4.0 DESCRIPTION OF LOWER DON

4.1 The Don River Watershed

The Don River is one of more than sixty rivers and streams flowing south from the Oak Ridges Moraine. The River is approximately 38 km long and outlets into the Keating Channel, which then conveys the flows into Toronto Harbour and Lake Ontario. The entire drainage basin of the Don River is 360 km^2. ***Figure 4.1*** and ***Figure 4.2,*** on the following pages, describe the existing and future land use conditions within the Don River Watershed.

For 200 years, the Don Watershed has been subject to intense pressures from human settlement. These have fragmented the river valley's natural branching pattern; degraded and often destroyed its once rich aquatic and terrestrial wildlife habitat; and polluted its waters with raw sewage, industrial/agricultural chemicals, metals and other assorted contaminants.

Land clearing, settlement, and urbanization have proceeded in three waves in the Don River Watershed, beginning in the late 18th century with the City of Toronto in the Lower Don and scattered villages in the upper watershed. Next came the urbanization of the middle watershed, mainly in North York, after World War II. Rapid

Toronto's Waterfront

Historic Watershed

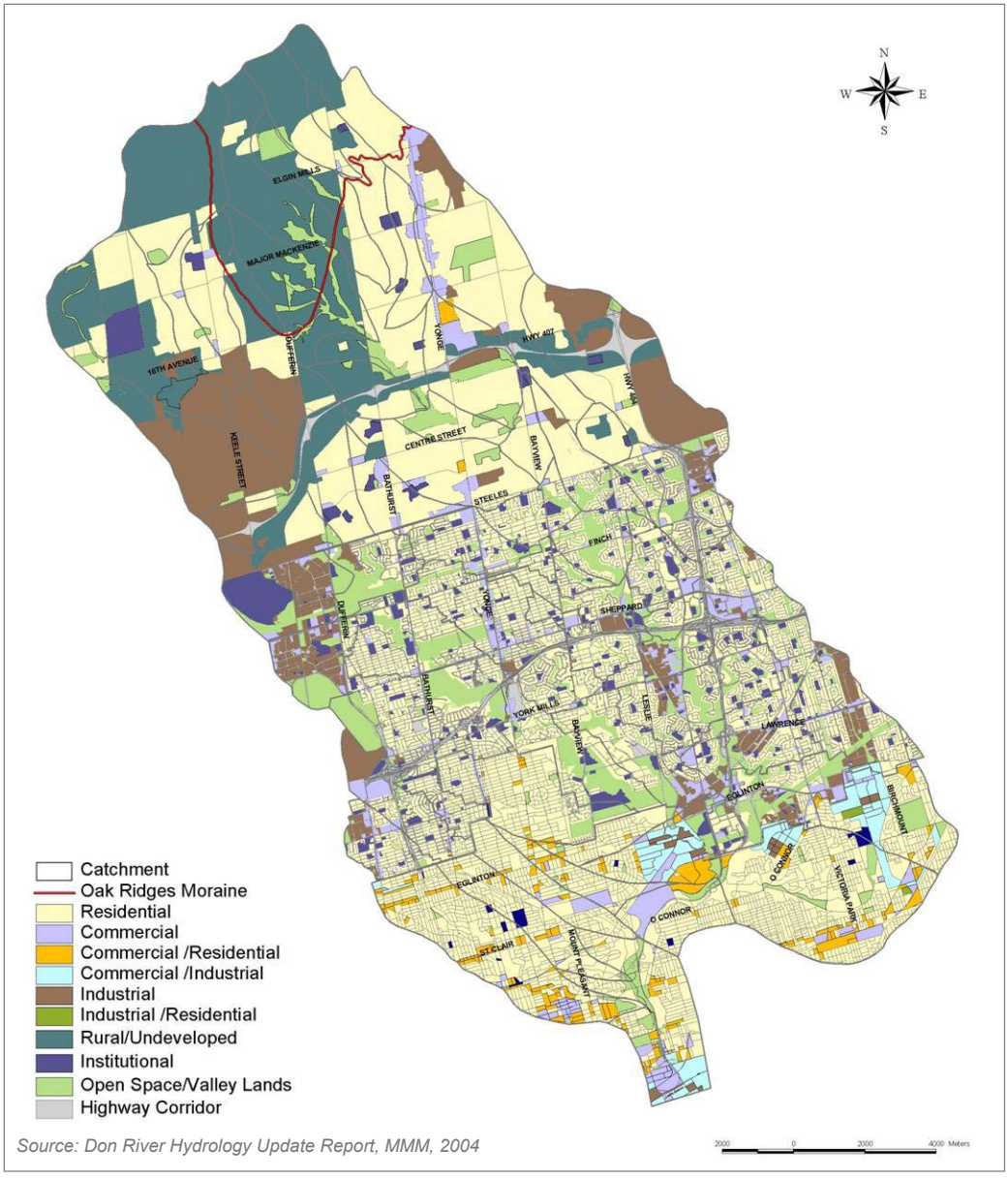
urbanization of the river's headwaters in York Region began in the early 1980s and continues today.

Hydrologic changes in the watershed began when settlers converted the forests to agricultural fields; many streams were denuded even of bank side vegetation. Urban development then intensified the problems of warmer water temperatures, erosion, and water pollution. Over the years during the three waves of urban expansion, the Don River mouth, originally an extensive delta marsh, was filled in and the lower portion of the river was straightened.

Small Don River tributaries were piped and buried, wetlands were "reclaimed," and springs were lost. The middle and lower valley became a transportation corridor. The hydrologic cycle was severely altered by the expanses of urban and suburban pavements, rooftops, roads, parking lots, and gutters: water that had once soaked into the ground and had run slowly through grassy fields was now collected in a network of underground sewers, bringing stormwater quickly and efficiently to the river and carrying many pollutants with it.

While sewage contamination is less prevalent today than it once was, sewage continues to reach the Don River through combined sewers in older neighbourhoods and illegal cross connections between the sanitary and storm sewers throughout the watershed.

Increasing flood peaks are also creating more of a problem. As well, following many changes to the Don River channel and valley, flooding remains a problem - the Don Valley Parkway and the Bayview Extension are frequently closed for short periods in the aftermath of a heavy rain storm. Flooding in the Lower Don River is in large part due to its broad and unconfined floodplain and the intensity of development within the entire watershed. Projects are being implemented to help ameliorate the problem: natural landscapes absorb, collect, filter and release stormwater gradually and collection ponds hold back runoff. But these projects typically only affect medium to small stormwater (rainfall) events. They are not large enough in scale to significantly reduce the peak runoff from a severe event like Hurricane Hazel.



Source: Don River Hydrology Update Report, MMM, 2004

Figure 4.1 - Existing Land Use in the Don River Watershed

Along with this legacy of hydrologic changes, water pollution, and degraded habitats, there are encouraging signs for regeneration. Eighteen species of fish still live in the river system, though brook trout and Atlantic salmon are no longer part of this community. Pacific salmon are now using the Don watershed for spawning. There are almost twenty designated natural areas (Environmentally Significant Areas (ESAs), Areas of Natural or Scientific Interest (ANSIs), and Ministry of Natural Resources designated wetlands) within the watershed. Trails are being

