

# Norfolk County Lakeshore Safety Strategy

## Flood and Storm Event Emergency Response Plan

---

To Address Public Health and Safety in the Resort Areas of Long Point and Turkey Point in Norfolk County

---

### Table of Contents:

**Introduction**

**Purpose**

**Approach**

**Background**

**Other Matters**

**Policy Linkage**

**Flood Risk**

**Conditions of Access / Egress**

**Flood Frequency**

**Hazards Associated with Flooding**

**Risk Mitigation**

**Communicating Flood Forecasts and Warnings**

**Norfolk County Mass Communication System**

**Activation of the Norfolk County Emergency Response Plan**

**Safe Haven / Safe Areas**

**Physical Infrastructure Enhancements**

**Conclusion**

# Norfolk County Lakeshore Safety Strategy

## Flood and Storm Event Emergency Response Plan

### **Introduction**

The Resort Areas of Long Point and Turkey Point are existing developed areas located in Hazard Lands along the Lake Erie shoreline. Long Point and Turkey Point are important to the continued economic and social viability and health of Norfolk County.

Long Point and Turkey Point are subject to flooding and storm events from Lake Erie and have limited safe access/egress for evacuation and emergency assistance during a 100-year flood and lesser floods. The resort area of Long Point in particular has one point of access/ egress which could be compromised to the point of interrupting safe access to the entire resort community during a severe storm event.

Norfolk County has and continues to support limited new development of cottages/vacation homes for seasonal occupancy on existing lots of record while being mindful of the existing hazards and natural environment. There is limited opportunity for new development in Long Point and Turkey Point due to the existing size of the built up area and physical constraints on abutting lands. Most development opportunities center on minor additions to existing cottages and boathouses. There are in fact a very limited number of vacant lots of suitable size to accommodate new development in both Long Point and Turkey Point.

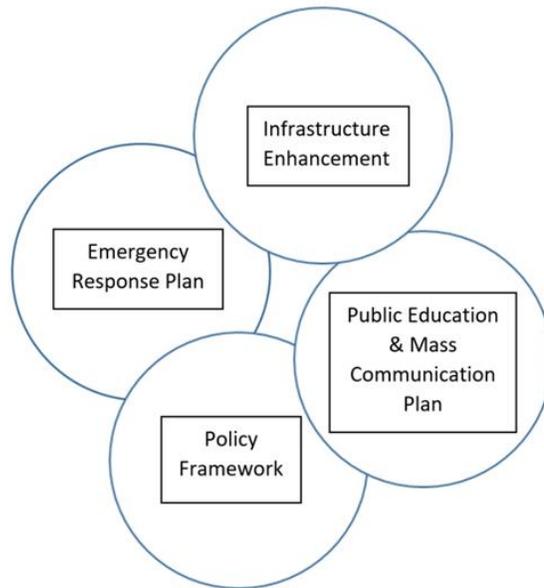
### **Purpose**

To demonstrate that the resort areas of Long Point and Turkey Point have safe access appropriate for the nature of the development and the natural hazard. The County in consultation with the Long Point Region Conservation Authority (LPRCA) can address flooding through this Flood Emergency Response Plan for the areas of Long Point and Turkey Point to protect public health and safety and properties from damage. It should be noted that this Flood Emergency Response Plan only applies to the resort areas of Long Point and Turkey Point as defined in the Norfolk County Official Plan. All other lands along Lake Erie susceptible to flooding are required to be addressed on an individual basis.

## Approach

The Plan has been developed in consultation with Norfolk County's General Managers of Development & Cultural Services, Public Works & Environmental Services, Community Services Department and the Long Point Region Conservation Authority.

The four-pronged approach includes:



## Background

### Long Point

The Long Point area was established in the 1800's and is located on a sand spit along a narrow stretch of beach and Provincially Significant Wetland, part of which is within the Long Point Provincial Park. The majority of the cottages were built between 1940 and 1970. Today there are approximately 1,165 cottages. The oldest settlement area is on the western end between Amy Avenue and Fourth Avenue. The wetland side has more vegetation and better protected from storm events.

