^{-6}$ m/sec. and that no waste has been placed in this area for nine years, it is believed that the leachate plume, shown as Area C of the Geoterrex drawing, in Appendix D, shall not advance further but rather will retreat with time.

## 3.2 Present Operations (current fill area)

The Township started disposing of their waste at the south end of the landfill site in 1982. Between 1982 and 1988, the Township placed 9800 cubic metres of their waste using the ramp method of operation on the west side of the landfill site in the area designated as "Current Fill Area", Figure 3.0. In 1988, the Township shifted the disposal area to the east side of the access road to the

current disposal area. The waste was deposited using a ramp method of operation. At the time of inspection, February 1991, the active (south) face of the ramp was approximately 7 - 8 metres high (see photos, Appendix F).

The status of the site is shown in Figure 2.0, Site Plan, Existing Conditions.

This plan outlines the location of site roads, access roads, extent of waste placement, topographical features, vegetation, surface drainage, wood disposal areas, scrap metal recovery, custodian's shelter, position of entrance gate and sign, and site boundaries.

Access to the south entrance to the site is by an all weather gravel surface road (Concession 15). The approach to the site along Concession 15 from either direction is visually attractive because of mixed bush along the front of the site. The east and west boundaries of the site are also covered in bush, which provides an adequate visual buffer that screens the waste disposal operation.

A steel frame gate with a padlock and chair prohibits entry to the site and appears adequate for its purpose. A painted plywood sign located near the site entrance informs the public of the following (see photos, Appendix F).

**MUNICIPAL DUMP**

| **Open** | | **Ouvert** |
|---|---|---|
| Monday | 9 to 6 | Lundi |
| Thursday | 9 to 6 | Jeudi |
| Saturday | 9 to 6 | Samedi |

**No trespassing when closed**

A small wooden structure serves as a shelter for the custodian, and is located to the north of the present disposal area. The shelter is heated by a wood burning stove. Waste disposal operations are performed using a ramp method of waste disposal. The ramp is inclined to a 4H:1V slope and the active face was approximately 7-8 metres in height at the time of inspection (Feb/91). the photos contained in Appendix F show this operation.

Surface water drainage does not pose an erosion problem on the earth cover because of the gentle slope on the ramp. Since most of the area is underlain by sand, drainage is internal and little runoff occurs during precipitation.

There appears to be few problems with vermin and litter control. Some minor clean up along the east property boundary would improve the visual aesthetics at the site. If the problem with wind blown debris worsens a snow fence could be erected down wind of the active face to collect wind blown debris.

Scavenging does not appear to be a problem. The custodian provides suitable supervision of the site to ensure this practice is minimized.

## 3.3 Future Operations

### 3.3.1 Methodology for Developing Additional Capacity

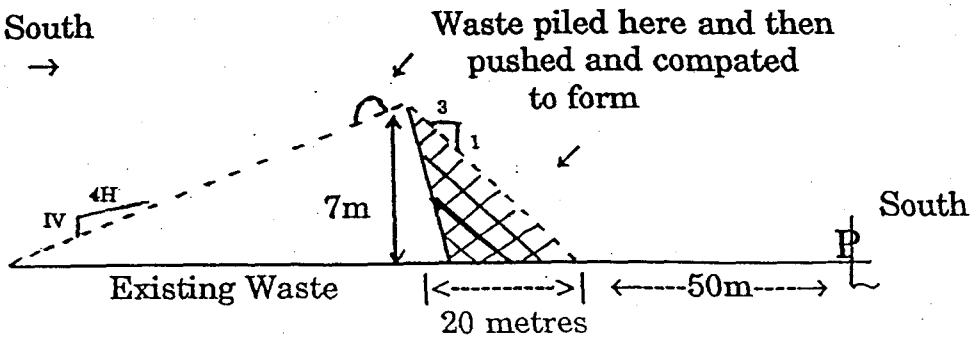
The Township of South Plantagenet intends to develop its 30.4 hectare landfilling site in an environmentally safe manner that will follow the recommendations of the 1990 hydrogeological investigation completed for this site. These recommendations stated:

- a minimum setback of the landfilling area from surface water courses of 60 metres.

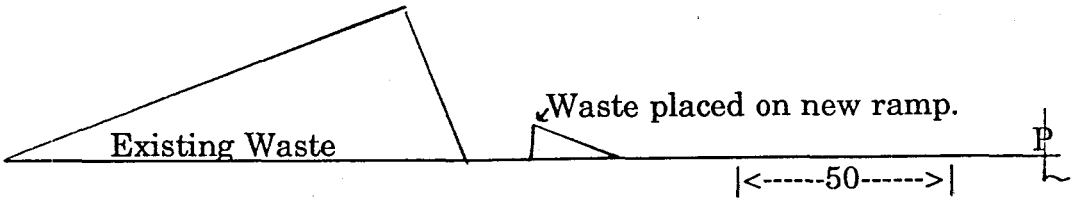
- a minimum setback of the landfilling area from property boundaries of 50 metres.
- past fill area to be covered with a low permeability soil material and revegetated with grasses and small shrubs.

Since most of the site services already exists at the south end of the landfill site, it makes sense to continue developing the landfill site from the south end in a northerly direction. This minimizes the potential for complaints from wood burning practices on site and possible leachate contamination of wells along County Road #10. Figures 3.0 and 4.0 depict the staging of site development and the proposed aerial extent of each stage. The current disposal of wastes is occurring within Stage 1. Landfilling will continue in Stage 1 at the present elevation in a southerly direction and east of the access road until the active face reaches 70 metres from the south property line. At this time, either of the following options are available.

1. Waste is piled at the active face and a dozer is used to push and compact the waste so that a 3(H):1(V) descending ramp is created for the final shape or:



2. A ramp is started at 50 metres north of the south property line and wastes are placed and compacted in increasing elevation to join up with the present waste face.




Option 1 appears to be less costly to complete because less preparation work is required (i.e. new culvert on access road ditch to get to ramp is not required).

It is envisaged that Stage 1 has sufficient capacity to accept another 2000 cubic metres of waste or the equivalent of one year of operation. At this time, Stage 2 area will require development.

Stage 2 and 3 will be developed in a similar manner, that is:

- a 0.5 metres depth of sand will be excavated from the disposal area in order to create a small trench for waste placement and provide a volume of sand for interim cover material, road construction and berms. A minimum of 0.5 - 0.6 metre separation will be maintain between the placement of wastes and the groundwater table.
- The area method of operation will be employed for disposal of wastes.
- On site sand material to be used for interim cover.
- Each lift to be advanced in a 2 - 3 metre thickness.

- 3(H) to 4(H):1(V) slopes to be used for ramp and 3(H):1(V) for other side slopes. Side slopes to be constructed so that a final low permeability cover or other suitable cover can be placed and adequately compacted.
- low areas or depressions to be filled in so that all waste placement occurs at least 0.5 - 0.6 metres above the groundwater table.