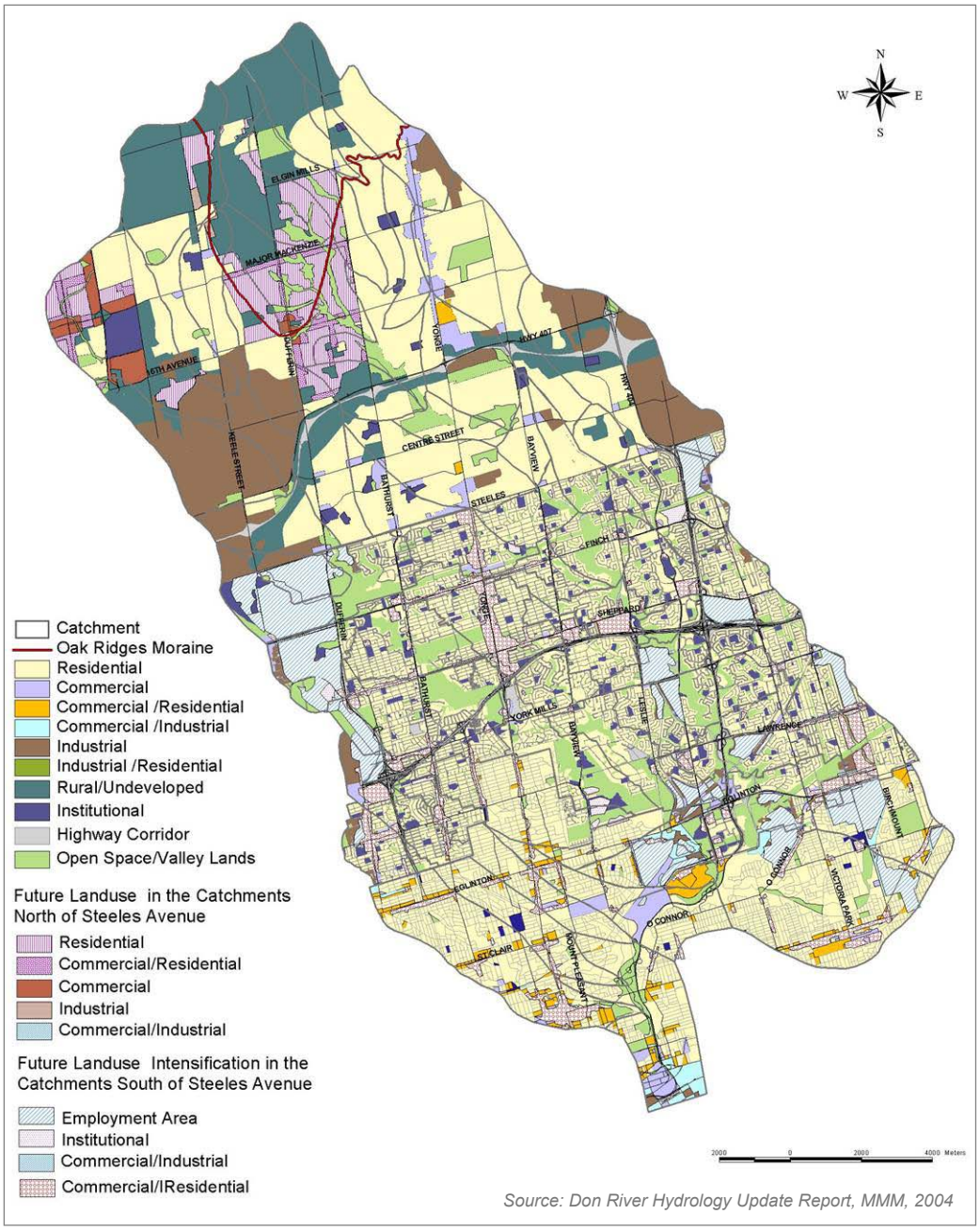


Figure 4.2 - Future Land Use in the Don River Watershed

built in many areas. Old combined sewers are being remediated in the Lower Don River to reduce sewage contamination in the river.

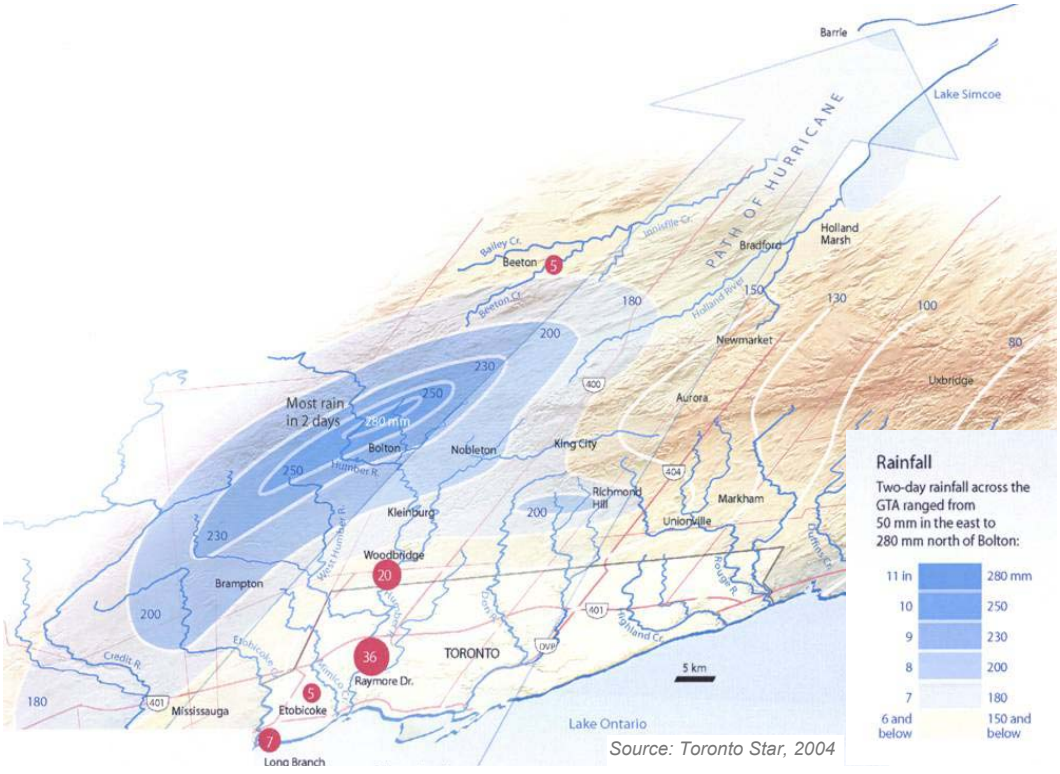
Since Hurricane Hazel in 1954, a large part of the Don River valley and stream corridors have been brought into public ownership, resulting in a better starting point for regeneration than many other urban rivers enjoy. Most importantly, throughout the watershed residents and businesses are taking responsibility for the Don River in many types of volunteer activities, and governments are coming to share accountability, planning, and funding for regeneration.

4.2 Lower Don River Flooding – A Historical Perspective

Flooding along the Lower Don River has a written history dating back to the mid-1870s, beginning with ice jams and late fall flooding. As recently as May 2000, flooding occurred within this area due to a series of severe thunderstorms. While most of the flooding over the past few decades has resulted mainly in nuisance type flooding, the area would be subject to extensive flooding under a tropical storm similar to Hurricane Hazel, which occurred on October 15 and 16, 1954 over the Humber River.

The Province of Ontario currently requires the application of the rainfall from Hurricane Hazel centered over the Don River Watershed to define the limits of flooding. Given antecedent saturated soil conditions, with this amount of rainfall, the river is anticipated to rise to levels that exceed the banks of the river and begin to spill to the extent that the valley allows.

Upstream of Queen Street, the valley feature is narrow and will contain the flood, although depths and velocities of flow will be extremely



Rainfall Depths Deposited by Hurricane Hazel in the GTA during October 1954.

high. South of Queen Street, the valley expands laterally to form the historical Lake Ontario shoreline, which enables the flood to also travel outwards, spilling south and west into the downtown core of the City and eastward towards the beaches area.

The CN Rail's Kingston line runs west to east across the area and is on an elevated fill embankment that would impede flows under the Regulatory Flood and increase upstream flooding to the west through Spill Zone 3. Water depths over the surrounding floodplain are estimated to be in the 3 m range immediately upstream of the tracks during the peak of the flood. These overbank flood waters would find southern release through the rail embankment at underpasses for Cherry, Parliament, Sherbourne, Jarvis, Yonge, Bay and York Streets, causing flooding south of the rail line in what is know as the East Bayfront Precinct.

To protect the lands west of the river within Spill Zone 3, Regulatory Flood water will be contained within the channel of the Don River and a new floodway. To prevent against increased flooding upstream and to the east of the Don River, flood conveyance under the CN Rails' Kingston line must be increased to accommodate water that would have flowed over the floodplain through Spill Zone 3.

4.3 Physiographic Description

When the ice fronts of the last Ice Age retreated 11,000 to 13,000 years ago, the Don River flowed out of the long glacial deposit north of Toronto, the Oak Ridges Moraine. At first, the river's two main branches, the West Don and the East Don, flowed as separate rivers south into Lake Iroquois. When the shores of that ancestral lake fell to become Lake Ontario about 9,000 years ago, the two rivers joined at the huge sandbar they had formed on the old shoreline - along with a third stream, Taylor/Massey Creek - to become one river at what is now the Forks of the Don. The new, united Lower Don then flowed in a westerly

View of the Don River below Queen Street during May 2000 flood event. Note closure of Don Valley Parkway to the right.

and then southerly direction across the old lakebed, carving out a broad deep valley through the lacustrine sediments and glacial deposits. Subsequent rising of Lake Ontario's waters through rebound of the land following the disappearance of the glacier formed marshes in the lower reaches of the broad valley.

The Don River Watershed was a network of branching tributaries and wetlands connecting the Oak Ridges Moraine with Lake Ontario 38 kilometres to the south. Originally, the river was sustained by underground aquifers of glacial water in its headwaters, as well as by rainfall and snowmelt that infiltrated the soils of the region's vast forests. The forests, streams, ponds, and marshes of the watershed provided varied habitats for fish, birds, and other animals, and a branching, natural corridor for migratory species to travel from the lake at the south to the headwaters and deep upland forests in the north.

Today the terrain of the Don's valley and stream corridors still varies considerably. There are small streams that flow across level fields; there are steep sided, wooded ravines, and broad, deep floodplain meadows. But what has changed dramatically through the last 200 years of settlement is the rich, branching pattern of the pristine Don's tributaries and associated wetlands. A great many streams have been truncated,

buried, dammed, rerouted, straightened, and lined with wood, steel, rock, or concrete in the process of building the city and suburbs. Ponds and marshes have also been filled; the widespread removal of vegetation and the disturbance and compaction of soils have also occurred. These actions have severely altered the character, habitats, and hydrogeological functioning of the natural watershed.

