North Thurston Public School's Annex to the Natural Hazards Mitigation Plan for the Thurston Region

Table of Contents

Title Page and Table of Contents.....1
Adopting Resolution 3
School District Profile 5
North Thurston Public Schools Plan Development Process.....7
North Thurston Public Schools Risk Assessment.....9
North Thurston Public Schools Mitigation Initiatives.....29

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NORTH THURSTON PUBLIC SCHOOLS

RESOLUTION #807

Approving and Adopting the North Thurston Public Schools Natural Hazards Mitigation Plan

WHEREAS, the Federal Disaster Mitigation Act of 2000 requires that for sub-grants following any disaster and for Pre-Disaster Mitigation Grant Programs project funding, local government applicants for sub-grants, following any disaster, must have an approved Natural Mitigation Plan prior to receipt of hazard Mitigation Grant Program project funding; and

WHEREAS, the Natural Hazards Mitigation plan represents the commitment of the North Thurston Public Schools working in cooperation and partnership with Thurston County and other surrounding government entities to reduce the risk from natural and man-made hazards and is in the public interest to proceed with the planning process in a timely manner; and

WHEREAS, an open public involvement process is essential to the development of an effective plan, and the process was coordinated with the affected jurisdictions, agencies, business and other private and non-profit interests in the region to insure a comprehensive approach to mitigating the effects of natural and man-made disasters; and

WHEREAS, the plan includes documentation of the planning process and an updated risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses, sufficient to enable the District to identify and prioritize mitigation actions; and

WHEREAS, the plan shall include a detailed mitigation strategy that provided the blueprint for reducing the potential losses identified in the risk assessment, a five year cycle for plan maintenance and documentation of formal adoptions by District; and

WHEREAS, the plan will also serve as the basis for the State and Federal governments to provide technical assistance and to prioritize project funding; and

THEREFORE, BE IT RESOLVED, that the Board of Directors for the North Thurston Public Schools certifies that the attached Natural Hazards Mitigation Plan be approved and adopted by the Board of Directors.

ADOPTED by the Board of Directors of North Thurston Public Schools, Thurston County, Washington, at the regular meeting held January 5, 2009 upon the motion of Ms. Davies and the second of Ms. Wells.

NORTH THURSTON PUBLIC SCHOOLS
Thurston County, Washington

Board Member

Board Member

Board Member

Board Member

Board Member

Board Member

ATTEST:

Secretary, Board of Directors

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School District Profile
North Thurston Public Schools

(360)412-4400
www.nthurston.k12.wa.us

Governance: Five Board of Directors; each representing a director district; each is elected to a four year term.

Demographics

District Size (square miles):	75.8
Population, 2000:	76,200
Population, 2008:	91,290
Population, 2030:	131,360
Student Body Growth 2000-2008	1.8%
Students Per Classroom Teacher	17
Ethnicity (October 2008):	
American Indian/Alaskan Native	3.2%
Asian	12.8%
Pacific Islander	0.1%
Black	9.1%
Hispanic	10.5%
White	60.2%
Special Programs (May 2008):	
Transitional Bilingual	2.8%
Special Education	13.0%
Free or Reduced Price Meals	46.3%

Mission
The mission of the North Thurston Public Schools, is to provide every student the academic and life skills necessary to succeed in a diverse world.

Vision
The vision of the North Thurston Public Schools is to provide an educationally excellent, safe and invigorating community in which to learn, work and grow.

Enrollment

2007-08 School Year:	Number	Students	Faculty	Staff
Administration/Service Center				201
High Schools	4	4135	243	108
Middle Schools	4	2070	126	51
Elementary Schools	13	6136	440	275
Other Schools	0	0	0	0
Total	**21**	**12,341**	**809**	**635**

Financial

Assets (2008):	
Valuation of Infrastructure	$267,338,942
Valuation of Contents	$20,361,992
Total	$287,700,934

Revenues (2007-08):	Per Student Amounts	
State	$6.389	74%
Federal	$643	7%
Local Tax	$1.345	16%
Other Sources	$300	3%
Total	$8.647	100%

Expenditures (2007-08):	Per Student Amounts	
Central Administration	$ 557	6%
Building Administration	$ 517	6%
Maintenance and Operations	$ 661	8%
Food Services	$ 291	3%
Transportation Services	$ 336	4%
Teaching	$ 6,085	71%
Other	$ 200	2%
Total	$ 8,306	100%

Sources:
Washington State Superintendent of Public Instruction
Thurston Regional Planning Council

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North Thurston Public Schools Plan Development Process

Hazard Mitigation Plan Development Staff

The following staff served as North Thurston Public School's hazards mitigation planning development team:

Title	Representative
Assistant Superintendent	Shawn Lewis
Facilities Director	Tom Nelson

Hazard Mitigation Plan Development

The following activities supported the development of North Thurston Public Schools local hazard mitigation planning process:

Date	Location	Activity	Subject
May 28, 2009	Horizons Intermediate School	Meeting with TRPC staff	School District Hazards Mitigation Plan Development
June 23, 2009	District Office	Meeting /Work Session	Risk Assessment and Hazards Mitigation Plan
June 30, 2009	District Office	Superintendant Review/Work Session	Review of the Natural Hazards Mitigation Plan for the Thurston Region and North Thurston Public Schools
September 22, 2009	Timberline High School	School Board Presentation	Presentation of The Natural Hazards Mitigation Plan for the Thurston Region and NTPS Annex
TBA	TBA	School Board Plan Adoption	Adoption of The Natural Hazards Mitigation Plan for the Thurston Region and NTPS Annex

Mitigation Initiative Prioritization Process

North Thurston Public Schools reviewed all mitigation initiatives, identified those that had been completed and those that were still necessary. No new initiatives were initiated.

Paul Brewster, Associate Planner, TRPC provided ongoing updates regarding the overall process and how the District process needed to feed the larger plan. His assistance, guidance and direction was greatly appreciated.

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North Thurston Public Schools Risk Assessment

Introduction

The risk assessment provides information about the hazards that threaten North Thurston Public Schools. This information provides the factual basis to identify and support a strategy that can effectively mitigate the effects of the hazards that threaten this jurisdiction's safety and challenge its ability to perform essential functions.

The content and structure of this plan's risk assessment was developed using the Federal Emergency Management Agency's (FEMA) 2008 "Local Multi-Hazard Mitigation Planning Guidance." Table 1 shows the Disaster Mitigation Act (DMA) Risk Assessment Planning Requirements that must be met in order for this plan to receive a "satisfactory" score. Each of these planning requirements is met through the information contained in both the regional risk assessment and in this local annex.

Table 1: Disaster Mitigation Act Risk Assessment Planning Requirements

DMA Section	Requirement
§201.6(c)(2)(i):	[The risk assessment **shall** include a] description of the type … of all natural hazards that can affect the jurisdiction …
§201.6(c)(2)(i):	[The risk assessment **shall** include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan **shall** include information on previous occurrences of hazard events and on the probability of future hazard events.
§201.6(c)(2)(ii):	[The risk assessment **shall** include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description **shall** include an overall summary of each hazard and its impact on the community.
§201.6(c)(2)(ii):	[The risk assessment in all] plans approved after October 1, 2008 **must** also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.
§201.6(c)(2)(ii)(A):	The plan **should** describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas …
§201.6(c)(2)(ii)(B):	[The plan **should** describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate …
§201.6(c)(2)(ii)(C):	[The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
§201.6(c)(2)(iii):	For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

In general the Federal DMA planning requirements with the words "**shall**" and "**must**" indicate that the item is mandatory and must be included in the plan, otherwise it will not be approved by FEMA. Regulations with the word "**should**" indicate that the item is strongly recommended to be included in the plan, but its absence will not cause FEMA to disapprove the plan.

Hazard Analysis Definitions

The adjective descriptors (High, Moderate, and Low) for each hazard's probability of occurrence, vulnerability, and risk rating are consistent with the terms used in the regional assessment.