### 3.3.2 Operational Aspects

Method of Operation

In early 1992, the Township will need to do preparatory work to get Stage 2 prepared for development. Because the man made ditch, Ditch #1, intersects the site and the hydrogeological recommendation requires a 60 metre buffer to be maintained between the waste placement and the ditch (Stage 1A), a potential loss of some 19,200 cubic metres (160 $m^3/m$ x 120 metres) of capacity results. If a permit can be obtained from the Ministry of Natural Resources to fill in part of Ditch #1 and divert most of the water to a new ditch to be constructed along the western property line, economic savings can be made to the operation as well as reducing the potential for surface water contamination. A detailed survey would be required to obtain the necessary approvals. Preliminary costs to complete this work are estimated at $15,000 - 20,000. These costs are offset by not having to undertake certain work:

| | |
|---|---|
| • installing 4 metre CSP in ditch - 10 m @ $65/m | 650 |
| • 120 metres of road construction @ $30,000/km | 3,600 |
| | $4,250 |

A net cost of $16,000 for developing an additional capacity of 19,200 cubic metres in Stage 1A (or 7680 tonnes) represents an additional disposal cost of $2/tonne.

When comparing these costs to disposal costs of $92/tonne charged at a nearby site, it is worthwhile to consider the option of relocating the ditch and developing Stage 1A, if approval from the Ministry of Natural Resources can be obtained. The development of Stage 1A in two lifts, as shown in the cross section in Figure 5.0, would provide 19,200 cubic metres of capacity and service the Township for a period of 5 years, to the end of the year 1995 [refer to Volume, Table 2, (19,200 $m^3$ x 75% (assumed for cover) = 14,400 $m^3$ + 3987 $m^3$ (up to 1990) = 18,837 $m^3$)].

Landfill development north of ditch #1 in Stage 1A is to be developed in the same manner as Stage 2. To begin start up operations for Stage 2, the Township should perform the following tasks.

- clearing and salvaging of trees within the disposal area. A 40 metre wide strip of trees should remain along the east property line and a 30 metre wide strip to remain along the west side.
- using dozer equipment, strip topsoil from disposal area and stockpile in a 5 metre wide berm along eastern side, as shown in Figure 5.0.
- remove 0.5 metre depth of sand material within disposal area and use sand to form road base and stockpile remaining sand along northern limit of waste cell. This sand is to be used for interim cover.
- extend road in a north direction along the west boundary using sand as a road base and granular "A" for surfacing.
- relocate the location of the waste disposal area.
- each cell for waste placement to be developed from the west towards the east in a 50 metre wide strip. The length of each cell is 49 metres. The active face will require covering once each 6 - 8 metres of advance has occurred. The schematic, Figure 6.0, identifies this procedure. A minimum of one to two cells (50 - 100 metres) should be cleared north of the cell being developed to allow for burning of wood products.

- Stage 2 can be developed to provide a capacity of 98,000 cubic metres. Allowing 25% of this volume for site cover material, there remains 73,500 cubic metres of capacity available for waste. This volume will be sufficient to provide capacity well beyond the year 2010.
- Stage 3 is to be developed in a manner similar to Stage 2 except:
  - length of each cell will be increased from 45 metres to 200 metres.
  - waste placement would proceed from an east to a west direction, because the access ramp and road would be shifted to the east side. The road aligns itself with the previous road through Stage 3.

The following sections provide additional information on the operation of the site for all future stages of development.

Waste Compaction and Equipment Selection

The use of a track type bulldozer should be employed for the disposal of wastes, ramp construction and access road construction. The bulldozer should have a minimum of 140 hp rating to be efficient (caterpillar D6 or equivalent). A similar type unit should be used for compaction of the waste and for spreading the 150 mm thick lift of sand cover over the waste.

Cover and litter Control

Native (or imported) soil can be used for cover material and to construct the ramp for access to the active face and for the construction of the turnaround loop. As a minimum, cover material should be applied after each cell has been advanced by 6 - 8 metres.

Litter control can be accomplished by construction of earth and topsoil berms along the east and north boundary of each cell and the installation of a progressive snow fence, if required, to prevent litter blowing over the site.

## On Site Roads

The on-site roads as shown on the operation plan would be upgraded to provide a 6.5 metre wide riding platform. The sandy overburden at the site appears to compact reasonably well and would support regular vehicle traffic. A 150 mm thick lift of well graded granular material could be placed on the site roads to improve trafficability when required. This recommended thickness of well graded gravel (not to exceed 50 mm size) would be capable of supporting the larger waste disposal trucks. During the winter, the Township would undertake snow removal and erect sand boxes for traction.

## Surface Water Control and Monitoring

Surface runoff from this site is an important concern due to its proximity to Beaver Creek and the Scotch River, a tributary of the South Nation River. Runoff from the agricultural land to the west should be directed away from the current disposal area Stages 1, 1A working face by intersecting the runoff through construction of a new perimeter ditch along the west boundary. This ditch which would discharge into the 15th Concession roadside ditch which discharges to Beaver Creek. If monitoring indicates that the waste site is impacting on off site lands, a low permeability soil could be placed as a hydraulic barrier to reduce infiltration of rain water into the deposited waste and thereby reduce leachate production. Details on the extent of soil

placement would be reviewed and implemented as the need develops and as identified by the hydrogeological program. In addition, local depressions of ponded waters on the surface cover (from waste settling) would be minimized and graded to promote runoff. Continued monitoring of water quality in Beaver Creek, as described in the hydrogeological report is recommended.

Groundwater Control and Monitoring

To ensure that no significant contamination occurs, the six existing piezometers should be monitored in the spring, summer and fall, as described in StanCon Groundwater Engineering's report. The report also recommends that two additional wells be constructed in 1991 to provide continuous monitoring of leachate movement at the site, both from the past fill area and the current fill area. In addition, they also suggest the use of a geophysics survey every 4 or 5 years, to map plume migration from the waste site. Correlating monitoring results with the results of the geophysics survey would provide an early warning of leachate progression from the current fill area in the direction of groundwater flow towards the closest site boundary. The Township shall maintain a minimum setback of 60 m from surface water courses and 50 metres from property boundaries to allow adequate buffer for leachate attenuation.

Designation of Special Disposal Areas

No open burning of municipal refuse is permitted. In order to minimize the potential for fires at the domestic working face, an area some 10 metres x 10 metres for burning of wood waste products will be located at the north end of each cell as shown in Figure 5.0. No burning should be carried out unless the custodian is present.

A special area some 20 metres by 20 metres would also be designated for the collection and temporary storage of metal products. All metal products which can be recycled should be placed in this designated area shown in Figure 5.0 and recycled as the available storage area is consumed. The advantages of this location are that (1) it is not easily visible from Concession Road No. 15 and screening is provided by the tree growth, (2) it is close to the main entrance road and allows easy access for the public and recycling companies.

An area some 15 metres by 15 metres (Figure 5.0) is reserved for stockpiling of tires. The stockpile should not exceed 500 tires.