Four decades ago, in 1950, only 15 percent of the Don Watershed was urbanized. Most of the land was rural, with active farms and some natural areas. In 1994, the watershed was 80 percent urbanized, and home to more than 800,000 residents. It is estimated that by the year 2021, when the population of the Greater Toronto Area will be 6.7 million (compared to 4.4 million today), the Don River Watershed will become over 91 percent urbanized.

4.4 Baseline Studies

A series of baseline studies were undertaken to characterize the natural and human environment along the Lower Don River and generate data for use in the development and assessment of flood protection alternatives.

The specific studies that were undertaken, together with the organization responsible for the work are listed below:

- *Hydraulic Analyses – Marshall, Macklin, Monahan Ltd;*
- *Aquatic Investigations – TRCA;*
- *Terrestrial Natural Heritage – TRCA;*
- *Cultural Heritage – TRCA;*
- *Geo-environmental Considerations; - Consultant Project Team;*
- *Rail Transportation Baseline Study - Consultant Project Team;*
- *Socio-economic Assessment – Consultant Project Team; and,*
- *West Nile Virus Study - Consultant Project Team.*

The results of the above investigations and associated technical analyses are documented in six individual Study Reports that were prepared, and which are contained in ***Appendix D*** through ***Appendix I***. The findings for the Socio-economic assessment are contained in the ***Section 4.9 of*** this Report.

An overview of the investigations and findings of the above studies is provided in the following sections.

4.5 Hydrologic/Hydraulic Characterization

4.5.1 Hydrologic Analyses

The hydrologic characterization of the existing conditions, and the development of alternative remedial works was based on the report *Don River Hydrology Update (MMM, June 2004)* and hydraulic modelling performed by MMM for this Class Environmental Assessment Study. The hydrology update was conducted for TRCA to develop current estimates of potential floods throughout the Don River Basin. The update incorporated the most recent data available for re-calibration of the hydrologic model; and determined estimates of flood discharges for both existing and for future conditions, taking into account urban developments and storm water management plans.

The update involved the conversion of the previous hydrologic model (HYMO) to Visual OTTHYMO Version 2.0 (V02). Given the significant development in the Don watershed over the last 10 years, it was necessary to update the model to reflect the current and planned development conditions in the watershed.

The City of Toronto recently completed their *Wet Weather Flow Management Master Plan*, during which, current land use data and statistics were collected for the Don River watershed. This data was used to update the new hydrologic model.

A summary of the calculated flows, for a range of storm events, at several locations along the lower part of the Don River watershed, is presented in ***Table 4.1.*** The flow values shown reflect the anticipated future land uses within the watershed. ***Table 4.2*** indicates the increase in the flows associated with a Hurricane Hazel type event that can be expected as the Don River watershed is fully urbanized, as per current land use plans.

Comparing the estimates for current and future land use conditions the Hurricane Hazel flows are expected to increase from 1655 m^3/s to 1694 m^3/s, at the mouth of the Don River (i.e., Lake Ontario). This represents an increase of 2.4% in peak flow, which can be attributed to the predicted increase in impermeable areas in the basin.

calculated for future land use conditions (1694 m^3/s) were applied in the hydraulic assessment alternatives.

The documentation contained in the *Don River Hydrology Update Study*, attributes this increase to two factors: an increase in the impermeable area in the basin, and a change in the reduction factor that is applied to establish the design rainfall depths associated with Hurricane Hazel. For the previous estimates, a reduction factor of 82.4%, based on the *equivalent circular area* upstream of the Lake Ontario location was used throughout the watershed. As part of the *Don River Hydrology Update Study*, an individual reduction factor for each flow node was calculated based on the recommendations of the *Technical Guidelines for Flood Plain Management in Ontario.*

Consequently the input rainfall depths that were applied at locations with smaller upstream drainage areas are greater than the input rainfall originally used as part of the previous hydrologic analyses.

Table 4.1 - Summary of Calculated Peak Flows (Future land Use)

Location	Flow Node No.	Drainage Area (km^2)	Peak Flow (m^3/s)					
			2-year	5-year	10-year	50-year	100-year	H. Hazel
South of Bloor St.	48.3	334.0	150.1	224.3	278.2	356.1	479.3	1728.3
North of Gerrard Ave.	48.2	348.8	172.4	255.4	313.4	463.8	531.6	1807.0
Lake Ontario	48.1	360.8	164.0	239.6	295.4	430.5	496.3	1694.3

Table 4.2 also compares present estimates with previous estimates of the peak flows associated with the planned future land use conditions within the watershed. The peak flows presented in the table indicate that the future conditions peak flow at Lake Ontario has increased from, 1548 m^3/s to 1694 m^3/s, which constitutes an increase of 9.4%. It is noted that the flow values

The analyses for the *Don River Hydrology Update Study* also include a sensitivity study to predict potential impacts of climate change based on the assumption that climate change will cause an increase in the amount of rainfall. The study shows that there is a non-linear effect on the peak flows: an increase of 9% in rainfall causes a 17% increase in peak flow for future conditions.

Table 4.2 - Comparison of Calculated Flows (m^3/s) - Hurricane Hazel

Location	Land Use		Previous Studies
	Existing	Future	
South of Bloor Street	1685	1728	1535
North Of Gerrard St.	1767	1807	1590
Lake Ont.	1655	1694	1548

Note: Flow values indicated for Previous Studies were based on the anticipated Future Land Uses at the time. These values were also applied in for the purposes of the West Don Lands and Related Issues Study (2000).

However, with the current technology, climatologists are not yet able to provide predictions of changes in rainfall on a local scale, thus the results are only intended as very preliminary estimates.

Based on the results of the *Don River Hydrology Update*, it can be concluded that flood flows have increased in the Don River over the past 10 years and that the future may bring marginally higher flows. Thus there is a potential for higher flood levels at the West Don Lands. Accordingly, this consideration was included in the evaluation of the various flood protection alternatives.

4.5.2 Hydraulic Analysis

As discussed, the area adjacent to the Lower Don River has been subject to flooding since the development began in the Toronto area. In the past, numerous hydrologic and hydraulic studies have been completed in order to provide technical insights for this area.

Since 1988, several studies have been completed to investigate flood protection alternatives. These were based on the one-dimensional HEC-2 computer model, physical models, and the two dimensional Dynamic Hydro-diffusion Model (DHM). The HEC-2 and DHM models for the existing land use scenario for areas near the Lower Don River were obtained from on-going and previous studies, and adjusted to incorporate the updated peak flows.

The two-dimensional hydraulic model has been used to establish hydraulic conditions for the Lower Don River because of the extensive floodplain under the Regulatory Flood, whereby flow moves perpendicular to the river channel, rather than in a linear fashion assumed by original floodplain mapping completed for the TRCA in 1979, for which the HEC-2 model was used.

The DHM was employed because of its ability to model the effect of structures in an urban floodplain area. The model discretizes the floodplain into grids, whereby flow moves between the grids in all four directions depending on flood conditions. As previously discussed, under existing conditions (before the construction of flood control works), the Regulatory Floodplain extends to York Street in the west, Woodbine Avenue in the east and as far north as Queen Street.

The modelling was based on the higher Regulatory Flood values that were calculated as part of the *Don River Hydrology Update Study*, which calculated a flow of 1695 m^3/s at the mouth of the river – the previous value for this event was 1450 m^3/s.

A summary of the calculated Regulatory Flood levels, under existing conditions, for each of the

individual grids employed for the analyses is presented in ***Appendix D.***

A tabular summary of the calculated levels along the river channel is provided in ***Table 4.3***, and the resulting flooding depths that occur are shown graphically in ***Figure 4.3.*** A profile of along the river from Lake Shore Blvd to upstream of Queen Street, together with the surface water profile produced by the Regulatory Flood is shown in ***Figure 4.4.***

The results of the hydraulic analyses lead to the following conclusions:

- slightly higher flood levels for existing conditions (i.e., prior to the implementation of any flood protection works) are associated with the updated flow values; along the river channel, the increase is generally limited to less than 0.1 m, with a maximum value of 0.14 m noted at Queen Street;
- within the Don River channel, the flooding depth ranges from approximately 5.5 m at Lake Shore Road, to approximately 7 m at Queen Street;
- within Spill Zone 3 (the floodplain on the west bank), the flooding depth is generally less than 1 m, with the exceptions noted below;
- flood depths greater than 1m would be expected within the area immediately adjacent to the river, and immediately north of the CN Rail line – refer to ***Figure 4.3;***
- the lands approximately bounded by the Don River, to the east, Cherry Street to the west, the CN Rail line to the north, and Lake Shore Blvd to the south (i.e., 480 Lake Shore Blvd) remains generally unaffected by the Regulatory Flood levels;

Table 4.3 – Regulatory Flood Levels Along the Lower Don River

Location (DHM Grid No)	Flood Level (m) Existing Conditions
Queen Street Bridge (#1)	80.48
Upstream CN Bridge (#7)	79.68
Downstream CN Bridge (#8)	78.65
Gardiner Expressway Ramp (#9))	78.29
Upstream Lake Shore Road Bridge (#10)	78.21
Downstream Lake Shore Road Bridge (#11)	77.30

- under the Regulatory Flood conditions, approximately, 1/3 of the total flow would overtop the west bank of the river and travel westerly towards downtown Toronto and southerly through the roadway underpasses toward Lake Ontario;
- under existing conditions, none of the roadway crossings are overtopped, with the exception of Lake Shore Blvd.