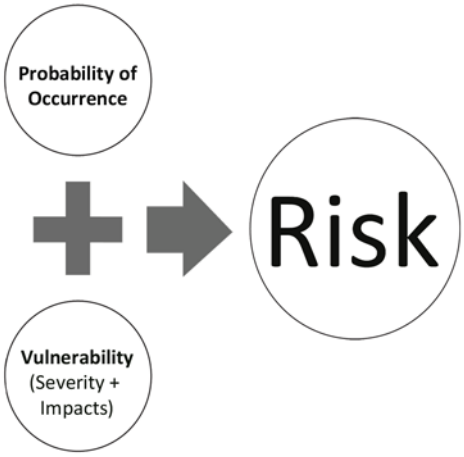


Figure 1: Risk is a subjective estimate of the combination of a hazard's probability of occurrence and a community's vulnerability.

The following terms are used in this plan to analyze and summarize the risk of the hazards that threaten this jurisdiction:

Risk Rating:

- An adjective description (High, Moderate, or Low) of the overall threat posed by a hazard is assessed for the next 25 years. Risk is the subjective estimate of the combination of any given hazard's probability of occurrence and vulnerability. High: There is strong potential for a disaster of major proportions during the next 25 years; or History suggests the occurrence of multiple disasters of moderate proportions during the next 25 years.
- Moderate: There is medium potential for a disaster of less than major proportions during the next 25 years.
- Low: There is little potential for a disaster during the next 25 years.

Probability of Occurrence:

An adjective description (High, Medium, or Low) of the probability of a hazard impacting the jurisdiction within the next 25 years.

- High: There is great likelihood that a hazardous event will occur within the next 25 years.
- Moderate: There is medium likelihood that a hazardous event will occur within the next 25 years.
- Low: There is little likelihood that a hazardous event will occur within the next 25 years.

Vulnerability:

Vulnerability can be expressed as combination of the severity of a natural hazard's effect and its consequential impacts to the community. An adjective description (High, Medium, or Low) of the potential impact a hazard could have on the community. It considers the population, property, commerce, infrastructure and services at risk relative to the entire jurisdiction.

- High: The total population, property, commerce, infrastructure and services of the community are uniformly exposed to the effects of a hazard of potentially great magnitude. In a worse case scenario, there could be a disaster of major to catastrophic proportions.
- Moderate: The total population, property, commerce, infrastructure, and services of the community are exposed to the effects of a hazard of moderate influence; or The total

population, property, commerce, infrastructure, and services of the community are exposed to the effects of a hazard of moderate influence, but not all to the same degree; or An important segment of population, property, commerce, infrastructure and services of the community are exposed to the effects of a hazard. In a worse case scenario there could be a disaster of moderate to major, though not catastrophic, proportions.

- Low: A limited area or segment of population, property, commerce, infrastructure, or service is exposed to the effects of a hazard. In a worse case scenario, there could be a disaster of minor to moderate proportions.

Summary Risk Assessment

Based on the regional risk assessment and the local risk assessment in the subsequent section, the following hazards pose the greatest threat to the North Thurston Public Schools:

Hazard	Probability of Occurrence	Vulnerability	Risk
Earthquake	High	High	High
Storm	High	High	High
Flood	Moderate	Low	Low
Landslide	Moderate	Low	Low
Wildland Fire	Low	Low	Low
Volcanic Event	Low	Moderate	Moderate

Local Risk Assessment

A comprehensive risk assessment of the major natural hazards that threaten North Thurston Public Schools was developed for this plan through the regional risk assessment process described in Chapter 4.0. The regional risk assessment and its hazard profiles serve as the foundation for this jurisdiction's risk assessment. A list of all of the potential natural hazards that could impact this jurisdiction is located in Chapter 4. Chapter 4 includes six natural hazard profiles for earthquake, storm, flood, landslide, wildland fire, and volcanic events. Each profile defines the hazard and describes its effects, severity, impacts, probability of occurrence, and historical occurrences. The regional profiles describe this jurisdiction's local vulnerabilities in terms of the portion of the jurisdictions land base or service area, population, employment, dwelling units, jurisdiction-owned assets, and critical facilities that are within each hazard zone.

This section of the plan provides additional details or explains differences where this jurisdiction's risks for each hazard vary from the risks facing the entire planning area. Maps of the hazards that affect North Thurston Public Schools are scaled to local boundaries and are included in this section.

Earthquake

Severity

Earthquake severity for the North Thurston Public Schools is consistent with the rest of Thurston County which is described in Chapter 4: Risk Assessment. Severity and the amount of damage is dependent upon the source of the quake, of three major types: 1) crustal (shallow) in faults along the North American plate; 2) subduction zone along the Juan de Fuca and North American plates, and 3) deep in the Juan de Fuca plate. The most current (and proximate) earthquake, that in 2001 centered near the Nisqually River Delta, was of the deep type. It was measured at 6.8 on the Richter Scale.

Impacts

In a major crustal earthquake of magnitude 6.7 or greater, the North Thurston Public Schools is likely to face transportation, communication, electricity, gas, water, septic system and sewer disruptions. Due to our public schools being mostly of recent construction or recently upgraded to current building code standards, schools are less vulnerable than many other structures within the District boundaries.

Transportation disruptions would hinder the District's ability to get children home from schools in the event of an earthquake while school was in session and would impact emergency response personnel from attending to any emergency that occurred in schools. Most schools have multiple access points and transportation routes to the location – but Olympic View Elementary and Lydia Hawk Elementary could be difficult to access if the entry road area becomes blocked by damaged roads, fallen trees or fallen utility poles.

Probability of Occurrence

Past events suggest that a destructive event reoccurs about every 26 years. Therefore, the overall probability of occurrence of a damaging earthquake is "high".

Historical Occurrences and Impacts Specific to this Jurisdiction

At 10:54 am on February 28, 2001 a magnitude 6.8 earthquake produced strong ground shaking across Washington State. The epicenter was located near Anderson Island north of the Nisqually River Delta. The focus was located nearly 33 miles underground. While Thurston County was among the hardest hit counties in the State, with most damages reported in the Olympia and Tumwater areas. The district incurred damage to several schools, most significantly, to the North Thurston High School pool and to external play sheds.

Summary Assessment

History suggests a high probability of occurrence of another damaging earthquake sometime in the next 25 years. It is important to note that the 2001 Nisqually earthquake was not the largest event possible in the Puget Sound region. It is conceivable that a similar magnitude earthquake could emanate from a shallow crustal fault which would result in much greater damage, producing catastrophic impacts upon the Thurston County area.

Summary Risk Assessment for Earthquake in North Thurston Public Schools

Probability of Occurrence	Vulnerability	Risk
High	High	High

Storm

Severity

Severe weather events are the most frequent source of natural disasters for North Thurston Public Schools and the rest of the Thurston County. Between 1962 and 2009, 19 of the 23 Presidential Disaster Declarations for Thurston County were attributed to damage resulting from the effects of winter storms. While the most damaging historical weather events were as a result of flooding, this type of hazard is almost non-existent with the district.

High winds, heavy rain, heavy snow, freezing rain, tornados, hail and lightning all impact Thurston County. Each element poses a threat at varying degrees throughout the county. The severity of each is summarized below:

1. High Winds/Windstorms: 59 windstorms have buffeted the district since 1953; nine produced peak gusts over 58 mph, the most powerful being the Columbus Day storm in 1962. The 13 point Beaufort Scale measuring windspeed is used to measure impacts to land conditions.
2. Heavy Rain: the overall region is moderately vulnerable to flooding as a result of heavy rains between November and February.
3. Freezing Rain: the overall region is susceptible to the effects of an ice storm. The 1996 event resulted in ice accumulations of ¼ to ¾ inch thick on surfaces.
4. Heavy Snow: while the average annual snowfall for the county is 18 inches between mid-November and mid-March, since 1948 six major heavy snow events have occurred in the county. Record accumulated snowfall was during December 1968-January 1969 with a total of 81.5 inches.
5. Tornado: No deaths or injuries have resulted from tornados in Thurston County. Four small tornados have been reported in the county (generally southern area) since 1950, none producing any significant damage or life hazard. The wind speed of tornados is classified by the Fujita Scale (F0-F5); all county tornados were F0 on the scale.
6. Hail: Most hail storms in the county produce mall non-destructive hail.
7. Lightning: Records indicate that lightning storms are most likely to occur in the county from April through September, and are of a short-lived localized nature.

Impacts

High winds, heavy rain, heavy snow, freezing rain, tornados, hail and lightning all impact Thurston County. Each element poses a threat at varying degrees throughout the county. The impact of each is summarized below:

1. High Winds/Windstorms: The region is vulnerable to high winds due to climatic conditions and trees resulting in the most damage caused by falling trees & limbs. Widespread power outages and debris damage are the most significant impacts. The relative risk for high winds in the district indicates few fatalities but many injuries, limited properties destroyed & damaged,

environmental resources damaged with short-term recovery and high direct and low indirect economic disruption.