The resort area is heavily utilized in the summer months by not only cottagers but also tourist's day tripping to the Crown beach and camping at the Long Point Provincial Park.

The geography of Long Point is flat with the majority of the topography being at or under water level. One two-lane causeway is the only access/egress point to the mainland and it could be compromised to the point of interrupting safe access to the entire community during a severe storm event or any event which may trigger the closure of the causeway.

### **Turkey Point**

Turkey Point's earliest approved subdivision was in 1922 near the end of Turkey Point Road. This resort area is also located on a sand spit which is just over 5 kilometers in length and somewhat protected by the Long Point sand spit. Turkey Point also has extensive sand beaches on the Lake Erie side and wetlands and marshes on the land side. The spit has limited elevation above the lake water level. Turkey Point Road and Old Hill Road provide access to the area but as the settlement extends southward Cedar Drive and then Ordnance Avenue provide the main route back to the two entrance points.

The resort area is heavily utilized in the summer months by not only cottagers but also tourist's day tripping to the Crown beach. Turkey Point has a component of year-round residency that Long Point does not have. Although planning documents only provided seasonal use, many land owners provided previous municipal governments with proof of legal year round occupancy. Later at the decision of the Ontario Municipal Board 80 cottages were permitted to convert to year round occupancy. There are approximately 710 cottages and year round occupied dwellings.

### **Other Matters**

The former Township of Norfolk and now Norfolk County have evolved emergency flood response plans for Long Point and Turkey Point prepared in consultation with the LPRCA. These have included matters such as emergency flood warnings, backup communication and coordinating safe sites.

It is policy that any development permitted in the flood plain shall be protected by acceptable flood proofing action and measures. New development shall only be permitted where safe access for pedestrian and vehicular movement can be provided during flood episodes. Development will generally be directed to areas outside of the regulatory shoreline which comprises three standards: the regulatory dynamic beach standard, the regulatory flood standard and the regulatory erosion standard. Development proposals are reviewed on a site specific basis with regard to these hazards.

The shoreline of Lake Erie is subject to naturally fluctuating lake levels, storm surges, regular wave action, and seiche episodes. Natural shoreline processes should be respected.

The Norfolk County Official Plan also includes a Lakeshore Special Policy Area (LSPA) Secondary Plan which was adopted by Council in 2009. The Plan identifies development pressures along the lakeshore need to be carefully managed in order to protect the area's unique natural attributes and ecological significance. Furthermore, the Plan also identifies the need to protect human health and safety from the natural hazards and human potential made hazards associated with concentrations of development on private services. The LSPA contains Community Design Guidelines identifying special lakeshore attributes and unique local land use arrangements in each waterfront community.

### **Policy Linkage**

While the *Planning Act* provides for repair and maintenance of existing non-conforming uses including additions, the PPS (3.1) directs new development away from flood prone areas and prohibits new development in areas that would be rendered inaccessible to people and vehicles during times of flooding hazards unless it has been demonstrated that the site has safe access appropriate for the nature of the development and the natural hazard.

The Norfolk County Official Plan (4.6.1) regarding the Resort Residential designation allows for seasonal vacation dwellings and small scale commercial, institutional, marine-related and recreational uses, and also recognizes (3.8.3) that very limited new development will occur in these Hazard Land areas due to

the very limited number of vacant lots of suitable size to accommodate new development. Because of the nature of the flood risk and need for safe access, the Official Plan does not permit residential dwellings for new permanent occupancy on lots within the Resort Residential Designation in the Long Point or Turkey Point Resort Areas. As set out above there are a limited number of permanent residences allowed in Turkey Point under a past Ontario Municipal Board decision. Both the Official Plan (3.8.3) and the Lakeshore Secondary Plan call for measures and emergency flood response plans to address matters of public health and safety.

### **Flood Risk**

Historically, flooding along the Lake Erie shoreline has typically occurred between the months of October and April. This is expected as Colorado Lows (moderate to strong low pressure systems with strong winds) typically form during the winter months and push into the Lake Erie region from the southwest, parallel to the lake's predominant orientation, resulting in a rise in lake levels. If the lake is ice covered, the risk of strong lake set-up during storms is reduced, making November, December, March and April the highest risk months for lakeshore floods.