4.6 Aquatic Investigations

4.6.1 General

The aquatic investigations and related work conducted by the TRCA are described in the Report entitled *Lower Don River Environmental Assessment – Aquatic Investigations*, which forms ***Appendix E*** of this Report.

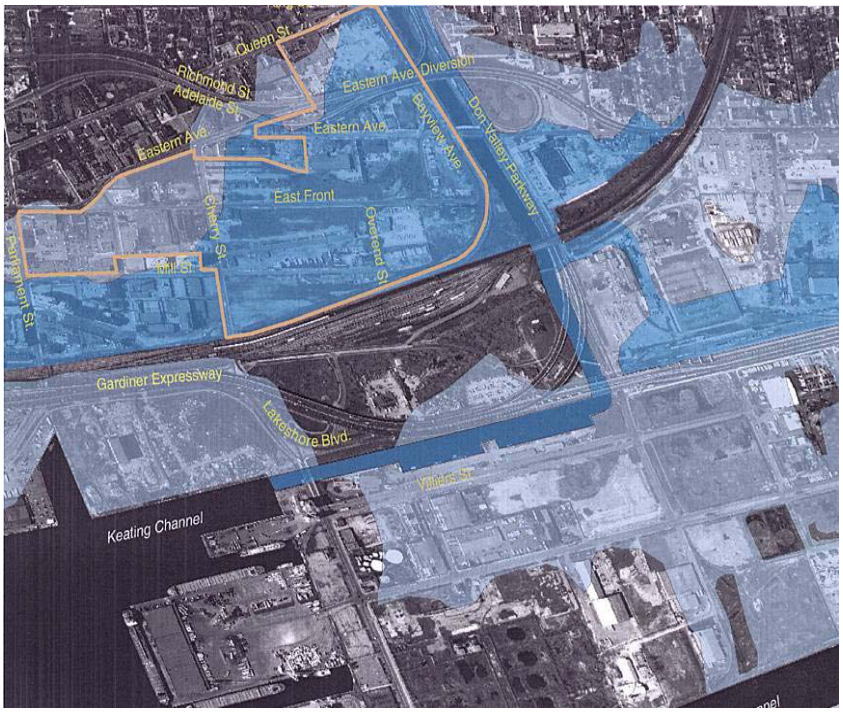
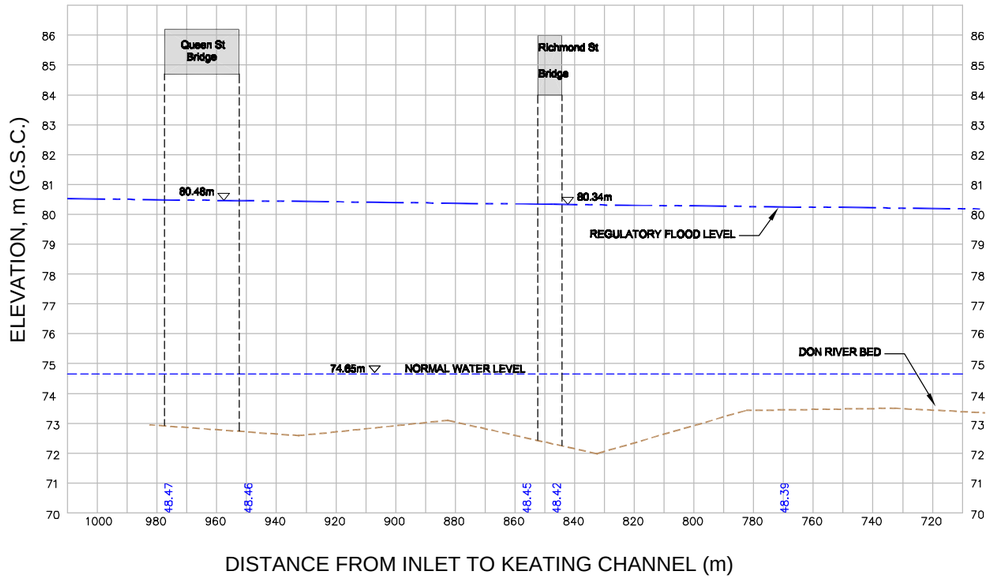
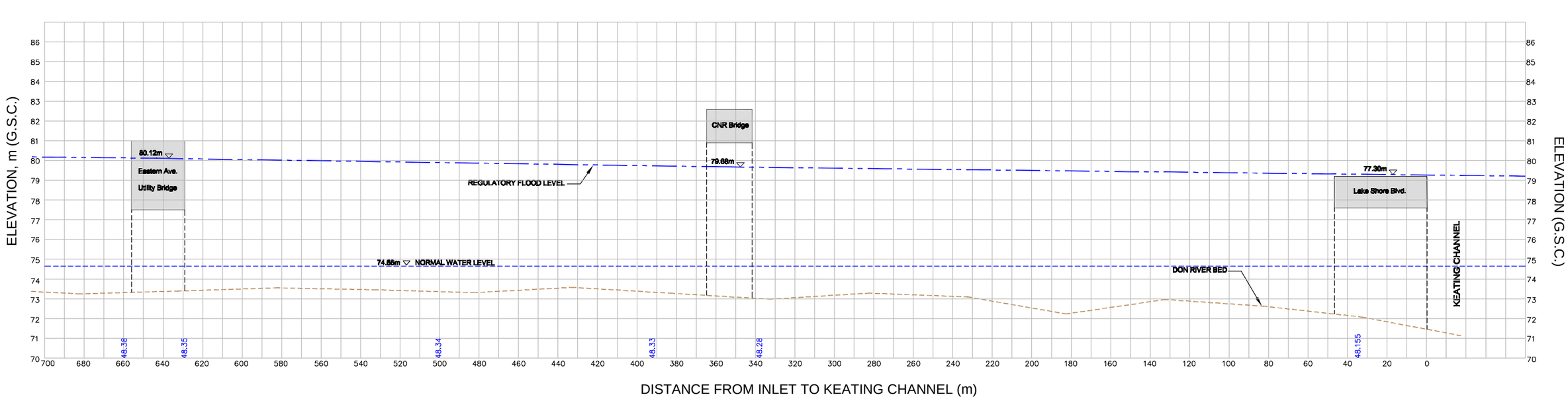


Figure 4.3 – Extent of Flooding along the Lower Don River During a Hurricane Hazel Event.

The investigation and assessment of the Lower Don River aquatic system was carried out with the objective of ensuring the requirements of both Environmental Assessment studies being carried out by TRCA are satisfied, i.e., both of *the Lower Don River Environmental Studies*.

Accordingly, the general study area for the aquatic investigations included the river channel and all top of bank lands within the Port Lands and along the Lower Don River, and ecologically significant areas that will be connected to the Don River Watershed as a result of channel naturalization. The specific study area includes all lands where flood protection, channel naturalization and soil management will be conducted to meet Project objectives. The geographic extent includes the Don Narrows, all of the West Don Lands, and follows the mouth of the Keating Channel at Parliament Street in the west and Villiers Street to the south.





DILLON CONSULTING

Lower Don River West
Remedial Flood Protection Project

WATER SURFACE PROFILE
EXISTING CONDITIONS

48.47 – HEC CROSS-SECTION LABEL

DATE: **NOVEMBER 2004** | DRAWN BY: **TJH** | CHECKED BY: **HCD**

PROJECT NO. **03-2658-5000**

FIGURE NO. **4.4**

The data gathered during this study can be used to evaluate alternatives for the Environmental Assessment, assist in the future to monitor the effectiveness of mitigation measures, as well as any impacts resulting from modifications to the river.

Existing conditions were first documented through a review of historical documents as well as fieldwork.

To determine the baseline environmental conditions for the aquatic environment, multiple inventory methods were used, including water temperature surveys, fish community assessment, water chemistry and bio-monitoring studies as well as wildlife studies.

4.6.2 Fish Community Assessment

The fish community assessment was conducted using an electrofishing boat. The lower reaches of the Lower Don River were sampled once in the Spring, once in the Summer and once in the Fall of 2003. Historical data from the TRCA database was also utilized. All fish were identified, enumerated, batch weighed, measured and released. Where appropriate, fish tags were applied to certain species and tag return information was used to provide migration data.

The results of the fish community assessment showed that at least 14 species of fish exist in the Study Area (Refer to ***Table 4.4***).

Over 88% of the fish community composition consists of white sucker, emerald shiner and spottail shiners. Other species present include northern pike, walleye, white bass, carp, Chinook salmon, gizzard shad, bluntnose minnow, Johnny darter, rainbow smelt and alewife. The low species diversity found in the Don River indicates a typical degraded system dominated by generalist species such as white suckers and shiners. Biomass results support the observation that white suckers are the dominant species in the Study Area. This species can withstand a wide variety of conditions. The presence of carp in the study area is also an indication that the system is degraded.

