Update on the Lora Lake Apartments Cleanup Site

Highline Forum Meeting

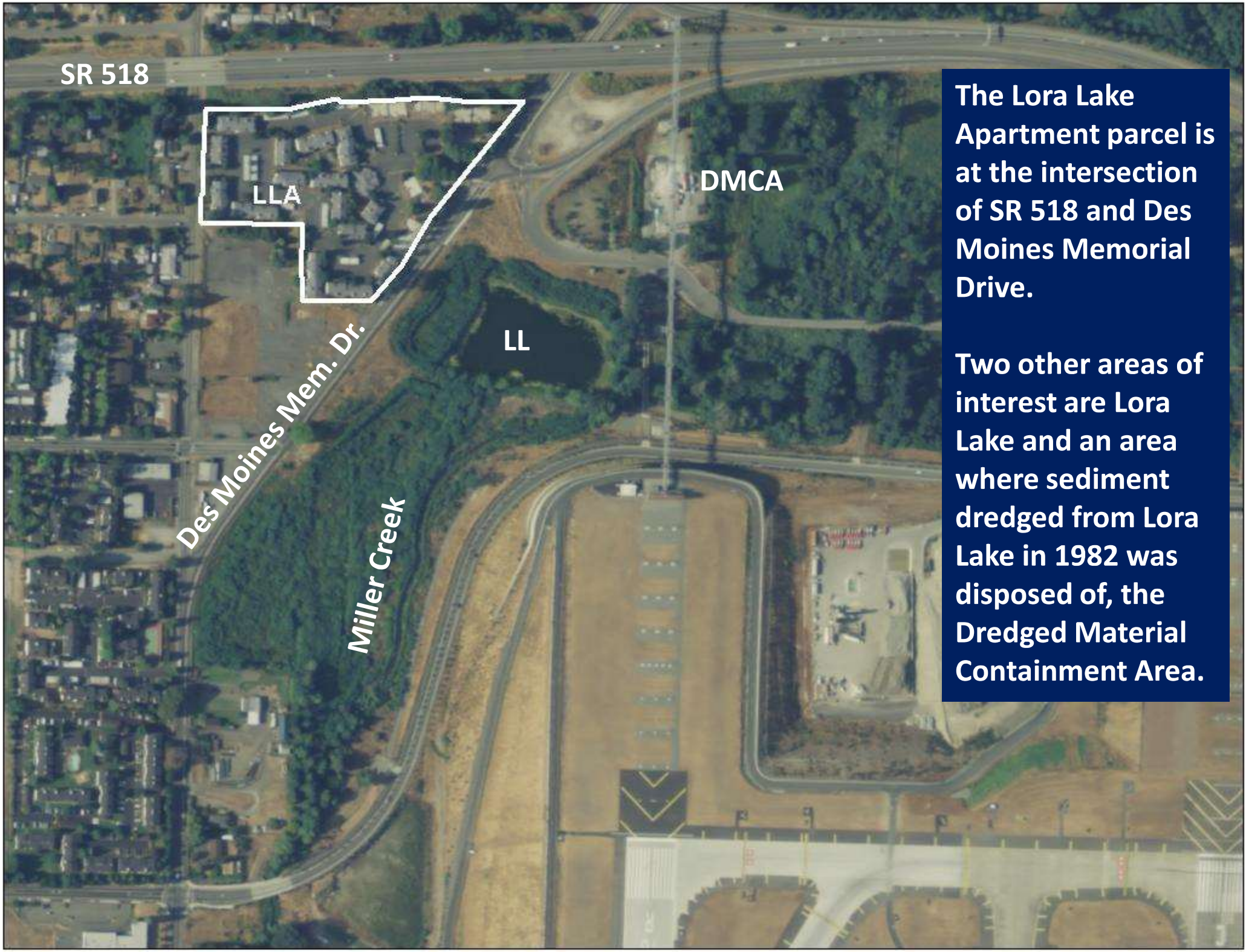
March 28, 2012

Major points:

- Dioxin is widespread in the environment and comes from many different sources.
- The Lora Lake Apartments Site does not appear to contribute significant amounts of dioxin to Miller Creek.
- Lora Lake Apartments contamination will be cleaned up by a combination of excavation and capping.

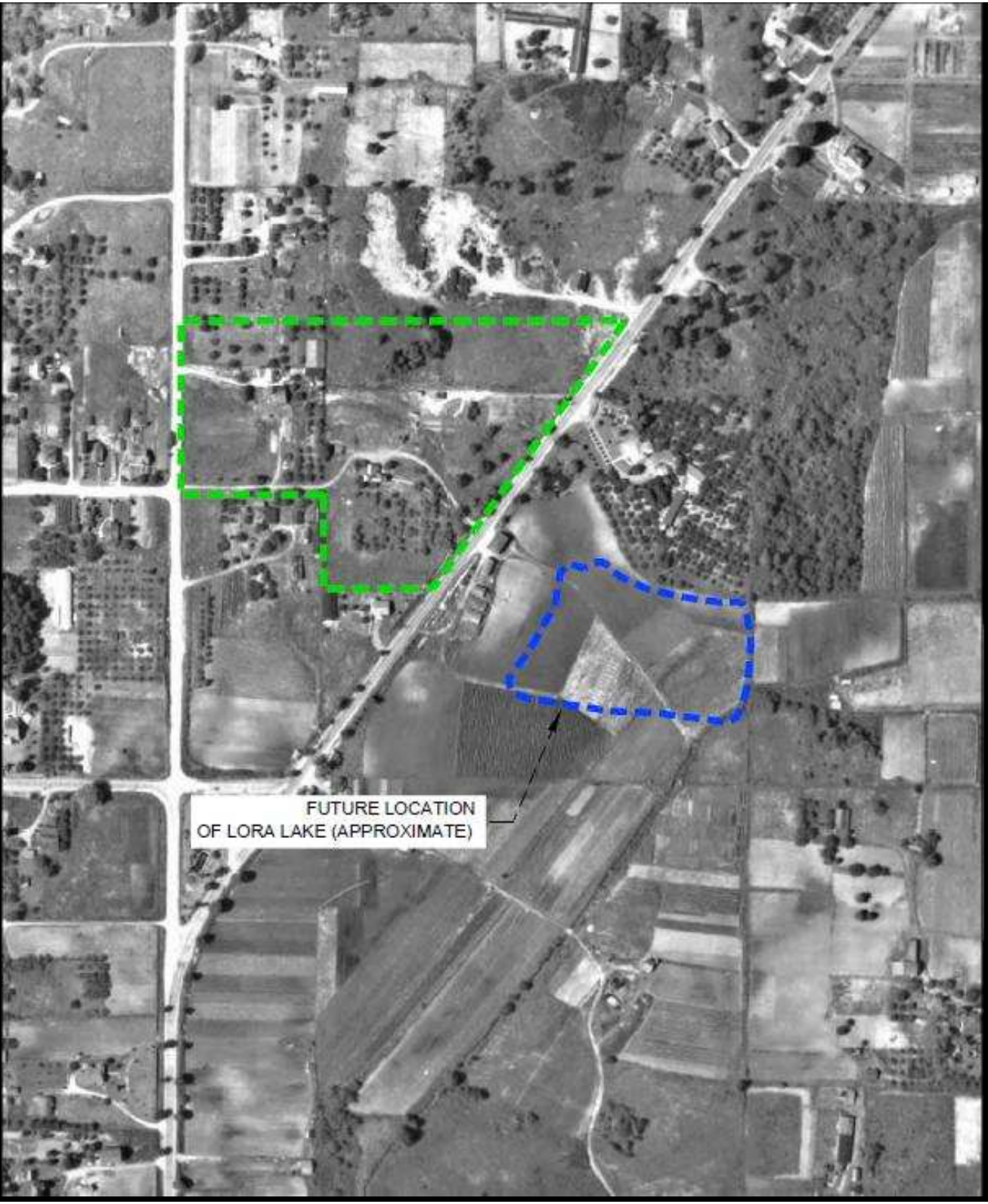
Project Status

- The Port of Seattle has submitted a draft Remedial Investigation/Feasibility Study to Ecology for review.
- The RI/FS describes the nature and extent of contamination and evaluates alternative approaches to cleaning it up.
- The purpose of the RI/FS is to provide sufficient information for Ecology to select a cleanup action for the site.
- The RI/FS is not a decision document.
- Ecology will present the selected cleanup action in a Cleanup Action Plan for the site. This will be Ecology's decision document.
- Ecology anticipates returning comments on the draft RI/FS to the Port by the end of May. After any necessary revisions, the draft RI/FS will be issued for public comment before being finalized.
- The Cleanup Action Plan also will be issued for public comment before it is finalized.
- Ecology is considering having a concurrent public comment period on the draft Remedial Investigation/Feasibility Study and the draft Cleanup Action Plan.



The Lora Lake Apartment parcel is at the intersection of SR 518 and Des Moines Memorial Drive.

Two other areas of interest are Lora Lake and an area where sediment dredged from Lora Lake in 1982 was disposed of, the Dredged Material Containment Area.