Designation of Special Area for Solid Non Hazardous Industrial Waste

Due to the increased demand for special waste services such as the disposal of hydrocarbons or other chemically contaminated soils resulting from spills from vehicular accidents (local roads and Highway No. 417) and from removal of underground tanks, the Township has designated the north end of the ramp area of the current fill area west as the most appropriate area for disposal of these items. This disposal area for special wastes is required since the Township provides service to 3 communities - Fournier, Riceville and Ste. Rose de Prescott.

Contingencies for Winter Operations

The design of the waste placement area has been done to minimize snow problems by:

(1) Providing a loop at the end of the road to allow easy turn around facility for snow removal equipment

(2) Natural wind protection using the natural tree cover and newly constructed earth berms

(3) Installing sand boxes for icy conditions

The Township shall import fill for cover material on an as required basis during the winter to maintain the recommended cover frequency if native soil cannot be obtained.

Improvements to Site Facilities

The existing site facilities are generally adequate to permit the controlled development of this site. However, the following areas required upgrading.

(1) Signs

Signs will be fabricated to indicate special disposal areas:

- dry brush/wood products only
- scrap metal recovery
- waste disposal face
- tires

Gas Control Measures

A comprehensive engineering assessment of gas generation at this site has not been conducted. The potential for gas migration is minimal at this site due to the previous open burning at this location, presence of a sandy cover material and the absence of a clay cap which would inhibit gas migration. Since there are no buildings within 400 metres of the current disposal area, problems with gas generation are not anticipated.

Contingency Plans for Emergency

The following concerns will be addressed for emergency purposes.

(1) Emergency Disposal Area

The ramp along the westside of Stage 1 will be used as an emergency disposal area. This area is large enough to accommodate at least 2 weeks of garbage. Any waste placed here during emergencies will later be transported to the licensed disposal area. This same area also serves as the area for disposal of solid non hazardous industrial waste.

(2) Fire Control

In the case of a fire in the waste pile, the sand earth berms located to the north of each cell can be used to smother the flame. The Fire department, located in the nearby hamlet of Fournier is also readily available to assist in extinguishing fires.

The custodian will also have readily available in his shelter some fire fighting equipment such as an axe, fire extinguisher, safety goggles, gloves, boots and first aid kit.

### 3.3.3 Closure Plan

When the final lift of Stage 2, as shown in Figure 3 has been completed, a low permeability material or equivalent barrier will be required over the waste pile to minimize infiltration. The section in Figure 3 identifies the final cover to be a 600 mm thick low permeability material and is overlain by 150 mm of topsoil. While this is likely the minimum required, it will be necessary to conduct a more thorough evaluation for final cover once more information on groundwater contamination has been gathered. As noted earlier, a 3(H):1(V) side slope for the final cover and a 10%-20% grade on the top are adequate for surface runoff and not steep enough to cause erosion problems.

Cover Details

The development and operation plan indicates that a minimum of 600 mm of low permeability material would be placed over the existing waste as final cover. This material would then be covered with 150 mm of topsoil and seeded. Because the South Plantagenet landfill site is located on silty sand and there is potential for off site contamination of groundwater, McNeely Engineering recommends that final cover details not be specified until closure is required. The final cover should be designed so that it satisfies the recommendations made by the hydrogeological consultant from the results of groundwater monitoring. This plan would be submitted to the Ministry for approval the year prior to closure.

The Township may have to consider:

- increasing the thickness of the clay liner to reduce infiltration or
- use a sand/bentonite soil mixture instead of clay or
- use a geomembrane or
- composite liner

The cost, applicability, and advantages and disadvantages for each of these options should be evaluated at closure and the option that best meets the overall objectives to be implemented.

The Township shall retain the services of a geotechnical engineering firm to identify:

- use of suitable material for use in cover
- compaction of the soil at the proper water content
- use of the proper type of compaction equipment to achieve design objectives
- material, compaction, hydraulic conductivity testing and inspection
- quality assurance

Staging of Closure

The Township presently uses the fine silty sand found on site for interim cover material. If the results of the on-going surface and groundwater monitoring indicate that remedial measures are necessary to reduce leachate generation, the Township shall consider placing a low permeability material over areas of existing waste that have been brought to final grade, as shown on the attached plan (Figure 7).

## 3.4 Waste Management Master Plan

The Township of South Plantagenet does not participate in a Waste Management Master Plan. The Township of South Plantagenet has adequate capacity at its present landfill to serve its residents for more than the next 35 years. The Township is aware of the problems with lack of landfill capacity with some of the surrounding municipalities and has strongly promoted recycling within the Township. These initiatives are described further in Section 3.5.

## 3.5 Waste Reduction, Reuse, Recycling Initiatives

The Township of South Plantagenet acknowledges that initiatives for waste reduction, recycling and reuse must play an important role in diverting waste from the landfill to achieve the Provincial waste diversion target of 25 percent by 1992. While these initiatives cannot completely solve the waste problem, it can reduce the size of the problem. South Plantagenet Township is undertaking the following measures to implement the 3R's initiative, in association with current landfilling practices by:

(1) Providing education to Township residents about the benefits of composting and waste reduction.

(2) The Township is considering implementing a garbage collection system for the entire Township by the fall of 1991. Going to a collection system will mean increased compaction of wastes going into the landfill site.

(3) Once the collection system is in place, the Township will consider implementing a curbside recycling program, starting with newspaper in the fall of 1991 and increasing the scope of collection to include other materials shortly thereafter.

## 3.6 Costs for Improvements

The following cost estimates were prepared as a guideline for the Township's budget purposes. We have used unit costs to estimate the cost for each improvement.

| Improvement | Quantity | Cost |
|---|---|---|
| Stage 1 | | |
| 1. Shape waste in Stage 1 and apply sand cover (1000 $m^3$) | 1000 $m^3$ | $ 3,500 |
| 2. Rodent control - Annual cost | | 1,500 |
| 3. Signs | | 500 |
| Stage 2 | | |
| 4. New ditch along west perimeter and deeper roadside ditch | 350 metres | 3,500 |
| 5. Fill in ditch #1 and regrade | 100 metres | 2,000 |
| 6. Culvert replacement or lower existing culvert on 15th Concession Road (Twp staff) | | 2,500 |
| 7. Relocate disposal areas for tires, burn area, metal | | 500 |
| 8. Rip rap protection on Beaver Creek bank | | 750 |
| 9. Survey work for MNR permit | | 2,500 |
| 10. Subdrain installation in ditch | 100 m | 2,000 |

## 3.7 Annual Reporting

McNeely Engineering have prepared a standard format that it uses to summarize the most important information contained in the Operations report and the Hydrogeology report prepared by StanCon Groundwater. This abbreviated form can be readily updated yearly to show volumes of waste placed annually, estimate remaining capacity and provide a summary of groundwater and surface water monitoring. Appendix E contains a completed report for the year 1990.

