Remedial Investigation Report for the Rayonier Mill clean up,
Port Angeles, WA

Comments on behalf of
The Olympic Environmental Coalition
Prepared by
Peter L. deFur, Ph.D.
Environmental Stewardship Concepts
Richmond VA
November 22, 2006
Peter L. deFur, Ph.D.

Funding for this product was provided by a Public Participation Grant from the Washington State Department of Ecology. These materials were reviewed by the Department of Ecology for consistency with the purposes of the grant only; grant funding does not constitute endorsement of opinions or recommendations expressed herein. A copy of these technical comments was sent to the Department of Ecology for their files.

These comments were prepared at the request of and on behalf of the Olympic Environmental Coalition, a group of citizen organizations in Washington cooperating to insure that the Rayonier Mill Site is cleaned to protect the health of the citizens and the environment.

SITE SUMMARY AND BACKGROUND

From 1930 to 1997, Rayonier operated a pump mill in Port Angeles. In 1993, EPA investigated the possible release of pollutants from the mill and contamination of the soils, marine environmental and groundwater on and near the site. Contamination came from a number of on site sources, included but not limited to the finishing room (a PCB spill), the screen room, a fuel oil tank, the hog fuel pile, the former machine shop, the spent sulfite liquor lagoon, the pre-fab/chlorine dioxide generator, and air emissions from the mill's stacks. The locations of these potential sources are shown in Figure 1. A number of previous actions at the site have taken place in an attempt to cleanup dioxins, PCBs, polyaromatic hydrocarbons (PAHs), and heavy metals to safe levels. Despite this previous work, large quantities of contamination remain.

The cleanup of the Rayonier Mill Site is being undertaken by Rayonier under the Model Toxics Control Act (MTCA) requirements. Accordingly, investigations were conducted in 2003 to evaluate the scope of remaining contamination and determine how to clean up the contamination. The information gathered during this investigation and previous investigations are discussed in this Remedial Investigation (RI) Report.

Evidence suggests that contamination from the mill has also affected the surrounding ocean habitats. Information regarding marine contamination at the site is contained in a

separate remedial investigation scheduled to be released next year, and is not included in the current RI.

The first draft of this Remedial Investigation Report (RI Report) was distributed to agencies for comment in December 2004, based on sampling conducted in 2002 and 2003. Thus, the data are not up to date and more current information should be and could be obtained.

Clean up of the Rayonier Mill site is part of the Governor's initiative to clean Puget Sound and the Straits of Georgia of toxic chemicals. The Rayonier cleanup will contribute to the Puget Sound /Straits of Georgia cleanup by eliminating the land-based sources of contamination derived from the Rayonier site.

RECOMMENDATIONS

- Groundwater samples need to be collected as soon as possible from those wells that seem to have isolated occurrences or declining concentrations of contaminants. These samples would be targeted to answering the question of whether the contaminants are present or not and at lower concentrations than previously measured.

- Soil samples should be obtained from the areas immediately up-gradient from two monitoring wells that had elevated levels of chemicals of potential concern, MW 51 and MW 56. Both wells are located east of the base of the dock and within a short distance of the shoreline and nearby soil samples had elevated COPC's. The data gap is that the soil samples and groundwater wells are not in sufficient proximity. MW 51 is near the former chip screen and MW56 is at the former pulp storage warehouse.

- The off-site soil sampling in the neighboring residential area and around Port Angeles needs to be initiated as soon as possible, without holding up the cleanup effort on the mill site proper.

- Include all data from both the RI and the ESI in the Feasibility Study unless further data can be obtained to justify not using both.

- Manganese sampling should be performed on both groundwater and soil samples.

- The dioxin analysis needs to be conducted in accordance with the accepted scientific methodology as approved by the World Health Organization (Van den Berg et al. 2006).

- There is not now, nor has there been an enforceable schedule for completion of any phase of this process. Ecology, with EPA concurrence, needs to set an enforceable schedule to insure that the remediation begins as soon as possible.

- Background levels of dioxins and arsenic are represented as unknown or variable because these contaminants occur at other sites or at some regional levels. In the cases of these two chemicals, the RI Report needs to use the background levels that are set by MTCA or determined by state surveys for non-urban areas.

- The RI Report needs to display the data along the lines of the figures displayed here in Figures 2 and 3 with the total number of COPC's above background or screening levels at each sampling location.

- The sulfate and manganese data from other investigations need to be shown in the RI Report, and additional data collected.

- Federal guidelines for assessing dioxin TEQ need to be used in the TEE, rather than the inappropriate method used in the present RI Report.

GENERAL COMMENTS

- On-site soil is contaminated with dioxins, arsenic, heavy metals, and other compounds. The pattern of contamination shows a limited distribution for many of these chemicals. Dioxin and arsenic are two exceptions and are found at elevated levels in many locations on site.
- Widespread groundwater contamination is apparent, but not in large plumes. As with the soil contamination, groundwater contamination occurs in smaller zones, seemingly associated with specific site activities.
- Off-site residential deposition of dioxins is not well treated in this RI Report. The only treatment is through an air deposition modeling effort that has problems and does not explain or account for the results observed in soil sampling by EPA. More soil sampling needs to be conducted in the neighborhood and the greater Port Angeles area.
- Lack of urgency for cleanup is evident in the 2 years it has taken to produce this draft of the RI Report that is little changed from the 2004 draft.
- Evaluation of the site is incomplete owing to the lack of off-site sampling, the need for up-to-date groundwater samples and soil samples in several places. Manganese (Mn) was not measured in soil or groundwater samples, despite the fact that Mn was elevated in ash and waste samples taken off-site.
- The data are presented and explained so as to minimize contamination problems. Several of the recent RI soil samples have considerably lower levels of contaminants than reported in the EPA ESI Report, and there is no logical explanation for the disparity between samples.

Overall, the document does not appear to be drastically different from the previous draft that was internally reviewed in 2004. No new data seem to be presented in this report, despite the two years that have elapsed since this report. An even longer period has elapsed since the last data were collected on site (2002- 2003) and some new information

from selected sampling would provide valuable insight into the spatial and temporal trends of chemical distributions.