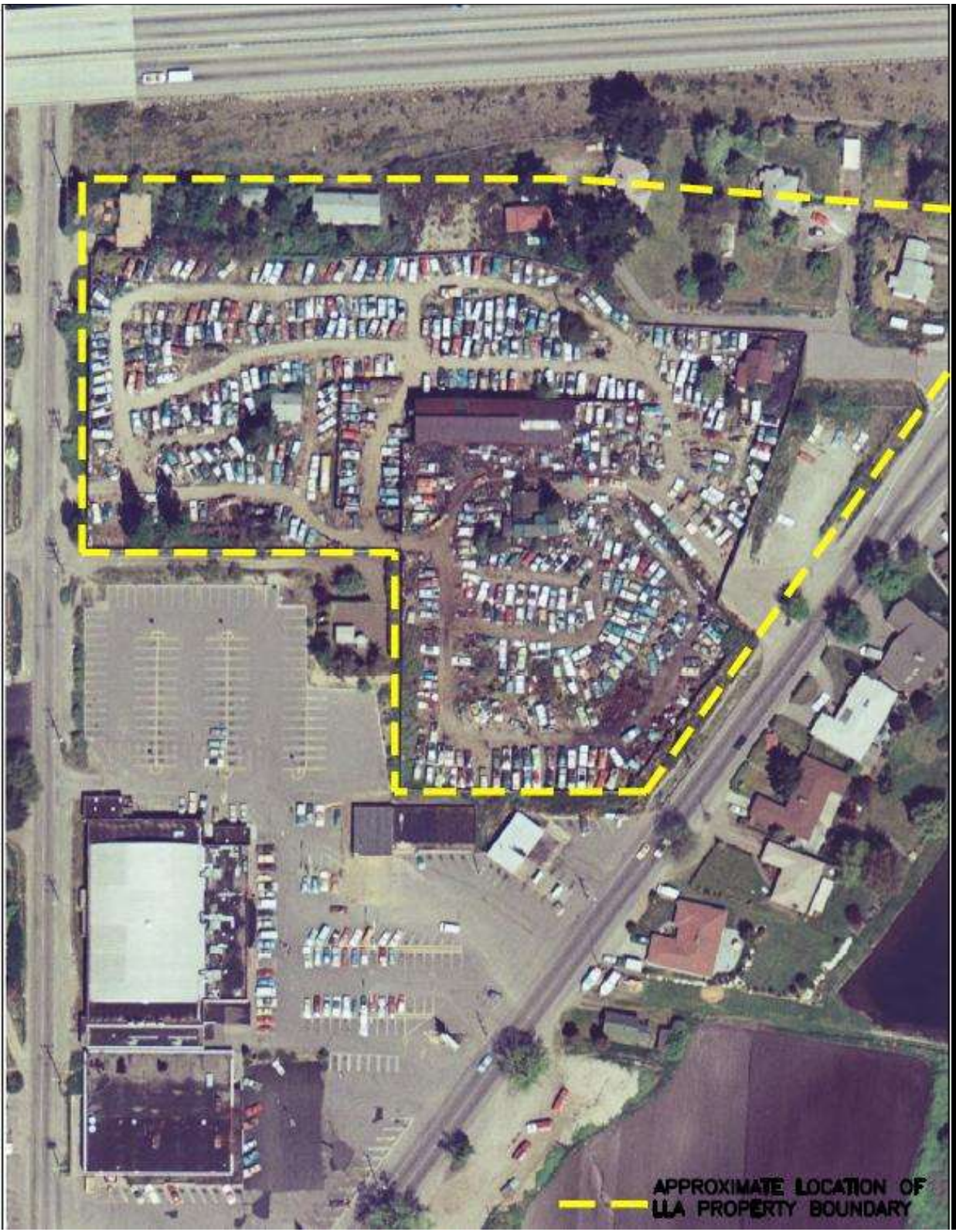


1936

The Apartment site had residences and trees.

Excavation of the peat mine that would become Lora Lake had not begun.


A barrel-washing operation was located on the Apartment site. Lora Lake had been created by peat mining.
1946
POTENTIAL DRUM
CLEANOUT POND



1980

Burien Auto Wrecking occupied the site from the 1950s to the 1980s.

Lora Lake was surrounded by homes.

1985

In the 1980s a developer bought the site and cleared it to construct the Lora Lake Apartments.

In 1982 King County dredged the lake because residents were complaining of siltation. The dredge material was placed on airport land to the north of the lake.

2004

The Port acquired the Lora Lake Apartments property in the late 1990s as part of their planning for construction of the Third Runway.

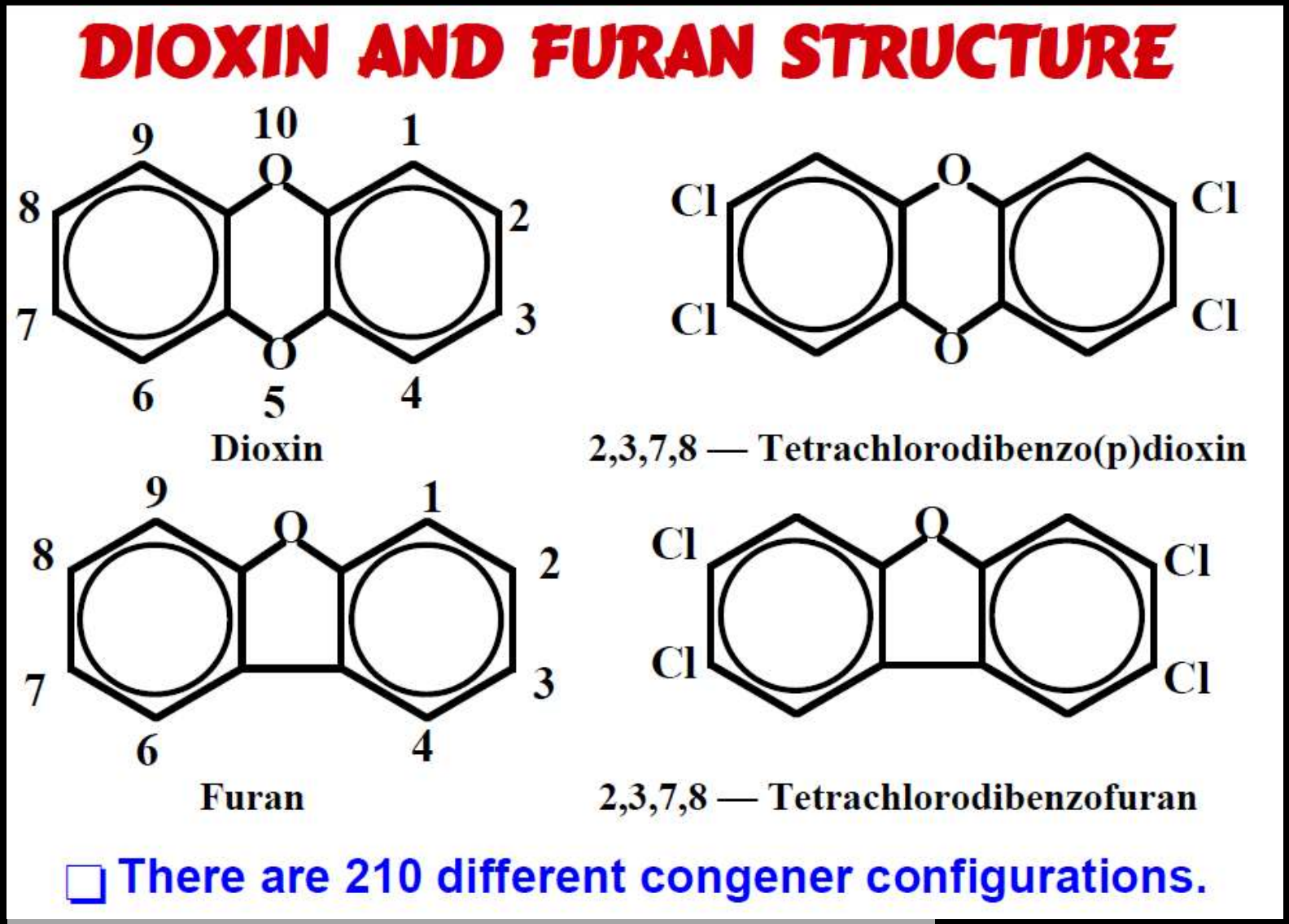
Part of the Apartment property is within the area needed for the Runway Protection Zone.

What was found?

- The chemicals of concern are:
  - Arsenic and lead
  - Petroleum
  - Pentachlorophenol
  - Carcinogenic polyaromatic hydrocarbons
  - Ethyl benzene and toluene
  - Dioxin
- **This presentation will focus on dioxin.** Dioxin is the most widespread chemical of concern and Ecology understands it is of most concern to the public.
- The other chemicals of concern are mostly co-located with the dioxin and will be cleaned up with it.

What are dioxins and furans?

- Dioxins and furans are double benzene rings with chlorine atoms attached at various points. They are not just one chemical composition.



From: http://www.ejnet.org/dioxin/dioxinpr2.pdf

Different congeners have different toxicities. 2,3,7,8 TCDD is the most toxic.

Dioxin/furan concentrations are reported as Toxicity Equivalent Quotients (TEQ).

Environmental studies normally look at 17 congeners.

Dioxins form when organic matter is burned in the presence of chlorine.