2. Heavy Rain: Most common impacts from heavy rainfall are flooding & erosion. The relative risk for heavy rains/erosion & landslide in the district indicates few injuries, few properties destroyed & damaged, environmental resources damaged with short-term recovery and low direct and/or indirect economic disruption.
3. Freezing Rain: As was discovered in 1996, freezing rain can produce debilitating effects: as schools were shut-down for an extended period of time due to slick roads blocked by number limbs & debris, no land-line communications and no electrical power.
4. Heavy Snow: As discovered in 2008, heavy snow can cause power line, tree limbs and structures to fail due to the weight of snowload; safe transportation can grind to a halt (reducing or eliminating transportation capabilities) and create widespread power outages. These resulting conditions can also produce consumer shortages due to the inability of freight carriers to deliver goods.
5. Tornado: The effects of a tornado can be extremely destructive during a short period of time in a very localized setting.
6. Hail: The effects of hail can be destructive during a short period of time in a very localized setting.
7. Lightning: While there are no documented lighting fatalities in Thurston County, there have been several documented injuries within the district, both of a serious nature. Lightning can also cause fires, however, none are documented to have caused any fires in the district.

Probability of Occurrence

High winds, heavy rain, heavy snow, freezing rain, tornados, hail and lightning all impact Thurston County. Each element poses a threat at varying degrees throughout the county. The probability of occurrence of each is summarized below:

1. High Winds/Windstorms: Thurston County has a high wind reoccurrence rate of 175% (high) with at least 18 notable Pacific Northwest cyclones impacting the area in the last 25 years, thus, the probability of occurrence is “high”.
2. Heavy Rain: The annual probability of occurrence is “high”.
3. Freezing Rain: The annual probability of occurrence is “low”, with only one major event in the county in the past 50 years.
4. Heavy Snow: Between the period of 1948-1994, 23 heavy snow events experienced in
5. Thurston County indicate “high” probability of snow exceeding 12 inches within the next 25 years.
6. Tornado: The annual probability of occurrence is “low”.
7. Hail: The annual probability of occurrence is “low”.
8. Lightning: The annual probability of occurrence is “moderate”.

Historical Occurrences and Impacts Specific to this Jurisdiction

Local effects (within the district) of storm events has generally been somewhat less than other parts of the county; the most recent and most damaging events have been as a result of flooding (December 2008, December 2007, November-December 2006, December 1996, etc) along major river plains. The most debilitating events have resulted from windstorms, the ice storm and heavy snow. The primary impacts are safe transportation of students, accessibility to student services, and the loss of electrical power. North Thurston's implementation of emergency power supply to some of its core facilities, and pre-planning & preparation have helped mitigate the impacts of storms.

Summary Assessment

The high reoccurrence rate of Pacific Northwest storms, the record of historical damage and the repetitive response & recovery costs (regionally and county wide) associated with these destructive events make the county and district highly vulnerable to storm events. Thus the overall risk rating for severe storms is "high".

Summary Risk Assessment for Storm in North Thurston Public Schools

Probability of Occurrence	Vulnerability	Risk
High	High	High

Flood

Severity

A flood is a temporary condition in which a normally dry area of land or infrastructure is inundated by excess standing or flowing water. Floods occur during any season and at any time. Four types of flooding occur in Thurston County: "riverine" (excess flow & volume exceeding a river's normal channel), "groundwater" (caused by high water table & excessive rain), "tidal" (high tide combined with low atmospheric pressure, excessive run-off and/or strong northerly winds), and "urban" (when stormwater runoff exceeds the capacity of natural or infrastructural drainage systems). In the district, the primary risk of flooding is due to urban flooding, but there is also some risk associated with groundwater or tidal conditions – specifically as it relates to the student transportation system.

Impacts

The relative risk for floods in the district indicates little or no health safety impacts, few properties destroyed & damaged, environmental resources damaged with long-term recovery and low direct and high indirect economic disruption. The district's schools are all located outside of historical or potential flooding hazard zones. However, the known impacts of urban flooding have been seen at schools with portable classrooms and some buildings flooded along with flooded underground utility vaults. Stormwater retention facilities have been upgraded to mitigate some of the impacts.

Probability of Occurrence

Although difficult to predict, the frequency of urban flooding is diminishing due to capital improvements and storm water utility practices. Periodic groundwater and tidal flooding is expected and likely to occur within the district.

Historical Occurrences and Impacts Specific to this Jurisdiction

Flooding events have not presented a significant impact to the district but have caused the District to relocate some classroom activities for a limited time (due to urban flooding). Once storm drainage systems are cleared of debris, flooding issues usually dissipate.

Summary Assessment

While the history of Thurston County clearly demonstrates a moderate probability of future occurrence, the severity and impact on the district is "low".

Summary Risk Assessment for Flood in North Thurston Public Schools

Probability of Occurrence	Vulnerability	Risk
Moderate	Low	Low

Landslide

Severity

Landslides are the movement of rock, soil or other debris down a slope. Factors that contribute to landslides include erosion, earthquakes, volcanic eruptions, increased land bearing loads, hydrologic (water) factors, human modifications to land structures, removal of lateral & underlying support, increased lateral pressures and regional tilting. In the North Thurston Public Schools boundaries, there are slopes of a significant portion of the Puget Sound coastline that have been identified as slope exceeding 40%, however, this consists a very small percentage of the district's total landmass and no District facilities live in areas that are in these areas.

Impacts

The relative risk for landslides in the district indicates few injuries or illnesses, few properties destroyed & damaged, environmental resources damaged with short-term recovery and low direct / indirect economic disruption. The district's schools are all located outside of historical or potential landslide hazard zones – but district transportation systems may be impacted if landslides impact roadways or bridges. Historically, the known impacts of landslides in the district have been minimal.

Probability of Occurrence

Based on historical precedent, the incidence of landslides are concurrent with winter storms, flooding and earthquakes. The majority of landslides in the region are triggered by heavy precipitation. While significant landslides have occurred in nearby areas (Carlyon Beach, Hunter Point), there have been no recent notable landslides causing injuries or damage to personal property in the district. Based on geologic information, the probability for occurrence is "moderate".

Historical Occurrences and Impacts Specific to this Jurisdiction

Landslide events have not presented a significant impact to the district or the delivery of its services to the community.

Summary Assessment

In the district, landslides tend to occur in isolated, sparsely developed areas with minimal impact on individual structures, transportation networks and power/communications infrastructures; this would indicate a "low" risk rating.

Summary Risk Assessment for Landslide in North Thurston Public Schools

Probability of Occurrence	Vulnerability	Risk
Moderate	Low	Low

Wildland Fire

Severity

The wildland fire, or "wildfire", hazard is unique from other hazards in Thurston County in that a) it is the most frequently occurring hazard with approximately 71 wildland fires start per year, b) it can be prevented (over 99% of the fires started are due to poor human judgement or accidental ignition), and c) it is the only hazard that can be actively contained or suppressed in real time. While ecological science views wildfires as a natural process necessary to sustain the health of forests and grasslands, when interfaced with humans and human structural improvements (generally homes), risk to the community dictates aggressive prevention & suppression practices.

Sources and factors in wildland fires include fuel loading & types, weather conditions and terrain. In turn, the severity of a fire is influenced by soil conditions present, slope of the land, the type & moisture content of vegetation present, accessibility of fire suppression resources to the fire and the size when discovered/reported and subsequently attacked by the initial responders.

The number, size and severity of wildfires in the district in the past several years have been affected by the growing residential community (less wildlands, quicker reporting of fires, home-owner intervention), implementation & enforcement of open burning regulations and upgraded training & equipping of emergency responders.

Impacts

The relative risk for wildland fires in the district indicates few injuries or illnesses, few properties destroyed but many damaged, environmental resources damaged with long-term recovery and high direct / indirect economic disruption. .

While one of the district's three current stations and the proposed new north-end firestation location are located within the historical or potential wildfire hazard zone, the structures are not directly impacted by factors as described in the above "Severity" section.

The impacts of a wildland fire varies upon the size & location of the fire. . This means that relatively little of the "wildland areas" within the district exist any longer, most with adequate to good public or private access. The impact to schools would be very limited due to the vast amount of open space adjacent to most schools within the district.