Rayonier continues to use explanations and language that paint the site as not very contaminated and that industrial, less protective cleanup standards should be used. Rayonier often seeks to find ways to discount elevated concentrations of metals, dioxins and furans, and other contaminants in soils.

This language and tone contribute to an overall pattern where Rayonier appears to be actively resisting efforts to cleanup the site. This document was originally supposed to have been released 18 or more months ago, but Rayonier has actively contested the internationally recognized WHO methodology for evaluating dioxins in an effort to weaken state standards. This has continued even after NAS reviewed those standards and found them to be the best available approach for regulatory agencies to use. A general lack of urgency and appreciation for the widespread extent of the contamination of the site has contributed to a number of glaring flaws, which leaves the RI incomplete and inaccurate.

Soils

The data from the ESI and RI reports combine to reveal a large number of sampling locations with multiple chemicals in excess of screening or "background" levels (Figure 2). The data from the RI report that show soil samples with contaminants exceeding the screening levels were taken from tables and the total number of different contaminants summed for display in graphic form in Figure 2. This simple analysis reveals that while few individual chemicals are "site-wide", many sampling sites on the Rayonier site have multiple contaminants.

It is not clear how some of the soil data will be treated, specifically the cases where there are substantial differences between the samples taken by EPA (presented in the ESI report, 1997-98), and the data collected and presented here in the RI report. There are several cases where substantial differences between the two sets of sampling are not obviously explained. The report needs to comment on the interpretation of the data, and how and where the data interpretation will be presented. Specifically, the RI report needs to have some text on what will be done to resolve the differences among data sets. This comment is not meant to indicate that the RI report is the place for that resolution, but the report should say how and where it will be done.

The fact that the site has been "created" over many years with fill material only creates conditions that are not-uniform. Fill material is not a justification for contamination that discounts the need to address the problem. Clearly, uneven groundwater flow and concentrations can be explained in part by "fill" creating non-natural conditions. Rayonier is still responsible for fill related contamination.

The RI also does not accurately represent background levels. The problem with background samples for anthropogenic chemicals is that true background is 0. We should

use the term “ambient” and perhaps add a qualifier such as “reference” or “unaffected”. There being no known natural sources of dioxins, it is hard to set a natural background. This case is true for dioxins, PCB’s, chlorinated pesticides, certain industrial chemicals and PAH’s, though less so this last group. Clearly the RI report is correct in trying to frame a natural background for minerals and metals. The RI would be better to include a paragraph acknowledging the issue with establishing background for natural v anthropogenic chemicals.

The Department of Ecology data on dioxin levels in Washington also yields a mean (geometric) state-wide ambient soil dioxin level of about 0.98 ppt. The geometric mean for rural areas is even lower (0.24 ppt). The values presented in the figures and table should be presented against the state-wide geometric mean for comparison. The state-wide geometric mean needs to be used as the screening level or at least as one point of comparison. I am certain that the citizens of Port Angeles do not consider their community to be similar to Spokane, Tacoma or Seattle. I am also certain that the industrial activity in these three cities is far greater than in Port Angeles.

Metals

Rayonier fails to account for the differences between the sampling results in the RI and the earlier ESI results. The RI cannot simply discount the earlier samples (in the ESI) and claim that debris or site variability or sampling depth was the explanation. Without a coherent and convincing reason to not use the earlier data, all of the sampling information has to be included in the evaluation.

High concentrations of metals, particularly arsenic, copper, and lead are present at a number of sampling locations and are dismissed offhand. Rayonier claims laboratory contamination whenever concentrations exceed standards. If Rayonier followed their own procedures, then there is no way they can dismiss samples for contamination from metal debris etc. The first bullet in Section 4.1.2.1 states:

“The sample location was visually inspected to ensure the area was relatively free of debris and foreign objects.”

And the fifth bullet:

“The soils in the stainless steel bowl were inspected for non-soil material, which were removed from the sample.”

If these relatively standard soil sampling procedures were followed, no debris should have made it into soil samples to contaminate the testing process. Backhoe samples underwent similar precautions to those stated above. Based on this information, the values obtained from this sampling are accurate or Rayonier failed to follow its own sampling protocols. Include these data in the RI Report, as they potentially represent “hot spots” of contamination which need to be remediated.

The results indicate that arsenic is quite widely distributed across the site, despite the attempt to discount arsenic levels on the basis of some variable "background." The discussion on arsenic levels presents some ambiguity in the background levels and the regulations. The cleanup standards for residential, unrestricted use need to apply here and indicate a number of exceedances for arsenic.

Groundwater

The most glaring problem with the groundwater samples detailed in the RI is that no new samples have been taken since those taken in 2003 for the previous draft of the RI. Additional sampling could have revealed important trends. The identification of wells with increasing or declining concentrations of contamination could help evaluate the extent and scope of soil contamination at the site. Instead, regulatory agencies and the public are again not given the information required to adequately address the pollution at the site.

There are no groundwater monitoring stations over the screen room. In light of the current contamination of dioxins and other heavy metals as well as the discovery of a broken pipe with an unknown liquid in that area, more extensive groundwater monitoring should be performed at this location on the site.

The groundwater maps do show a pattern of contamination, though not the one that indicates a plume in a large area (Figure 3). Plotting the data from the figures in the RI report, based on the data tables as inserts, the results yield a number of wells that have several chemicals above the screening levels. The numbers of chemicals detected above screening levels in each well is shown in color coded fashion in Figure 3. Monitoring wells 51, 56, 57, 59, and PZ 3 all have 5 or more chemicals. This pattern is one of multiple chemical occurrence in a group of wells, four of which form a cluster and the other is near the shoreline. This summary needs to be included in the text.

The RI report does not include all the ground water results. Specifically, sulfate and manganese have been routinely found in well water over the years. These results should be presented in the RI report body, not just in the appendix.

We also recommend adding sulfate to the list of COPCs because it is a product of the industrial processes carried on at this site and sulfate is a source of bacterial production of hydrogen sulfide and carbon disulfide. Both of these gasses are poisonous to animal life including humans.