Natural Sources

- Forest Fires

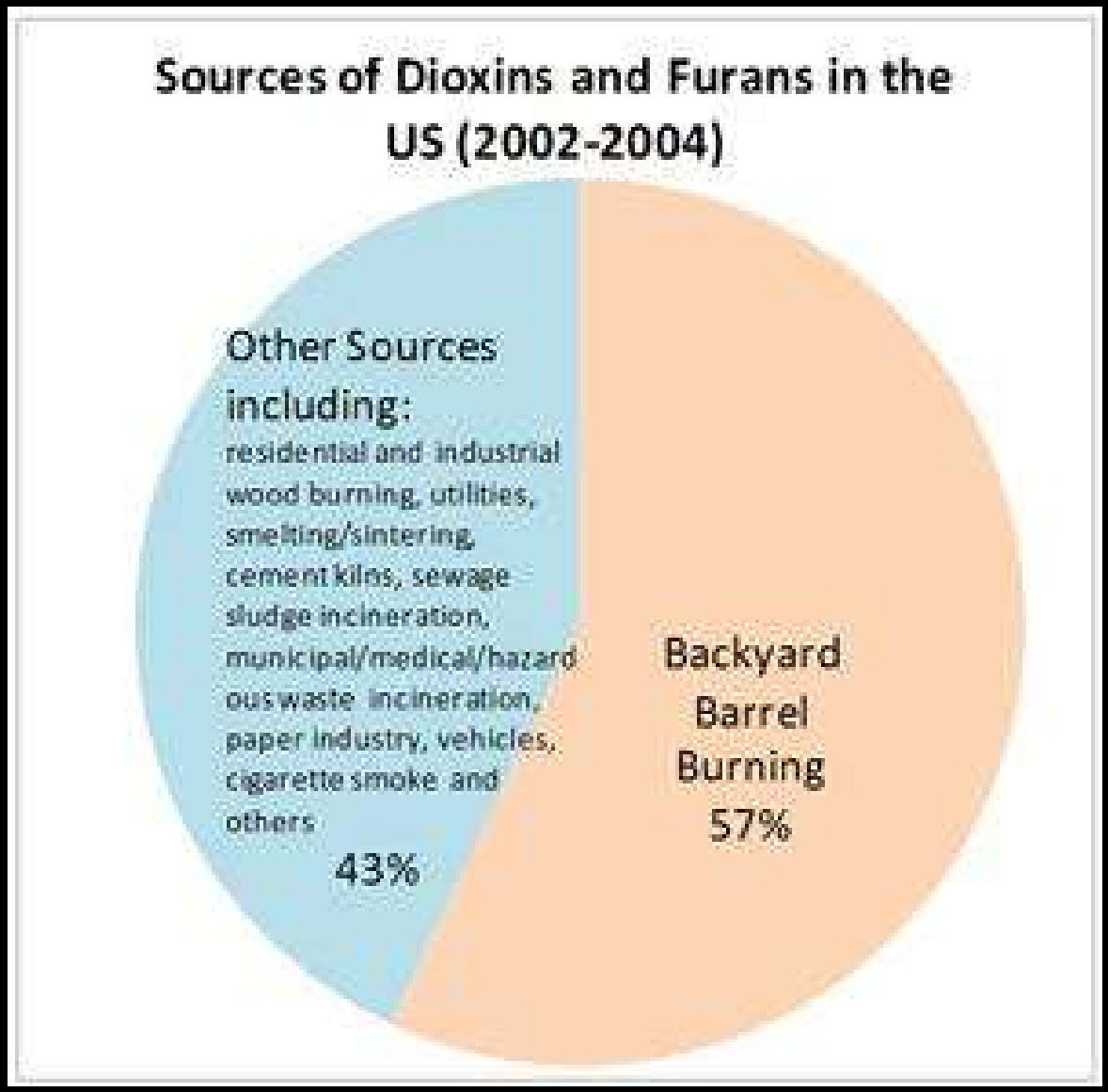
- Volcanos

Some Man-Made Sources

- Residential wood burning
- Backyard burn barrels
- Chlorinated chemical production

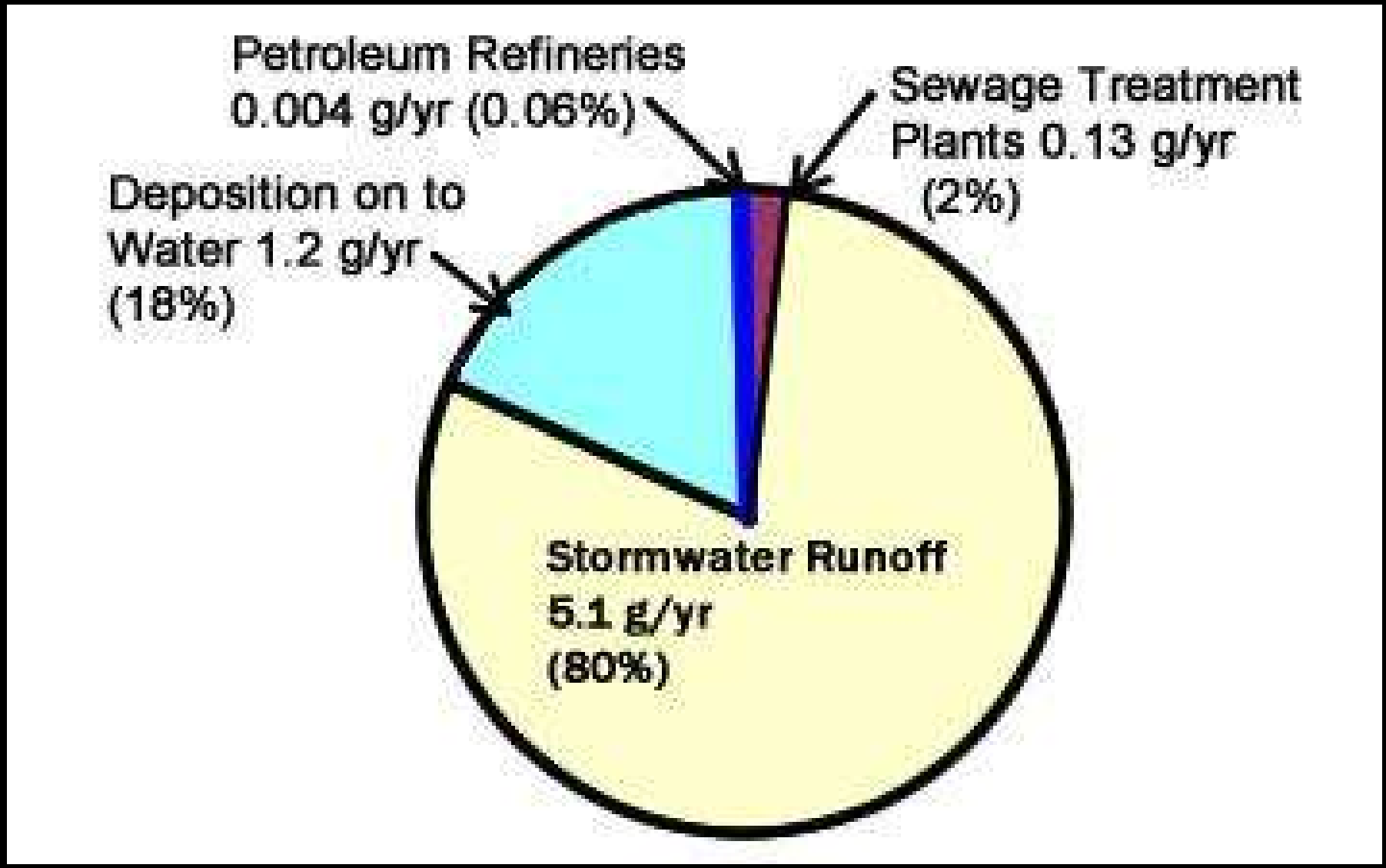
- Diesel exhaust
- Chlorine bleaching of pulp
- Burning salt-laden wood in hog-fuel boilers
- Waste incineration
- Cement kilns
- Crematoriums

Example: Backyard Burn Barrels



Source: New York Department of Environmental Conservation

Example: Sources of dioxin to San Francisco Bay



See: http://www.epa.gov/region9/water/dioxin/sfbay.html#whataresources

Point 1:

- Dioxin is widespread in the environment and comes from many different sources.

How do dioxins behave in the environment?

- Dioxins are PERSISTENT: They last a long time when released to the environment.
- Dioxins have LOW VOLATILITY.
- Dioxins have VERY LOW SOLUBILITY in water.
- Dioxins have VERY LOW MOBILITY. They tend to attach to soil particles.
- Dioxins are BIOACCUMULATIVE. When ingested (say by a big fish that eats a small fish that has fed on small critters living in contaminated sediment), they will dissolve in the lipids (fats) and accumulate in the food chain.

Principle Sources of Exposure to Dioxin

- Diet – over 90% of human background exposure to dioxin is due to bioaccumulation of dioxin in animal fat.
- Accident
  - Chemical plant explosion with dioxin in the resulting cloud (Sveso, Italy).
  - Fires in PCB-filled electrical equipment.
  - Food accidentally contaminated with dioxin.

From: http://www.greenfacts.org/en/dioxins/l-2/dioxins-2.htm

Before we proceed, a word on units

Units Used in Environmental Dioxin Studies

- Soil and Sediment
  - Parts per trillion: ppt
- Ground and Surface Water
  - Parts per quadrillion: ppq
- A ppq is one-thousandth of a ppt.

What does this mean?

- It is not the absolute concentration that is normally of concern.
- It is how the measured concentration compares to a relevant standard or other comparison measure.
- When reviewing data, be sure the various concentrations given are in the same units.

Note:

- This cleanup is addressing dioxin and related contamination from historic industrial operations at the Lora Lake Apartments Site that ended long ago.
- This dioxin contamination is likely from dioxin impurities in the chlorinated chemicals that were washed out of the barrels during cleaning, particularly pentachlorophenol.