Probability of Occurrence

The documented record of wildland fires in Thurston County suggest that approximately 97% of future wildfires will be 5 acres or less; the region can expect at least one fire exceeding 100 acres over the next 25 years. Although, there is a "high" probability of reoccurrence in the district for wildland fires, the probability of the incident impacting a school facility is low.

Historical Occurrences and Impacts Specific to this Jurisdiction

Since 1972, most of the largest wildfires in the North Thurston Public School boundary were located in the Hawks Prarie and Marvin Road area; most of this area has been developed with mid-level and high density housing, and no longer feature the wildland attributes present during those fire periods.

Summary Assessment

In the district, wildland fires tend to occur in the remaining isolated, sparsely developed areas or are of a nature where they are quickly reported/suppressed with minimal impact on life safety, individual structures, transportation networks and power/communications infrastructures; this would indicate a "low" risk rating.

Summary Risk Assessment for Wildland Fire in North Thurston Public Schools

Probability of Occurrence	Vulnerability	Risk
Low	Low	Low

Volcanic Hazards

Severity

There are 5 major Cascade volcanoes in Washington State: Mount Baker, Glacier Peak, Mount Rainier, Mount St. Helens and Mount Adams. In the last 4,000 years, 11 Cascade volcanoes have erupted an estimated 100 times. The last major eruption was of Mount St Helens on May 18, 1980. An explosive eruption could create an ash plume that could conceivably deposit ash all across Thurston County and could trigger large debris and mudflows, known as "lahars", down glacial river valleys like the Nisqually. The two most likely hazards to affect Thurston County are tephra (volcanic dust & rock fragments as a result of an explosion) and lahar.

In the district, landslides tend to occur in isolated, sparsely developed areas with minimal impact on individual structures, transportation networks and power/communications infrastructures; this would indicate a "low" risk rating. While the location & geography of South Bay FD8 do not indicate any hazard for lahars (in Thurston County it lies mainly in the Nisqually River plain), it could potentially be quickly exposed to tephra during a volcanic event.

Impacts

Ash fall of a ¼ inch or more would reduce motorist visibility and disrupt nearly every mode of transportation due to both reductions of visibility and contamination for air-breathing engines. The ash would also effect persons with respiratory problems. Large accumulations or wet ash could cause load bearing problems for structures, trees and utility lines, causing collapses and power/communications outages. The ability of the district to respond to emergency incidents could correspondingly be complicated or reduced. Clean-up and recovery would likely be the greatest cost to both the public and private sector.

Probability of Occurrence

The US Geological Survey reports that Mount Rainier has only produced moderate quantities of ash in past eruptions; Mount St Helens 1980 eruption deposited only a scant layer of ash in Thurston County. Because the prevailing winds blow from the south & west, it is likely most ash from a Cascade Range eruption be blown east away from Thurston County, with little (less than .02%) chance of winds blowing it into the county. Therefore, there is a "low" probability of occurrence in the county and district.

Historical Occurrences and Impacts Specific to this Jurisdiction

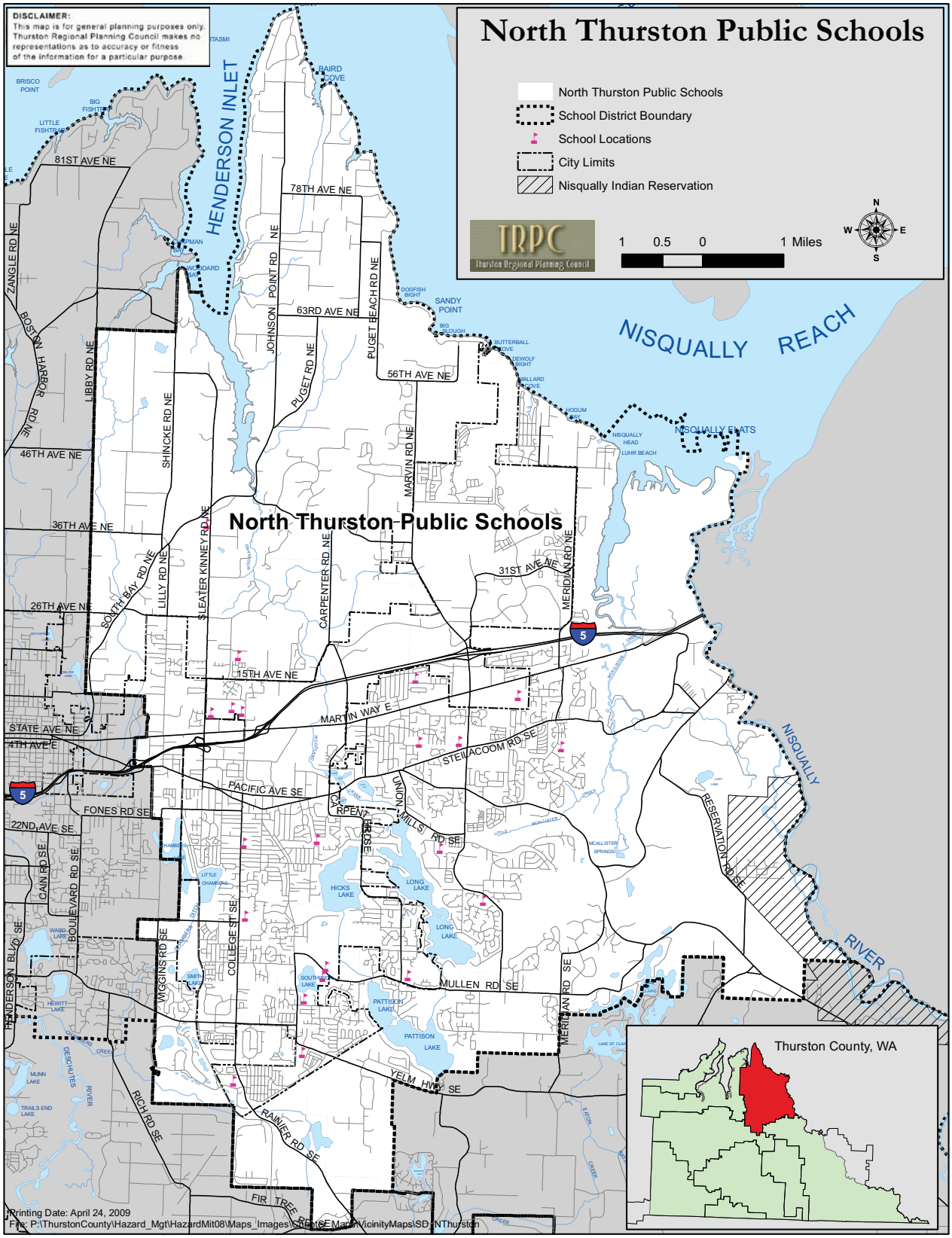
No known historical precedence in North Thurston Public Schools.

Summary Assessment

Under certain conditions, tephra could fall within the district; the effects would not pose immediate life threatening conditions, but the clean-up and recovery costs could be significant. Therefore, the district is "moderately" vulnerable to volcanic activity.