Groundwater contamination at the site appears to be directly influenced by contamination in overlying soils. At almost every location at the site, contaminants in groundwater match those in the soils above. More extensive groundwater monitoring in areas where soil contamination has been identified is required. Figure 4 plots the occurrence of both soil and groundwater contamination, essentially taking the data from figures 2 and 3 to show where they overlap. Some of these combinations are quite close, others are in proximity. It is clear from Figure 4 that several locations have both groundwater and soil

contamination. These locations should be considered “hot spots” of contamination that will need remediation in the upcoming feasibility study and cleanup plan. At least two of these sites, MW 51 and MW 56 are near the shoreline and more precisely located soil samples would greatly improve the understanding of any co-occurrence of the soil and groundwater contamination.

Air Modeling

The modeling of air emissions remains unchanged, and is just as unacceptable as it was before. We continue to express our dismay over the analysis of soil contamination off site, especially on the bluff and in the surrounding residential neighborhood. Notwithstanding the plan by the SMT to wait on off site soil sampling, the effort here does not provide the evidence needed to decide on no further sampling. The soil sampling by EPA in 1998 stills stands as unrefuted evidence of contamination. Additional soil sampling is needed in the community surrounding the mill site, analyzing for the compounds known or suspected in the mill emissions. We do not agree that the fact that some of the compounds may derive from other sources makes this known source free of responsibility for contaminating the residential properties.

Rayonier again shirks responsibility for its actions by blaming the highest soil concentrations on another source, a waste incinerator operational when the mill was active. Rayonier proposes this hypothesis because concentrations were higher than the modeled deposition rate predicted. It is important to note that Rayonier isn’t denying that its air emissions affected those locations, just the degree to which they did. Based on the evidence presented it can only be assumed that the model was wrong in its predictions. Rayonier should be held fully accountable for the cleanup of these off-site soils. Rayonier’s attempted confusion about the degree to which particular sources contributed to the contamination does not change the fact that the soils in those areas continue to be a threat to public health and the environment.

The Clean Air Hotline (CAH) took 3000 calls and took photographs of mill plumes to match with the calls between 1990 and 1995. These data overlapped with the excessive death rate data of 1990-1997 reviewed by the Washington Sate Department of Health and Eloise Kailin, MD. These data and the photographs of Olympic National Park provide empirical evidence of the distribution of Rayonier emissions and contaminants. The CAH data were submitted to DOE and OAPCA. The RI Report should incorporate these data into the analysis of deposition in the soils at residential, business, school and health facility locations import Angeles.

One key assumption of the model may be the reason for the underestimation of particulate deposition in some areas. The assumption that emissions from the electroscrubber inlet are representative of emissions prior to the installation of the scrubber may not be accurate due to changes in production rates or processes. Another problem with the air modeling is the assumption that only particulate deposition is a mechanism of depositing contaminants. A number of contaminants (dioxins, PAH’s, lead, mercury, SVOC’s, etc.) can volatilize and transport greater distances, depositing out

when the warm emission air cools to ambient temperatures or by evening cooling. These possibilities are not accounted for in the present RI report.

The RI report should have a discussion of the limitations of the ISCST3 model, including whether it is effective for these distances and for deposition of these chemicals. The comment on effectiveness of the model also needs to address the time period over which the emissions occurred- many decades. To address these flaws, Rayonier should either accept responsibility for contamination on the bluff or perform additional sampling to incorporate into a more accurate air model, and quickly, so as to not delay the cleanup process.

Dioxins

The main document has been revised to reflect the recent settlement requiring Rayonier to use the internationally accepted TEQ methodology. However, risks from dioxins are often painted in an unthreatening light or as inconsequential. There also appear to be significant differences between concentrations found during the earlier ESI sampling and the current round of samples taken for the RI [See Morgan's Table]. Rayonier offers no explanation for these differences before discounting the earlier samples. All ESI samples should be included in the RI's evaluation of dioxins.

The Terrestrial Ecological Evaluation does not appear to have been revised pursuant to the recent agreement regarding dioxins and the Rayonier site. This is completely unacceptable. Rayonier has had ample time to revise this document using the internationally accepted TEQ methodology, so there is no excuse for them not to do so. ESC in conjunction with environmental groups from around the state have repeatedly outlined how and why the MTCA approach used in the Terrestrial Ecological Evaluation significantly underestimates risks posed from dioxin-like compounds. We have attached the correspondence and white papers that have been prepared and previously submitted outlining these flaws.

The TEE also does not follow the official EPA framework for the handling of dioxins in an ecological setting. These guidelines were set out in a 2003 EPA document titled "Framework for the Application of the Toxicity Equivalency Methodology for Polychlorinated Dioxins, Furans, and Biphenyls in Ecological Risk Assessment" (EPA 2003). In the absence of state guidelines or when they are in dispute, the federal guidelines should be used.

There is significantly more uncertainty in the hazard quotient index approach than the TEQ approach, and also places a greater emphasis on comparative soil concentrations than verified toxicological data. Please reference attached dioxin information. Even as Rayonier uses this more relaxed approach, they do not respect its findings. Hazard indices over one are representative of unacceptable risks to wildlife, but Rayonier dismisses the hazard indices for shrews and voles in the west mill area because they are apparently not far enough above one. The standards used in the hazard index methodology are levels assumed to be greater than the "*de minimus*" claimed in the

evaluation. These effects would also not be as localized as Rayonier claims, with both shrews and voles being prey species for the various raptors that may forage in the area. The Terrestrial Ecological Evaluation needs to be revised before the final draft to be in compliance with the agreement to use the TEQ methodology. Anything short of this would be unacceptable.

The Terrestrial Ecological Evaluation (TEE)

Beyond the problems mentioned above regarding the methodology for measuring dioxin toxicity, the Terrestrial Ecological Evaluation (TEE) is flawed in a number of other ways. The TEE contains no evaluation of higher predators such as raptors, otters, or other high level carnivores as if they do not occur at the site. This is completely inappropriate and has not changed since the last draft of the document. These species are the most susceptible to the biomagnification of persistent compounds like dioxins and PCBs, both of which are found in significant concentrations throughout the site. Representative species of these types of organisms should be included in the TEE.