Data have been collected in several environmental media

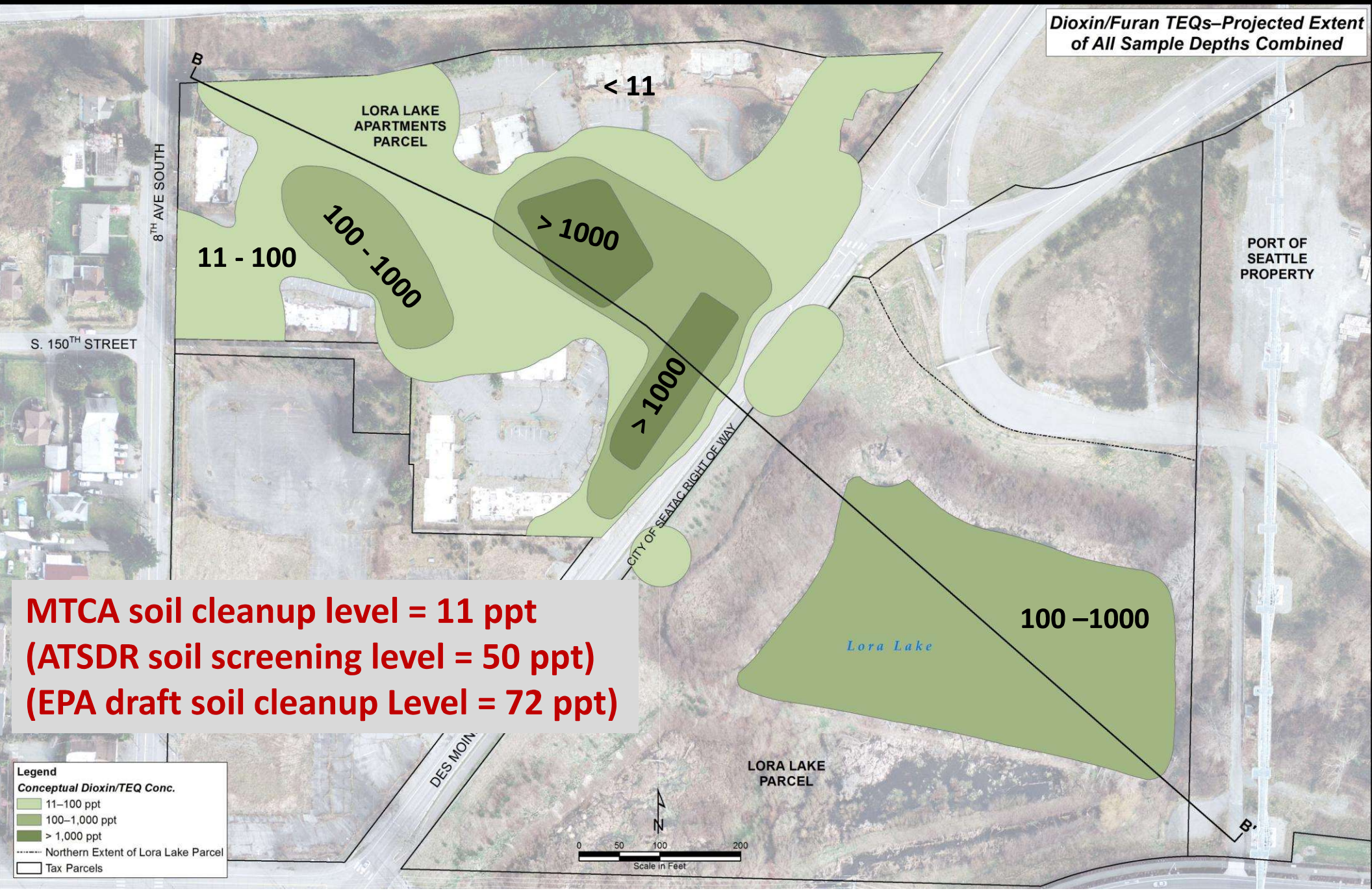
Soil

Storm water and storm drain solids

Ground water

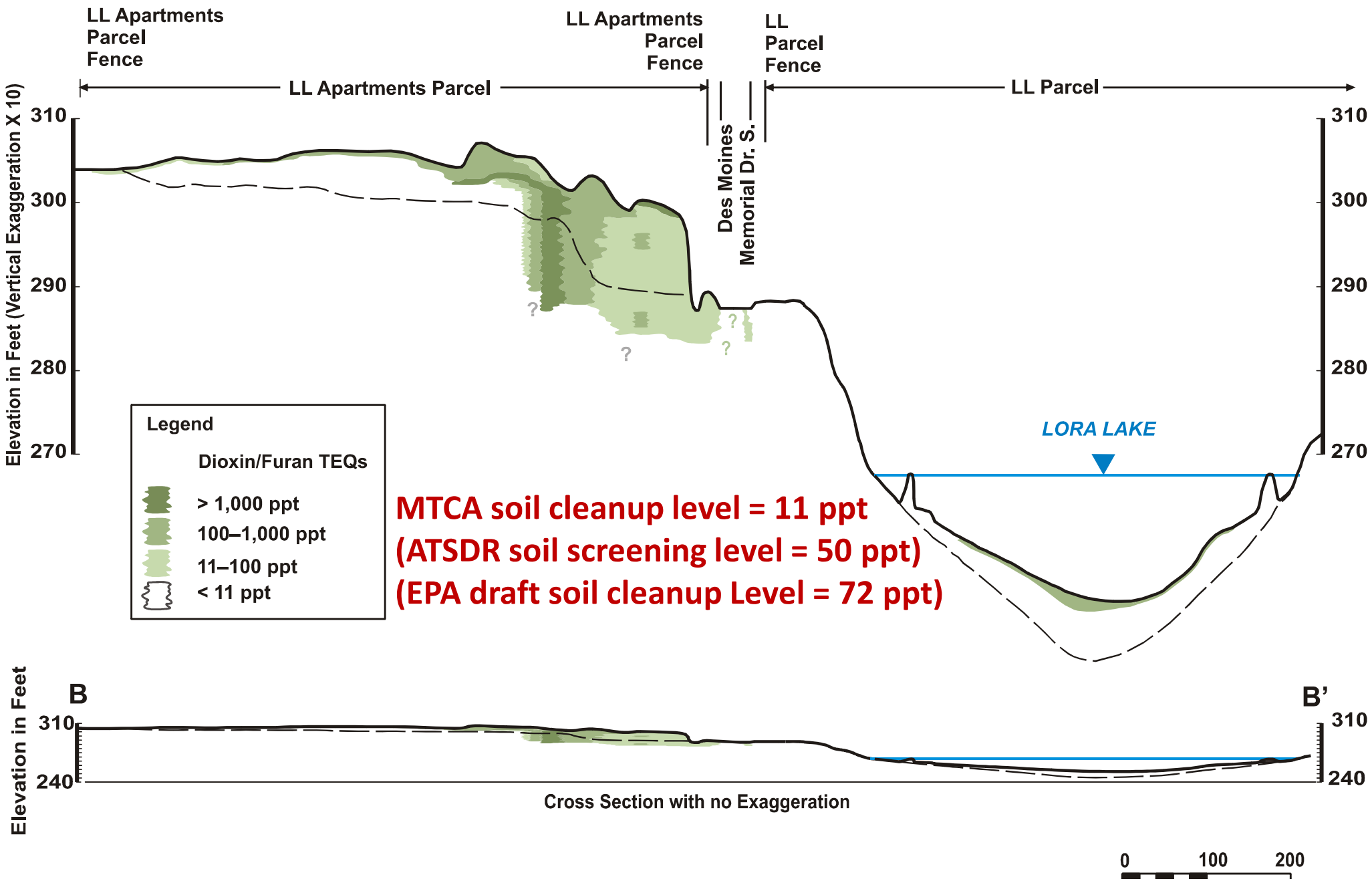
Lora Lake sediment

Within the Lora Lake Apartments Parcel dioxin soil contamination is highest at and downhill from the old barrel cleanout area. Over much of the western part of the property dioxin concentrations are < 100 ppt.

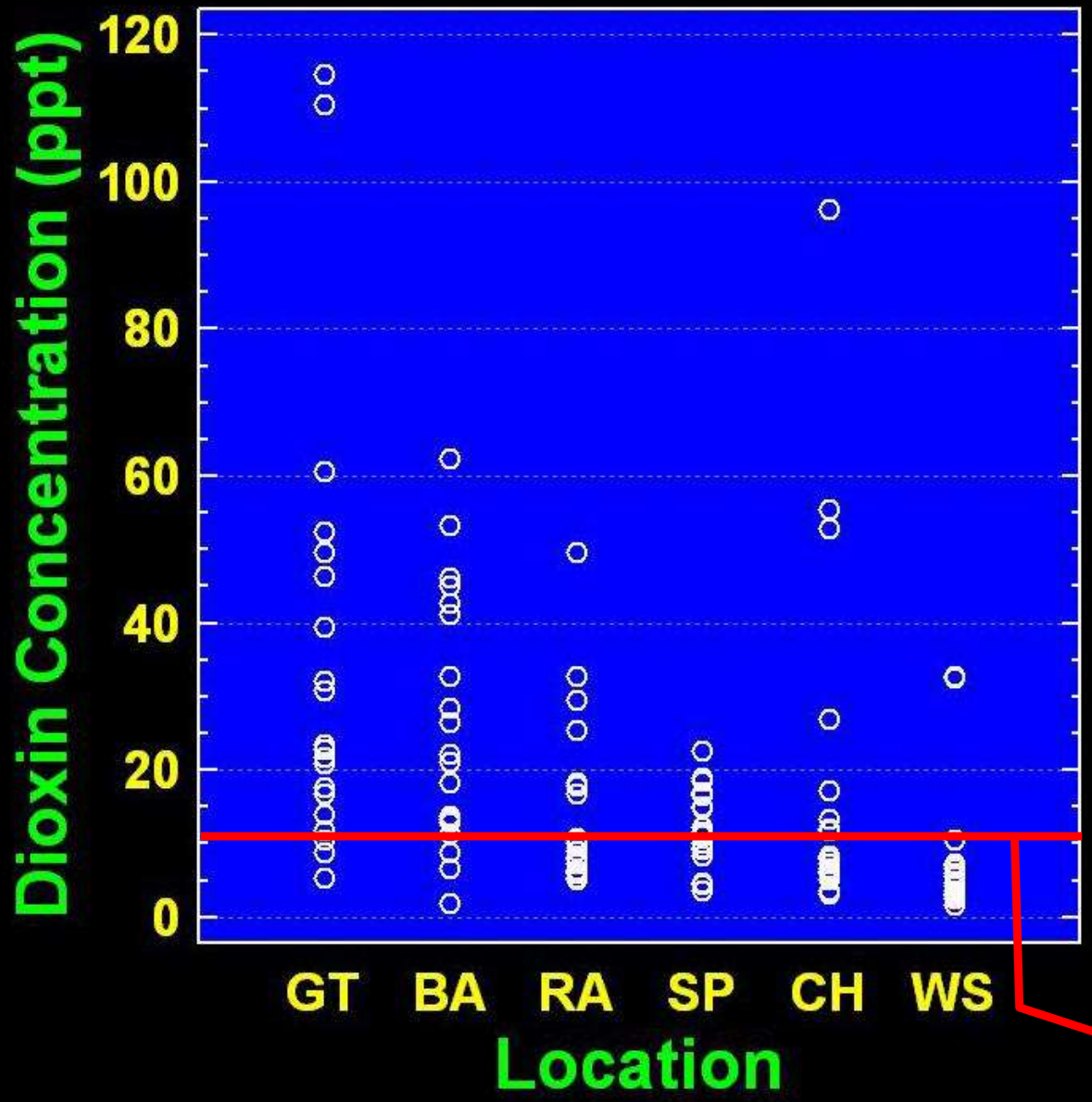


MTCA soil cleanup level = 11 ppt
(ATSDR soil screening level = 50 ppt)
(EPA draft soil cleanup Level = 72 ppt)

Cross-section view.