Summary Risk Assessment for Volcanic Events in North Thurston Public Schools

Probability of Occurrence	Vulnerability	Risk
Low	Moderate	Moderate


North Thurston Public Schools
North Thurston Public Schools
School District Boundary
School Locations
City Limits
Nisqually Indian Reservation
TRPC
Thurston Regional Planning Council
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DISCLAIMER:
This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to accuracy or fitness of the information for a particular purpose.
North Thurston Public Schools
HENDERSON INLET
NISQUALLY REACH
NISQUALLY RIVER
NISQUALLY FLATS
BOSTON HARBOR
81ST AVE NE
78TH AVE NE
63RD AVE NE
56TH AVE NE
46TH AVE NE
36TH AVE NE
31ST AVE NE
26TH AVE NE
15TH AVE NE
4TH AVE E
STATE AVE NE
MARTIN WAY E
STEILACOOM RD SE
PACIFIC AVE SE
FONES RD SE
22ND AVE SE
MULLEN RD SE
YELM HWY SE
RICH RD SE
RAINIER RD SE
FIR TREE RD SE
ZANGLE RD NE
LIBBY RD NE
SHINCKE RD NE
SLEATER KINNEY RD NE
LILLY RD NE
SOUTH BAY RD NE
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MARVIN RD NE
CARPENTER RD NE
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BOULEVARD RD SE
HENDERSON BLVD SE
WIGGINS RD SE
COLLEGE ST SE
RESERVATION RD SE
HICKS LAKE
LONG LAKE
PATTISON LAKE
Thurston County, WA
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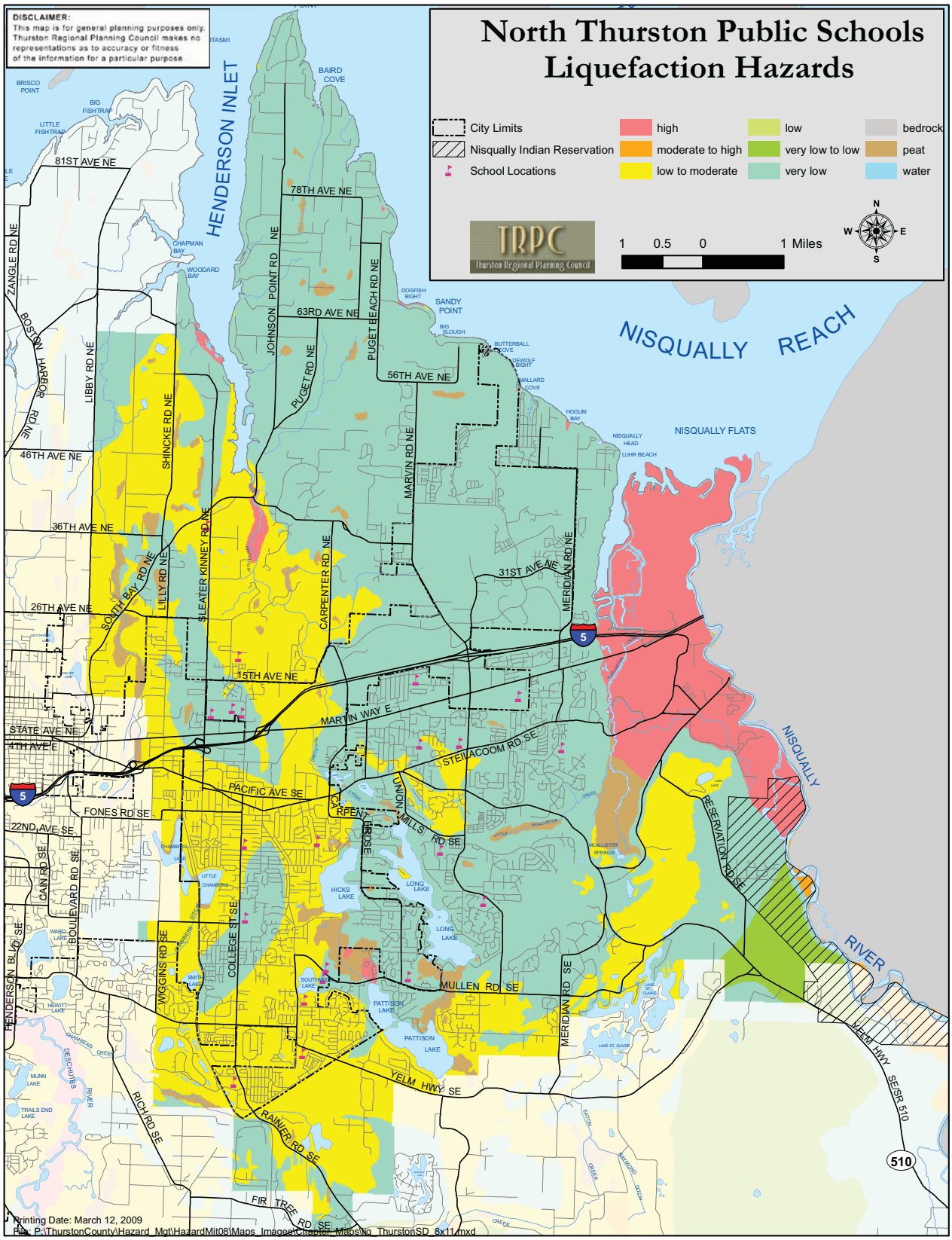
North Thurston Public Schools
Liquefaction Hazards
DISCLAIMER:
This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to accuracy or fitness of the information for a particular purpose.
City Limits
Nisqually Indian Reservation
School Locations
high
moderate to high
low to moderate
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STEILACOOM RD SE
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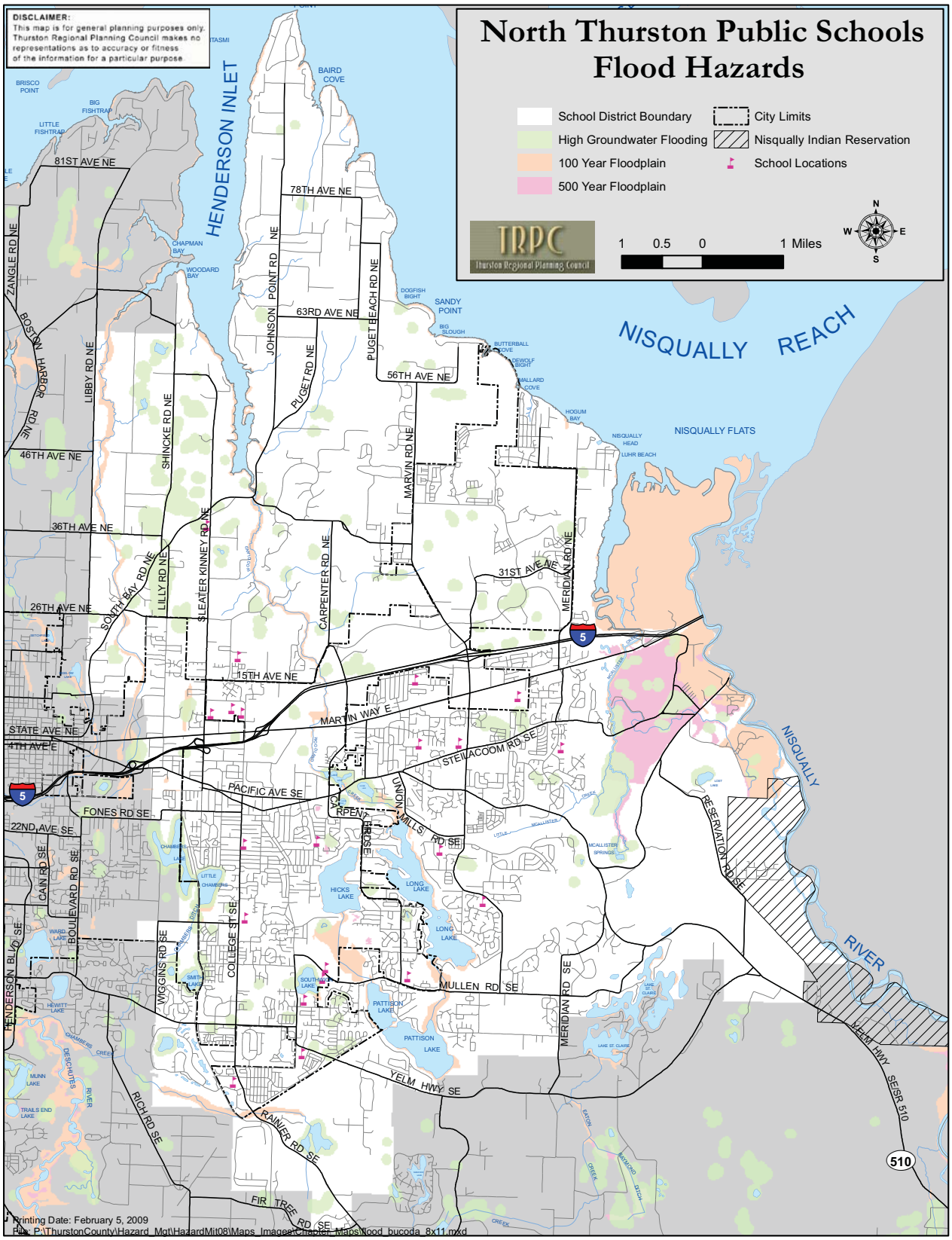
North Thurston Public Schools
Flood Hazards
School District Boundary
High Groundwater Flooding
100 Year Floodplain
500 Year Floodplain
City Limits
Nisqually Indian Reservation
School Locations
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DISCLAIMER:
This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to accuracy or fitness of the information for a particular purpose.
HENDERSON INLET
