



Mark,
Here's that report
done by Laurie Cooper, by hand
for your information.
DWH

SEP 14 1987

the metropolitan toronto and region conservation authority

5 shoreham drive, downsview, ontario, m3n 1s4 (416) 661-6600

August 21, 1987

Our File No. 00008

Mr. David Heeney
Heeney and Associates
130 Maplewood Avenue
Toronto, Ontario
M6C 1J6

Dear Sir,

Re: Study of Lakefilling for M.O.E.

Further to our recent conversation, please find enclosed copies of 2 reports concerning the importance of lakefills to the construction industry in the Metro Toronto region. Obviously, the parks and small craft harbours that result from lakefilling provide major social and economic benefits which are not documented within this material. We understand that type of analysis forms a part of your study and would appreciate being kept informed of your progress. We would also be pleased to assist you in any other way that relates to the Authority's waterfront development program since the program has and will involve some lakefilling activities.

Yours very truly,

Brian E. Denney, P. Eng.
Manager
Engineering and Development Section
Water Resource Division

Enclosures:

BED/md

PROPOSAL TO RE-OPEN THE EASTERN HEADLAND IN THE TORONTO HARBOUR TO A
CONTROLLED LANDFILL PROGRAM, THE PURPOSE OF WHICH IS TO PROVIDE FOR
NECESSARY ARMAMENT AND PROTECTION

and

TO SECURE A LONG-TERM COMMITMENT FROM GOVERNMENT TO A CONTINUING LANDFILL
PROGRAM ON THE METROPOLITAN TORONTO WATERFRONT.

This brief is endorsed by:

Toronto Construction Association

Toronto and District Excavators Association

Metropolitan Toronto Sewer and Watermain Contractors Association

Heavy Construction Association of Toronto

Metropolitan Toronto Apartment Builders Association

Certain Members of the Canadian Institute of Public Real Estate Companies.

Metropolitan Toronto Road Builders Association

I. BACKGROUND CONCERNING LANDFILL ON THE TORONTO WATERFRONT

- For over twenty years, a successful landfill program has been taking place on the Toronto waterfront. Results include Ontario Place, the Eastern Headland, Ashbridges Bay Park, Humber Bay Park, and Bluffers Park, as well as several important erosion control projects.
- Waterfront landfill has provided an economic and effective means of recycling clean fill material, a necessary byproduct of construction.
- Through implementation of the Metropolitan Waterfront Plan, a mutually beneficial co-operation has developed between the plan implementers - the Metropolitan Toronto Conservation Authority and the Toronto Harbour Commission which design and administer sites for fill recycling - and the construction industry which provide the necessary fill material.
- Suitable central waterfront locations are still needed to recycle fill material, but such sites are no longer available. During the winter of 1978/79, no central waterfront landfill site will be in operation unless action is taken to remedy this situation.
- The case of the Eastern Headland, the largest waterfront landfill, illustrates the problem.
- Historically, approximately 18.5 million cubic yards of landfill, the equivalent of about 2.5 million truckloads, have been deposited to create the Eastern Headland. During the peak years the site handled up to 1,500 truckloads of fill material each day but, in recent years, volume has been considerably lower.

- This fill has created a 3 1/2 mile long "spit" extending into Lake Ontario from the foot of Leslie Street. The Headland has an area of approximately 400 acres, 250 acres of which have been created by trucked landfill, the remainder by sediment dredged from Toronto Harbour.
- The Headland provides needed protection to the port and represents a land resource with significant recreation and conservation potential.
- In 1977, the landfill program on the Headland was terminated. Only rubble dumping is permitted now.
- There are three principal reasons for the decision to close the Headland landfill.
 - (1) There is no approved, final development plan for the site.
 - (2) Appropriate financing arrangements are lacking.
 - (3) There are some environmental concerns.
- No one disputes the potential and value of the Headland because:
 - it protects the port and facilitates navigation
 - it provides a conservation function by reducing sediment build-up and shoreline erosion
 - it contains ecologically unique features
 - it has tremendous recreation potential.
- All proposals for use of the spit depend on its being secured for the future.

IN SPITE OF THESE ADVANTAGES, THE HEADLAND REMAINS INCOMPLETE AND, IF LEFT IN ITS CURRENT STATE, THE SPIT WILL EVENTUALLY BE BREACHED BY WAVE ACTION. THE BREACHING OF THE HEADLAND WOULD DESTROY THE POSITIVE FEATURES OF THE LAND FORMATION AND EXPOSE THE CONTAMINATED SEDIMENT DIRECTLY TO THE LAKE. POLLUTION WILL RESULT.

THE COMPLETION AND PROPER ARMOURING OF THE EASTERN HEADLAND IS IN THE INTEREST OF ALL.

THE SPONSORS OF THIS BRIEF STRONGLY URGE THAT THE EASTERN HEADLAND BE REOPENED TO A CONTROLLED LANDFILL PROGRAM TO ALLOW FOR COMPLETION OF THE NECESSARY PROTECTIVE MEASURES TO SECURE THIS VALUABLE LAND FORM FOR THE FUTURE.

II. ARGUMENTS TO SUPPORT THE POSITION THAT THE EASTERN HEADLAND LANDFILL SHOULD BE RE-OPENED

A. THE EASTERN HEADLAND PROVIDES PROTECTION TO THE PORT. LEFT INCOMPLETE THE HEADLAND WILL BE DESTROYED BY THE ELEMENTS, THE RESULT WILL BE THE LOSS OF A SIGNIFICANT CAPITAL INVESTMENT AND A RECREATION RESOURCE AND CONTAMINATION OF THE HARBOUR.

- There is a high risk that the Eastern Headland will be breached if the south shoreline of the land form is left unarmoured. Large quantities of contaminated sediment will be exposed to direct wave action and, therefore, will considerably pollute the water in the harbour. Alternatively, proper protection of the Headland will, in the long run, improve the aquatic environment around it.
- If the Headland is breached, the Eastern Gap will again have to be dredged regularly to maintain it as a navigable entrance to the port.
- The breaching of the Headland will hinder the public use of this land and seriously limit its value for recreational purposes.
- A scheme developed by Toronto Harbour Commission staff, and tested in other projects elsewhere on the waterfront, is proposed to provide needed protection to the Headland. The south shore of the Eastern Headland would be secured by creation of several armoured promontories extending into the lake perpendicular to the direction of principle wave action. This shoreline scalloping requires a landfill operation for several years during the pre-armament phase. Pre-armouring reduces the requirements for purchased quarry stone, and thus reduces armament costs.

B. TERMINATION OF THE WATERFRONT LANDFILL PROGRAM WILL RESULT IN
SUBSTANTIAL INCREASES IN THE COST OF ALL CENTRALLY LOCATED
CONSTRUCTION AND PUBLIC WORKS PROJECTS

- Ultimately, the financial penalty of increased haulage costs is borne by the public at large, either directly in the form of increased purchase prices, rent or taxes or indirectly by increased costs of services. This avoidable cost increase fuels current inflationary trends in the local economy and adds upward pressure on municipal government expenditures.
- The additional cost of the removal of fill to inland sites is substantial. In some cases, use of inland sites increases haulage cost ten times.