What is the occurrence of dioxin in urban Seattle soils?

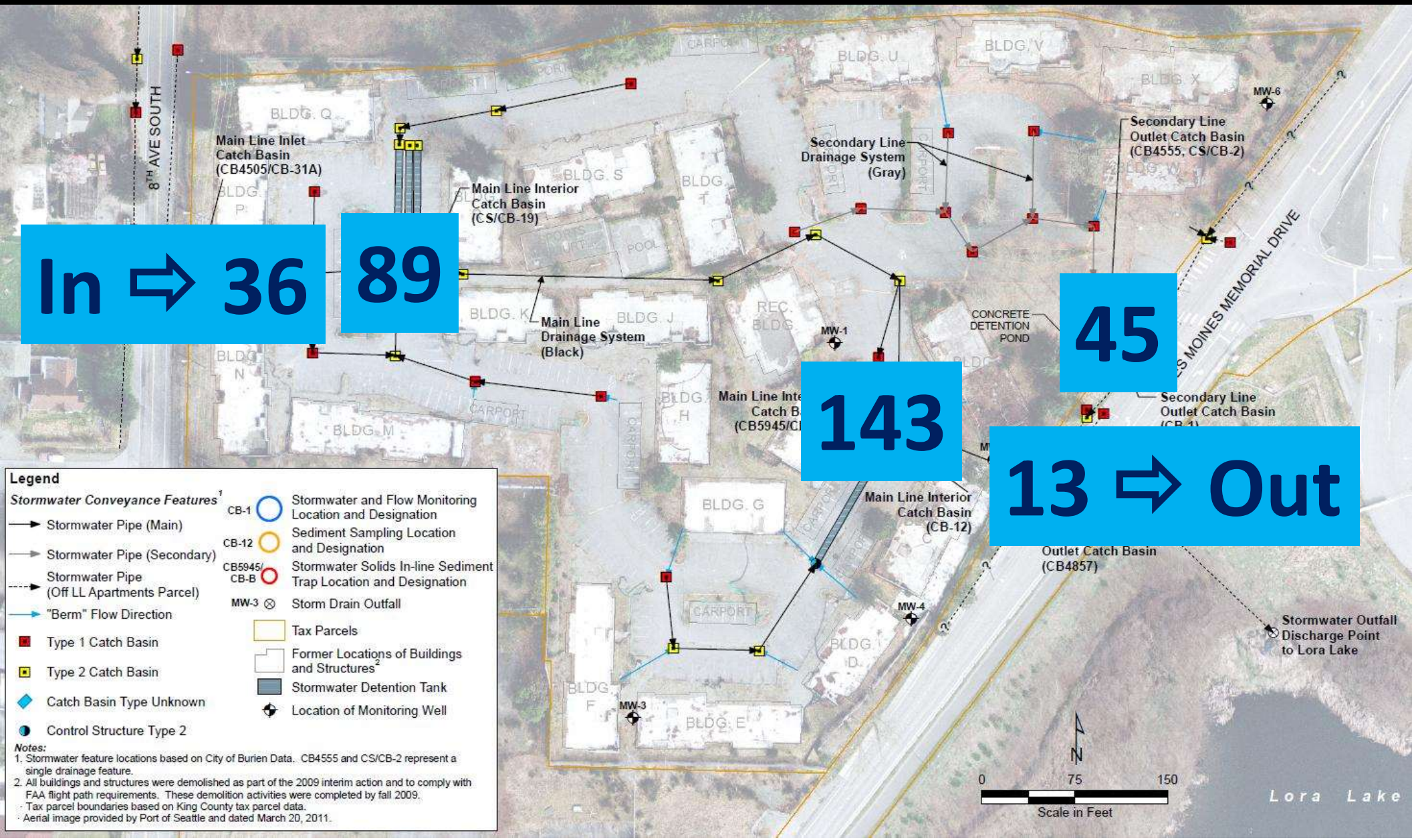


- Ecology recently completed a study of dioxin concentrations in Seattle neighborhoods. Concentrations ranged from 2 to 114 ppt.
- One of the challenges at Lora Lake is to know when to stop.

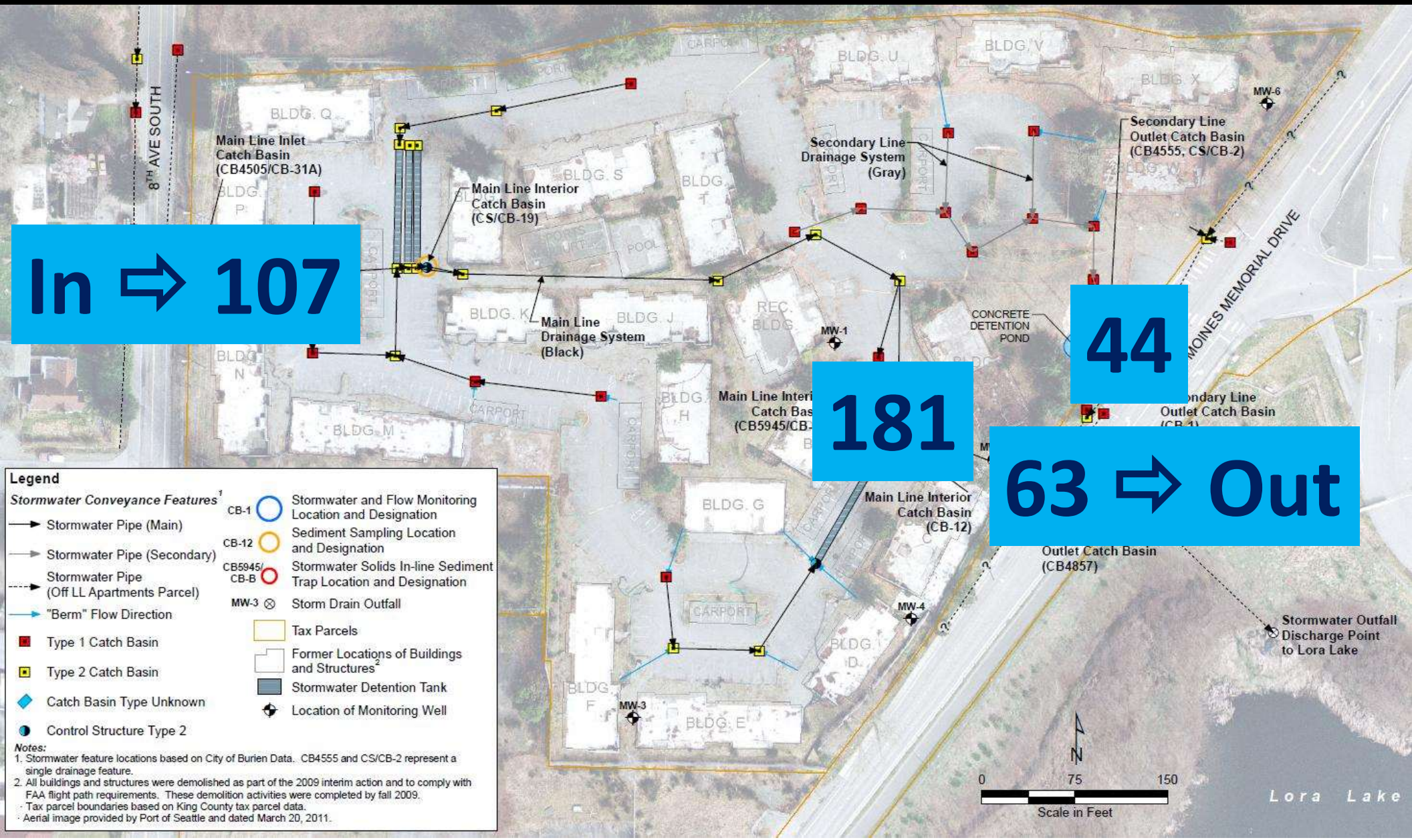
Storm water and storm drain solids.

- The storm drain passing through the Lora Lake Apartments has a 78-acre catchment area.