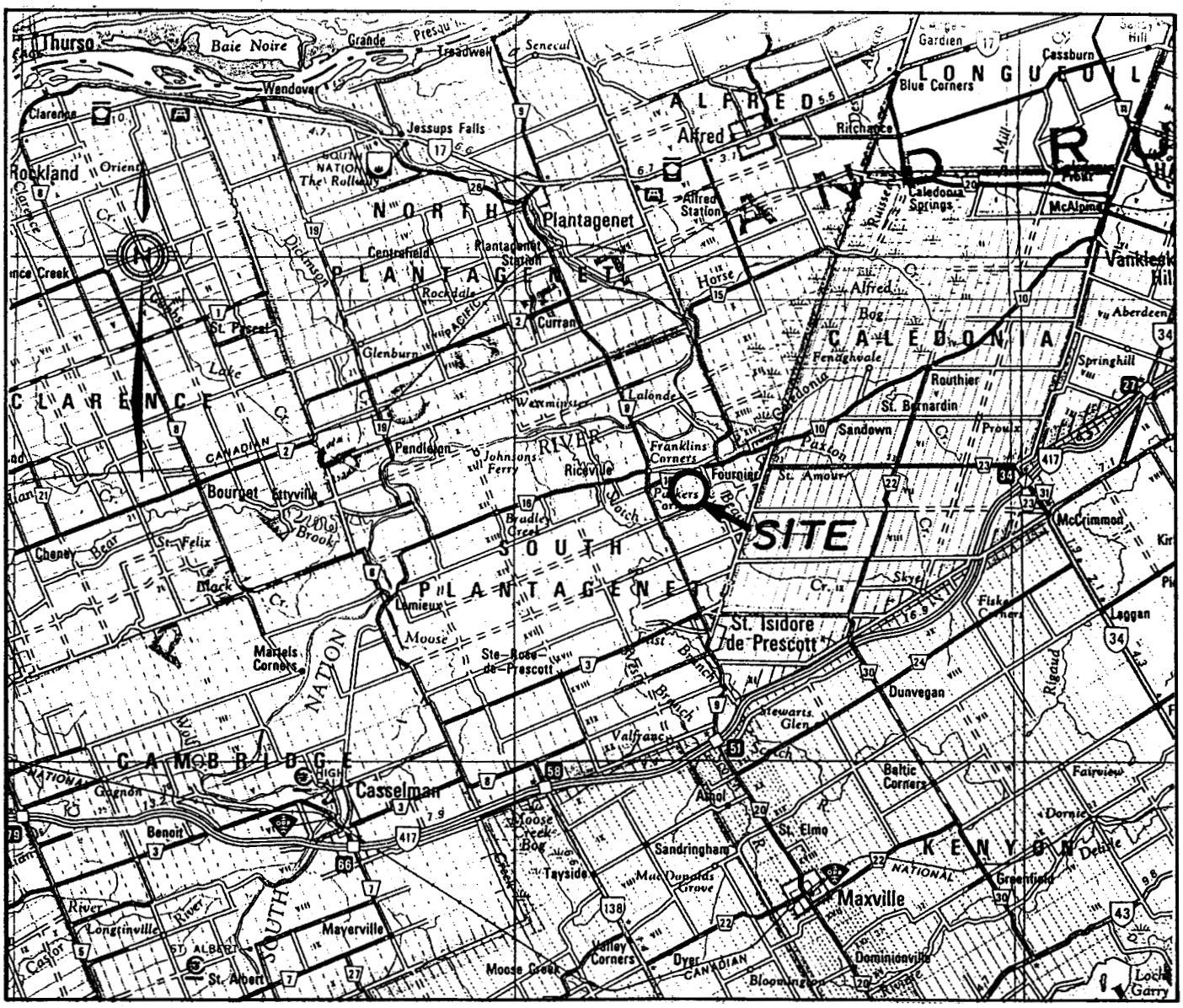



FIGURE 1.0
KEY PLAN
LANDFILL SITE
TOWNSHIP OF SOUTH
PLANTAGENET

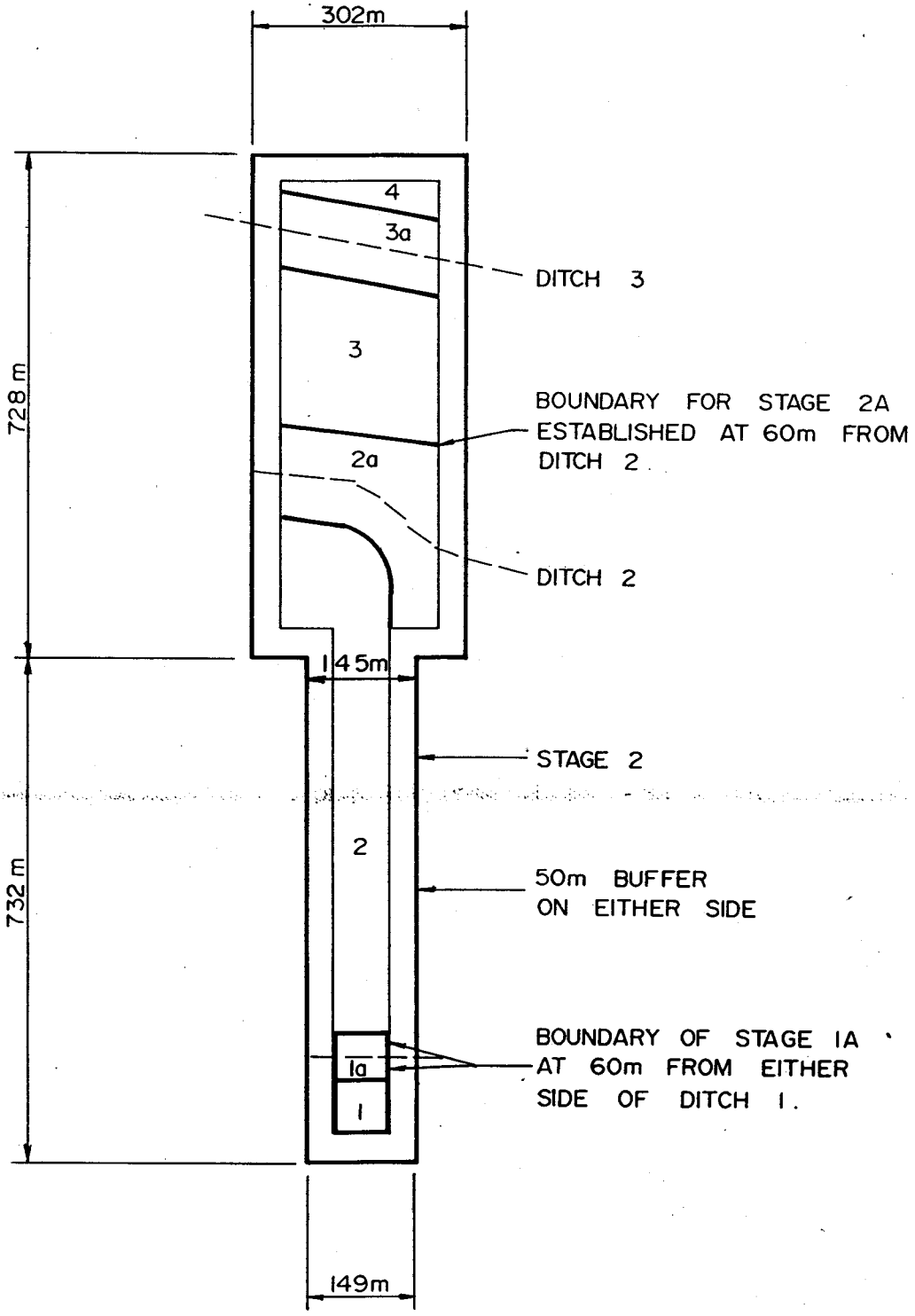



FIGURE 4.0
STAGING OF LANDFILL
DEVELOPMENT

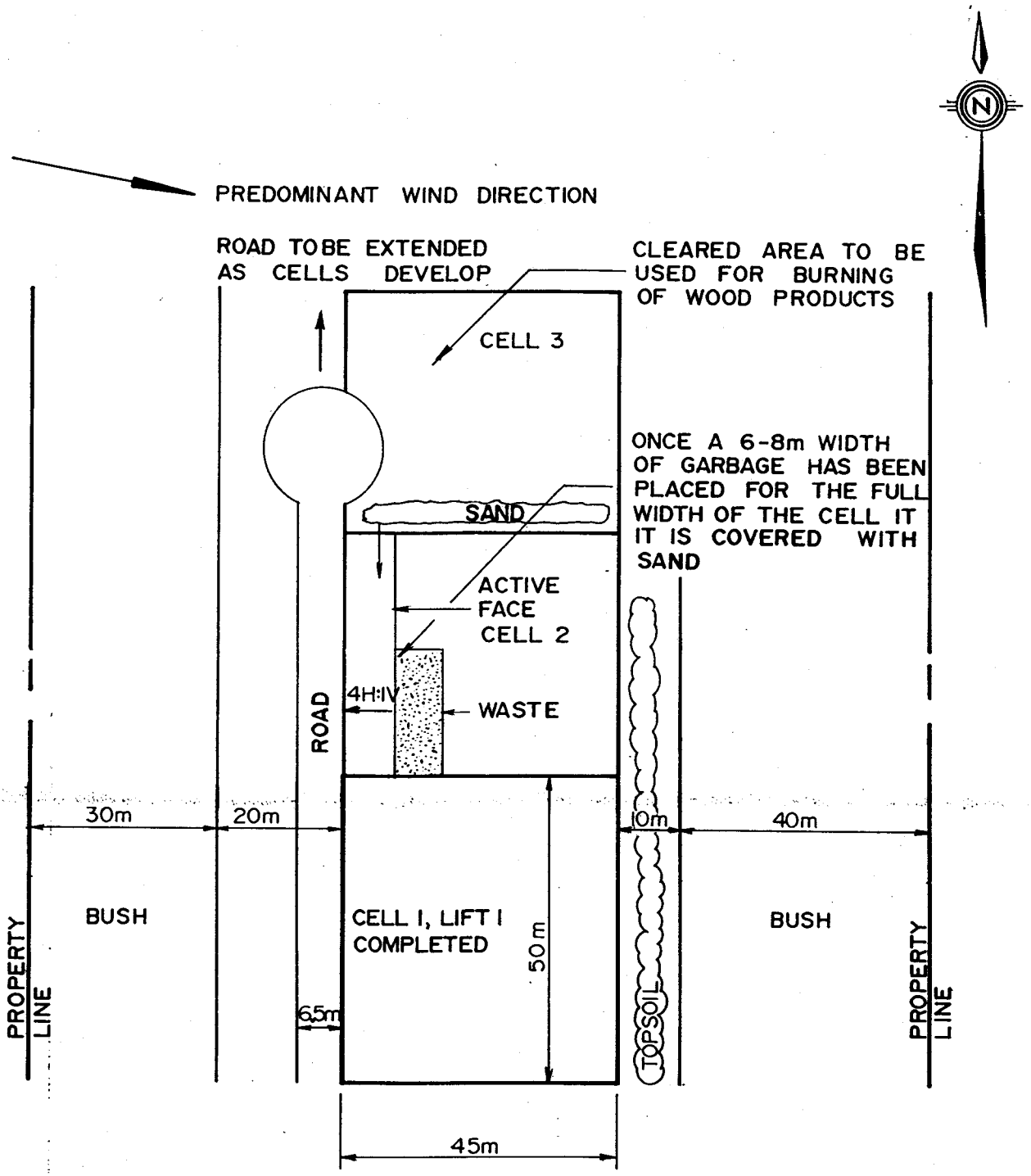



FIGURE 6.0
WASTE CELL DEVELOPMENT