In the case of the Massey Hall project, to transport material to the best alternate site with assured availability, the additional cost is approximately \$275,000; for the Eaton Centre the comparable figure is \$1,540,000 and for the Humber Sewage Treatment Plant expansion the increase is \$1,560,000.

- The cost analysis (contained in the supporting research) shows that the most economical locations for re-use of excavated material from the central metropolitan area are sites in the Eastern Harbour.
- All the alternative landfill sites which exist, have limitations which will make them unavailable in the short term, or expensive because of their remoteness. Immediate action is required to avoid the economic penalty which will otherwise be borne by the community.

C. WATERFRONT LANDFILL AIDS CONSERVATION BY PROVIDING SHORELINE PROTECTION AND THE RECYCLING OF A CONSTRUCTION BYPRODUCT

- Waterfront landfill provides valuable recreational lands at a fraction of the cost of other alternatives, and has provided needed shoreline protection and erosion control, especially to the Scarborough Bluffs and the Toronto Island. If the waterfront plans of the Metropolitan Toronto Region Conservation Authority are fully implemented, sediment entering Lake Ontario will be reduced.
- Construction of the Eastern Headland has overcome the requirement for continuous dredging in the Eastern Gap where, historically, sedimentation has impeded navigation.
- Disposal of fill material near the source area reduces the overall negative impact on the environment. Recycling of excavated material at convenient locations near construction sites has alleviated the necessity of hauling material long distances through urban areas with the resulting increases in air and noise pollution, added energy consumption in fuel, increased "wear and tear" on roads, and congestion of the transportation system.

D. THE WATERFRONT LANDFILL PROGRAM PROVIDES NEEDED PARKLAND AT REASONABLE COST

- Valuable parkland is created by landfill at a fraction of the cost of purchase and preparation of comparable on-shore land areas. Land on the waterfront has been created at costs ranging from \$20-\$50,000 per acre, significantly less than the purchase price of existing land similarly situated.
- Creation of parkland by the landfilling process allows landscape features to be custom designed and shaped to conform with the ultimate planned land use.
- Landfill was used to construct Ontario Place, an expansion to Exhibition Place, Ashbridges Bay Park, Bluffers Park, Humber Bay Park, and the Eastern Headland ("Aquatic Park"). Each owes its existence to the creative recycling of clean fill from construction.
- The waterfront parks are often situated favourably in relation to residential neighbourhoods most in need of improved recreational service.
- Aquatic parkland, resulting from the implementation of the waterfront fill program, particularly benefits those sections of society less capable, for financial or physical reasons, of travelling to the more costly and remote recreational alternatives. The poor and the physically handicapped are examples of groups who enjoy the significant benefit of such accessible parks.
- The creation of readily accessible parkland and the resulting reduction in travel to remote recreation areas is consistent with general government initiatives for fitness and energy conservation.

E. WATERFRONT LANDFILL IS CONSISTANT WITH APPROVED LAND USE PLANS AND FORMAL STATEMENTS OF PUBLIC POLICY

- The value of and necessity for the provision of waterfront parkland was stated in the Waterfront Plan for the Metropolitan Toronto Planning Area. The Waterfront Plan also indicated that because of the cost of land and shortage of public parks on the waterfront, parkland development should be implemented primarily through land creation by landfill.
- The waterfront plan, now in its eighth year of implementation, specifically endorses "constructive use of fill materials".

"The lake should continue to be used for disposition in a constructive way of surplus fill from building sites and public works projects within economic haul distances. In this way, worthwhile additions can be made to the waterfront which lower construction costs and can be obtained in building projects."

A record of government commitment to a specific waterfront development on the Eastern Headland is contained in the accompanying background papers.

III. CONCLUSIONS:

- LEFT INCOMPLETE, THE HEADLAND WILL BE DESTROYED. THIS WILL RESULT, NOT ONLY IN THE LOSS OF A SIGNIFICANT CAPITAL INVESTMENT AND RECREATION RESOURCE BUT ALSO IN CONTAMINATION OF THE HARBOUR.
- ALL ALTERNATIVE LAND USE PROPOSALS FOR THE HEADLAND REQUIRE IT TO BE ARMoured.
- ALL DESIGN OPTIONS TO ARMOUR THE EASTERN HEADLAND REQUIRE LANDFILL.
- STUDIES CONDUCTED AT EXISTING WATERFRONT LANDFILL SITES INDICATE THAT LONG-TERM NEGATIVE ENVIRONMENTAL IMPACTS ARE MINIMAL.
- THE CONSTRUCTION INDUSTRY IS WILLING TO PARTICIPATE IN DISCUSSIONS RESPECTING RE-ALLOCATION OF COST FOR THE OPERATION OF THE EASTERN HEADLAND LANDFILL.
- CO-ORDINATED ACTION BY GOVERNMENTS WILL RESULT IN A NUMBER OF SIGNIFICANT PUBLIC BENEFITS: ADDITIONAL PARK AND CONSERVATION LAND, REDUCED POLLUTION, AND LOWER CONSTRUCTION COSTS.
- THE EASTERN HEADLAND REPRESENTS AN ECONOMIC LOCATION TO USEFULLY RECYCLE EXCAVATED MATERIAL WHICH IS A NECESSARY BY-PRODUCT OF CONSTRUCTION AND PUBLIC WORKS.

THEREFORE, WE REQUEST THAT A DECISION BE MADE TO RE-OPEN THE EASTERN HEADLAND TO A CONTROLLED LANDFILL PROGRAM, THE PURPOSE OF WHICH IS TO PROVIDE FOR NECESSARY ARMAMENT AND PROTECTION OF THE HEADLAND.

BACKGROUND APPENDICES

Proposal to re-open the Eastern Headland in the Toronto Harbour to landfill and to secure a long-term commitment from government to a continuing landfill program on the Metropolitan Toronto waterfront.

PRESENTED ON BEHALF OF THE TORONTO CONSTRUCTION ASSOCIATION
AND OTHERS

LIST OF APPENDICES

- I. AN EXAMINATION OF THE REASONS FOR THE CLOSURE OF THE EASTERN HEADLAND
- II. COMPARISON OF CONVENTIONAL LANDFILL METHODS WITH TORONTO HARBOUR COMMISSION STAFF PROPOSAL
- III. COMPARATIVE COST ANALYSIS
- IV. SUMMARY OF LANDFILL SITE CHARACTERISTICS
- V. DEMAND FOR WATERFRONT LANDFILL SITES
- VI. EFFECTS OF WATERFRONT LANDFILL ON THE AQUATIC ENVIRONMENT
- VII. A RECORD OF GOVERNMENT RESOLUTIONS RESPECTING THE AQUATIC PARK ON THE EASTERN HEADLAND

AN EXAMINATION OF THE REASONS FOR
THE CLOSURE OF THE EASTERN HEADLAND

THE EASTERN HEADLAND SITUATION ILLUSTRATES THE TYPICAL PROBLEMS WHICH RESULT IN THE DECLINING AVAILABILITY OF SITES FOR LAKEFRONT LANDFILL

- In 1977, after approximately twenty years of operation as the principal landfill project on the metropolitan waterfront, the operation at the Eastern Headland was closed to all types of fill with the exception of rubble.
- Historically, this site has received approximately 18.5 million cubic yards of fill material (2.5 million truckloads).
- Some 250 acres of total land area of over 400 acres on the headland have been created by trucked landfill, the remainder by dredged sediment taken from the Toronto Harbour.
- During peak construction activity, between 1,000 and 1,500 truckloads of fill per day were handled at the site. Current activity has declined to about one-tenth of these maximums as a result of the closure of the site for the receipt of normal fill.