Dioxin in catch-basin solids (ppt)
The catch basin solids were removed in 2010



Dioxin in in-line solids traps (ppt)



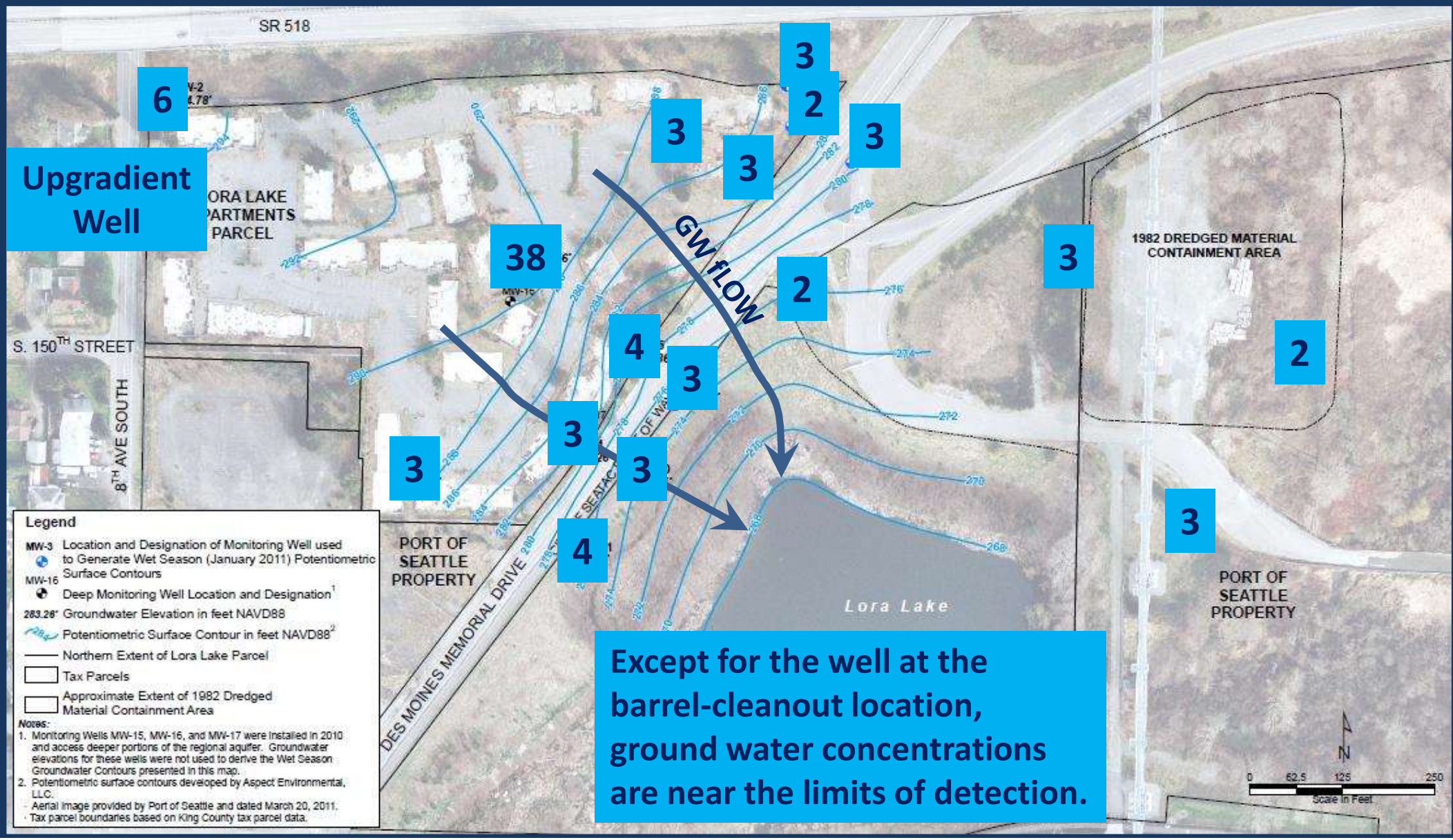
Dioxin in Storm Water

Upstream and downstream stations were statistically the same

Water cleanup levels

- 30 ppq – Safe Drinking Water Act (Federal)
- 5.83 ppq – MTCA Drinking water standard (State)
- 1 – 6 ppq – limits of detectability; depends upon what else is in the water.
- 0.005 ppq – Protective for fish consumption combined with drinking the water the fish are in.

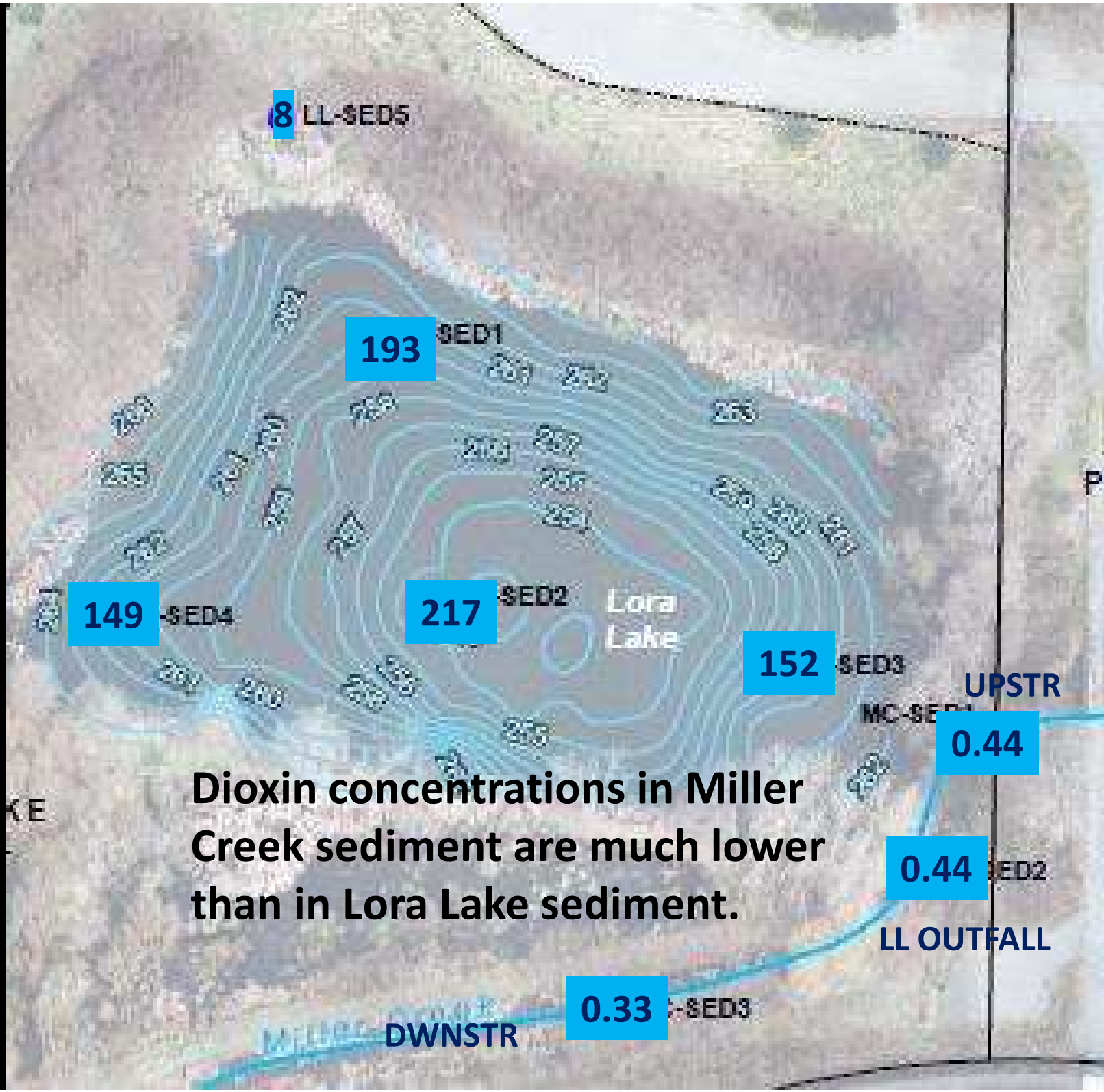
Maximum dioxin concentrations detected in ground water (ppq). Blue lines are ground water elevation contours, wet season. Flow is to Lora Lake.



Lora Lake Sediment

Dioxin concentrations in the biologically active zone (ppt)

There are no freshwater chemistry standards.



What about dioxin in sediment at deeper depths?

Station	Depth	Upper_Depth_ft	Lower_Depth_ft	Dioxin_ppt
LL-SED1	Surface	0.0	0.5	193
LL-SED2	Surface	0.0	0.5	217
LL-SED3	Surface	0.0	0.5	152
LL-SED4	Surface	0.0	0.5	149
LL-SED5	Surface	0.0	0.5	8
MC-SED1	Surface	0.0	0.3	0.4
MC-SED2	Surface	0.0	0.3	0.4
MC-SED3	Surface	0.0	0.3	0.3
LL-SED1	Mid	0.0	1.8	23
LL-SED2	Mid	0.0	1.8	154
LL-SED3	Mid	0.0	1.2	202
LL-SED2	Deeper	1.8	3.7	1
LL-SED3	Deeper	1.2	4.6	1
LL-SED2	Deepest	3.7	5.5	1
LL-SED3	Deepest	4.6	5.5	2

Lora Lake Bioassay Results

- Scuds and midge larvae were exposed to sediment from the biologically active zones in Lora Lake and Miller Creek.
- The effect on their growth and mortality was measured.

Scud
(Hyalla azteca)

Midge larvae
(Chironomous dilutus)