Fish catches conducted in the spring, summer and fall suggest that the Don River is capable of supporting a walleye population, but limiting

Table 4.4 - Classification of Fish Captured in the Lower Don River Spring, Summer, Fall 2003

Top Piscivore	Specialist/Insectivore/Planktivores	Generalists
Walleye – *Stizostedion vitreum*	Emerald Shiner – *Notropis atherinoides*	Bluntnose Minnow – *Pimephales promelas*
Chinook Salmon – *Oncorhynchus tshawytscha*	Gizzard Shad - *Dorosoma cepedianum*	Carp – *Cyprinidae carpio*
Northern Pike – *Esox lucius*	Spottail Shiner – *Notropis hudsonius*	Grass Carp – *Ctenopharyngodon idella*
	Johnny Darter – *Etheostoma nigrum Rafinesque*	White Sucker – *Catostomus commersoni*
	White Bass – *Morone chrysops*	Alewife – *Alosa pseudoharengus*
	Pumpkinseed – *Lepomis macrohirus*	

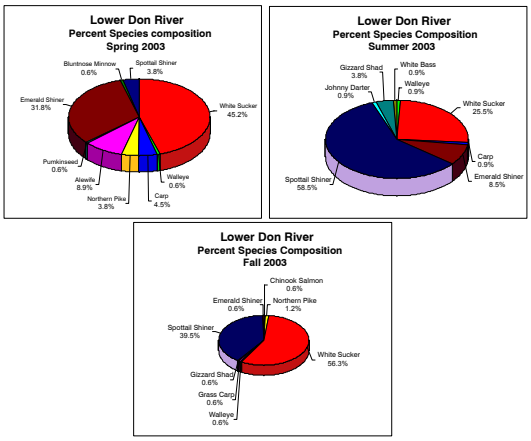


Figure 4.5 – Seasonal Distribution of Fish Species

factors, such as water quality and lack of habitat components, could produce a population that may never develop beyond isolated incidences. Refer to ***Figure 4.5*** for a seasonal composition of fish species.

The presence of northern pike is likely due to favourable water temperatures, as well as the presence of high populations of forage fish such as white suckers and shiners.

In historical documents, the Lower Don River has been classified as a warmwater fishery; however the 2003 fish survey indicates significantly low biomass and/or absence of warm water species in the system. This is probably due to a lack of instream cover, the uniformity of the river channel, the lack of riffles and pools as well as shallow depths and silty substrates.

4.6.3 Water Temperature Survey

To assess the water temperature in the Lower Don River a number of temperature recorders were placed in the river. It was important to determine the water temperature at different locations in the river because water temperature influences the species composition within the river. Water temperature is directly related to solar radiation and is influenced by stormwater discharge, weather, as well as riparian and aquatic vegetation.

Water temperatures in the Study Area were relatively uniform throughout the eight recording stations. Temperatures fluctuated according to weather patterns and in general there were not major differences from one station to the next throughout the reach. Average temperatures in the river were compared against ideal temperature ranges for fish spawning. The average temperature during spawning was within the required range for most species.

4.6.4 Benthic Invertebrate Sampling

Benthic invertebrates are useful indicators of environmental conditions as they are generally less mobile than other organisms and integrate all the physical parameters of their environment. In addition, many species have a narrow range of environmental requirements. As a result, the health of the benthic community can be correlated with the river conditions.

Because the benthic communities of the Lower Don River had already been studied extensively by the TRCA for previous studies, this background data was used and no further surveys were conducted. A copy of this report is included in ***Appendix E***. Poor water quality and sediment conditions upstream of the study area are likely having a negative effect on the benthic community downstream within the Study Area.

4.6.5 Water Chemistry Monitoring

Water chemistry affects aquatic life in both the water column and in the sediment. Biomonitoring was conducted to determine the bioavailability of contaminants in the river. Filter feeders such as bivalves (clams and mussels) are used as a method to determine levels of water contamination. Clams were placed in wire cages in the Study Area, as well as at another location used as a control site. Clams were removed from the cages at regular intervals and analyzed for the presence of contaminants such as zinc, copper, arsenic, mercury, lead, PCB/Pesticides and PAHs. Only zinc was observed to be above the maximum recommended 'no effect' level of 30 µg/g at many of the sampling stations. Hexachlorobenzene and Heptachlor were the only parameters that registered measurable levels within any part of the Study Area but were less than the Provincial Water Quality Objectives (note that there are no direct tissue contaminant guidelines to compare the data against). In terms of PAHs, Fluoranthene was the only parameter that measured detectable levels within any of the study sites. There are also no direct guidelines for comparison for this data.

4.7 Terrestrial Natural Heritage

4.7.1 Terrestrial Attributes

The terrestrial natural heritage conditions of the study area are fully documented in the report entitled *Lower Don Valley – Biological Inventory,* which forms ***Appendix F*** of this document.

The Study Area (Refer to ***Figure 4.6***) for the natural heritage work includes most of the open space in and associated with the Don River south of Bloor Street. It does not include the areas east of the Don valley Parkway south of Gerrard Street, nor does it include the Necropolis Cemetery lands. Similar to the aquatic investigations, the Study Area limits were selected with due consideration for the data requirements of both

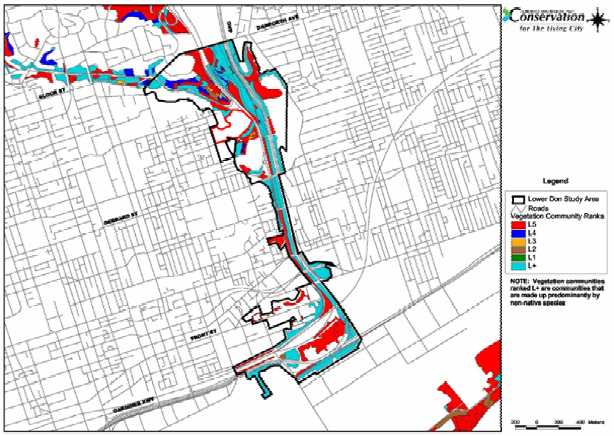


Figure 4.6 – Terrestrial Natural Heritage Study Area and Community Ranks

Environmental Assessment undertakings dealing with the Lower Don River.

The approach adopted for this component takes into account the site within the context of the region and regional pressures. A key component of the approach is the scoring and ranking of natural cover at three scales of detail: the landscape, the vegetation communities and the flora and fauna species.

The total amount of natural cover or abundance of particular vegetation communities or species was determined. The amount of natural cover is important because species and community abundance are dependent on it. A ranking was applied to determine the function of habitats and the positive or negative influences on them. Similarly, all vegetation communities and flora and fauna species have been ranked according to their overall resilience. Several factors influence this resilience and these factors have been used as scoring criteria that are then summed to produce the final rank. In this way, a species rarity is not the only factor influencing the rank, in fact, the majority of criteria are based on the species ecology. Species and communities that rank as L1 - L3 are considered to be of regional concern, while those that rank L4 are considered to be of concern within the urban areas. These species are not necessarily rate, but rather are considered

likely to decline if further alterations continue to happen to the natural system.

A comprehensive list of the vegetation communities, flora and fauna species within the Study Area is provided in ***Appendix F.***

Within the Lower Don River Study Area, approximately 19% of the land is forested (almost all of which are located along the valley slopes of the Don River, north of Gerrard Street) and 0.7% is wetland. Approximately 1% of the area is successional and approximately 11% is meadow. The remaining land (68%) is manicured or developed land. From a natural heritage perspective, the areas of manicured land represent potential restoration sites or provide opportunities to direct future development away from natural features. In the Study Area, 41 vegetation communities have been identified.

The study area includes five vegetation communities of regional concern (L1 - L3): three remnant oak communities on the "Hogsback" ridge near Castle Frank ranging from forest through woodland to savannah, a Duckweed Mixed Shallow Aquatic community resulting from successful restoration at the Riverdale Farm, and a Flat-Stemmed Bluegrass - Forb Sand Barren that developed on Gravelly fill northwest of the Keating Channel. In addition, nine other communities are of concern in the urban context (L4). These include upland forests, wetlands, and a riverbank sand bar. The ranks for communities are derived from a combination of rarity and sensitivity with respect to site conditions.

In the Lower Don study area, 324 established vascular plant species have been identified, of which 56 are of concern either region wide (L1 - L3) or within the urban context (L4). Eighteen of the 56 are regionally rare, so factors such as habitat dependence and sensitivity to land use impacts are of paramount importance in the status of a species.

Within the study area, there are 16 species that are considered to be of concern (L1 - L4). Only two of these 16 species are demonstrably rare within the TRCA jurisdiction but the other 14 are species that are expected to decline both locally and regionally if their natural habitat is impacted by development. The 16 species of concern include the beaver, spotted sandpiper, great-crested flycatcher, green frog and midland painted turtle. Concentrating concern just on species that are known to be regionally rate, in the case northern rough-winged swallow, northern mockingbird and the L5 species, orchard oriole, would jeopardize the remaining 14 species whose populations are currently secure but are considered to be at risk of decline if conditions change.