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NISQUALLY RIVER
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STATE AVE NE
4TH AVE E
MARTIN WAY E
STEILACOOM RD SE
PACIFIC AVE SE
FONES RD SE
22ND AVE SE
MULLEN RD SE
YELM HWY SE
RAINIER RD SE
FIR TREE RD SE
RICH RD SE
HENDERSON BLVD SE
BOSTON HARBOR RD NE
ZANGLE RD NE
LIBBY RD NE
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SOUTH BAY RD NE
LILLY RD NE
SLEATER KINNEY RD NE
JOHNSON POINT RD NE
PUGET RD NE
PUGET BEACH RD NE
CARPENTER RD NE
MARVIN RD NE
MERIDIAN RD NE
UNION MILLS RD SE
CARPENTER RD SE
COLLEGE ST SE
WIGGINS RD SE
BOULEVARD RD SE
CAIN RD SE
RESERVATION RD SE
YELM HWY SE/SR 510
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BAIRD COVE
SANDY POINT
HICKS LAKE
LONG LAKE
PATTISON LAKE
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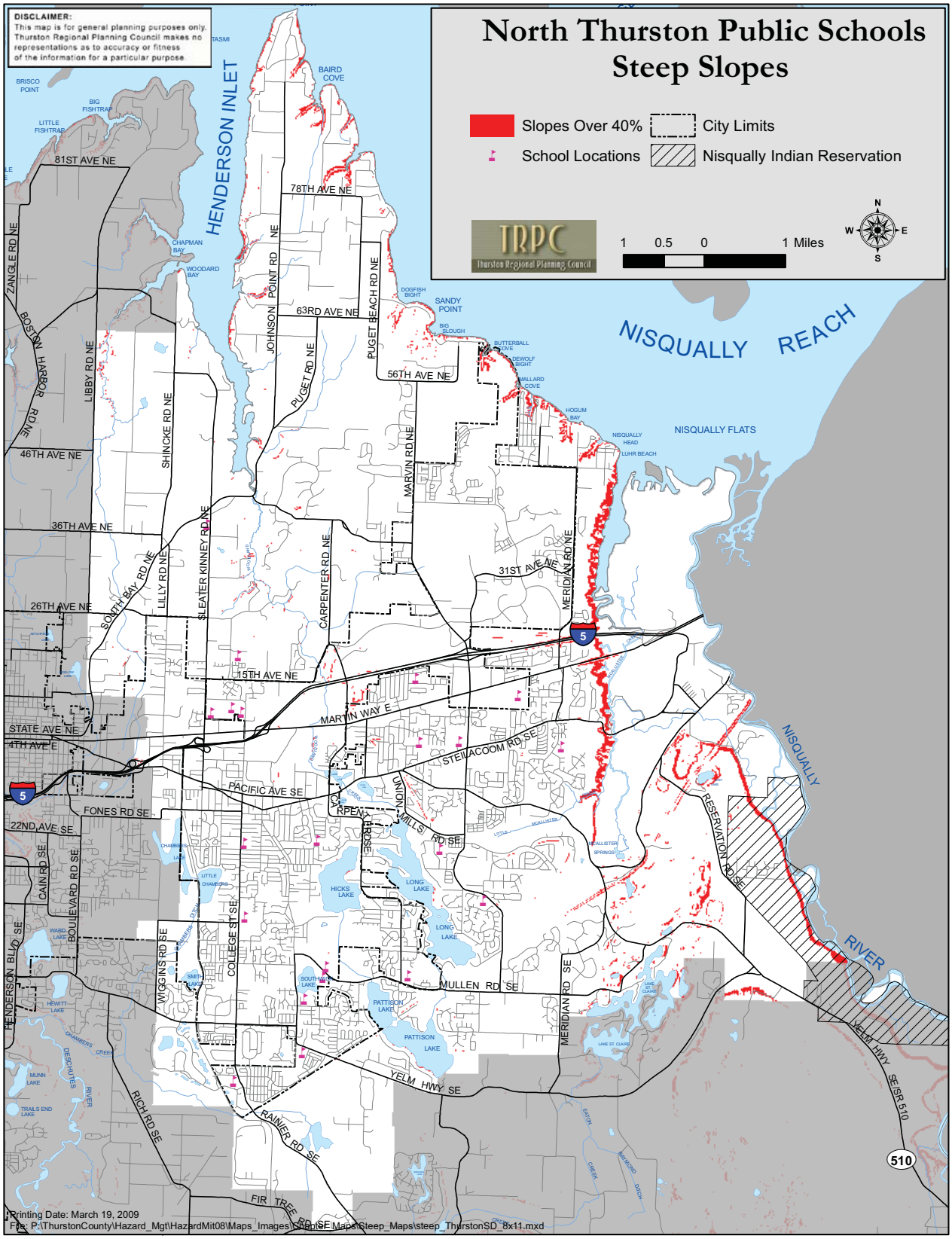
North Thurston Public Schools
Steep Slopes
Slopes Over 40%
City Limits
School Locations
Nisqually Indian Reservation
TRPC
Thurston Regional Planning Council
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DISCLAIMER:
This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to accuracy or fitness of the information for a particular purpose.
HENDERSON INLET
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NISQUALLY RIVER
BAIRD COVE
SANDY POINT
81ST AVE NE
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15TH AVE NE
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4TH AVE E
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STEILACOOM RD SE
PACIFIC AVE SE
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MULLEN RD SE
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FIR TREE RD SE
ZANGLE RD NE
BOSTON HARBOR RD NE
LIBBY RD NE
SHINCKE RD NE
JOHNSON POINT RD NE
PUGET RD NE
PUGET BEACH RD NE
MARVIN RD NE
SLEATER KINNEY RD NE
CARPENTER RD NE
MERIDIAN RD NE
SOUTH BAY RD NE
LILLY RD NE
CAIN RD SE
BOULEVARD RD SE
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WIGGINS RD SE
COLLEGE ST SE
UNION MILLS RD SE
RESERVATION RD SE
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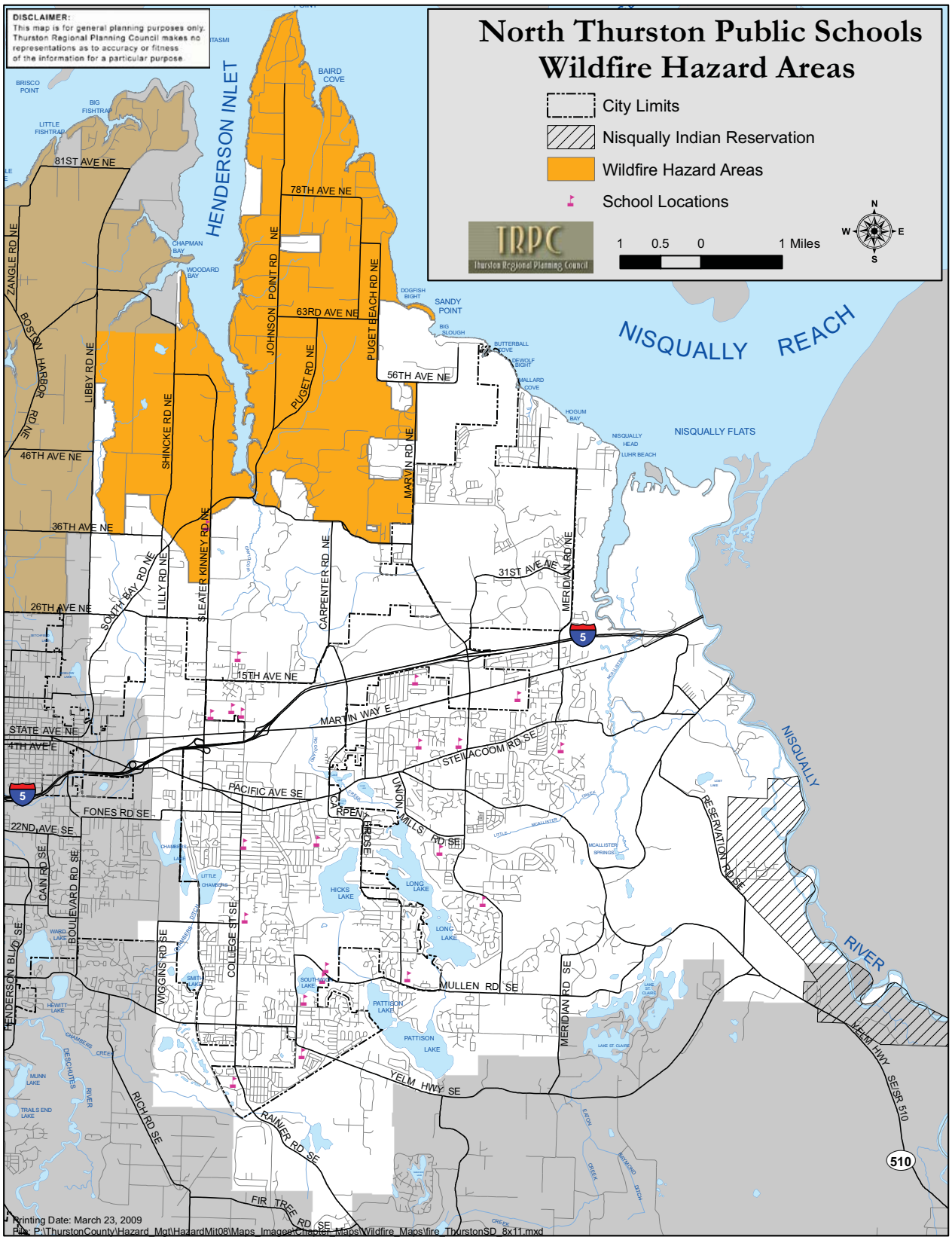
North Thurston Public Schools
Wildfire Hazard Areas
City Limits
Nisqually Indian Reservation
Wildfire Hazard Areas