STAGES IA,2,2A,3

# APPENDIX A

## PROVISIONAL CERTIFICATE OF APPROVAL # 471801

## and

## APPLICATION FOR A CERTIFICATE OF APPROVAL FOR A WASTE DISPOSAL SITE

# APPENDIX B

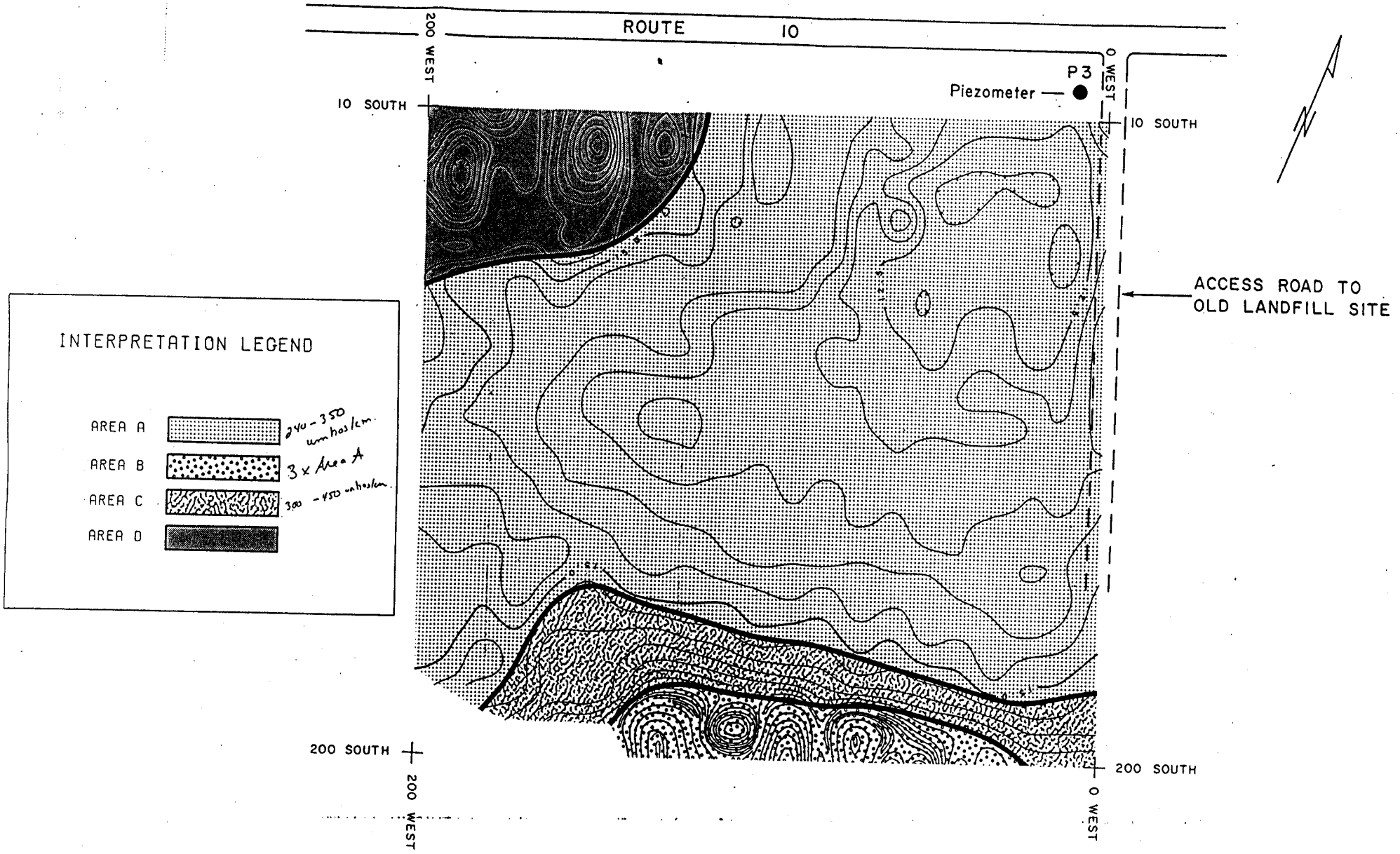
# MOE WASTE DISPOSAL SITE INVENTORY - MAY 1988