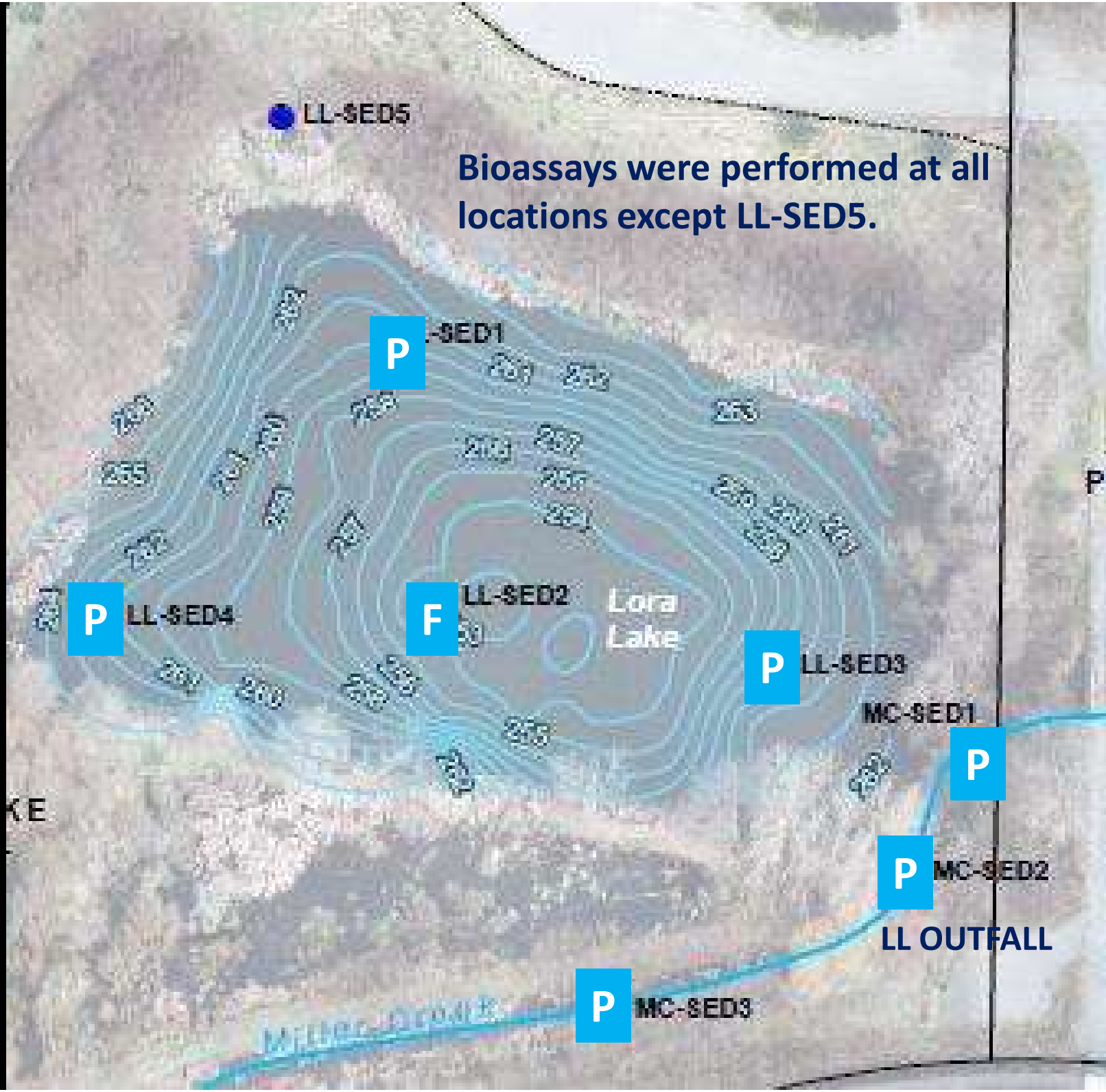
Midge – adult stage

Bioassay results:

Surface sediments are unlikely to cause adverse effects on biological receptors except in the deepest part of the lake (LL-SED2).

The adverse effect is thought to be due to high sulfides.

P = Pass
F = Fail



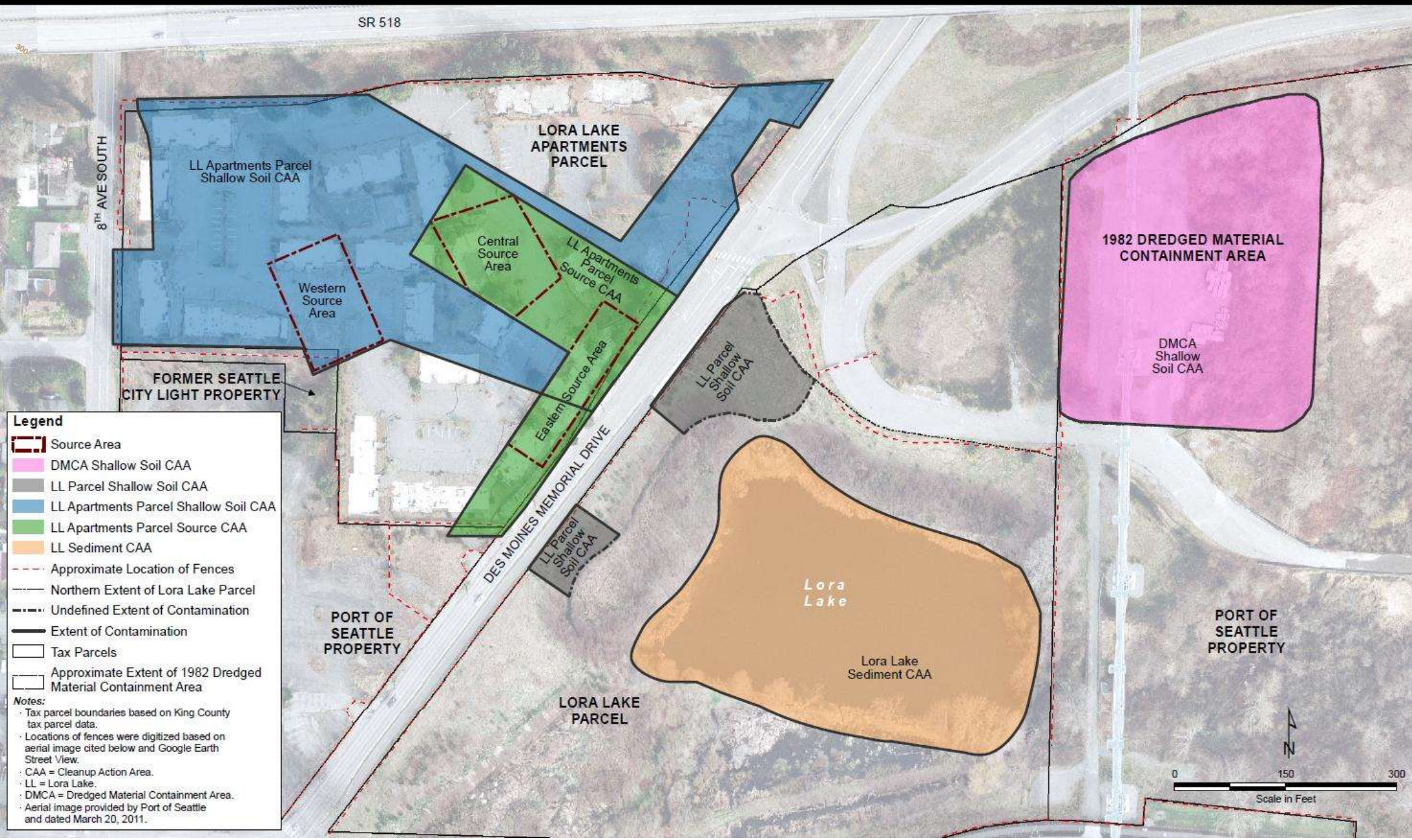
Point 2:

- The Lora Lake Apartments Site does not appear to contribute significant amounts of dioxin to Miller Creek.

Remediation Goals

- Protect people from exposure
- Keep contamination contained on site out of the storm drain system.
- Prevent migration of contaminants from the Site.
- Make the site suitable for development.

The RI/FS divides the site into several cleanup areas and evaluates various combinations of soil capping, soil excavation, and sediment capping or sediment dredging.

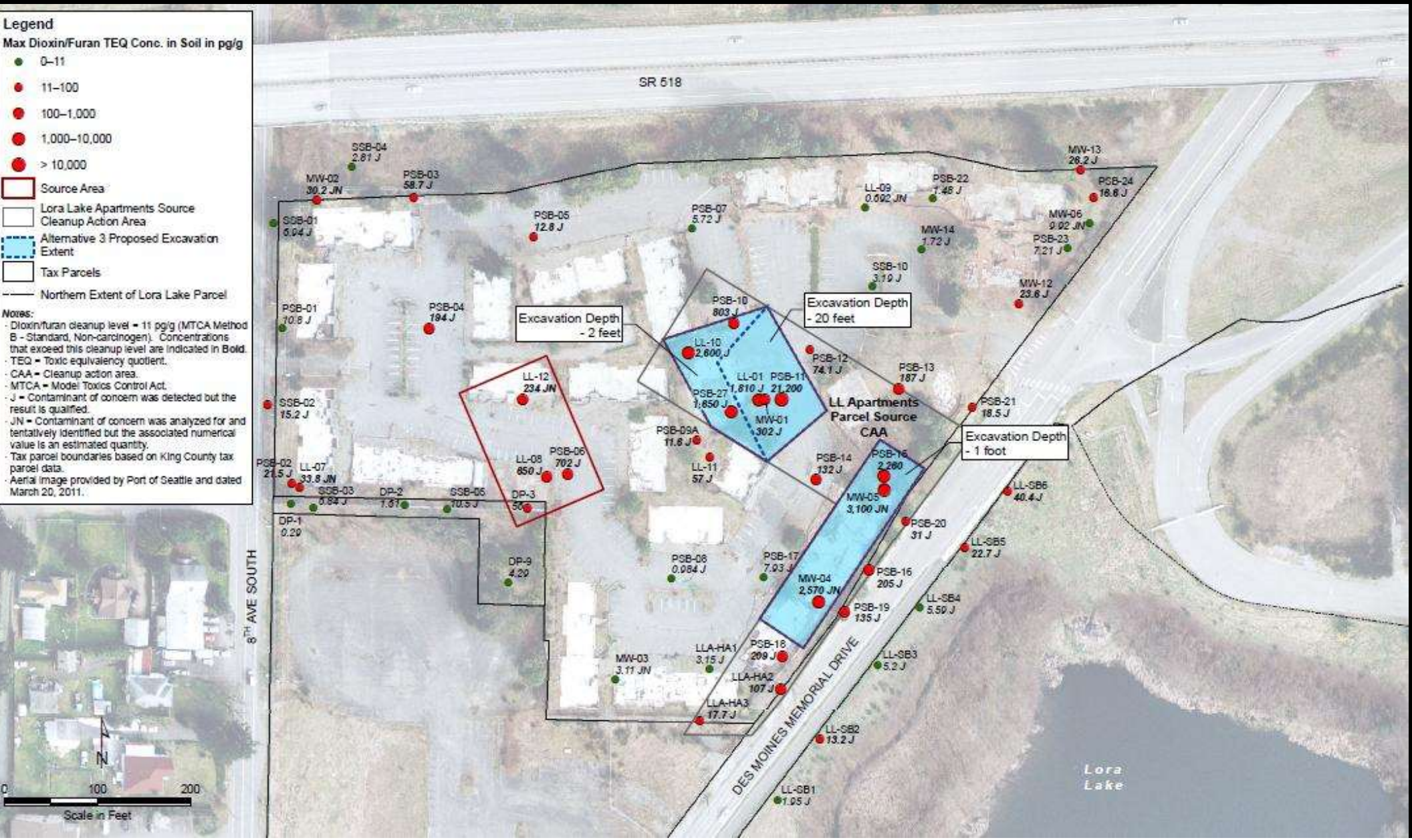


The FS evaluated 5 cleanup alternatives that spanned the range from no action to complete removal.