The benefits associated with natural cover, including the support of biodiversity as well as recreational and aesthetic opportunities, are dependent on the distribution of the natural cover. If natural cover is distributed evenly then the benefits are also distributed evenly. In the Lower Don Study Area, it is suggested that the amount of natural cover in the TRCA jurisdiction is low. This is particularly the case within the Don River watershed, in general and especially the Lower Don area, where almost no natural cover remains. Given this condition, all habitats are therefore considered important as part of the remnant regional natural system.

The Terrestrial Natural Heritage Approach also considers the matrix influence which refers to the effects of surrounding land uses on habitat patches, flora and fauna. The patches of natural cover in the Lower Don Study Area face impacts from the surrounding matrix of primarily urban lands. The adjacent urban areas are having negative impacts on the natural system. Even if higher quality patches are left intact, increasing the proportion of adjacent urban areas through the conversion of natural cover to urban land use will further degrade the matrix influence.

A habitat patch score analysis that was conducted within the Study Area resulted in a very low value. If one of the three landscape measures (size, shape or matrix) were reduced, the total habitat patch score would further decrease and would reflect a decline in the quality of the natural system. Therefore, the study results recommend focusing restoration efforts to improve the Habitat Patch Total Score by improving poor functioning patches.

It should be noted that because the vegetation communities, as well as the flora and fauna in the Study Area are subject to very high pressures resulting from the surrounding urban matrix, it is unlikely that the full complement of biodiversity associated with forest habitat could be ever restored or maintained. However, one way of mitigating against the matrix influence is to increase the amount of natural cover, effectively diluting the negative influence over a wider area. Currently, although breeding bird diversity is low, the natural cover in the Lower Don provides foraging and resting opportunities for thousands of migratory songbirds. The habitat patches in the Lower Don are important to this north-south movement because they provide a link between the Leslie Street Spit and the natural areas north of the city.

4.7.2 Avian Migratory Stopover and Corridor Evaluation

The Lower Don River, as well as the Keating Channel, represents a link between the Tommy Thompson Park Important Bird Area (IBA) to the south and the continuous Don Valley Corridor to the north. The migratory and stopover utilization data developed as part of the *Biological Inventory Study* is a part of the newly developed and larger migratory bird banding project titled Tommy Thompson Park Oakridges Moraine migratory bird project (refer to ***Figure 4.7***). Permanent bird monitoring stations throughout the Don River corridor have been established. These stations monitor migratory bird abundance and richness by point count observations, and corridor usage

Figure 4.7 – Avian Migratory Stopover Evaluations Stations

by recording the occurrence of colour leg banded birds. Data from the spring shows sharper peaks of diversity and abundance due to the rushed nature of migration then whereas in the fall there is a more gradual increase in numbers. Point count data from the Lower Don sites reveal that species abundance and diversity are positively correlated to habitat size and density in both spring and fall migration windows.

4.8 Cultural Resources

4.8.1 Built Heritage

A Cultural Heritage Study, including an historical review and a resulting data base of identified cultural heritage resources, was conducted by the TRCA to support both the *Lower Don River Environmental Studies*. The nature of the work that was completed and the findings of the investigations were documented in the *Environmental Assessment for the Naturalization and Flood Protection for the Lower Don River: Cultural Heritage Study*, which is attached in ***Appendix G***.

The study provides an archaeological and historical review of the locations most likely to be affected by future naturalization and flood protection activities.

The analyses and assessments were conducted on the basis of a General Study Area and a Specific

Study Area (refer to ***Figure 4.8***). The General Study Area is based on:

- the area of flood prone lands, following zones that are considered Special Policy Areas within the Port Lands and along the Lower Don River; and,

- all culturally and ecologically significant areas that may be connected to the Don Watershed as a result of river channel naturalizations.

This area stretches north from the existing edge of Toronto's Inner Harbour to the Queen Street bridge on the west side of the Don River; the north side of Eastern Avenue on the east side of the river; and from the York Street Slip on the west end, to Ashbridge's Bay on the east end.

The Specific Study Area includes all lands where flood protection, river channel naturalization, and management of subsurface environmental conditions works may be conducted throughout the course of the two projects. This area encompasses the Don River from its mouth at the Keating Channel to Winchester Street, and is contained within Broadview Avenue to the east, and River Street to the west. Additionally, the proposed areas to be naturalized at 480 Lake Shore Blvd., the National Iron Works property and the West Don Lands are considered in some detail. The specific Study Area is focused on:

- natural history, especially the late 19th Century modifications which dramatically altered the original bed and flow of the Don River;

- the extant built heritage found adjacent to and within its banks; and,

- some 'lost sites' with archaeological potential.

A total of sixty-one (61) individual human heritage features were defined during the Resource Definition component of the study, two (2) for the Specific Study Area, and fifty-nine (59) for the General Study Area. Two (2)

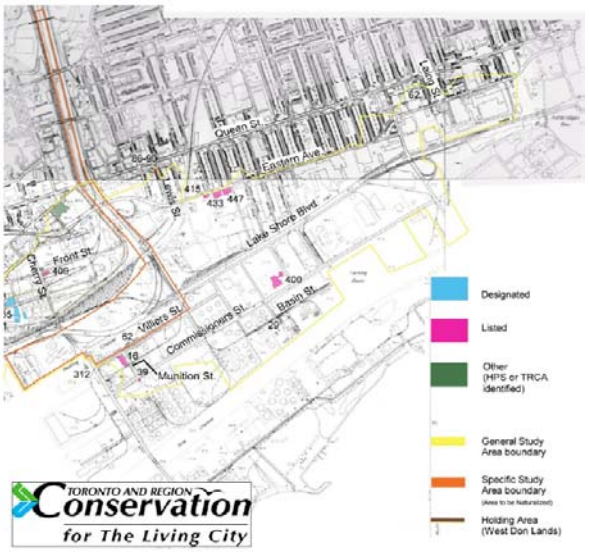


Figure 4.8 – Heritage Resources South & East of the Lower Don River

archaeological sites have been registered with the Ontario Ministry of Culture, both within the Special Policy Area of the General Study Area – the Parliament site of the 1797 to 1824 first and second parliament buildings of Upper Canada, and the Gooderham and Worts Windmill site. Both locations are west of any proposed flood protection works for the Lower Don River West Project area. The City of Toronto's current Inventory of Heritage Properties identified a total of 31 designated properties and 21 listed structures or landscapes within the study area. None of these 52 structures will be impacted by the proposed flood protection works for the Lower Don River West project. Additionally, four properties in the Study Area are being considered by the City in 2003 for inclusion in the Inventory. Two additional properties with the potential for historical significance were identified by TRCA archaeologists as being within the northwestern most part of the flood protection landform at 605 and 611 King Street East.

The Lower Don Valley has a long history which dates from the time of the Aboriginal Mississauga peoples and continued through the French and British regimes with extensive documentation and

maps dating from the 18th Century onwards. Human use and intervention of the Don River began almost immediately once the lands in the Township were taken up, with infilling, tree removal, farming, and the establishment of mills and industry significantly altering the flow of the Don early in the 19th Century. By the second quarter of the 19th Century, the Don was being used as an open sewer, a practice which continued into the early 20th Century. The late 19th Century saw the land use become almost entirely industrial, and after the extensive flooding which occurred in the second half of the 19th Century that destroyed businesses and bridges, lobbying began for improvements to the Don Valley. Improvements cost far more in time and money than anticipated and neither attracted further business, nor stopped the periodic flooding. Historic remnants of industrial sites, military installations homes and tavern stands have largely been destroyed due to the construction of roads and the Don Improvements of the 1880s-1890s. However, any excavation for the flood protection landform may unearth evidence of a buried stream and the footings of a breakwork and blockhouse near the King and Queen Street intersection. Other features that have the potential for being unearthed as part of the construction of the flood protection landform include possible bridge abutments formerly located along Front Street (formerly Palace Street), and Tate street (which was located between Front and Mill Streets). It is unknown whether these abutments were destroyed or only buried as part of the creation of the Don Narrows. An old bridge abutment was observed along the banks of the Don River immediately north of the CN Rail's Kingston line which appears to be within what would have been the alignment of Tate Street before it was decommissioned.

4.8.2 Archaeology

Cultural heritage forms one component of the *Lower Don River West - Remedial Flood Protection Project*, with archaeology forming one part of that component. The archaeological study was conducted by the TRCA and D. R. Poulton & Associates Inc. (DPA).

TRCA staff conducted a background study as an initial step in the cultural heritage component of the Lower Don Projects. The Study was informed by several past heritage studies, including the 2003 *Archaeological Master Plan of the Central Waterfront* which was prepared by Archaeological Services Inc. (ASI). The Report included a review of the historic development of the study area and provided data on known and potential archaeological resources. It also included a recommendation that more detailed Stage 1 archaeological background studies should be carried out for any areas that were subject to possible future impact from the construction of landform, wetlands or other developments associated with the flood protection and naturalization projects.