| MAP ID NO | SITE NO | COUNTY | MUNICIPALITY | LOT NO | CONCESS | NTS | D | C | O | H | L | NH | SS | ST | CL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | A471403 | PRESCOTT | HAWKESBURY, E | PT 7-8 | 5 | 31G08 | 100 | NAP | NAP | NAP | NAP | NAP | NAP | 1 | B4 |
| 11 | A471504 | PRESCOTT | HAWKESBURY, W | PT 15 1/2 | 4 | 31G10 | 64 | 20 | 4 | NAP | 2 | 10 | NAP | 1 | A4 |
| 12 | A471506 | PRESCOTT | HAWKESBURY, W | PT 1 E1/2 | 1 | 31G10 | 60 | 25 | 15 | NAP | NAP | NAP | NAP | 1 | A3 |
| 13 | A471507 | PRESCOTT | HAWKESBURY, W | PT 1 W1/2 | 1 | 31G10 | NAP | NAP | 25 | NAP | NAP | 100 | NAP | 1 | B4 |
| 14 | A471601 | PRESCOTT | LONGUEUIL | PT 59 | M-100-S | 31G10 | 80 | 5 | 15 | NAP | NAP | NAP | NAP | 1 | B4 |
| 15 | A471701 | PRESCOTT | PLANTAGENET | PT 11 S | 8 | 31G06 | 90 | 10 | 0 | NAP | NAP | NAP | NAP | 1 | B4 |
| 16 | A471801 | PRESCOTT | PLANTAGENET | PT 3 | 14 | 31G07 | 70 | 5 | 25 | NAP | NAP | NAP | NAP | 1 | A4 |
| 17 | A471802 | PRESCOTT | PLANTAGENET | PT 3SW1/4 | 15 | 31G07 | 85 | 10 | 5 | NAP | NAP | NAP | NAP | 1 | B4 |
| 18 | A471904 | PRESCOTT | RUSSELL | 2 | 4 | 31G03 | 75 | 20 | 5 | NAP | NAP | NAP | NAP | 1 | A4 |
| 1 | A350102 | PRINCE EDW | PICTON | PT 21-22 | 1 SE OF | 31C03 | NAP | NAP | 100 | NAP | NAP | NAP | NAP | 1 | A3 |
| 2 | A350301 | PRINCE EDW | WELLINGTON | PT 3 | 1 LKSID | 30N14 | NAP | 15 | 10 | NAP | NAP | 75 | NAP | 1 | A3 |
| 3 | A350401 | PRINCE EDW | AMELIASBURGH | PT 71-72 | 3 | 31C03 | 85 | 5 | 10 | NAP | NAP | NAP | NAP | 1 | A4 |
| 4 | A350601 | PRINCE EDW | HALLOWELL | PT 6 | 1 M T | 30N14 | 85 | 10 | 5 | NAP | NAP | NAP | NAP | 1 | A4 |
| 5 | A350602 | PRINCE EDW | HALLOWELL | PT 1 | S S WES | 30N14 | NAP | 95 | 5 | NAP | NAP | NAP | NAP | 1 | A4 |
| 6 | A350603 | PRINCE EDW | HALLOWELL | PT 21 | 2 MILIT | 30N14 | NAP | NAP | 5 | NAP | NAP | 95 | NAP | 1 | A3 |
| 7 | A350701 | PRINCE EDW | HILLIER | PT 27 | 2 | 30N14 | 70 | NAP | 30 | NAP | NAP | NAP | NAP | 1 | B4 |
| 8 | A350905 | PRINCE EDW | MARYSBURGH, S | PT 19 E1/2 | 1 N B R | 30N14 | 90 | NAP | 10 | NAP | NAP | NAP | NAP | 1 | B4 |
| 9 | A350906 | PRINCE EDW | MARYSBURGH, S | PT 6-7 | 1 N OF | 30N14 | NAP | NAP | NAP | NAP | 100 | NAP | NAP | 1 | A2 |
| 1 | A410401 | RENFREW | RENFREW | PT 14 W1/2 | 2 | 31F07 | 53 | 22 | 5 | NAP | NAP | 9 | 11 | 1 | A1 |
| 2 | A411301 | RENFREW | ADMASTON | PT 15 E1/2 | 5 | 31F07 | 90 | NAP | 10 | NAP | NAP | NAP | NAP | 1 | A4 |
| 3 | A411401 | RENFREW | ALGONA, NORTH | PT 7 | 3 | 31F11 | 92 | ɔ | 3 | NAP | NAP | NAP | NAP | 1 | B4 |
| 4 | A411501 | RENFREW | ALGONA, SOUTH | PT 27 | 9 | 31F11 | 94 | NAP | 6 | NAP | NAP | NAP | NAP | 1 | B4 |
| 5 | A411601 | RENFREW | ALICE & FRASE | PT 23-25 | 1 | 31F11 | 60 | 36 | 4 | NAP | NAP | NAP | NAP | 1 | B4 |
| 6 | A411702 | RENFREW | BAGOT, BLYTHF | PT 20 E1/2 | 7 | 31F07 | 87 | 10 | 3 | NAP | NAP | NAP | NAP | 1 | B4 |
| 7 | A411801 | RENFREW | BROMLEY | PT 5 | 10 | 31F10 | 90 | 5 | 5 | NAP | NAP | NAP | NAP | 1 | A4 |
| 8 | A411802 | RENFREW | BROMLEY | PT 18 | 3 | 31F10 | 92 | 5 | 3 | NAP | NAP | NAP | NAP | 1 | B4 |
| 9 | A411803 | RENFREW | BROMLEY | PT 19 | 3 | 31F10 | 100 | NAP | NAP | NAP | NAP | NAP | NAP | 3 | B |
| 10 | A411901 | RENFREW | BROUGHAM | PT 4 | 14 | 31F07 | 95 | 2 | 3 | NAP | NAP | NAP | NAP | 1 | B4 |
| 11 | A411902 | RENFREW | BROUGHAM | PT 9 | 3 | 31F02 | 47 | 50 | 3 | NAP | NAP | NAP | NAP | 1 | B4 |
| 12 | A412001 | RENFREW | BRUDENELL | PT 10 | 13 | 31F06 | 88 | 2 | 10 | NAP | NAP | NAP | NAP | 1 | B4 |
| 13 | A412002 | RENFREW | BRUDENELL | PT 22 | 12 | 31F06 | 85 | 5 | 10 | NAP | NAP | NAP | NAP | 1 | A4 |
| 14 | A412101 | RENFREW | GRATTAN | PT 36 N1/2 | 20 | 31F11 | 93 | 5 | 2 | NAP | NAP | NAP | NAP | 1 | B4 |
| 15 | A412102 | RENFREW | GRATTAN | PT 18-19 | 8 | 31F06 | 93 | 5 | 2 | NAP | NAP | NAP | NAP | 1 | B4 |