THE APPARENT PRINCIPAL REASONS FOR CLOSURE OF THE EASTERN HEADLAND TO A FULL FILL PROGRAM CAN BE SUMMARIZED AS FOLLOWS:

1. The Ultimate Land Use and Detailed Design for the Headland Have Not Been Agreed Upon Among the Large Number of Agencies Involved
 - Although a concept plan for an "Aquatic Park" exists, as prepared by consultants to the Metropolitan Toronto Region Conservation Authority, there appears to be a lack of unity among the several agencies involved in the approval and implementation process on the details of the ultimate plans. There is, however, consensus that the headland should be developed for park and open space uses.
 - The concept of an aquatic park in this location has been approved in principle by all necessary authorities, but no detailed implementation plan has been prepared. Differences respecting the preferred ultimate development plan exist, relating primarily to the issue of the appropriate balance between active (boat and recreational) and passive (wilderness, natural area) uses, the area to be devoted to each, and the degree to which cars and public transit will be allowed on the headland.

- The City of Toronto has approved only the concept of open space and park uses on the headland, and will make no commitments respecting specific improvements until such time as it has had the opportunity to review a detailed implementation plan.
- The government jurisdictions and their agencies follow, together with their responsibilities.
 - The Metropolitan Toronto Region Conservation Authority has been designated by the Province of Ontario as the provincial agent with respect to the planning and development of the aquatic park. The Toronto Harbour Commission, which designed and administered the initial construction of the spit, has been designated by the Metropolitan Toronto Region Conservation Authority as its agent with respect to waterfront landfill operations.
 - The City of Toronto is charged with land use planning responsibilities within its jurisdiction. The City Official Plan designation for the outer headland is inappropriate and amendments are required.
 - A Central Waterfront Planning Advisory Committee has been established by the City with broadly defined responsibilities for planning of the central waterfront.
 - The Metropolitan Toronto Council also has a mandate to plan within its jurisdiction. Metropolitan Toronto was instrumental in the initiation of the overall waterfront parkland development program when it endorsed a general plan for the development of the metropolitan waterfront in 1967. Metropolitan Council's approval of the "Aquatic Park Master Plan" is also conditional. One of the conditions is that the final implementation plans for development of the site, once prepared, be submitted and approved by the City of Toronto and Metro prior to execution.
 - Both provincial and federal governments are directly involved by reason of land ownership and the international port, respectively.

2. The Financial Responsibilities Are Significant

- The cost of implementing the proposals contained in the Aquatic Park Master Plan has been estimated at \$22 million. The Metropolitan Toronto Region Conservation Authority has accepted responsibility through its waterfront program for implementation of the final development program, but in the absence of an approved detailed implementation plan, no project-specific funding commitments have been made.

- Metropolitan Toronto, as the benefiting municipality in this case, must share the cost of the project with the Province of Ontario.
- Prior to the Metropolitan Toronto Conservation Authority assuming an active role in the implementation of plans, it must assume title to the lands. This will be done only if the spit has been properly and permanently armoured. Cost estimates to accomplish this armouring range to \$4 million.
- Staff of the Toronto Harbour Commission have proposed a scheme to armour the southern shore of the Eastern Headland which involves an on-going landfill operation over several years.

This process could accommodate between 300,000 and 350,000 cubic yards of clean fill over a period of two to three years and would allow for seven to ten years of rubble dumping.

At the same time, substantial final cost reduction for armouring the headland would be realized.

- It is essential to all alternative land use proposals for the headland that it be properly protected and secured against destruction by the elements.

3. Agreement on Financial Responsibilities Between Governments and Their Agencies Is Necessary for Work to Proceed

- To the present, the Toronto Harbour Commission has been responsible for funding the majority of the work to create the Eastern Headland. Cost estimates for this land creation process range to \$10 million.
- It is unlikely the creation of a significant "port" facility will occur in the outer harbour as a result of any of the current proposals for development of the Eastern Headland. The Toronto Harbour Commission is, therefore, reluctant to assume any further costs associated with implementation of the recreational development of the headland.
- The Metropolitan Toronto Parks Department which will ultimately operate and maintain parkland on the Eastern Headland sees its financial involvement as being in the future, commencing after rather than before, final development plans are implemented.
- The Toronto Harbour Commission and the Metropolitan Toronto Region Conservation Authority are committed to approach the federal government for financial assistance in the armouring of the headland.

4. Concern for the Quality of the Environment Exists

- Provincial Ministry of Environment officials have expressed some concern respecting lakefront landfilling programs in general. Ministry intervention has resulted in the alteration of fill programs.
- Some citizen interest groups have formed and these have articulated concerns on the type of development proposed on the spit. Two groups, in particular the "Friends of the Spit" and the "City Cycling Committee" (not a governmental committee), have been involved, expressing preference that the Eastern Headland remain a wilderness preserve, that development for active recreational uses be minimized, and that automobiles be prohibited on the headland.
- The Ontario Field Biologists have studied the Spit¹ and have identified a number of ecologically significant characteristics, including rare flora and fauna and unique vegetal succession. It appears these attributes are concentrated primarily on the inner-shore side of the spit in areas created by dredged sediment from the harbour.
- On the basis of study and observation of existing landfill sites, it appears that negative effects to the natural environment are of a short-term and localized nature.

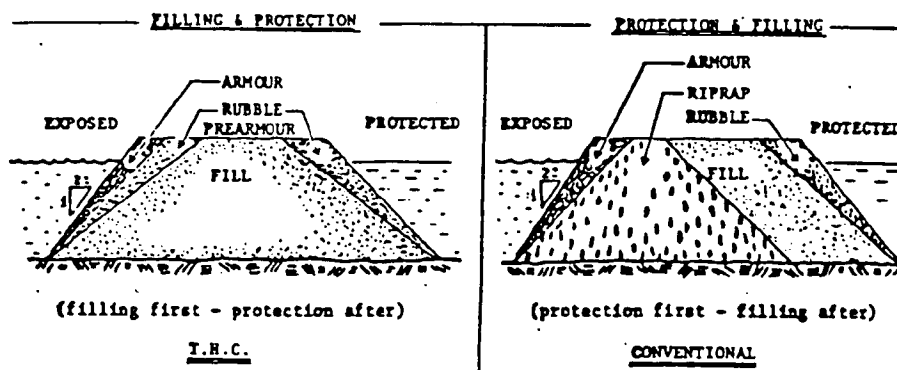
¹ The Ontario Field Biologist, Vol. 31, No. 1, June 1977.