One flaw of the current plan is that Rayonier examines the uplands and marine habitats separately. For bald eagles and a number of other species that forage in both environments, this greatly underestimates risks for them by not combining the risks from the two ecosystems. The level of interaction between the two can be significant (Polis et al. 2004), and should not be overlooked.

Rayonier does not include sufficient evaluation of threatened and endangered species as legally required. For example, Section 2.1 states: “The marbled murrelet is listed as both threatened on both federal and state lists and may forage within the bay, but numbers documented during the Puget Sound Avian Monitoring Project flights are low.” Marbled murrelet numbers are threatened *because* its numbers are low. For Rayonier to discount a threatened species because of insufficient population densities is the height of irresponsibility. Another example of Rayonier’s cavalier attitude regarding endangered species involves bald eagles foraging on the site: “The mere presence of eagles does not indicate that they are exposed to chemicals found in the site soil.” This fact doesn’t indicate that the birds aren’t either. The assumption should be made that if they are present at the site they are foraging there. These sorts of intellectually dishonest approaches to wildlife protection have no place in a document such as this.

There was also a significant problem in the evaluation of contaminants contained within earthworm tissues. Rayonier used ash soluble analysis to eliminate the influence of contaminated soils contained in the worm’s digestive tracts. Purging soils from the worm’s guts is not appropriate for incorporating the earthworm samples. Robins do not remove the soil from earthworms before they are eaten, so Rayonier should not do so in its sampling either. This is especially pertinent since negative values of some contaminants were obtained using the ash-soluble analysis, further indicating the unreliability of this methodology. Earthworm samples should be retaken and analyzed in a way that includes contributions from soils within worm digestive system.

Even with its flaws the data in the TEE still indicates that action should be taken at the site to protect wildlife. Contrary to Rayonier's claims, remedial action is required in all sections of the site based on Rayonier's own hazard indices. Still, the number of unfounded and inappropriate assumptions is discouraging, and these problems should all be rectified before the release of the Final Upland RI Report. This is particularly true regarding dioxins and the inappropriate methodology used to evaluate them. Rayonier appears to openly be flaunting both Ecology and the legal agreements that it has made, which is unacceptable.

SPECIFIC COMMENTS

Section 3

Section 3.1.3: There should be more information regarding the remediation of the Hog Fuel Pile. In particular, the effectiveness of the 2001 and 2002 excavations need to be discussed. Text should be inserted into the last paragraph of this section regarding any monitoring since that action as well as current contaminant levels.

Section 4

Section 4.1.4, page 4-6, last dash bullet: Why weren't wood chips sampled? They were on the surface and accessible to both human and ecological receptors. It is inappropriate to take a deeper sample in this instance.

Section 4.1.4, page 4-6, second to last bullet: Location SR21 should be resampled with an effort to obtain enough soil for conventional analysis. Many of the compounds in that suite have been detected at levels exceeding cleanup standards at other locations on the site. If the only requirement to close this data gap is a sample with more soil, then there is no reason to not test this location for those compounds.

Section 4.1.4, page 4-7: The contents of the green pipe encountered during the excavation at location SR23 should be analyzed. A common byproduct of paper mill operations is a black liquor like fluid similar to the one encountered. The fluid has caustic properties and frequently contains high levels of chlorides and other harmful compounds. It is worrisome that the pipe was capped and no further action taken especially considering that a cleanup action is in progress at the site. Further investigation is required.

Section 4.2.9, page 4-10 and 4-11: Why were conventionals like tannins and ammonia sampled from PZ-7? If there was limited sample volume why not focus on COPCs?

4.2.10: ESC and the Olympic Environmental Coalition agree that all wells need to be tested for the full suite of chemicals. In the case of monitoring well PZ-7, PCBs should have been included because they are considered a priority pollutant for the site. PCB compounds should be measured across this site because PCB's are known contaminants here.

Section 4.4.6, page 4-15, first bullet: Acid insoluble ash analysis is inappropriate for earthworms. Wildlife consuming the worms would also ingest soils contained in their guts.

Table 4-1: The type of the fluid discovered in the pipe at location SR23, where that pipe leads, and the state of soils and groundwater around that location should all be considered data gaps. Current data shows high levels of dioxins and other compounds in the soils in the screen room. These data gaps should be closed by positively identifying the contents of the pipe in question, determining the location of the rest of the pipe-work, and a further characterization of the soils and groundwater in the area.

Section 6

6.2.2: Screening page 6-7 to 6-8 This section lists two SVOCs, 2 PAHs, six metals, pesticides, PCBs, and ammonia as COPCs on page 6-7. Manganese is notably lacking from this list, despite the fact that it is elevated in soils and has been found in high concentrations in waste removed from the mill site. We recommend adding manganese to this list and analyzing manganese in archived groundwater samples. Manganese is not listed as an analyte in Appendix A and was not measured, but this omission is a flaw and Mn needs to be measured in groundwater and soil across the site.

Section 6.3.2: With MW-11 abandoned, there is no clear evidence that total petroleum hydrocarbons (TPHs) do not pose a risk to the ecosystem. Reactivation of MW-11 should be considered to assess the extent of TPH contamination before it is removed from the list of COPCs.

The Terrestrial Ecological Evaluation

Section 2.2 page 2-6, first bullet: Most predators forage over large areas, so determining locations with “sufficient prey base” is inappropriate. If prey are present, then they could be consumed.

Section 2.4: Why is this section even mentioned if all the information relevant to it is to be included in an appendix? It should all be moved from the appendix to the main document.

Section 2.6, page 2-13, first full paragraph: “Chemical concentrations are generally highest near the surface.” There are a number of soil samples on site where this is not the case. While grasses should be included as an indicator species, other plant species with deeper root systems should have also been included in the evaluation.

Table 2-9: Why is manganese not on this table? Regardless of the results of Rayonier’s evaluation it should be included.

Table 2-10- This table should have “compare concentrations to toxicological thresholds/NOAELs” for each species included in the process. This is a common sense step and it is odd that it is not included.

Table 3-2: Manganese is again not included in this table, but should be measured on site. See comment on Table 2-9.