The risk of damaging floods is also influenced by the static Lake Erie water level which varies from year to year depending on precipitation over the upper Great Lakes basin. When the starting lake level is high, less storm related lake set-up is required to cause damage.

#### **Long Point**

The Long Point Resort Area is subject to shoreline flooding that results from the set-up of Lake Erie water levels due to strong and sustained south-west winds accompanied by high waves. Documented flooding of the highest magnitudes occurred in the Long Point settlement in 1952, 1954, 1955, 1958, 1972, 1973 and 1985. LPRCA estimates the return period of the December 1985 flood to be about 30 years.

#### **Turkey Point**

With the wind set up of lake level flooding occurs at Turkey Point as well. Often it rises on the land side in the marshes and then advances into the settlement area from that side. As there is not as much open water after crossing the Long Point sand spit, the winds are often not as strong as those at Long Point.

## Flood Frequency

Information about the frequency of flooding is taken from the 1989 Long Point Region Shoreline Management Plan for Detailed Study Zone 1 Reach 3 (Long Point Settlement) and reflects the combined probability of static lake level and storm-related lake set-up.

**Table 1 Return Period Frequency of Lake Erie Flood Levels**

Return Period Frequency of Lake Erie Flood Levels					
Return Period	2-year	5-year	10-year	25-year	100-year
Probability of exceedance in any given year	50%	20%	10%	4%	1%
Instantaneous water level in m GSC (static lake level plus set-up)	175.4 m	175.7 m	175.9 m	176.1 m	176.3 m
Wave uprush elevation on the beach	175.8 m	176.1 m	176.3 m	176.5 m	176.8 m
Wave uprush elevation on dune					178.0 m

Long Point is subject to a rise in Lake Erie water levels. Along the exposed southern shore of Long Point, waves are expected to break and run up onto the dunes within the settlement of Long Point on Erie Blvd., Woodstock Ave. and Beach Ave. Where the shoreline profile does not extend above the uprush elevation, floodwater is expected to flow inland resulting in flooding. Wave overtopping is expected to first occur on Erie Blvd from the bend east to First Avenue.

In addition, the rise in lake level may be high enough in the Inner Bay to inundate the lowest elevations, for example, along Howey Blvd. and Rogers Ave.

More info is needed about flooding from the Marsh and Inner Bay, how and under what conditions the Inner Bay levels respond to lake set-up from southwest or northeast winds

The topographic maps suggest that Hwy 59 and the ends of the residential streets along the Inner Bay (e.g. Howey) are barely above the high static lake level and would be flooded with any small rise when the lake is high. As lake levels rise, the lowest areas are expected to be inundated first from the Inner Bay and then the outer Lake Erie side. The lowest land locations with the greatest potential for flooding are along the southern half of the causeway (Hwy 59) and the residential streets within the village.

Flood levels around the Long Point settlement areas will continue to rise depending on wind magnitude, direction and duration. During an extreme event, the entirety of Long Point settlement is expected to be flooded with the exception of the top of the dune along Erie, Woodstock and Beach Avenues.

Based on the 1989 LPRCA topographical maps, elevations in the Long Point settlement varies between 175.1 m GSC (Geodetic Survey of Canada Datum) along Hwy 59 and First Ave to 176.1 on Erie Avenue at Third and Fourth Streets. The elevations on the residential streets along the Inner Bay vary from 175.3 to 175.4 m GSC rising to 175.6 as they proceed south. Most of the Long Point settlement will be flooded when lake levels exceed 175.6 and will be flooded to depths in excess of 1.0 m during a 100-year flood.

Specific velocities are not known for Long Point during flood events. Generally flood velocities for these areas would result from bore propagation as a result of wave uprush, inland wave generation, and the flow of water between the outer lake and inner bay if there is a variation in level. Wave uprush involves

the breaking of waves on the shoreline and propagation of water inland and travelling as a bore. The velocity and depth of the bore is dependent on the characteristics of the shoreline in the conjunction with the magnitude of the breaking waves. Areas within Long Point Village have been identified to be subject to flood waters of sufficient depth to allow for inland waves to develop resulting in the moving water. Difference of flood water between the outer lake and inner bay is highly dependent upon the magnitude and duration of the winds driving the rise in lake levels.