COMPARISON OF CONVENTIONAL METHODS OF LANDFILL WITH
TORONTO HARBOUR COMMISSION STAFF PROPOSAL

(SOURCE: Toronto Harbour Commissioners "Dredged Material Disposal Study Phase I
(Technical Date) December 1975.)

4.6 Environmental and Economical Comparisons

This page shows in sketch form the proposed and the conventional methods of enclosure dike design and construction. As the table below the sketch indicates, there is very little gained environmentally by using the conventional PROTECTION FIRST - FILLING AFTER method. Moreover, the extensive need for quarried riprap stone in this method makes this type of dike about ten times as costly as the proposed method. The T.H.C. method FILLING FIRST - PROTECTION AFTER, pre-armours with rubble both sides of the fill as the filling advances - thus minimizing the likelihood of erosion. Usually the rubble pre-armour is subjected to some wave action to attain a less steep slope - otherwise the expensive quarried armour stone may roll down-slope to depths where waves do not reach. Final armouring follows. The size of quarried armour stone and protection layer thickness of it are designed to supplement the rubble pre-armour and to resist storm waves, predicted by wave climate study.



1. TYPE	FILLING & PROTECTION	PROTECTION & FILLING
2. CONSTRUCTION STAGING	1st - core & prearmouring with rubble 2nd - armouring	1st - riprap & armouring 2nd - fill & rubble
3. POLLUTION, TURBIDITY HAZARDS DURING CONSTRUCTION	- low during stage 1 - negligible during stage 2	- negligible during stage 1 - low to medium during stage 2
4. MINIMIZING OF ENVIRONMENTAL HAZARDS	- by using sufficient rubble prearmour - by filling only when, or where low waves occur	- by filling only when or where low waves occur - by using sufficient rubble
5. APPROXIMATE COST OF STRUCTURE, WHEN: (i) Preconstruction water depth 35 ft. (ii) Structure width 200 ft. - per lin. ft. - per acre above water elev.	 - \$350 - \$76,000	 - \$3,200 - \$700,000

4.7 Proposed Enclosure Dike

The following page shows:

- A. in sketch form the proposed incoming truck fill material segregation and placement, and
- B. in table form, the filling sequence for minimizing erosion losses.

The exposed edge is of the Commissioners' pioneered hardpoint-bay design.

The hardpoints are to receive the brunt of the wave energy and hence of rugged shape and extensive armouring. The bays are gentler; to the point of resembling beaches, hence having lesser armour, and having recreational values.

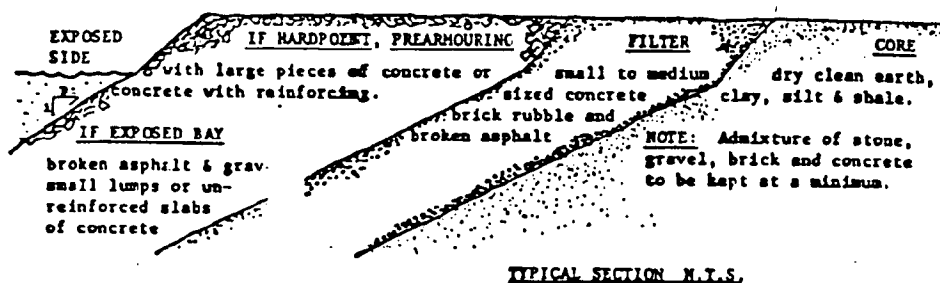
To minimize erosion losses, the filling is directed in the calm summer months toward the direction from which destructive waves are arriving during the winter storms. The advancing core is closely followed by rubble pre-armour.

During the stormy season, filling is turned toward the protected areas, thus preventing exposure of the active fill face.

All of the following enclosure construction alternatives in this report employ this filling sequence principle. These procedures have been reviewed by MOE.

MATERIAL SEGREGATION AND PLACEMENT

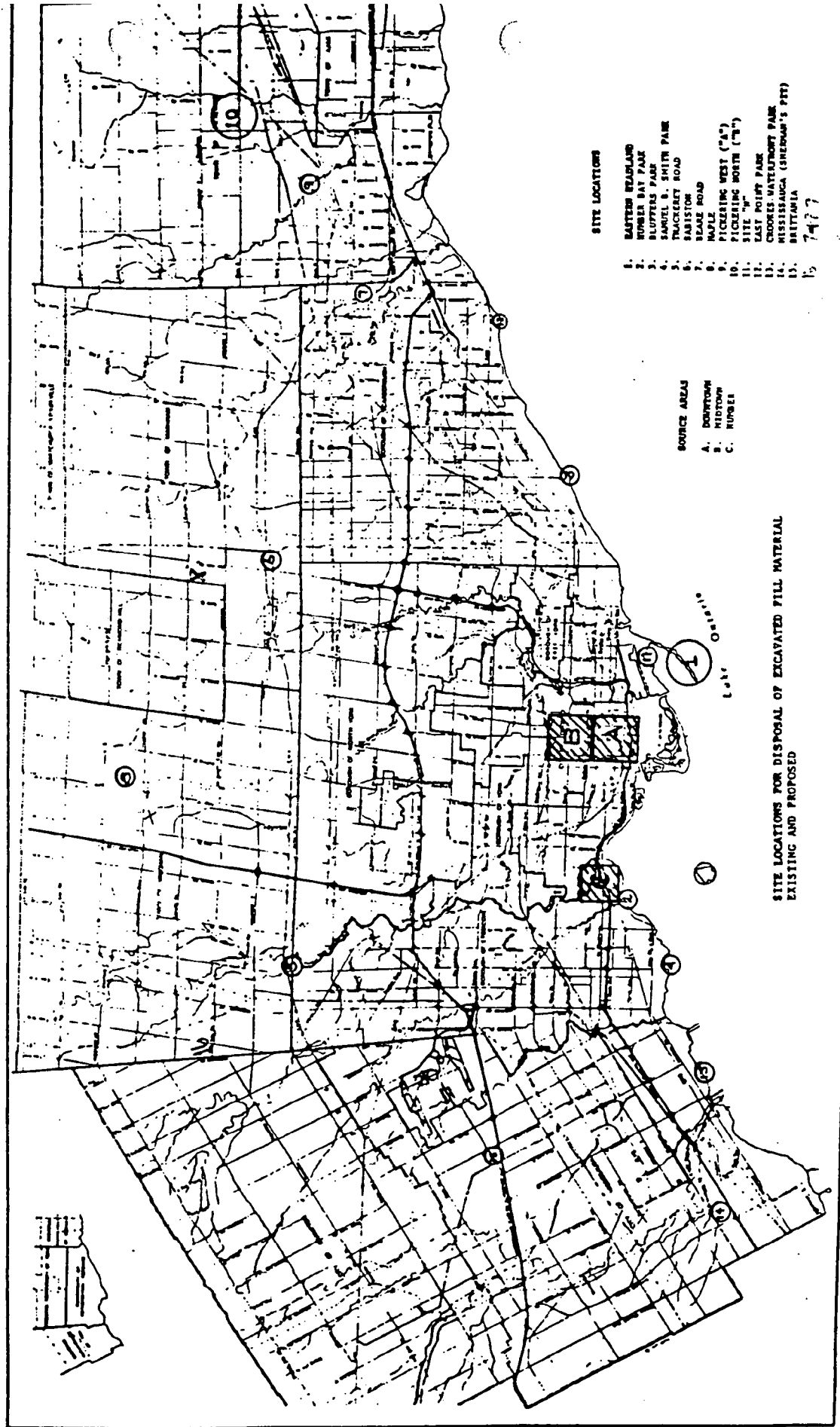
NOTE: Final Armouring to follow as and when required.