Concurrent with the TRCA background study, an independent Stage 1 archaeological background study was conducted that overlapped part of the study area for the Don Mouth Project. It was carried out on behalf of the Toronto Waterfront Revitalization Corporation (TWRC) by Historical Research Limited and ASI. The TWRC study focused on the East Bayfront, West Don Lands and Portlands Areas of the City of Toronto. The report on that study was finalized in April 2004. As with the TRCA study, it included a review of the historic development of the study area as well as data on known and potential archaeological resources. It also included recommendations concerning the need for more intensive documentary research and for Stage 2 survey to confirm the presence or absence of archaeological remains.

The vicinity of the Lower Don River has undergone enormous changes over the past 150 years, since the first European settlement began in earnest in the 1790s. Portions of this area would originally have had a very high potential for Aboriginal sites of the pre-contact and post-contact periods. However, it is the consensus of both previous and current studies that there is

little or no potential for such sites to survive owing to the extent of 19th Century and later landscaping and construction impacts.

The TRCA and TWRC studies both determined that the study area for the Don Mouth Naturalization and Flood Protection Project has a relatively high inherent archaeological potential for remains relating to the late 18th and 19th Century historic evolution of York, later Toronto. The documented sites range in type from military to residential, institutional, commercial and industrial. For example, the lands of concern to this study include a substantial portion of the Eastern Liberties that lay directly east of the eastern limits of the City of Toronto as incorporated in 1834. Those lands included a wide range of historic structures. Similarly, the Naturalization Study Area for the Lower Don extends north to Riverdale Park. The upper reaches of that part of the river valley area include the locations of early historic wharves and factories. The key question for any such sites will be the extent to which the archaeological remains survived subsequent development impacts.

4.9 Socio-Economic & Land Use

4.9.1 Existing Land Use

As shown in ***Figure 4.9***, Spill Zone 3 contains a variety of land uses including: residential properties, retail and office space, vacant land and parking lots, and industrial and warehouse/storage businesses. In total, there are approximately 280 properties within Spill Zone 3, and the breakdown of the existing land uses are summarized in ***Table 4.5***.

Table 4.5 - Existing Land Use in Spill Zone 3

Land Use	Number of Properties
Residential	164
Retail	38
Warehouse/Storage	36
Vacant Land	31
Industrial	20
Office	20
Parking	17
Utility/Transportation	14
Open/Miscellaneous	8
Institutional	1

The West Don Lands, which occupy the eastern portion of Spill Zone 3, is the area most likely to be affected by the flood protection alternatives. The West Don Lands are bounded by the Don Valley Parkway/Don Roadway on the east, the CN Rail tracks to the south, Parliament Street to the west and Queen Street to the north. Historically this land has been used for a variety of uses from residential to industrial. Previous industries have included, tannery, metal processing, asphalt paving, scrap metal yard, waste paper processing, meat packing, soap manufacturing, resin storage, dye chemicals, oil company and fertilizer plant. Given the previous industrial nature of the study area, the soil and groundwater is likely contaminated.

Much of the existing land area is currently vacant and or underutilized, and the lands are largely owned by the Ontario Realty Corporation (ORC).

Current lands uses are summarized as follows:

- Within the West Don Lands, there are about 10 buildings in the block of ORC owned land bounded by: the proposed Bayview Avenue Extension, King Street, the CNR tracks and the Don River. This is the area to be covered by the proposed landform that is required for flood protection. All buildings are occupied and these buildings/properties are leased from the ORC and are used for a variety of commercial uses including storage, film industry, a network installation business and Foodshare Toronto. Large vacant areas of the ORC lands are used for miscellaneous storage of vehicles and containers;

- On the east side of the Don River, there is a car dealership (BMW) located south of Queen Street. The Unilever owned property/ industrial plant is located south of the CN Rail tracks and leased by Korex;

- Although there are no residents within the block of land potentially affected by the flood control works, there are residences along, and to the north, of Queen and King Street. The closest of these residences is about 350 to 400 m away from the northern point of the proposed landform. Larger residential areas are located north of King Street (Corktown) and South Riverdale on the east side of the Don River. There are also new condominium developments to the west of the site associated with the Gooderham & Worts redevelopment area;

Figure 4.9 – Existing Land Use

Figure 4.10 – Official Plan Land Use Designation in Spill Zone 3.

- A paved walkway/bicycle path extends along the east side of the West Don Lands. It is located along the west side of the Don River (between the Don River and rail tracks). The walkway/path connects the upper reaches of the Don River to the waterfront trails system. The walkway/pathway crosses under the CN Rail tracks on a hanging bridge adjacent to the west bank of the river. During flooding events the culvert floods and the pathway is closed; and,

- The West Don Lands are included in the City's Part II Official Plan for the King-Parliament area. Key objectives for this revitalization area involve a mix of uses including the retention of existing commercial/light industrial activity. The plan also includes the provision for a Don River open space district for various uses including regeneration of the Don River. ***Figure 4.10*** shows the land use designations for Spill Zone 3. The Plan also provides for the enactment of a hold-bylaw for the area. The lands are currently zoned 'Reinvestment Area (hold) District'. The removal of the holding status is subject to the provision of several studies including an Environmental Management Plan to address the land/groundwater contamination issue.

The area has also been incorporated into the redevelopment plans of the Toronto Waterfront Revitalization Corporation (TWRC). As outlined in the TWRC Development Plan and Business Strategy, the West Don Lands are to be a mixed use area including a variety of building types for

commercial, institutional, and residential uses. A large portion of the area is also to provide open space opportunities.

4.9.2 Methodology

A component of the Environmental Assessment involved the determination of the flood protection benefits that would be derived through the implementation of the proposed undertaking. This was achieved through the calculation of the flood damages associated with the occurrence of a Hurricane Hazel flood over the Don River Watershed. Through the implementation of the proposed works these damages would be prevented and accordingly, represent the benefits that would be realized.

To undertake this determination, the following procedure was adopted:

- Spill Zone 3 was divided into two areas: those that would be subject to flood depth of less than 1 m during a Regulatory Storm and those where the flood depth would be greater than 1m (Refer to ***Figure 4.11*** on the following page). For the purposes of estimating damages, an average depth of 0.6 m and 1.5m was considered for these areas, respectively.

- The residential structures in Spill Zone 3, are generally townhomes or multi-rise apartment buildings. The potential flood damages for such structures were obtained from a previous residential depth-damage study (*Paragon Engineering Limited (1985)*). Based on the information contained in the above-noted study, the damages associated with townhomes were estimated at: $13,500/townhome for a flood depth of 0.6 m and $18,500/townhome for a depth of 1.5 m.

- Flood damage data is not readily available for multi-rise residential buildings, and accordingly, the damages associated with this type of structure were assumed to be similar to

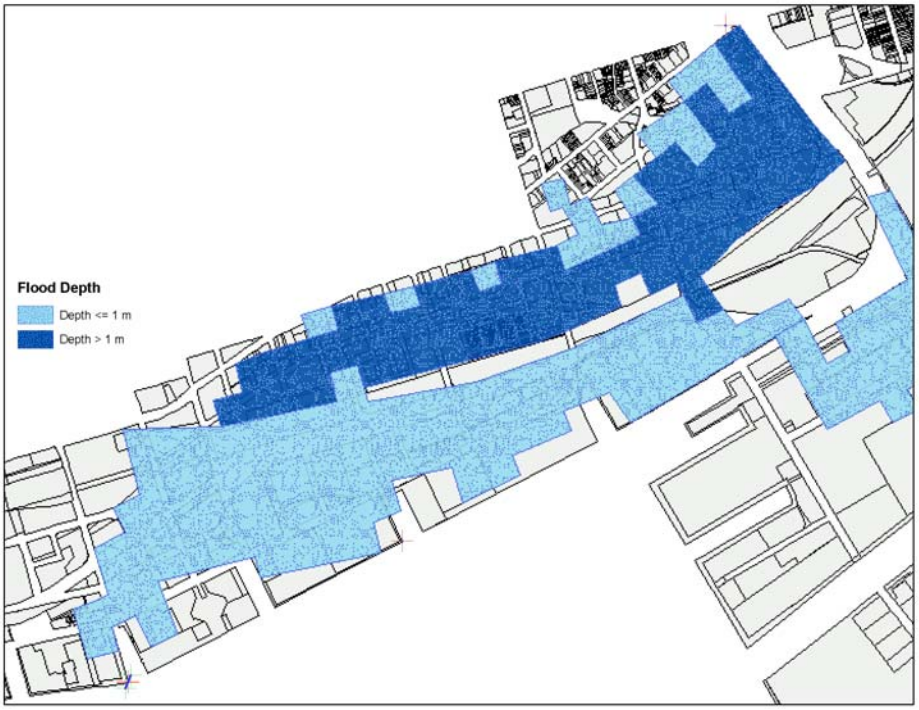


Figure 4.11 – Flood Depth under the Regulatory Flood – Spill Zone 3

that of hotels (given the similarity in contents and structure).

On the basis of the above, the damage rate on a unit area basis was assumed to be $95/m² for a flood depth of 0.6 m and $170/m² for a depth 1.5 m.