Additional study is required to quantify potential flood velocities in Long Point.

Areas at most risk of erosion in Long Point include the entire southern shoreline along portions of Woodstock Ave, Beach Ave and Erie Ave. There is an unknown probability and risk of erosion occurring to the causeway during flood events; however it is anticipated to be small but cannot be ignored due to historic occurrences

The shoreline management plan specifically states that there is the potential for a complete washout between the outer lake and inner bay always exists as a result of significant storms. These types of washouts have historically occurred (Old Cut) and since filled in with the deposition of sand material.

### **Conditions of Access/Egress**

“Safe Access” means that an access route is available that has shallow flooding with low water velocities such that people and vehicles can safely move in and out of the area. Safe access is needed to allow people to safely evacuate homes and businesses, emergency vehicles to safely reach those needing medical attention or mobility assistance, and emergency vehicles to safely attend to related emergencies such as fires and gas leaks.

The access routes for evacuation or emergency assistance in the Long Point settlement will be flooded up to 1.4 metres (4.6 feet) during a 100-year flood.

The MNRF Natural Hazards Technical Guide proposes that the maximum flood depth a healthy adult can safely walk through is 0.8 m of standing water. The Technical Guide limits safe access/egress to a maximum depth of 0.30 m if flood velocities resulting from flooding are not 0 m/sec. The Shoreline Management Plan recommends that 0.25 m be used as the maximum depth in Long Point for safe access.

At 176.6.0-177.8 m GSC, the top of the dunes south of Woodstock and Beach Ave have the highest elevations. The properties on the dune are above the 100-year flood level but are subject to wave over-rush and erosion.

The highest street locations behind the dunes, at 176.1 m GSC, are on Erie Blvd between Third and Fourth Streets, at Johnson and east of Old Cut and on Beach Ave near Austin. While these street locations are all below the 176.5 m flood level, they will be dry for lesser floods when the rest of the settlement is flooded and are more likely to be accessible during a 100-year flood. Note: this description is based on the 1989 topographic maps and should be updated periodically.

Infrastructure blockage and damage to roads may disrupt access/egress for some period of time after the wind has calmed and water receded.

## **Hazards Associated with Flooding**

**Health** – Inundation of private septic systems – this includes Class 3 (holding tanks) and Class 4 (typical tank and leaching beds). These septic systems would be non-functioning during the flood event and afterwards. It is anticipated the release of pathogens would occur as a result of the flood impacting drinking water systems.

**Water Supply** - A number of the residences are served by a private potable drinking distribution system which draws water directly from the lake, provides treatment and distribution to the dwellings. The remaining residences take water directly from the lake, ground (well/sand point) or receive water delivery to a cistern. It is anticipated all of the potable drinking water sources will be contaminated as a result of a flood and the release of sewage from flooded holding tanks and septic systems. Components of buildings that are inundated during a flood including crawlspaces and insulation are likely to be subject to water contaminated by septic sewage.

**Fire** – Current literature indicates fires do occur during flooding, most commonly as a result of electrical damage and gas leaks.

## **Risk Mitigation**

The risk to life and property can be reduced over the long term by floodproofing existing cottages and accessory buildings as they are replaced or undergo major renovations.

“Floodproofing” means structural measures incorporated into the basic design and/or construction or alteration of individual buildings to protect them from flood damage.

- In a flood prone area, the safest forms of construction are those that keep water out and limit structural damage caused by hydrostatic pressures and waves.
- All new dwellings must incorporate dry, passive floodproofing measures for all habitable and potentially habitable space.
- Wet floodproofing is an alternative for non-habitable uses, accessory buildings (e.g. garage, boat house), and non-habitable spaces in dwellings (e.g. crawl space, garage).
- All new non-habitable and accessory buildings should be floodproofed to the extent practical by raising the floor level and/or using materials that resist water damage.