# APPENDIX C
# LEGAL PLAN

# APPENDIX D

# GEOPHYSICAL MAP - GEOTERREX


ROUTE 10
200 WEST
0 WEST
10 SOUTH
P3
Piezometer
ACCESS ROAD TO
OLD LANDFILL SITE
200 SOUTH
INTERPRETATION LEGEND
AREA A
240 - 350 umhos/cm
AREA B
3 x Area A
AREA C
350 - 450 umhos/cm
AREA D

# APPENDIX E

# ANNUAL REPORT FORM, 1990

# ANNUAL REPORT ON WASTE DISPOSAL OPERATIONS

PREPARED FOR: Township of South Plantagenet

PREPARED BY: McNeely Engineering Ltd.

DATE SUBMITTED: February 1991

## SITE DESCRIPTION

| | | | | | | |
|---|---|---|---|---|---|---|
| LOCATION | LOT | 3 | CONC. | 14 | TOWNSHIP | S. Plantagenet |
| TYPE | DUMP | | LANDFILL | X | | |
| STATUS | OPEN | X | CLOSED | | | |
| SITE DIMENSIONS | LENGTH | 1460m | WIDTH | 225m | AREA | 33 ha |

CERTFICATE OF APPROVAL # 471801

ISSUED ON April 16,1980

TYPE OF CERTIFICATE

| | |
|---|---|
| - PROVISIONAL | X |
| - EMERGENCY | |
| - EXPANSION | |

LEGAL PLAN

PLAN # 46R-642 Aug.3 1979, Revised May 5 1980

REGISTRY Charles H. Donnelly, Ontario Land Surveyor

# WASTE QUANTITIES AND QUALITIES

MUNICIPALITIES AUTHORIZED TO USE DISPOSAL

1 Township of South Plantagenet

2

3

POPULATION SERVE 1986 1636 1988 1579 ROWTH % -1.6

WASTE TYPE DOMESTIC 98% COMMERCIAL 2% OTHER

SOLID NON HAZARDOUS INDUSTRIAL

| | | | | | |
|---|---|---|---|---|---|
| SITE AREA IN HECTARES | TOTAL | 33 | DISPOSAL | 30.4 | |
| OPERATION PLAN PREPARED | YES | X | NO | | |
| PLAN PREPARED BY McNeely Eng. | DATE | Feb./91 | PLAN # | M-2940 | |
| TOTAL WASTE DISPOSAL CAPACITY*** | CU.M. | 143000 | STARTING YEAR | 1990 | |
| WASTE VOLUME PRODUCED IN 1990 | CU.M. | | MEASURED BY | | |
| CUMULATIVE VOLUME PLACED TO DATE | CU.M. | 24000 | MEASURED BY | Survey | |
| REMAINING CAPACITY | CU.M. | 119000 | # OF YEARS | 20+ | |
| WASTE GENERATION | CU.M/CAPITA/DAY | 1.25 | | | |

***Stages 1,1A,2***

# SITE OPERATIONS

BUFFER DISTANCE TO PROPERTY LINE DESIGN 50 METRES ACTUAL 15 METRES

METHOD OF PLACEMENT (Stage 1) TRENCH [ ] AREA FILL [ ] RAMP [X]

CELL OR TRENCH DIMENSIONS (LENGTH * WIDTH * HEIGHT) METRES

COMPACTION EQUIPMENT TYPE Track-Dozer STATUS Rental

FREQUENCY OF COMPACTION SUMMER WINTER

INTERIM COVER MATERIAL TYPE Sand THICKNES 150-200mm MPORTED [X] ON-SITE [ ]

# SPECIAL DESIGNATED AREAS

| | | | | | |
|---|---|---|---|---|---|
| METAL | YES X | NO | SIZE OF PILE | <20 | SQ.M. |
| TIRES | YES X | NO | # OF TIRES | <100 | |
| WOOD PRODUCTS | YES X | NO | SIZE OF PILE | <5 | CU.M. |
| OTHER | YES | NO X | SIZE OF PILE | | CU.M. |

## SITE FACILITIES RATING

| DESCRIPTION | CONDITION | | | NEEDS IMPROVEMENTS IN CURRENT YEAR |
|---|---|---|---|---|
| | POOR | FAIR | GOOD | |
| | | | | |
| GATE | | | X | |
| SIGN AT ENTRANCE | | | X | |
| SIGNS AT SPECIAL DISPOSAL AREAS | X | | | X |
| VISUAL BUFFER | | X | | |
| SITE ATTENDANT'S SHELTER | | | X | |
| ACCESS ROAD | | | X | |
| FENCE | | X | | |
| SECURITY | | X | | |
| SCAVAGING | | X | | |
| OTHER | | | | |
| Rodent Control | X | | | X |
| Site Housekeeping | | X | | |

## ENVIRONMENTAL FACTORS

| DESCRIPTION | PROBLEMS | | REMEDIAL ACTION |
|---|---|---|---|
| | YES | NO | |
| | | | |
| ODOURS | | X | |
| BURNING | | X | |
| LITTER | X | | -erect snow fence |
| RODENTS | X | | -retain licensed exterminator |
| VECTORS | | X | |

OTHER COMMENT Total remaining capacity in Stages 1,1A, and 2 is 119000 cubic metres. Additional capacity can be attained by developing Stages 2A,3,3A and 4.