School Locations
TRPC
Thurston Regional Planning Council
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DISCLAIMER:
This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to accuracy or fitness of the information for a particular purpose
HENDERSON INLET
NISQUALLY REACH
NISQUALLY FLATS
NISQUALLY RIVER
BAIRD COVE
BRISCO POINT
BIG FISHTRAP
LITTLE FISHTRAP
CHAPMAN BAY
WOODARD BAY
DOGFISH BIGHT
SANDY POINT
BIG SLOUGH
BUTTERBALL COVE
DEWOLF BIGHT
MALLARD COVE
HOGUM BAY
NISQUALLY HEAD
LUHR BEACH
81ST AVE NE
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CARPENTER RD NE
MERIDIAN RD NE
SOUTH BAY RD NE
LILLY RD NE
MARTIN WAY E
STEILACOOM RD SE
PACIFIC AVE SE
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BOULEVARD RD SE
HENDERSON BLVD SE
WIGGINS RD SE
COLLEGE ST SE
UNION MILLS RD SE
MULLEN RD SE
MERIDIAN RD SE
YELM HWY SE
RICH RD SE
RAINIER RD SE
FIR TREE RD SE
RESERVATION RD SE
YELM HWY SE
SR 510
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HICKS LAKE
LONG LAKE
PATTISON LAKE
HEWITT LAKE
MUNN LAKE
TRAILS END LAKE
DESCHUTES RIVER
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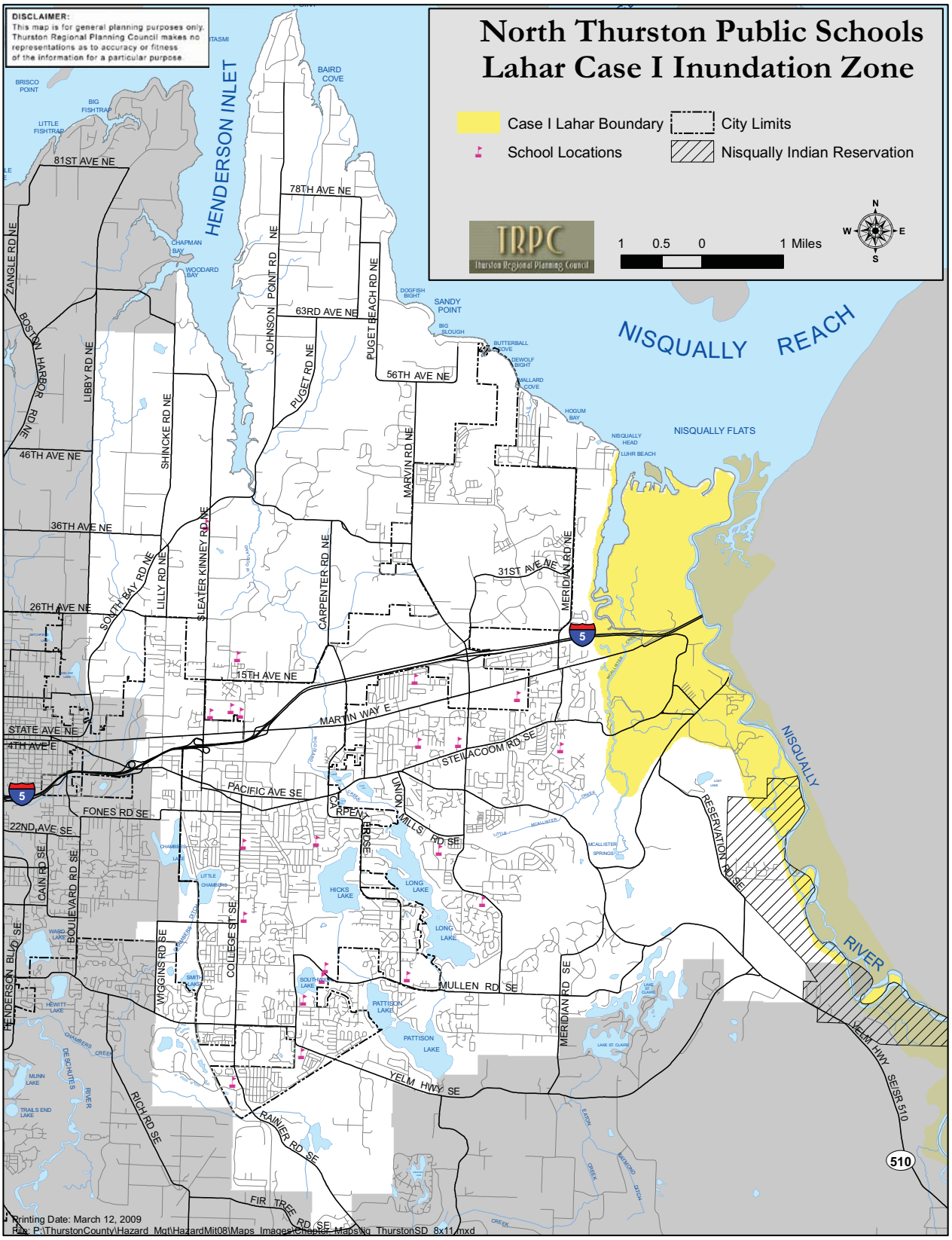
North Thurston Public Schools
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City Limits
School Locations
Nisqually Indian Reservation
TRPC
Thurston Regional Planning Council
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DISCLAIMER:
This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to accuracy or fitness of the information for a particular purpose.
HENDERSON INLET
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BAIRD COVE
BRISCO POINT
BIG FISHTRAP
LITTLE FISHTRAP
CHAPMAN BAY
WOODARD BAY
SANDY POINT
DOGFISH BIGHT
BIG SLOUGH
BUTTERBALL COVE
DEWOLF BIGHT
MALLARD COVE
HOGUM BAY
NISQUALLY HEAD
LUHR BEACH
81ST AVE NE
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ZANGLE RD NE
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HICKS LAKE
LONG LAKE
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LAKE ST. CLAIRE
MCALLISTER SPRINGS
WARD LAKE
HEWITT LAKE
MUNN LAKE
TRAILS END LAKE
DESCHUTES RIVER
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North Thurston Public Schools Mitigation Initiatives