“Dry, Passive Floodproofing” keeps a development and its contents completely dry without the need to take action in anticipation of flooding. Dry, passive floodproofing is required for all habitable spaces and spaces that could potentially be habitable. Measures include raising the top of foundation and openings above the design flood level, locating electrical and mechanical services above the design flood level, anchoring fuel tanks against movement and flotation and limiting the adverse effect of hydrostatic and hydrodynamic pressures that could cause structural damage.

“Wet Floodproofing” allows water to enter a structure to prevent differential hydrostatic water pressures that could cause structural damage. Wet-floodproofing is only acceptable for non-habitable structures such as garages and sheds and non-habitable areas such as crawl spaces. Building materials subject to water damage, e.g. drywall, paneling, insulation, should be avoided in wet-floodproofed structures. Wet floodproofing for crawl spaces is complex and requires design by an experienced structural engineer.

Floodproofing Requirements for Dwelling Replacement, Major Additions and Foundation Replacement:

- a) The dwelling is relocated to an area within the existing lot where the risk of flooding, erosion and/or property damage is reduced to the greatest extent, wherever possible,
- b) The top of foundation elevation is at or exceeds the Design Flood Level,
- c) Electrical, mechanical and heating services are located and accessible above the Design Flood Level,
- d) Heating fuel tanks (oil or propane) are anchored to prevent movement and flotation due to flooding.
- e) No basement is proposed in the flooding hazard and the foundation and any crawl space are designed to withstand potential hydrostatic pressures and uplift due to flooding without significant structural damage. Unexcavated foundations with the top of foundation and floor slab set above the design flood level are encouraged.
- f) Plans accompanying permit applications show the elements of the floodproofing design completed by a qualified professional engineer including foundation design details and elevations, description of the floodproofing elements and designs, location of building services, and specifications for construction materials to reduce potential flood damages.

Special Requirements for Dwelling Replacement along Long Point Beach

Cottages that front on the lake are subject to additional wave forces. In addition to the requirements for cottage replacement above:

- a) the building is at least 10 metres from the beach and no closer to the lake than the former building;
- b) the cottage is elevated on piles above the design wave uprush elevation and the pile foundation is designed by a professional engineer explicitly to withstand wave forces and erosion.

Floodproofing Requirements for Accessory Structures

New and replacement accessory structures should be floodproofed to the maximum practical extent by raising the floor level, using materials that resist water damage, and anchoring the structure to prevent movement during a flood event.

### Requirements for Septic Systems

In addition to the *Ontario Building Code* requirements, new or replacement filtration beds in the flood-prone resort residential communities should be designed to be effective when the water table reflects the maximum monthly Lake Erie water level which is 175.0 m International Great Lakes Datum (IGLD) or 175.2 m GSC<sup>1</sup>).

Design Flood Elevations for Long Point (in metres GSC)	
Maximum monthly lake level (for design of crawl spaces and septic tile beds)	175.2 m GSC
Design flood level for floodproofing)	176.5 m GSC
Wave uprush elevation on dune (for lake-side foundation protection)	178.0 m GSC

### Retrofitting Dwellings to Reduce Flood Damage

Through public information and awareness initiatives, encourage property owners to take action to reduce potential flood damages by:

- Moving buildings and structures back from the shoreline;
- Raising buildings and structures above the design flood level on a foundation designed to improve structural stability;
- Moving electrical, mechanical and heating services to the first floor;
- Elevating or anchoring heating fuel tanks.

---

<sup>1</sup> Geodetic Survey of Canada datum (GSC) is generally used for land based elevations including topographic surveys and design flood levels. International Great Lakes Datum (IGLD) is used for Lake Erie water levels including lake level reporting and storm surge level forecasts. In the Norfolk County shoreline area, the difference is about 0.2 metres. That is, the GSC elevation minus 0.2 metres is equal to the IGLD elevation.