- For the industrial/commercial/institutional (ICI) properties (with the exception of Vacant Land, Parking and Open/Miscellaneous land uses whose damages were assumed to be negligible), the depth-damage data in shown in ***Table 4.6*** was used for estimating flood damages (from *Flood Estimation Guide*, Ministry of Natural Resources, 1990).

- The ICI sector depth-damage data is based on a previous study for the Fort McMurray area, in Alberta; flood damage in Toronto is assumed to be consistent with that of Fort McMurray for the purposes of this study.

- Depth-damage data was available in 1984 dollars. Estimates of damage were converted to present value using the consumer price index (CPI) that measures the inflation of prices over time. The all-items CPI for 1984 is 72.1 and is 123.9 currently. The all-items CPI has been identified as suitable for estimating residential damages (MNR, 1990) and was assumed to be appropriate for ICI sector properties for the purposes of this study.

4.9.3 Flood Damage Assessment

Based on existing land use in Spill Zone 3, the total value of flood damages (structural and contents) from the Regulatory Storm was estimated to be $162.5 million. This estimate is based upon the flood depths resulting from a single occurrence of the Regulatory Storm at existing conditions (i.e., existing land use with no flood protection works in place). As shown in ***Table 4.7*** retail space and warehouse/storage industries account for the majority of the damages at $69 million and $44 million, respectively. Industrial, residential and office space also contribute significantly to the total flood damage value with values of $20 million, $14 million and $13 million, respectively. Damages to vacant Land, parking and open/miscellaneous land uses were assumed to be negligible.

Table 4.7 - Flood Damages by Primary Land Use

Primary Land Use	Damage Costs
Retail	$69 M
Warehouse/Storage	$44 M
Industrial	$20 M
Residential	$14 M
Office	$13 M
Utility/Transportation	$1.4 M
Institutional	$0.9 M
TOTAL	$162.5 M

Table 4.6 – Industrial/Commercial/Industrial Flood Damages Values

Primary Land Use	Flood Depth of 0.6 m	Flood Depth of 1.5 m	Primary Land Use	Flood Depth of 0.6 m	Flood Depth of 1.5 m
Retail	$617/m²	$1204/m²	Office	$188/m²	$337/m²
Warehouse/Storage	$263/m²	$509/m²	Utility/Transportation	$263/m²	$509/m²
Industrial	$263/m²	$509/m²	Institutional	$320/m²	$365/m²

With future development in the West Don Lands and the East Bayfront area, flood damages are likely to increase without the flood protection works in place, with the introduction of mixed-use areas where currently much of the land is vacant or used for parking.

4.10 Topography, Soils, Groundwater and Soil Contamination

The average elevation of the West Don Lands is about 2 m above Lake Ontario Levels. There is little ground surface relief change in the area. The West Don Lands are underlain by Upper Ordovician bedrock consisting of dark grey shale of the Georgian Bay Formation. Although it varies by location, bedrock (sometimes shale) has been encountered between 7 to 26 m below ground surface. Subsurface investigations to-date indicate that the lands are underlain by very loose to dense fill up to 6 m thick. Depending on the location, the fill is underlain by either peat, organic silt, loose to compact grey sand, silty sand, or brown silt till. The fill materials consist predominately of dredged lake sediments and construction debris or waste debris that includes metal fragments, fly ash and incinerated municipal waste.

The shallow groundwater table is within the fill and varies between 78.1 and 74.2 m above sea level (about 1 to 3 m below ground surface). In general, east of Cherry Street, the shallow groundwater flows are to the southeast into the Don River. West of Cherry Street the shallow groundwater flow direction is to the southwest into the Inner Harbour. The shallow horizontal groundwater flow velocity was estimated to be in the order of several mm/yr, based on an estimated hydraulic conductivity of 10^{-7} cm/s and a porosity of 0.45. The bedrock flow regime was investigated by a series of six wells installed by Trow, Dames and Moore (TDM). There appears to be a downward hydraulic gradient from the fill through the native till to the bedrock. The bedrock horizontal groundwater flow velocity was estimated to be in the order of 100 m/yr, using an estimated hydraulic conductivity of 10^{-2} cm/s for fractured shale and a porosity of 0.05.

The following provides comments with respect to the extent of soil and groundwater contamination in the area. Further details are presented in ***Appendix H***.

Based on reported soil sample chemical analyses, there are metals and polynuclear aromatic hydrocarbon (PAH) impacted soils across the flood protection landform area. A large portion of the metals and PAHs impacts occur within 1.5 m of ground surface. Depending on the soil sample location, there are some areas where the PAH and arsenic concentrations are more than 7 times greater than the current Part XV.1 EPA Table 3 generic full depth standards for Residential/ Parkland/Institutional property use in a non potable groundwater condition (Table 3). The extent and nature of soil contamination in the Lower Don Lands is to be confirmed through the West Don Lands (WDL) Soil and Groundwater Management Strategy (SGMS) that is to be undertaken by the TWRC.

With respect to groundwater impacts, the limited groundwater quality data indicate some lead, cyanide and PAH concentrations greater than current generic standards. At some soil sample borehole locations, there were reports of petroleum hydrocarbon-like odours, but groundwater monitoring wells were not installed at these investigation locations. The extent and nature of the groundwater contamination in the Lower Don Land area is to be confirmed through the West Don Lands (WDL) Soil and Groundwater Management Strategy (SGMS) that is being undertaken by the Ontario Realty Corporation (ORC).

4.11 Existing Infrastructure

4.11.1 Utility Lines

A summary of the existing utilities located within the area that will affected by the flood protection works is presented in ***Table 4.8***.

Regarding the east side of the Don River, it is noted that there is a steel 10" NEB regulated Trans-northern gas line located within the area of the 'northern' wall/dyke that may be affected by the construction of a dyke south of the CN Rail line. There are also a 200 mm and 250 mm oil pipelines parallel to the TNP pipeline. There are other utilities that include 300 mm and 375 mm storm sewers, THES conduit, and a 500 mm gas main located between the Don Roadway and the Don River. The existing storm system outlets to the Don River via a 450 mm sewer and the 525 mm outlets in this area also.

4.11.2 Rail Infrastructure

The CN Rail bridge over the Don River carries two mainline tracks for the Kingston Subdivision, two service tracks and one pullback track. The pullback track will be converted into a mainline in 2006. Two tracks from the Bala Subdivision run along the west bank of the Don River and, just west of the CN Rail bridge over the Don River, turn almost 90°, then parallel to the Kingston Subdivision tracks towards Union Station. A number of tracks for the Don Yard are located at the southwest corner of the bridge. The Wilson Yard is located just south of the Don Yard. Mill Street Junction hydro substation is located about 85 m north of the northwest side of the bridge. Don Fleet Junction hydro substation is located about 67 m south of the southwest side of bridge. Underground hydro ducts run between the two hydro substations, and cross the two Kingston Subdivision mainline tracks, two service tracks and one pullback track. The bicycle and walking trail that extends along the west bank of Don River is suspended on the side of the west abutment through the bridge structure.

CN Rail, GO Transit and VIA Rail require two live tracks on the CN Rail bridge over the Don River at all times.

The bridge was originally built in 1928 and had two spans. In 1949, the east span was demolished, and three spans were added on the same side to accommodate the Don Valley Parkway. The superstructure consists of five individual deck plate girders (DPGs) with concrete decks, each carrying a track. Underground Hydro One Networks ducts were constructed in 1964. The ducts run parallel to the Don River on the west side of the bridge, and cross the Rail tracks almost perpendicularly. A summary of the rail transportation study is included in ***Appendix G***.

Table 4.8 – Study Area Utilities

Street/Location	List of Utilities
Front Street	• 150mm, 200mm, and 400mm diameter water mains • 300mm and 375mm diameter sanitary sewers. • 600mm by 900mm and 300mm diameter storm sewer • Bell conduit • 100mm diameter steel high-pressure gas line
Eastern Avenue	• 1500mm diameter sanitary trunk sewer (Low Level Interceptor (LLI)) • 675mm and 750mm diameter storm sewer • 300mm diameter sanitary sewer • 300mm diameter water main • 600mm diameter gas line • Bell conduit • THES duct bank
Cypress Street	• 375mm diameter sanitary sewer • 300mm diameter storm sewer • 300mm diameter water main • Bell conduit • 300mm diameter gas line
Queen Street/King Street Area	• 1650mm diameter storm sewer • T.H.E.S. cable • 300mm, 375mm, 450mm diameter and 600mm by 900mm combined sewer • 150mm and 400mm diameter water main • 100mm intermediate pressure gas line
Bayview Avenue	• 300mm and 400mm diameter sanitary sewer • 525mm, 675mm,and 750mm diameter storm sewers • 150mm diameter watermain • 30" Enbridge gas main • Ontario Duct bank • TELUS Fibre Optic Cable
Overland Street	• 150mm diameter water main • 375mm diameter storm sewer • 300mm diameter sanitary sewer • THES conduit • 100mm diameter high-pressure gas line
Mill Street	• 300mm diameter storm sewer. • 300mm diameter sanitary sewer. • 100mm diameter high-pressure gas line. • 150mm diameter water main.