FILLING SEQUENCE FOR MINIMIZING EROSION LOSSES

1. CALM (June through Oct)	- core to be advanced along edge exposed to longest fetch, followed closely by filter layer.
2. INTERMEDIATE (Apr, May, Nov, Dec)	- if core advanced along exposed edge, it is to be followed closely by filter layer. Upon storm warnings, the exposed face of active fill to be reinforced with rubble, which has been stockpiled for this purpose.
3. STORMY (Jan, Feb, March)	- advance core toward protected areas, or - advance core along less exposed edge and proceed with protection as per "intermediate" above.

- Exhibit 1 SITE LOCATIONS FOR DISPOSAL OF EXCAVATED FILL
MATERIAL EXISTING AND PROPOSED
- Exhibit 2 COMPARISON OF HAULAGE COSTS FROM THREE GENERAL
AREAS OF DEVELOPMENT ACTIVITY TO SELECTED
DISPOSAL SITES
- Exhibit 3 ESTIMATED TOTAL HAULAGE COSTS FOR DISPOSAL OF
EXCAVATED MATERIAL BY PROJECT AND LANDFILL SITE
- Exhibit 4 INCREMENTAL COST TO ALTERNATE LANDFILL SITES BY
PROJECT



SITE LOCATIONS

1. BATTERY HEADLAND
2. HUNTER BAY PARK
3. BLUFFERS PARK
4. SARGENT & SUTHER PARK
5. TRACERET ROAD
6. FABRISTON
7. BEARE ROAD
8. NAPLE
9. PICKERING WEST ("A")
10. PICKERING NORTH ("B")
11. SITE "B"
12. EAST POINT PARK
13. CROOKES WATERPORT PARK
14. MISSISSAUGA (SHELDON'S PIT)
15. BRITANNIA

SOURCE AREAS

- A. DOWNTOWN
- B. MIDTOWN
- C. HUNTER

**SITE LOCATIONS FOR DISPOSAL OF EXCAVATED FILL MATERIAL
EXISTING AND PROPOSED**

7477

COMPARISON OF HAULAGE COSTS FROM THREE GENERAL AREAS OF DEVELOPMENT ACTIVITY TO SELECTED DISPOSAL SITES

FILL LOCATION	TYPE OF OPERATION	SOURCE AREA	RETURN DISTANCE SOURCE TO FILL SITE	ESTIMATED AV. SPEED	ESTIMATED TRIP TIME	RUNNING COST/TRIP (@ 40¢/MILE) *	FIXED COST/TRIP (@ \$13.50/HR) *	GATE FEE	TOTAL COST RETURN TRIP BY TRUCK **	COST/CY FILL (@ 9 CY/TRUCK)
EASTERN HEADLAND	R	A	14	15	1	\$ 5.00	\$13.50	N/A	\$19.10	\$2.11
		B	16		1	\$ 6.40	\$13.50		\$19.90	\$2.21
		C	26		1.7	\$10.40	\$22.95		\$33.35	\$3.71
HUMBER BAY	F	A	14	15	1	\$ 5.00	\$13.50	N/A	\$19.10	\$2.11
		B	16		1	\$ 6.40	\$13.00		\$19.90	\$2.21
		C	3		.3	\$ 1.20	\$ 4.05		\$ 6.25	.75
BLUFFERS PARK	F	A	20	15	1.3	\$ 8.00	\$17.60	N/A	\$25.00	\$2.85
		B	20		1.3	\$ 8.00	\$17.60		\$25.00	\$2.85
		C	32		2.2	\$12.80	\$29.20		\$32.00	\$3.56
COL S.B. SMITH PARK	F	A	20	15	1.3	\$ 8.00	\$17.60	N/A	\$25.60	\$2.85
		B	22		1.4	\$ 8.80	\$18.90		\$27.70	\$3.08
		C	8		.6	\$ 3.20	\$ 8.10		\$11.30	\$1.26
TRACKERY ROAD	F	A	40	20	2	\$16.00	\$27.00	N/A	\$43.00	\$4.78
		B	42		2.1	\$16.80	\$28.40		\$45.20	\$5.02
		C	28		1.4	\$11.20	\$18.90		\$30.00	\$3.31
SABISTON	F, F	A	32	20	1.6	\$12.80	\$21.00	N/A	\$37.40	\$4.16
		B	30		1.5	\$12.00	\$20.25		\$35.25	\$3.92
		C	44		2.2	\$17.60	\$29.70		\$50.30	\$5.89
BEARS ROAD	F	A	44	20	2.2	\$17.60	\$29.70	N/A	\$47.30	\$5.26
		B	42		2.1	\$16.80	\$28.40		\$45.20	\$5.02
		C	56		2.8	\$22.40	\$37.80		\$60.20	\$6.69
MAPLE	F, F	A	44	20	2.2	\$17.60	\$29.70	\$3.00	\$50.30	\$5.59
		B	42		2.1	\$16.80	\$28.40		\$48.20	\$5.36
		C	50		2.5	\$20.00	\$33.75		\$56.75	\$6.31
PICKERING A WEST	F	A	56	25	2.3	\$22.40	\$31.10	N/A	\$53.50	\$5.95
		B	54		2.2	\$21.60	\$29.70		\$51.30	\$5.70
		C	c 68		2.6	\$27.20	\$35.10		\$62.30	\$6.92
PICKERING B NORTH	F	A	66	25	2.6	\$26.40	\$35.10	N/A	\$61.50	\$6.83
		B	64		2.6	\$25.00	\$35.10		\$60.70	\$6.75
		C	c 78		3.1	\$31.20	\$41.85		\$73.15	\$8.12
SITE "W"	F	A	10	15	.7	\$ 4.00	\$ 9.45	N/A	\$13.45	\$1.50
		B	12		.8	\$ 4.80	\$10.80		\$18.60	\$1.73
		C	22		1.5	\$ 8.80	\$20.25		\$29.05	\$3.23
EAST POINT PARK	F	A	32	15	2	\$12.80	\$27.00	N/A	\$39.80	\$4.40
		B	32		2	\$12.80	\$27.00		\$39.80	\$4.40
		C	44		3	\$17.60	\$40.50		\$58.10	\$6.45
CROOKES PARK	F, FR	A	28	20	1.4	\$11.20	\$18.90	N/A	\$29.20	\$3.25
		B	30		1.5	\$12.00	\$20.25		\$32.25	\$3.58
		C	16		.8	\$ 6.40	\$10.80		\$17.20	\$1.91
MISSISSAUGA (SHERMAN'S PIT)	F, FR	A	40	25	1.6	\$16.00	\$21.60	N/A	\$36.60	\$4.07
		B	42		1.6	\$16.80	\$21.60		\$38.40	\$4.27
		C	28		1.2	\$11.20	\$16.20		\$27.40	\$3.04
BRITANNIA RD (PROPOSED)	F	A	36	25	1.5	\$14.40	\$20.35	N/A	\$34.65	\$3.85
		B	38		1.5	\$15.20	\$20.35		\$35.55	\$3.95
		C	24		1.0	\$ 9.60	\$13.50		\$23.10	\$2.57