## Communicating Flood Forecasts and Warnings

LPRCA is mandated by the Province to monitor watershed and weather conditions and operate a flood forecasting and warning system for its watercourses and the Lake Erie shoreline. The Flood Forecasting and Warning System is a 24-hour service. When a flood is anticipated, LPRCA issues messages to member municipalities who coordinate the necessary response. Flood watches and warnings are issued by LPRCA to provide early notice for municipal decision makers, emergency responders and the public. LPRCA also participates in annual municipal emergency response training.

Shoreline flooding predictions are provided directly to LPRCA by the MNR Great Lakes Operational Storm Surge System (GLOSS). GLOSS is a suite of models that employs near-to-real-time data and forecast meteorological data to predict surge water level and wave height, period and direction for Port Colborne, Long Point, Point Stanley and the Hilman Marsh within Lake Erie.

To complement the MNR forecast, LPRCA staff has online access to the Lake Erie Operational Forecast System (LEOFS) produced by the US National Oceanic and Atmospheric Administration (NOAA).

The Lake Erie flood potential is assessed using real-time data about the following conditions:

- Real-time Lake Erie level gauges maintained by the Canadian Hydrometric Service (CHS) - Fisheries and Oceans Canada for Bar Point, Kingsville, Eriean, Port Stanley, Port Dover and Port Colborne.
- Forecast wind speed and direction.
- Nearshore and offshore wave height and period predictions.
- Lake Erie static water levels.
- Off and nearshore ice conditions.

LPRCA staff monitors flood predictions for Long Point, Port Colborne and Buffalo. The physical locations of Port Colborne and Buffalo inherently produce excellent modelling results and provide a good indicator that is correlated to the LPRCA shoreline and its potential damage centers. The forecast levels east of Long Point and Turkey Point are used in conjunction with the Long Point forecast from the SWMC and NOAA.

The following water level thresholds are used as an unofficial guide for issuing flood messages for Lake Erie flooding:

Forecast Area	Threshold ( m + Chart Datum 173.5 m IGLD)	Type of Message
Long Point	1.7 m	Flood Watch
	2.0 m	Flood Warning
Port Colborne	1.6 m	Flood Outlook – maybe flood watch
Buffalo	2.0 m	Flood Watch

The LPRCA General Manager acts as the LPRCA Flood Coordinator with the Manager of Watershed Services as alternate. The Flood Coordinator approves Flood Messages, communicates with municipal officials and the media and deploys CA resources to assist the municipal flood response.

One staff member is assigned at any given time as a Duty Officer responsible for monitoring weather and watershed conditions and activating the flood warning system if required. Normally the Water Resources Analyst has this responsibility, with the Water Resources Specialist as alternate. The Duty Officer monitors conditions, prepares flood messages and communicates directly with the municipal emergency response personnel as required.

LPRCA Staff are trained to operate the flood forecasting and warning system. 24-hour contact information is maintained in the LPRCA Flood Contingency Plan.

The LPRCA maintains a Flood Contingency Plan which describes the respective roles and responsibilities of the municipalities, the Conservation Authority and the Ministry of Natural Resources and Forestry in planning for, forecasting, warning, communicating and responding to floods.

Flood messages are primarily communicated by email to the contacts.

Three different flood messages standardized across all Conservation Authorities and MNRF are issued depending on the potential for flooding, severity or if flooding is currently occurring. The three types of messages are issued:

1. Watershed Conditions Statement: General notice of weather conditions that could pose a risk to personal safety or which have the potential to lead to flooding.
2. Flood Watch: Issued when flooding is possible and municipalities and individuals should be prepared to respond.
3. Flood Warning: Flooding is occurring or about to occur and municipalities and individuals should take action to deal with the results of flooding.

All three types of flood messages are issued by LPRCA to the media to be broadcast to the public. Media includes local radio stations, newspapers and television stations which broadcast the flood messages through their standard format and social media outlets.

All flood warnings are terminated by LPRCA with a follow-up flood message.

The same flood bulletins are also posted on the LPRCA website (<http://www.lprca.on.ca>). The LPRCA is also implementing a system to distribute the messages via the LPRCA's social media outlets.

In the event that primary email and telephone communications fail, where no alternative exists, the Authority may contact the OPP – Provincial Communication Centre who will in turn notify the police service jurisdiction, the affected municipality, or as required. Because of the vulnerability of hydro services and cell services, LPRCA maintains a telephone land line for backup communication.