Section 4.2.1.1.4, page 4-11, top paragraph: Where was the .66 ft value regarding impacted soils obtained from? Is there evidence to support this assertion?

Section 4.2.2.1, pg 4-17: The Oakridge Labs data are almost 10 years old. More recent data are needed.

Page 4-18, first bullet: All dioxins listed by WHO and examined in this document have Ah-receptor toxicity. This passage is misleading and should be amended.

References

EPA. 2003. Framework for Application of the Toxic Equivalence Methodology for Polychlorinated Dioxins, Furans, and Biphenyls in Ecological Risk Assessment. EPA/630/P-03/002A.

Polis et al. 2004. Food Webs at the Landscape Level.

Van den Berg et al. 2006. The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. Toxicological Sciences. 93: 223-241.

Figure 1: Potential Souces of Contamination

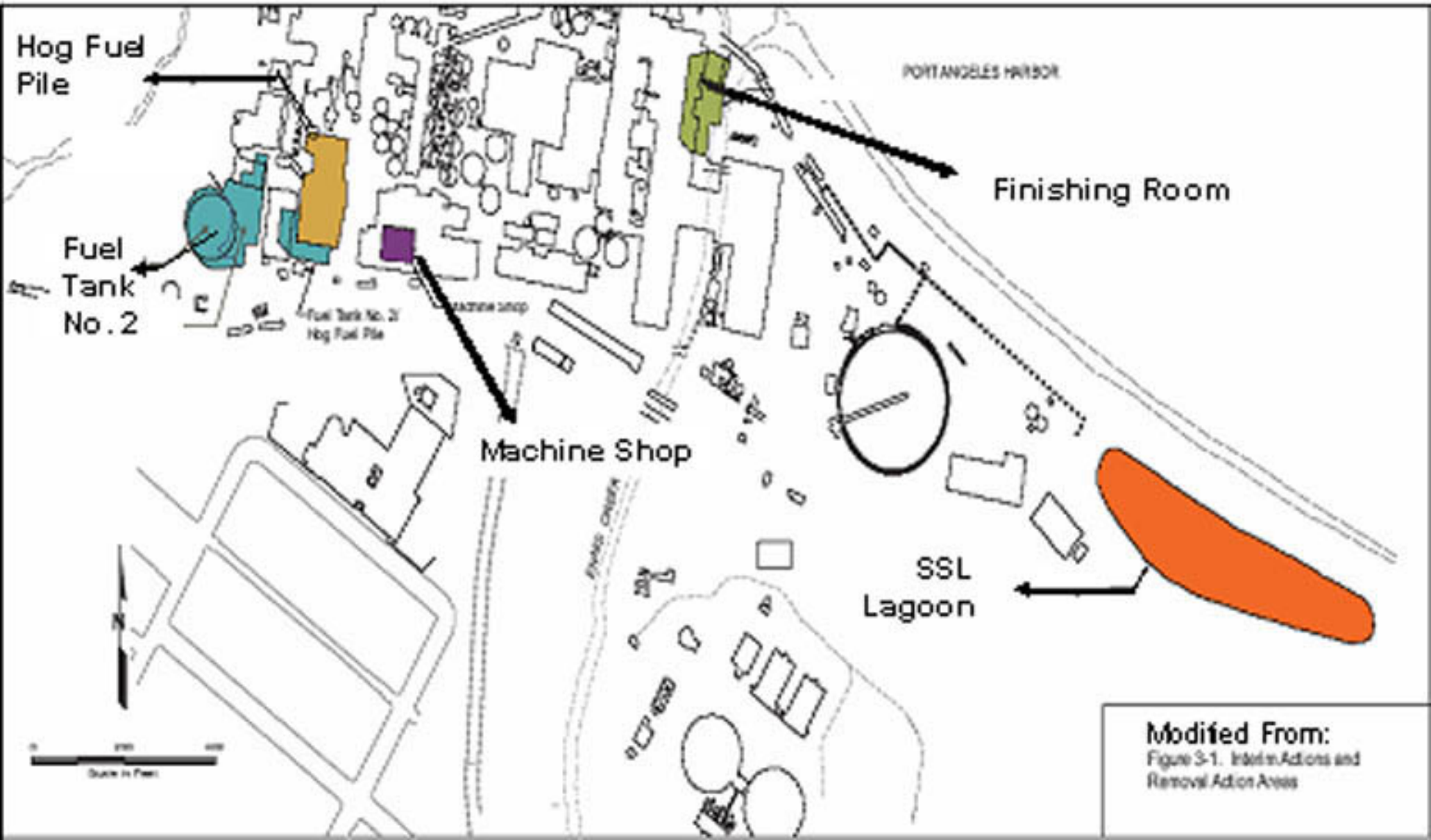

Figure 2: Extent of Soil Contamination

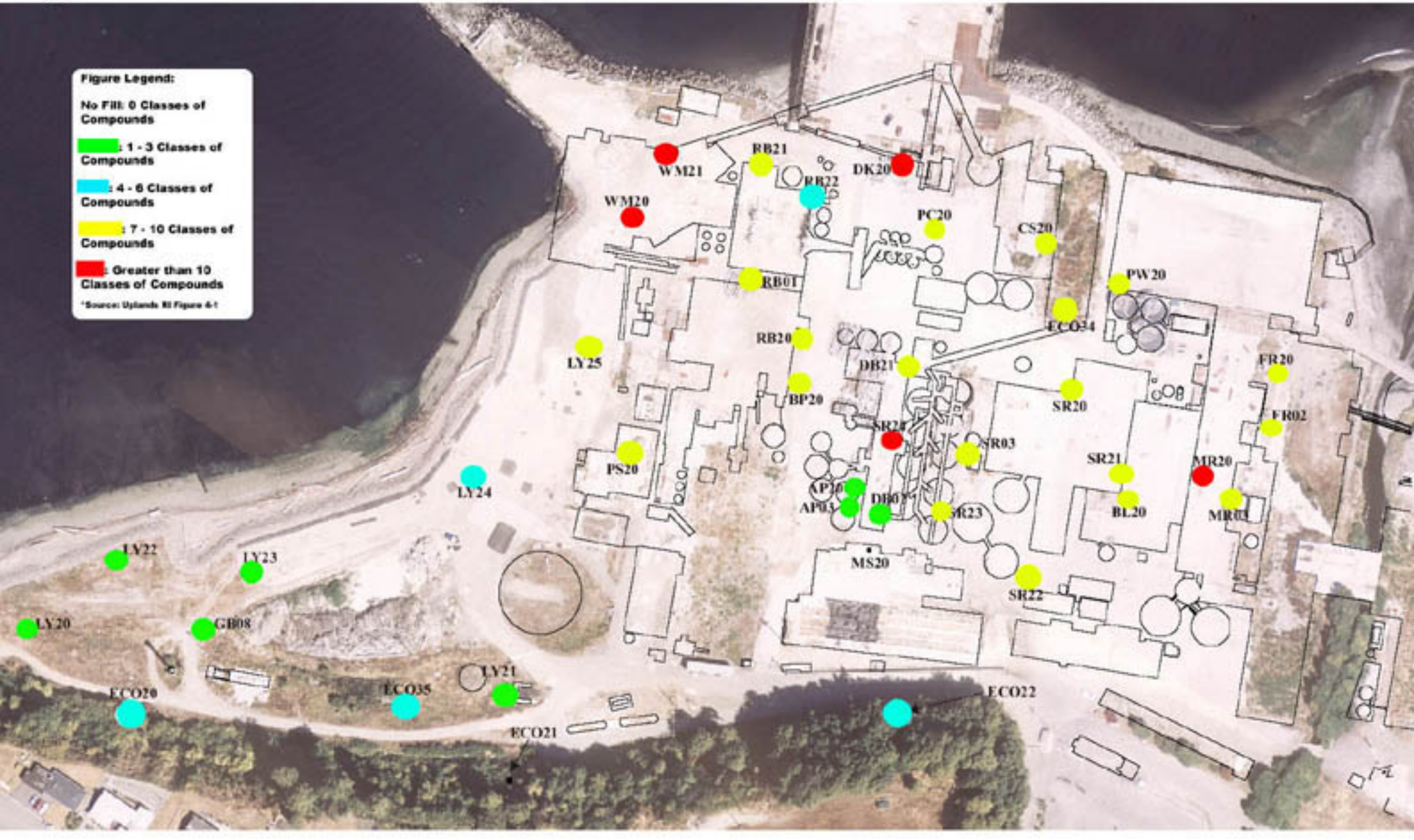

Figure 3: Extent of Groundwater Contamination

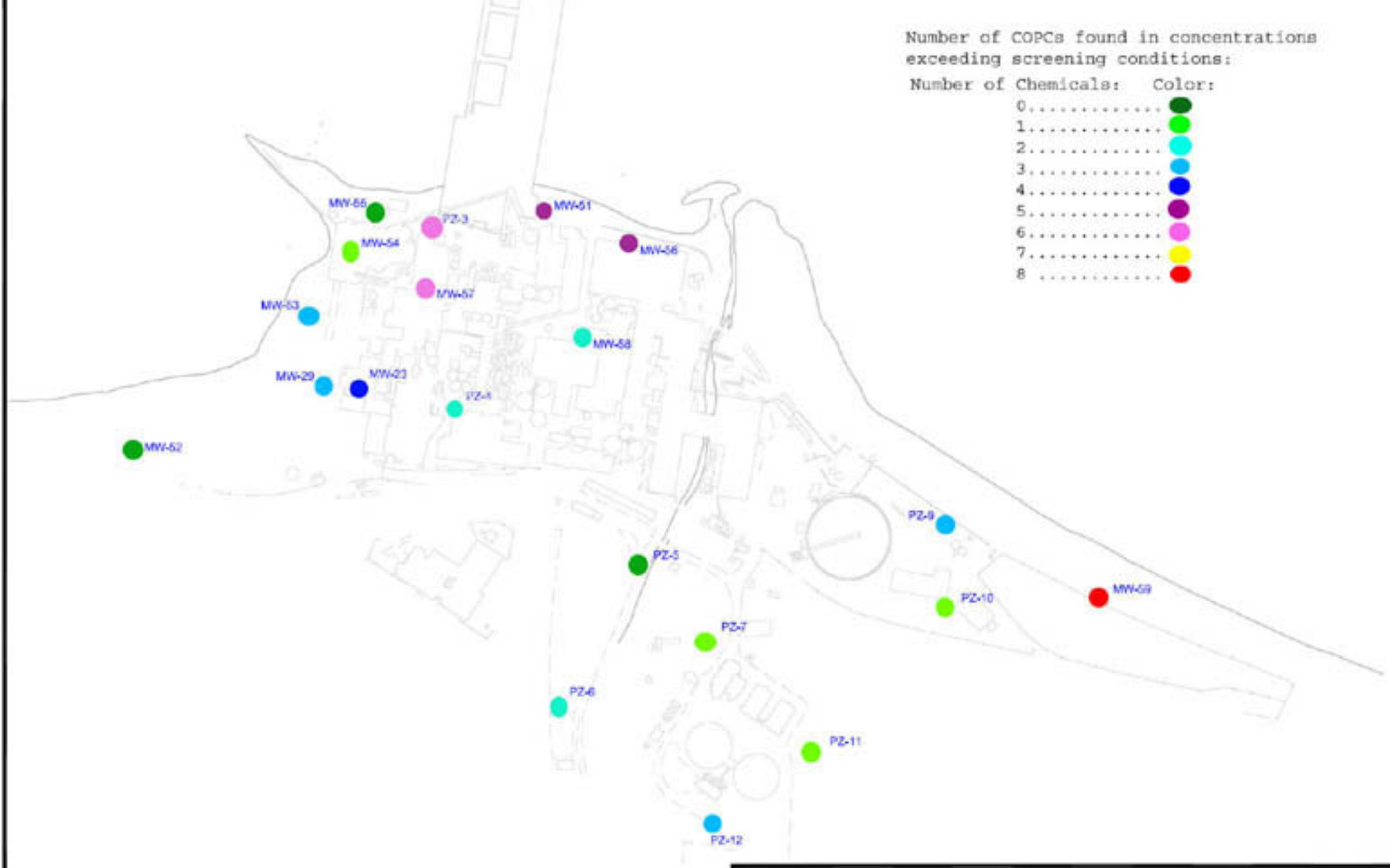

Figure 4: Co-occurance of Soil and Groundwater Contamination

Figure adapted from Uplands Remedial Investigation Figure 6-45.