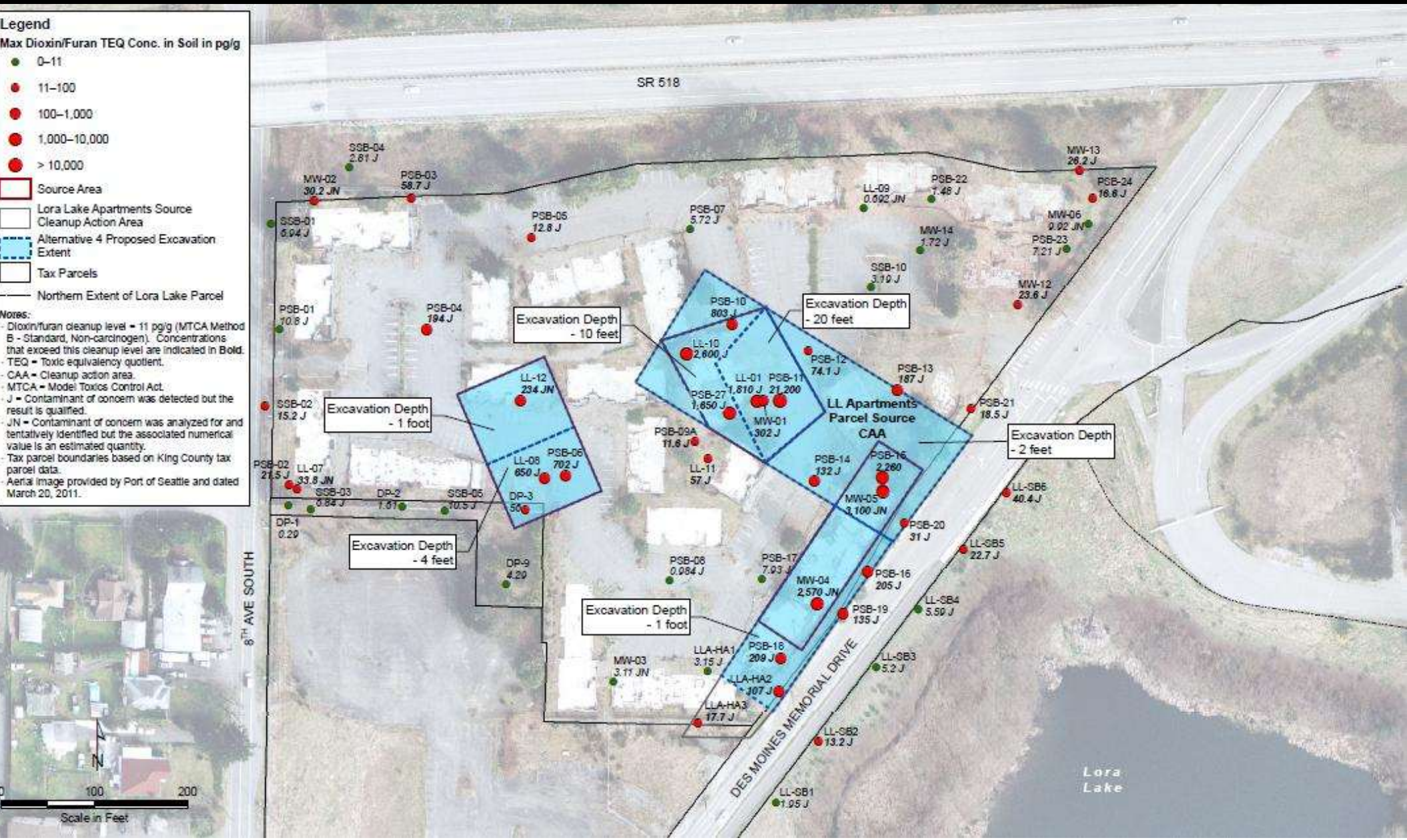
- Alternative 1 – No Action.
- Alternative 2 – Capping, long-Term monitoring, and deed covenants restricting property use.

- The Port found that Alternatives 1 and 2 did not meet all of the remediation goals.

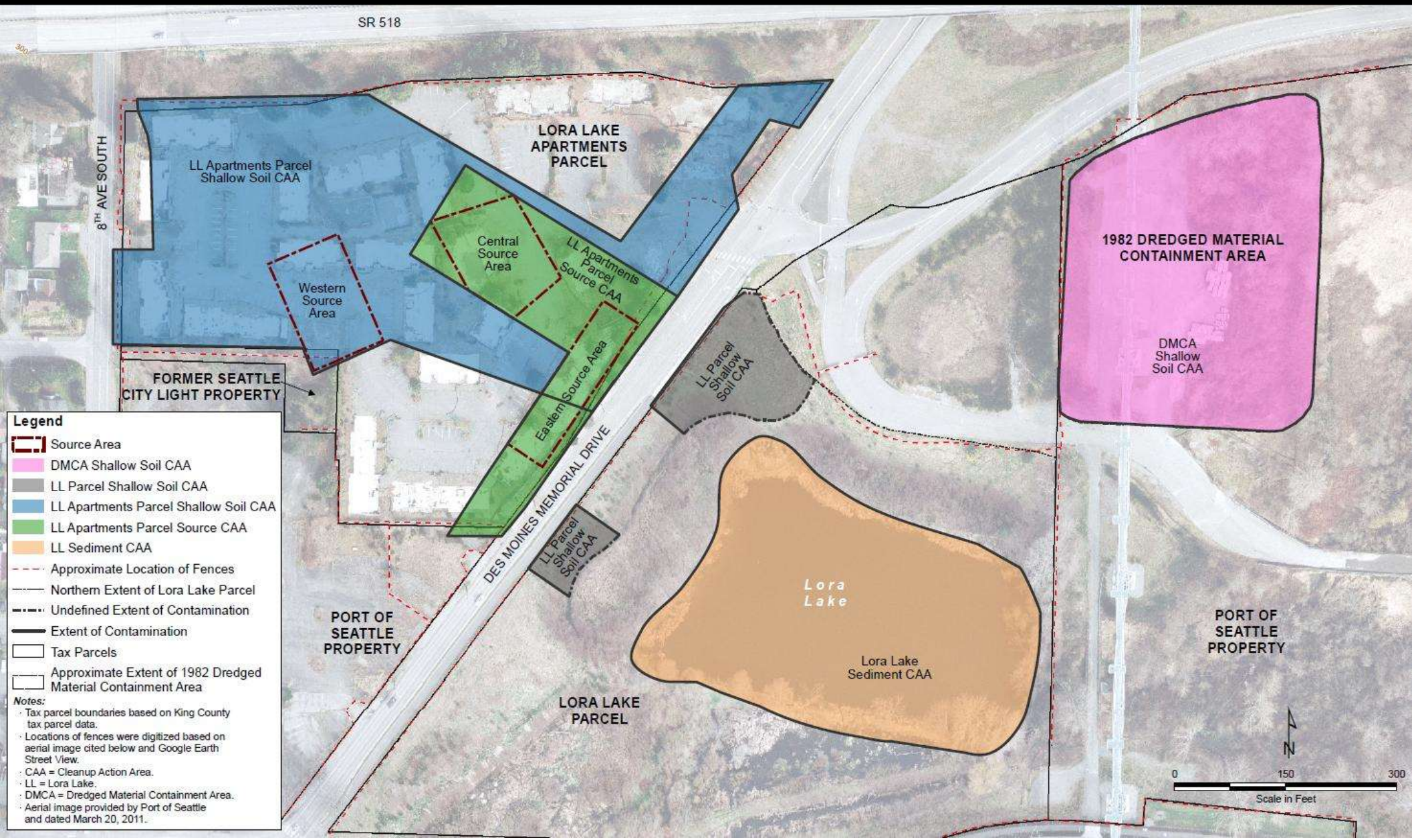
Alternative 3 Excavation Extent – Excavates soil with dioxin over **1,000** ppt. Cap other areas, storm drain system improvements, deed covenants, long-term monitoring. $7.9 million.



Alternative 4 Excavation Extent – Excavates soil with dioxin over **100** ppt. Cap other areas, storm drain system improvements, deed covenants, long-term monitoring. $8.1 million



Alternative 5 – All soil with dioxin exceeding **11** ppt is excavated. Lora Lake is dredged. $14 million,



Ecology has asked the Port to evaluate two alternatives intermediate between Alternatives 4 and 5.

Alternative 4+

- This is Alternative 4 except that Lora Lake is dredged instead of having a sand cap placed over the dioxin-contaminated sediment.

Alternative 5-

- This is Alternative 5 except that the DMCA is capped with asphalt or an engineered gravel cap instead of excavated.

Point 3:

- Lora Lake Apartments contamination will be cleaned up by a combination of excavation and capping.

When Will Actual Cleanup Start?

- By the time we get through developing all the plans and legal documents, and
- Holding all the public comments periods, and
- Preparing all the design documents,
- Actual digging is anticipated to start in the 2014 construction season.

Major points:

- Dioxin is widespread in the environment and comes from many different sources.
- The Lora Lake Apartments Site does not appear to contribute significant amounts of dioxin to Miller Creek.
- Lora Lake Apartments contamination will be cleaned up by a combination of excavation and capping.

Questions?