TYPE OF OPERATION

R - RUBBLE ONLY
F - ALL CLEAN FILL
P - PROPOSED OR POSSIBLE
FR - PRIVATELY OPERATED

SOURCE AREA

A - DOWNTOWN TORONTO
B - MIDTOWN
C - HUMBER SEWAGE TREATMENT

NOTES:

* - FIGURES BASED ON 1978 ESTIMATED COSTS
** - FINAL COST FIGURES DO NOT INCLUDE COSTS
TO/FROM CONTRACTORS YARD. THIS COULD
RESULT IN UP TO 10% COST INCREMENT

ESTIMATED TOTAL HAULAGE COSTS FOR DISPOSAL OF EXCAVATED MATERIAL BY PROJECT AND LANDFILL SITE

FILL SITE	PROPOSAL (SOURCE AREA)	MASSETT HALL (A)	ROYAL ONTARIO (B) MUSEUM EXPANSION	EATON CENTRE PHASES 1 & 2 (A)	U OF T ATHLETIC COMPLEX (B)	500 UNIT RESIDENTIAL/ COMMERCIAL COMPLEX BAY & CHARLES (B)	EXTENSION TO FIRST CANADIAN PLACE (A) KING & YORK	SCHOOL DEMOLITION (B) OSSINGTON & COLLEGE	HUMBER TREATMENT PLANT EXPANSION (C)
	TOTAL EXCAVATED MATERIAL IN CUBIC YARDS	140,000 cys	42,000 cys	750,000 cys	50,000 cys	42,000 cys	100,000 cys	10,800 cys	325,000 cys
1. EASTERN HEADLAND		\$295,400 *	\$ 92,820 *	\$1,582,500 *	\$110,500 *	\$ 92,820 *	\$211,000 *	\$23,868 *	\$1,205,750
2. HUMBER		\$295,400 *	\$ 92,800 *	\$1,582,500 *	\$110,500 *	\$ 92,820 *	\$211,000 *	\$23,868 *	\$ 243,750 @
3. BLUFFERS PARK		\$399,000	\$119,700	\$2,137,500	\$142,500	\$119,700	\$285,000	\$30,780	\$1,157,000
4. COL S.B. SMITH PARK		\$399,000	\$129,360	\$2,137,500	\$154,000	\$124,360	\$285,000	\$33,264	\$ 409,500 *
5. THACKERY ROAD		\$669,200	\$210,840	\$3,585,000	\$251,000	\$210,840	\$478,000	\$54,216	\$1,082,250
6. BABISTON		\$582,400	\$164,640	\$3,120,000	\$196,000	\$164,640	\$416,000	\$42,336	\$1,816,750
BEARE ROAD		\$736,400	\$210,840	\$3,945,000	\$251,000	\$210,840	\$526,000	\$54,216	\$2,174,250
MAPLE		\$782,600	\$225,120	\$4,192,500	\$268,000	\$225,120	\$559,000	\$57,888	\$2,050,750
PICKERING A WEST		\$833,000	\$239,400	\$4,462,500	\$285,000	\$239,400	\$595,000	\$61,560	\$2,249,000
PICKERING B NORTH		\$956,200 +	\$283,500 +	\$5,122,500 +	\$337,500 +	\$283,500 +	\$683,000 +	\$72,900 +	\$2,639,000 +
7. SITE "N"		\$210,000 @	\$ 72,600 @	\$1,125,000 @	\$ 86,500 @	\$ 72,000 @	\$150,000 @	\$18,684 @	\$1,049,750
8. EAST POINT		\$618,000	\$185,640	\$3,315,000	\$221,000	\$185,640	\$442,000	\$47,736	\$2,049,500
9. CROOKES PARK		\$455,000	\$150,500	\$2,437,500	\$179,000	\$150,500	\$325,000	\$38,664	\$ 620,750 #
MISSISSAUGA (SHERMANS PIT)		\$569,800	\$179,340	\$3,052,500	\$213,500	\$179,340	\$407,000	\$46,116	\$ 988,000
10. BRITANNIA		\$539,000	\$165,900	\$2,887,500	\$197,500	\$165,900	\$385,000	\$42,660	\$ 835,250

- I @ - LOWEST COST
II * - 2ND LOWEST COST
III # - 3RD LOWEST COST
IV + - MOST EXPENSIVE

- NOTE: 1. POTENTIAL 10% COST INCREMENT IF TRAVEL COSTS
TO AND FROM YARD WERE TO BE INCLUDED IN CALCULATIONS.
2. ASSUME ALL FILL TO BE "CLEAN". USUALLY SOME PROPORTION
OF TOTAL EXCAVATED MATERIAL IS CONTAMINATED, HENCE NOT
USEFUL FOR WATERFRONT LANDFILL.
3. SOURCE AREAS:
A. DOWNTOWN TORONTO
B. MIDTOWN TORONTO
C. HUMBER SEWAGE TREATMENT PLANT

1. CURRENTLY CLOSED TO ALL FILL BUT RUBBLE
2. SCHEDULE CLOSING WINTER 78/79
3. 1-2 YRS CAPACITY - LIMITED WINTER USE
4. PROPOSED - REQUIRES FAVOURABLE DECISION RE ENVIRONMENTAL
ASSESSMENT - AWAITING HEARING
5. CLOSING THIS YEAR
6. PRIVATE DISPOSAL SITE
7. POSSIBLE SITE - REQUIRES ALL NECESSARY APPROVALS
8. PROPOSAL LACKS APPROVED MASTERPLAN AND ENVIRONMENTAL
ASSESSMENT
9. RUBBLE DUMPING - FILL STOCKPILING WINTER 78/79 - PHASE I
CAPACITY 1 YEAR
PHASE II PROPOSED APPROVALS LACKING.
10. PROPOSED

INCREMENTAL COST TO ALTERNATE LANDFILL SITES BY PROJECT (IN \$1,000's)

PROJECT SITE	MASSEY HALL	ROYAL ONTARIO MUSEUM	EATON CENTRE	U OF T ATHLETIC COMPLEX	APARTMENTS BAY & CHARLES	1ST CANADIAN PLACE	SCHOOL DEMOLITION	HUMBER S.T.P.
I PREFERRED	A. 296 103	93 23	1,581 555	111 32	93 23	211 74	24 7	244 377
II 2ND MOST ECONOMICAL	B. 399 159	120 36	2,138 300	143 36	120 36	285 122	31 8	621 359
III 3RD MOST ECONOMICAL	C. 455	156	2,438	179	156	407	39	980

A - HUMBER BAY
B - BLUFFER'S PARK
C - CROOKES PARK

* - ROUNDED TO THE NEAREST \$1,000.