Current Adopted Mitigation Initiatives

Current Mitigation Initiatives consist of actions that have not yet begun or require additional work. They consist of new initiatives identified by North Thurston Public Schools during the plan update process. They also consist of existing initiatives that were carried over in their original form from the first edition of this plan or other plans, or modified from their original form to reflect present needs.

Priority	I.D. Number	Category	Action	Status
1 of 2	NTPS-EH 1	Critical Facilities Replacement/Retrofit	Perform seismic evaluations on all district buildings and correct if needed…	Existing
2 of 2	NTPS-MH 2	Critical Facilities Replacement/Retrofit	Develop a comprehensive operations response plan to include hazard preparation planning with outside agencies…	Existing

Hazard Category Codes are as follows: EH=Earthquake Hazard; FH=Flood Hazard; LH=Landslide Hazard; MH=Multi Hazard; SH=Storm Hazard; WH=Wildland Fire Hazard; and VH=Volcanic Hazard.

Completed or Removed Mitigation Initiatives

Initiatives that were completed in the last five years are included in this plan to provide evidence of progress made. These initiatives are no longer relevant and no longer part of North Thurston Public School's adopted mitigation strategy. These initiatives are not ranked as they are no longer relevant.

I.D. Number	Category	Action	Status
NTPS-EH 2	Critical Facilities Replacement/Retrofit	Upgrade current communication system including system redundancy, primary/secondary command center, and NTPS district-wide communication ability to and from all locations and coordinating ability with outside command centers	Completed
NTPS-MH 1	Critical Facilities Replacement/Retrofit	Develop alternative loading and unloading areas at each school. Emergency bus routes will be the same as snow routes with planning to modify as necessary	Completed
NTPS-SH 1	Critical Facilities Replacement/Retrofit	Purchase and install generators to maintain power to South Bay Elementary School, District and school based freezers and refrigerators, transportation fuel pumps, sewer lift stations, provide long term lighting for stairways and stairwells	Completed
NTPS-SH 2	Critical Facilities Replacement/Retrofit	Perform evaluations of trees that could pose a threat to persons or facilities and remove if necessary	Completed

Hazard Category Codes are as follows: EH=Earthquake Hazard; FH=Flood Hazard; LH=Landslide Hazard; MH=Multi Hazard; SH=Storm Hazard; WH=Wildland Fire Hazard; and VH=Volcanic Hazard.

Priority: 1 of 2 Status: Existing

Hazard Addressed: Earthquake Hazard
Category: Critical Facilities Replacement/Retrofit

NTPS-EH 1: Perform seismic evaluations on all district buildings and correct if needed. Evaluation to include: heating and cooling systems, structure, water systems, sprinkler systems and gas piping. Correction will be completed during building modernizations.

Rationale: Building systems have a high likelihood of failure in a major earthquake, which could disrupt services and limit the district's ability to provide a safe environment for students, staff and visitors

Relates to Plan Goal(s) and Objectives: 4C

Implementer: Construction Design Department

Estimated Cost: Exact cost is not known.

Time Period: Completed by 2017 through modernization projects

Funding Source: Bond funding has been used for this initiative and new funding authorization will be requested from the public in 2011 for the remainder of the projects.

Source and Date: North Thurston Public Schools Six Year Capital Facilities Plan and 2005 NTPS Study and Survey

Adopted Plan Number: N/A

Reference Page: Found on each individual school section.

Initiative and Implementation Status: Most schools did not require upgrades or have been upgraded in projects at Timberline High School, Woodland Elementary School, South Bay Elementary, Current projects underway include Chambers Prairie Elementary, Chinook Middle School and Nisqually Middle School. Additional schools awaiting new funding in next bond issue.

Priority: 2 of 2 Status: Existing

Hazard Addressed: Multi Hazard
Category: Critical Facilities Replacement/Retrofit

NTPS-MH 2: Develop a comprehensive operations response plan to include hazard preparation planning with outside agencies. Conduct awareness planning and training within the North Thurston Public Schools to include site emergency supply storage needs.

Rationale: To have a well, thought out plan that is shared with all stakeholders so that, in a disaster situation, we can be as prepared as possible for the emergency needs of our students, staff and visitors.

Relates to Plan Goal(s) and Objectives: 4D and 4E

Implementer: All Departments led by Administrative Services

Estimated Cost: $100,000 for training time and supplies

Time Period: 2011

Funding Source: General Fund

Source and Date: 2003 Natural Hazards Mitigation Plan for the Thurston Region

Adopted Plan Number: NTPS-EH/ST-2

Reference Page: Addendum 4-10

Initiative and Implementation Status: While plans exist and are routinely practiced, emergency supply storage is a constant issue. The district also needs to improve efforts to coordinate and train with outside organizations including emergency responders. This will be focused on over the next two school years.

Priority: N/A Status: Completed

Hazard Addressed: Earthquake Hazard
Category: Critical Facilities Replacement/Retrofit

NTPS-EH 2: Upgrade current communication system including system redundancy, primary/secondary command center, and NTPS district-wide communication ability to and from all locations and coordinating ability with outside command centers.

Rationale: Inadequate ability to report and relay building staff and student conditions and needs would severely limit our ability to prioritize district needs and appropriate responses.

Relates to Plan Goal(s) and Objectives: 4D

Implementer: Operations Department

Estimated Cost: $40,000

Time Period: Completed 2005

Funding Source: State Funding provided through Capital Projects Fund

Source and Date: 2003 Natural Hazards Mitigation Plan

Adopted Plan Number: NTPS-EH 2

Reference Page: Addendum 4-6

Initiative and Implementation Status: This initiative was completed. It was previously ranked 2 of 6. Evaluations were performed, additional equipment was purchased.

Priority: N/A Status: Completed

Hazard Addressed: Multi Hazard
Category: Critical Facilities Replacement/Retrofit

NTPS-MH 1: Develop alternative loading and unloading areas at each school. Emergency bus routes will be the same as snow routes with planning to modify as necessary.

Rationale: In the event of blocked entry or exit from a district building an alternate load/unload location would be necessary to ensure the safety of students and staff. Bus routes would be the same as currently published emergency snow routes. They would be adjusted as necessary.

Relates to Plan Goal(s) and Objectives: 7A

Implementer: Transportation Department

Estimated Cost: $0

Time Period: Completed 2007

Funding Source: General Fund

Source and Date: 2003 Natural Hazards Mitigation Plan for the Thurston Region

Adopted Plan Number: NTPS-EH/ST-1

Reference Page: Addendum 4-9

Initiative and Implementation Status: This initiative was completed. It was previously ranked 5 of 6. This project was done in conjunction with the school mapping project completed with emergency responders. We have fully developed a process for addressing changes in emergency situations that is utilized when necessary and drilled annually.

Priority: N/A Status: Completed

Hazard Addressed: Severe Storm Hazard
Category: Critical Facilities Replacement/Retrofit

NTPS-SH 1: Purchase and install generators to maintain power to South Bay Elementary School, District and school based freezers and refrigerators, transportation fuel pumps, sewer lift stations, provide long term lighting for stairways and stairwells.

Rationale: Power during severe storms has a likelihood of being disrupted. Power is essential to provide critical areas of operation as outlined above.

Relates to Plan Goal(s) and Objectives: 4D

Implementer: Construction and Design Department

Estimated Cost: $400,000

Time Period: Completed 2008

Funding Source: State Funding and Bond Funding provided through Capital Projects Fund

Source and Date: 2003 Natural Hazards Mitigation Plan for the Thurston Region

Adopted Plan Number: NTPS-ST-1

Reference Page: Addendum 4-7

Initiative and Implementation Status: This initiative is complete. It was previously ranked 3 of 6. Additional emergency generators have been purchased as deemed appropriate. In some locations, it was not deemed necessary or cost effective to install generators to maintain refrigeration or other non-critical systems. Emergency lighting systems have been installed utilizing long term battery back-up systems which are sufficient for short term power needs.

Priority: N/A Status: Completed

Hazard Addressed: Severe Storm Hazard
Category: Critical Facilities Replacement/Retrofit

NTPS-SH 2: Perform evaluations of trees that could pose a threat to persons or facilities and remove if necessary.

Rationale: Trees located near schools and other facilities have a likelihood of falling during severe storms. This could injure students, staff and the public – or damage facilities

Relates to Plan Goal(s) and Objectives: 5A

Implementer: Construction Design Department

Estimated Cost: $17,000

Time Period: Completed 2008

Funding Source: State Funding provided through Capital Projects Fund

Source and Date: 2003 Natural Hazards Mitigation Plan for the Thurston Region

Adopted Plan Number: NTPS-ST 2

Reference Page: Addendum 4-8

Initiative and Implementation Status: This initiative was completed. It was previously ranked 4 of 6. Evaluations were performed and dangerous trees were removed from all locations.