The LPRCA Flood Contingency Plan is updated annually and distributed to the municipal flood coordinators, emergency responders, and responsible provincial agencies. Contact information is maintained on an ongoing basis throughout the year.

## **Norfolk County Mass Communication System**

Norfolk County Council has authorized Staff to proceed with the procurement of a Mass Communication System which will not only serve the needs of communicating warnings and watches to the Long Point and Turkey Point areas but also for Emergency response planning across the whole County. It is anticipated the system will be in place by the end of 2017. Until such time, Norfolk County & LPRCA will continue to utilize all forms of media communication and public education to ensure residents remain well informed of pending emergency situation.

## **Activation of the Norfolk County Emergency Response Plan**

Activation of the Norfolk County Emergency Response Plan may be appropriate when:

- The emergency requires a coordinated and controlled response from a number of agencies and county departments; and
- The emergency affects a significant number of inhabitants or area of the County; or
- The emergency requires extraordinary actions or expenditure of monies for the protection of life and property; or
- The aforementioned situations are reasonably expected due to reliable information such as weather reports.
- A situation of unknown consequences i.e.; Chloropicrin release, is occurring and input from all departments could bring pertinent information forth to develop a course of action.

Activation of the Norfolk County Emergency Response Plan does not necessarily require the Declaration of a State of Emergency. The provisions contained in this document should be used regardless of whether or not a State of Emergency will or will not be made.

Any member of the Emergency Control Group or their designate is authorized to initiate the Notification Procedure when, in their judgement, it is required to assemble the ECG in order to make decisions pertaining to the mitigation of an emergency or potential emergency.

The Emergency Control Group, (or their designates) will meet at the Emergency Operations Centre designated by the initiator of the notification. Thereafter all actions taken by the Emergency Control Group will be in accordance with the provisions of this plan.

## **Safe Haven / Safe Areas**

### **Long Point**

The shelter at the Long Point Provincial Park shall be utilized as a safe have or emergency cluster in an event of flooding in Long Point. Evacuees are to go to this location only if they cannot stay in their dwelling and are unable to reach the defined evacuation site as established by the Norfolk County Emergency Control Group.

### **Turkey Point**

The County, in partnership with the LPRCA and MNRF will investigate potential Safe Haven / Safe Areas in the immediate future.

### **Physical Infrastructure Enhancements**

Public Works & Environmental Services will consider on a case-by-case basis, when road reconstruction and maintenance in the Long Point and Turkey Point areas is identified in the capital works plan, that those roads be raised with improved drainage characteristics where practically and economically feasible.

For the most part, the County does not own the beach areas. Hence, it is impractical to consider preventing, through seawalls or other means, the intrusion of waters inland.

Roads are designed to minimize flooding, and this has been considered in the construction of roads on Long Point. Accordingly, though there may be periods when the flood water is at a depth that makes the roads impassable, as the water recedes, ponding should be minimized and normal road can resume.

The Causeway is the single access for Long Point. Raising the grade of this road may reduce the impact of flooding. Due to the length of road, and the physical and financial impact of undertaking a grade change, this is not a measure that the County can undertake at this time.

### **Conclusion**

The degree to which access (ingress/egress) is available to and from a site to escape from potential danger due to flood hazards, especially short-term hazards such as storm surge and wave uprush, should be taken into consideration when establishing the acceptable level of risk for users of the development. ... Where egress is constrained or limited, the requirements for floodproofing should be carefully evaluated.

The options of ensuring access (ingress/egress) to an individual development site and/or the entire shoreline area (e.g. low lying, flood susceptible shoreline communities) should also be addressed through the Municipal Emergency Response Plan. Assistance in the establishment of options for site and/or area evacuation, the issuance of flood and storm warning and/or flood and storm alerts from local Conservation Authorities, and the provisions of emergency action programs (e.g. sandbagging, technical advice, etc.) should be developed in consultation with the local Conservation Authority, the Ministry of Natural Resources, the Office of the Solicitor General and other pertinent emergency management agencies.