Black font signifies Groundwater Sampling Location

Blue font signifies Soil Sampling Location

Red dots indicate common chemicals present in both Soil and Groundwater Sampling Results

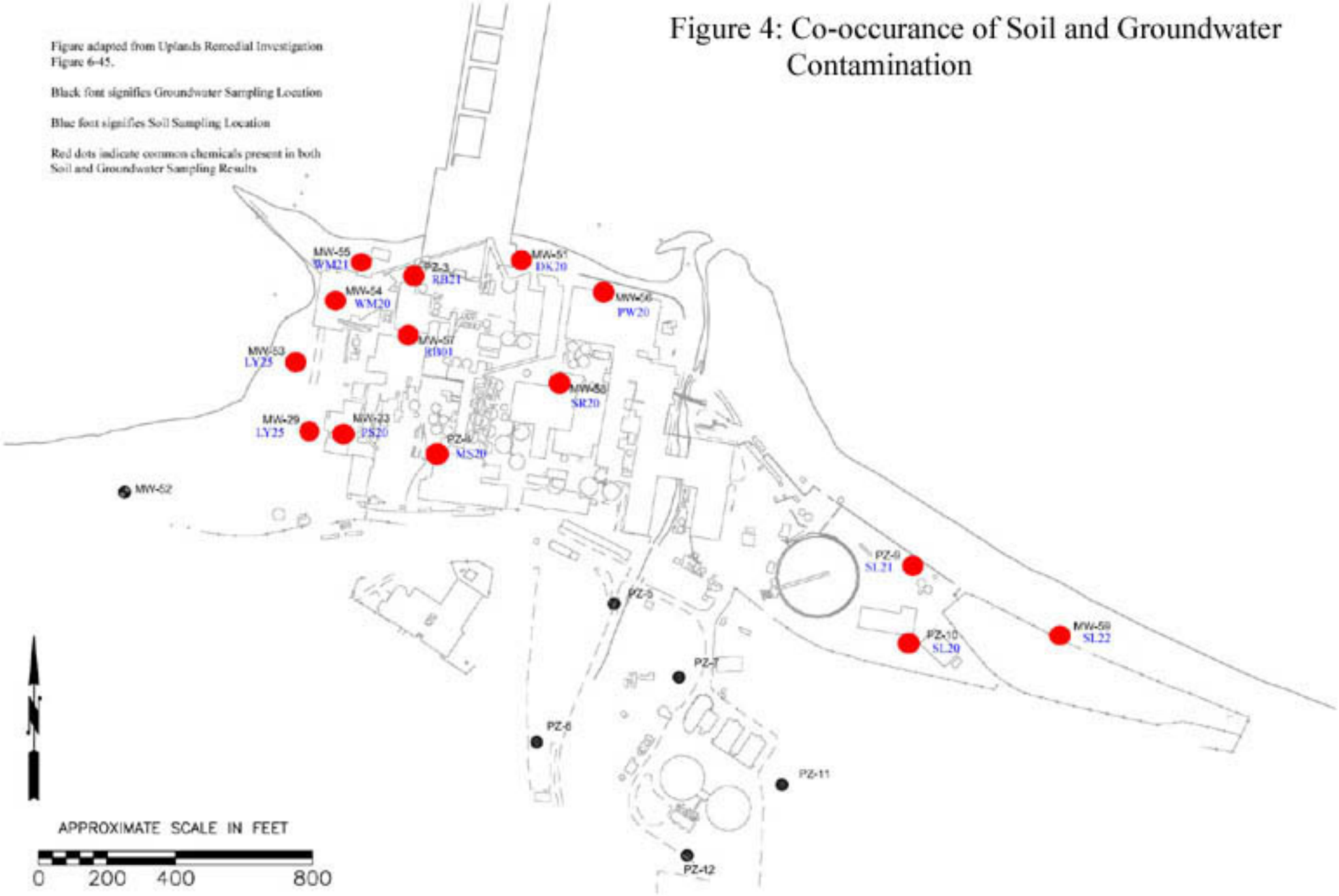