NOTE : IN THE CASE OF ALL PROJECTS EXCEPT THE HUMBER SEWAGE TREATMENT PLANT
- PREFERRED SITE IS HUMBER BAY - ETOBICOKE
- SECOND CHOICE SITE IS - BLUFFERS PARK - SCARBOROUGH
- THIRD CHOICE SITE IS - CROOKES PARK - PORT CREDIT

IN THE CASE OF THE HUMBER STP

- PREFERRED SITE IS HUMBER BAY
- SECOND CHOICE IS CROOKES PARK
- THIRD CHOICE IS SHERMANS PIT - MISSISSAUGA

> VARIANCE - (II-I), (III-II)

SUMMARY OF LANDFILL SITE CHARACTERISTICS

1. THE EASTERN HEADLAND

- Location: Toronto Eastern Harbour
- Since 1977, rubble dumping only. Historically over past 20 years recipient of a major proportion of all clean fill.
- Capable of utilizing both clean fill and rubble to complete development plans and protection.
- Needed protection works alone could accommodate two to three years of fill (approximately 450,000 cubic yards) and seven to ten years of rubble ("as much rubble as possible").
- Problems respecting political jurisdiction and planning responsibilities.
- Financial responsibility for necessary armouring under discussion.
- Problems respecting ultimate uses in master plan and financing of project.
- Problem respecting title transfer in the absence of appropriate armouring.
- Environmental and land use issues, including the extent of the area to remain as protected wilderness.

2. HUMBER BAY PARK

- Location: Etobicoke at Mimico Creek
- Ideal disposal site; however, closing during winter 1978-79, possibly prior to end of 1978, upon completion of planned land creation program.

3. BLUFFERS PARK

- Location: Scarborough - at Brimley Road
- Filling currently in progress
- Restricted winter fill potential, given limited suitable protected fill locations and hazardous approach route.
- One to two years to complete project.
- Capacity: Summer - 400 trucks per day, Winter - 300 trucks per day maximum.

4. COLONNEL SAMUEL B. SMITH PARK

- Location: Central Etobicoke Waterfront (Kipling Road)
- Master plan for project exists but requires favourable environmental assessment review and related approvals before landfilling can commence.
- If approved, can accommodate several years of fill (2.35 million cubic yards).

5. EAST POINT PARK

- Location: East Scarborough Waterfront
- Requires approved master plan and environmental assessment.
- If approved, several years fill potential. However, poorly located in respect to prime excavated material source sites.

6. SHORELINE MANAGEMENT ON SCARBOROUGH WATERFRONT

- Location: Fallingbrook Road to East Point Park
- At proposal stage, requires all levels of approval.
- If approved, operation during spring to fall period only.
- A several year program at about 200,000 cubic yards per year.

7. CROOKES WATERFRONT PARK

- Location: Port Credit
- Phase I of the project nearing completion in 1979.
- Winter 1978-79, rubble dumping only. However, stockpiling of clean fill at 200 trucks per day.
- Capacity of Phase I: 60,000 to 100,000 cubic yards capacity remaining.
- Phase II: proposed but requires all levels of approval.

8. THACKERY ROAD LANDFILL

- Location: Northwest Etobicoke
- Closing later this year.

9. SABISTON LANDFILL

- Location: Highway 404 North of Metro boundary.
- A private land fill operation charging \$3.00 gate fee.
- Unknown capacity.

10. MAPLE LANDFILL

- Location: Keele Street, North of Major MacKenzie Drive.
- A private land fill site charging \$3.00 gate fee.
- Capacity unknown.

11. BEAR ROAD SANITARY LANDFILL

- Location: Northeast Scarborough
- Capacity unknown, but limited

12. PICKERING SANITARY LANDFILL SITES

- Location: Central Pickering; Brock Road
- Ample capacity until after 1985.
- Remote location.
- Operated by Metropolitan Toronto Works Department.

13. MISSISSAUGA LANDFILL (SHERMAN'S PIT)

- Location: Q.E.W. and Erin Mills Parkway
- Capacity unknown.

14. BRITANNIA LANDFILL

- Location: Britannia Road and Highway 401
- A proposed site.
- Capacity unknown.

15. SITE "N"

- Location: North shore of outer harbour extending easterly from Cherry Beach to Hearn Generating Plant outfall.
- A proposed site requiring all levels of approval.
- Approval related to needs for port expansion.
- An excellent site for winter fill given the protected location and accessibility through industrial areas.
- Capacity minimum - 1-3/4 - 2 million cubic yards.
- Appears acceptable to the officials of the Ministry of Environment (letter 6th of May, 1975).
- Identified in 1975 Toronto Harbour Commission report also as a potential site for disposal of dredgeate.

16. SITES E2 AND NE

- Location: City of Toronto at easterly end of the Eastern Headland.
- Potential sites only.
- Lacking necessary approvals.
- Identified concern by relevant approval agencies on environmental and financial grounds.
- Significant potential.
- No decisions regarding opening of these sites expected in near future.

DEMAND FOR WATERFRONT LANDFILL SITES

THERE IS A SIGNIFICANT DEMAND FOR CONVENIENT LOCATIONS TO RECYCLE LANDFILL

- The Toronto Metropolitan region has experienced considerable growth and development in the thirty year period since World War II.
- Most of the large scale projects have occurred in the central area of Metropolitan of Toronto. All such projects regardless of use, generate a significant quantity of excavated material.
- In most cases, excavated material from construction is "clean fill". This means it is not contaminated and is suitable for utilization in an aquatic landfill project. Such projects will create land in areas currently occupied by water.
- Landfilling on the Toronto Waterfront is not a recent phenomenon. Since 1956, some twenty million cubic yards of excavated material have been used to create more than five hundred and fifty acres of valuable land along the length of the Metropolitan Toronto Waterfront.
- From 1971 to the present, fill activity has been significant with two million truck loads of fill or approximately the equivalent of 20 million cubic yards being deposited. Yearly totals have ranged from a low of 220,000 truck loads (1-3/4 million cubic yards) in 1978 to a high volume in 1973 of 425,000 truck loads (3-1/2 million cubic yards). The yearly average over this period of time has been approximately 320,000 truck loads per year or 2-1/2 million cubic yards.
- Demand projections indicate a continuing need to provide suitable central locations for the recycling of clean fill. Current building activity and proposals indicate a need to accommodate 300-350,000 truck loads of clean fill by the end of 1979. Long-term projections of fill generation in the central area are 150-300,000 truck loads per year.

EFFECTS OF WATERFRONT LANDFILLING ON THE AQUATIC ENVIRONMENT

Waterfront landfill activity normally increases the local turbidity of water, particularly at times of storm activity.