## SITE CLOSURE

CLOSURE PLAN PREPARED YES [ ] NO [X]
PLAN PREPARED BY _____ DATE _____ PLAN # _____

SITE CLOSED YES [ ] NO [X]
IF YES, MONTH/YEAR CLOSED _____

## SITE INSPECTION SUMMARY

| SITE INSPECTED BY | | |
|---|---|---|
| NAME OF PERSON | COMPANY | DATE |
| | | |
| 1 - G. Lalonde | McNeely Engineering | February 1991 |
| 2 - | | |
| 3 - | | |
| 4 - | | |

| EVALUATION OF CLOSED LANDFILL | | | | |
|---|---|---|---|---|
| DESCRIPTION | POOR | FAIR | GOOD | NEEDS IMPROVEMENTS |
| | | | | |
| GATE | | | | |
| SIGN AT ENTRANCE | | | | |
| ACCESS ROAD | | | | |
| SURFACE DRAINAGE | | | | |
| VISUAL BUFFER | | | | |
| BERM CONDITION | | | | |
| TREE GROWTH | | | | |
| COVER MATERIAL | | | | |
| SIDE SLOPE GRADING | | | | |
| GRADING ON WASTE SURFACE | | | | |
| EROSION PROBLEMS | | | | |
| VEGETATIVE GROWTH | | | | |
| RODENTS | | | | |
| EVIDENCE OF LEACHATE | | | | |
| EVIDENCE OF GAS | | | | |
| EVIDENCE OF BURNING | | | | |
| CONDITION OF PIEZOMETERS | | | | |

OTHER COMMENT _____

# HYDROGEOLOGICAL ASSESSMENT

HYDROGEOLOGICAL REPORT PREPARED — YES [X] NO [ ]

REPORT PREPARED StanCon Eng. DATE Feb./1991 REPORT # 90-78

GEOLOGY/SOIL DESCRIPTION

The overburden material consists of a 4 to 10 metre thick sequence of fine grained deltaic and estuarine sands. Below this a stiff brown/grey clay some 20 to 30 metres thick overlies a black gravel some 0 to 10 metres thick.

TYPE OF SOIL UNDERLYING WASTE: Fine grained sands

PERMEABILITY CM/SEC: 1x10E-6 metres per second

DEPTH TO BEDROCK IN METRES: Between 24 and 50 metres

# OF PIEZOMETERS 6 IDENTIFICATION P1,P2,P3,P4,P5,P6.

CURRENT YEAR SAMPLING PROGRAM

| | GROUNDWATER | | SURFACE WATER | |
|---|---|---|---|---|
| | ACTUAL | PROPOSED | ACTUAL | PROPOSED |
| SPRING | | | | |
| SUMMER | | X | | X |
| FALL | X | X | X | X |
| WINTER | | | | |

SAMPLING DONE YEARS: 1990

GROUNDWATER FLOW

| | DIRECTION | VELOCITY |
|---|---|---|
| NORTH END OF SIT | N.W. | METRES/YEAR |
| SOUTH END OF SIT | S.E. | METRES/YEAR |

RESULTS OF SAMPLING YEAR 1990

WERE SURFACE WATER QUALITY CRITERIA EXCEEDED — YES [ ] NO [X]

WERE GROUNDWATER QUALITY CRITERIA EXCEEDED — YES [ ] NO [X]

PARAMETERS MEASURED THAT EXCEEDED REASONABLE USE GUIDELINES

SURFACE WATER: No parameters exceeded in either the past or current fill area.

GROUNDWATER: No parameters exceeded in either the past or current fill area.

LEACHATE CHARACTERISTICS

The leachate characteristics from the three piezometers located at the current fill area are iron, mangenese,sodium, ammonia, sulphate and dissolved organic carbon. The extent of leachate migration at the current fill area shows minimal progression from the fill area and no off-site impacts.

# ENVIRONMENTAL EFFECTS

LOCATION OF NEAREST RESIDENCES

| | | |
|---|---|---|
| NORTH: | 160 | METRES |
| SOUTH: | 220 | METRES |
| EAST: | 50 | METRES |
| WEST: | 230 | METRES |

OTHER STRUCTURES OR UTILITIES

ENVIRONMENTAL IMPACT ON SURROUNDING LAND ASSESSED AS

| | |
|---|---|
| MINOR | X |
| MODERATE | |
| SIGNIFICANT | |

REFERENCE TO PREVIOUS STUDIES UNDERTAKEN AT THE SITE

1 NONE
2
3

OTHER COMMENT -Geophysical survey recommended for south end of the site
-Water levels to be taken in piezometers and surface waters in the spring, summer, and fall
-Conduct hydraulic testing of piezometers to obtain permeability values

# PLANNING CONSIDERATIONS AND COSTS

LIST IMPROVEMENTS UNDERTAKEN TO REDUCE,REUSE,RECYCLE WASTE

1 Educate township residents about composting and waste reduction
2 Implementation of garbage collection system
3 Implementation of curbside recycling program

ARE MUNICIPAL BY-LAWS IN PLACE FOR

| | | | | |
|---|---|---|---|---|
| - COLLECTION OF WASTE | YES | | NO | X |
| - DISPOSAL OF WASTE | YES | | NO | X |
| - RECYCLING | YES | | NO | X |
| - OTHER | YES | | NO | X |

HAS A RESERVE ($) BEEN ESTABLISHED FOR CLOSURE — YES [ ] NO [X]

HAS A RESERVE ($) BEEN ESTABLISHED FOR SITE REPLACEMENT — YES [ ] NO [X]

# SUMMARY OF EXPENDITURES

| DESCRIPTION | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|
| | | | | |
| PREVIOUS YEARS | | | | |
| OPERATION COSTS FOR COLLECTION | | | | |
| DISPOSAL COSTS AT LANDFILL | | | | |
| ADMINISTRATIVE/LEGAL COSTS | | | | |
| TECHNICAL/ENGINEERING COSTS | | | | |
| MONITORING COSTS | | | | |
| TOTAL | | | | |
| | | | | |
| FUTURE | | | | |
| EST. COLLECTION COSTS | | | | |
| EST. DISPOSAL COSTS | | | | |
| RESERVE FOR EQUIPMENT REPLACEMENT | | | | |
| EST. SITE UPGRADING/IMPROVEMENTS | | | | |
| EST. MONITORING COSTS | | | | |
| RESERVE ($) FOR SITE REPLACEMENT | | | | |
| RESERVE ($) FOR SITE CLOSURE | | | | |
| TOTAL | | | | |

# APPENDIX F

# PHOTOS


Access to Road to Landfill.

Gate & padlock

Custodian Shelter. East side, Stage 1 waste placement looking south.

Wastepile. East side, Stage 1. Looking east from access road.

DITCH #3
Looking east from center of site. Past fill area shown on left side of photo

DITCH #1
Looking east from center of site.