Figure 5a: Dioxin Contamination in Western Portion of Site

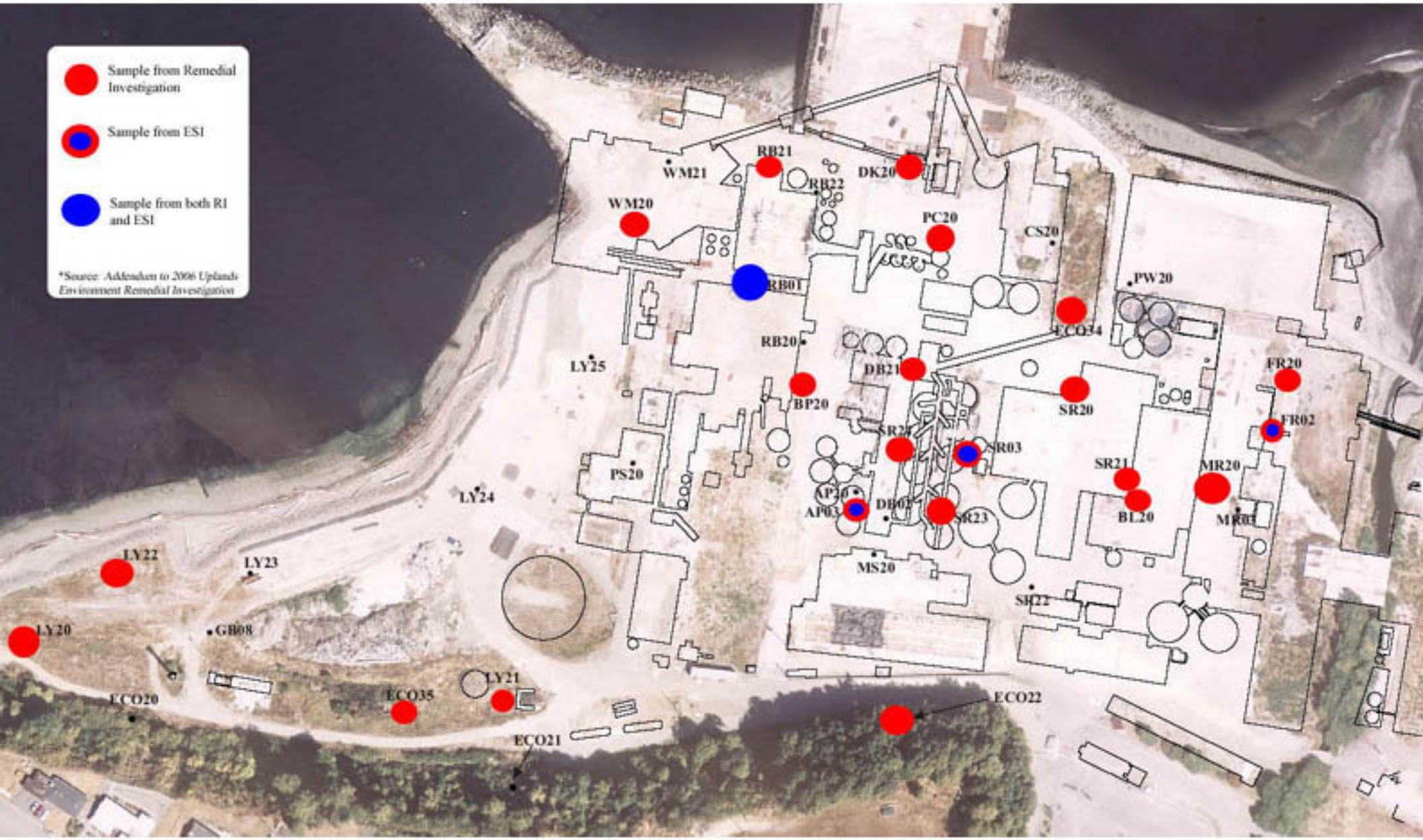
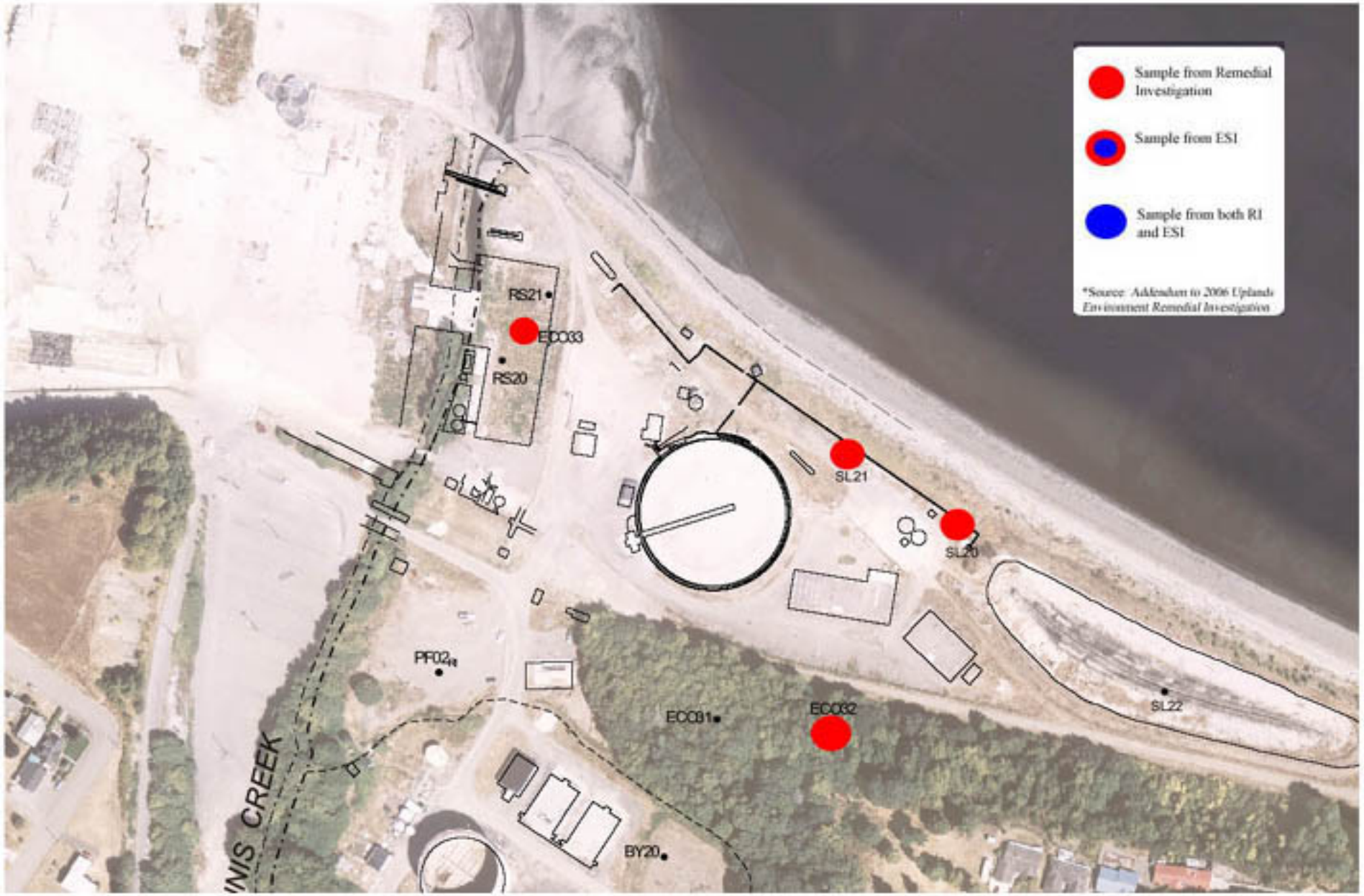
Figure 5b: Dioxin Contamination in Eastern Portion of Site