- Turbidity results primarily from the action of waves on "fines" (clay and silt) resulting in the suspension of the material in the water and transport over distance. The settling of these materials, particularly clay, takes considerable time to occur.
- However, through careful application of appropriate coastal engineering techniques and a controlled seasonally adjusted land fill program which curtails dumping under maximum storm conditions and contains the dumping of fill including large quantities of fines, to protected locations, the problem of turbidity can be minimized.
- Studies conducted on the Metropolitan Toronto waterfront show little long-term environmental effects from properly controlled and executed lakefront landfilling operations. Negative effects occur primarily in the short run and are localized. "Monitoring studies conducted in 1975 and 1976 at three sites operated by the Metropolitan Toronto Region Conservation Authority have not identified any permanent water quality impairment as a direct result of dumping fill in the lake."¹

"Generally, very little difference was observed in parameter values for all the stations in the vicinity of Aquatic Park and these are comparable to those found at other landfill sites with relatively good water quality.

Any erosion or landfilling activity appears to have little or no effect on local turbidity in the water quality in the Aquatic Park region."¹

(1) From introduction of Environmental Monitoring Program, Outer Harbour, East Headland and Aquatic Park; A report for the Toronto Harbour Commissioners, Toronto, March 1977 (prepared by Beak Consultants Limited).

- In a letter from Mr. P.G. Cockburn, a regional director with the Ontario Ministry of the Environment, in reference to a report on the effect of Toronto waterfront landfill sites on Benthic Fauna, dated December 1976, the author states "the study reveals that the impact of erosion from the two landfill sites on the local Benthic Fauna is minimal to negligible ... The report concludes that major land filling activities, if properly designed and constructed may not significantly damage the Benthic community, which is of considerable importance in terms of fish food and overall ecological stability."
- Potential environmental hazards associated with the landfill operation can be identified and minimized or completely overcome through environmental monitoring, in conjunction with the application of appropriate corrective engineering and operating techniques.

A RECORD OF GOVERNMENT RESOLUTIONS RESPECTING
THE AQUATIC PARK ON THE EASTERN HEADLAND

1978:09:13: Staff Recommendation to Metro Toronto Region Conservation Authority
Executive Committee (M.T.R.C.A.)

That:

1. The Authority convene a meeting of senior representatives of all interested agencies to discuss long-term plans for waterfront landfilling. The results of these discussions will form the basis of the next ten-year plan which should continue to rely heavily on the use of surplus construction material as a sound conservation measure in the development of the Metropolitan Toronto Waterfront.
2. The staff be directed to prepare a detailed report on the feasibility of charging for the receipt of fill.
3. The Toronto Harbour Commissioners be requested to confirm whether or not the Aquatic Park will be open to receive fill during 1978 or 1979.

1978:01:19: MTRCA Recommends that:

The Authority, together with Metropolitan Toronto, the Toronto Harbour Commissioners and the Province of Ontario, initiate discussions with the Government of Canada in order to obtain funding or works in lieu, for the exterior shore protection of the Outer Harbour Headland; and

The staff be directed to prepare property plans and other documents as required for the transfer of land and water required for the development of Aquatic Park, and that the staff work closely with the Toronto Harbour Commissioners and the Province of Ontario in this regard, and

The preparation of an Implementation Plan be carried out in accordance with Authority policy for processing plans of this type and significance, and further; that the Plan preparation incorporate the approved concepts of the Master Plan, and the following:

- a. additional landfill for Marineland and its associated Hotel be not now approved;
- b. the provision for boating facilities in the Outer Harbour be in accord with the report entitled "Allocation and Phasing for Boating Facilities; Metropolitan Waterfront Plan";

- c. the western tip and most westerly bay be considered a wildlife preserve, and that no interim use of this area of any other nature be permitted;
- d. a suitable balance be determined between boating needs and wildlife preserves recognizing the bird life concentrations in the area for the remainder of the site;
- e. artificial swimming facilities be provided if Lake water quality does not permit swimming use;
- f. that every effort be made to provide regular Toronto Transit Commission bus service to the heart of the area;
- g. provision be made for regional automobile access in all phases of the development; and further

WHEREAS the Authority is not in a position to become legally or financially involved in the development of Aquatic Park until the armouring and land transfer conditions have been resolved;

THE BOARD RECOMMENDS THAT interim uses will be considered on the basis that the Authority, as the Province's agent for interim management, and the Municipality of Metropolitan Toronto approve of such uses on the understanding that there is no cost to the Authority.

1977:11:29: Minister of Natural Resources (F.S. Miller) by Letter; To Chairman MTRCA (R.G. Henderson) Confirms Designation of MTRCA as the Province of Ontario agent with respect to

"Planning, interim management and development" of the Aquatic Park.

Province approves transfer of title of lands and waters for Aquatic Park to MTRCA when matter of "armouring the external shoreline" has been resolved with Federal Government.

1977:05:03: Metropolitan Toronto Council;

- Recognized the Master Plan for Aquatic Park "as an appropriate conceptual aspect of the Metropolitan Waterfront Plan".
- Made several procedural recommendations regarding processing and conditions of program support in financial and political terms.
- Requested the preparation of a phased implementation plan for approval by Metropolitan and City government prior to implementation works proceeding.

1977:03:08: City of Toronto Recommends:

1. That the City of Toronto Planning Board endorse the use for parks and open space purposes only of the Aquatic Park site, as defined in the Master Plan report, on the understanding that this does not imply acceptance of the Master Plan, which is to be seen as purely conceptual in nature, and that an Implementation Plan will be brought before the City Planning Board and Council for approval prior to any commitment for specific developments at the Aquatic Park.
2. That this report be forwarded to City Council with the request that Recommendation 1 be approved and sent forward to the Metropolitan Council.

1976:11:26: MTRCA

At its meeting of November 26, 1976. the Metropolitan Toronto and Region Conservation Authority adopted the following:

"THAT The Master Plan for Aquatic Park be approved in principle and forwarded to the Province of Ontario for approval.

THAT The Province of Ontario, jointly with The Municipality of Metropolitan Toronto, designate the Metropolitan Toronto and Region Conservation Authority as the implementing agency for Aquatic Park;

AND SUBJECT TO THE APPROVAL OF THE PROVINCE OF ONTARIO:

THAT the development of Aquatic Park be funded as part of the Metropolitan Toronto and Region Waterfront Project 1977-1981;

THAT staff be directed to prepare an implementation plan for Aquatic Park which sets out those items of development which can reasonably be included within the Waterfront Project 1977-1981, and their phasing; and those items which can be funded by other levels of government and other agencies, including the private sector;

THAT in accordance with the direction of the Ministry of Natural Resources and the Municipality of Metropolitan Toronto; the Toronto Harbour Commissioners be requested to assume responsibility for the armouring of the outer shoreline, and that the Authority support the Toronto Harbour Commissioners in any submission for funding to the Government of Canada in this connection;

THAT the Authority obtain, for a nominal sum, those land and water areas required for the development and operation of the park;

THAT the Authority place the park lands under the existing agreement with The Municipality of Metropolitan Toronto for management and operation; and further,

THAT The Municipality of Metropolitan Toronto enter into such tri-party agreements as may be necessary for the management of specific elements within the park."

1973:08:02: Ontario Minister of Natural Resources (Leo Bernier) advises MTRCA of cabinet decision to give MTRCA the authority to "co-ordinate recreation planning in the Central Waterfront", designates MTRCA as "provinces Agent" with respect to Aquatic Park and charges the authority with responsibility to determine appropriate land forms.