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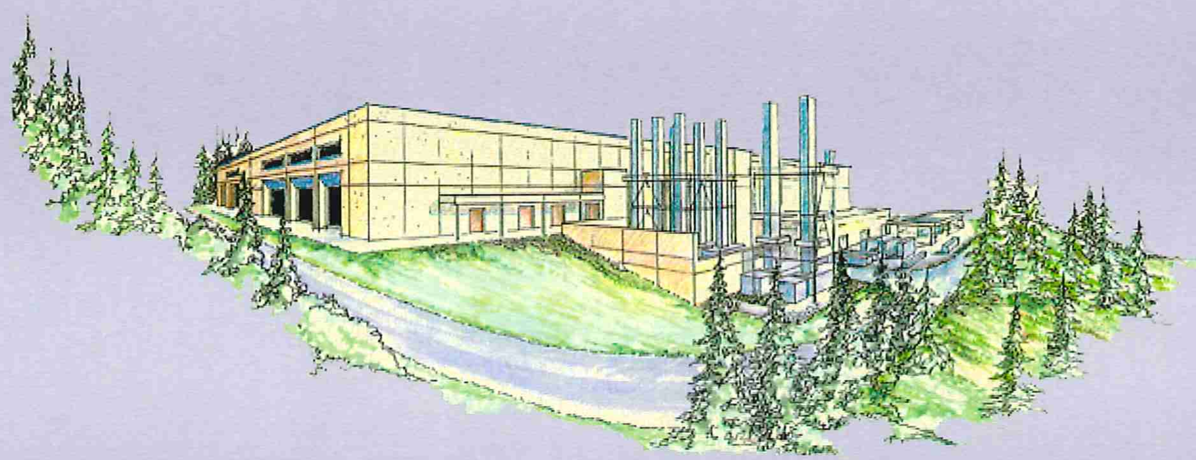
MASCA Plant



Building D Expansion

Final Supplemental Environmental Impact Statement

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DAVID EVANS AND ASSOCIATES, INC.

Supplemental Environmental Impact Statement

MASCA Puyallup Plant
Building D Expansion
(*Puyallup Science Park*)

PREPARED FOR:

City of Puyallup
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Puyallup, Washington 98371

Matsushita Semiconductor Corp. of America
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LIST OF ACRONYMS

Acronym	Definition
ASIL	Acceptable Source Impact Level
AWN	Acid Waste Neutralization
BACT	Best Achievable Control Technology
cfs	Cubic feet per second
City	The City of Puyallup
COE	US Army Corps of Engineers
CSP	Safety professional
dbh	Diameter at Breast Height
DI	De-ionization
DNR	Washington Department of Natural Resources
DOE	Washington Department of Ecology
ECS	Emergency Control Station
EDNA	Environmental Designation for Noise Abatement
EIS	Environmental Impact Statement
EPA	US Environmental Protection Agency
ERT	Emergency Response Team
F/P/A	flourides, phosphates, and ammonia
gpm	gallons per minute
HAP	Hazardous Air Pollutant
HLA	Harding, Lawson and Associates
HPM	Hazardous Protection Material
MASCA	Matsushita Semiconductor Corporation of America
MG	Million gallons
MGD	Million gallons per day
MSDS	Material Safety and Data Sheets
NFPA	National Fire Protection Association
NOC	Notice of Construction
NPDES	National Pollutant Discharge and Elimination System
PFD	Puyallup Fire Department
POTW	Publicly Owned Treatment Works
PSAPCA	Puget Sound Air Pollutant Control Authority
RO	Reverse Osmosis
SCBA	Self Contained Breathing Apparatus
SEIS	Supplemental Environmental Impact Statement
SEMI	Semiconductor Equipment Material Information
SEPA	State Environmental Policy Act
SMACDP	Synthetic Minor Air Quality Discharge Permit
SR	State Route
TI/RE	Toxicity Identification/Reduction Evaluation
UBC	Uniform Building Code
UFC	Uniform Fire Code
UMC	Uniform Mechanical Code
VOC	Volatile Organic Compounds
WAC	Washington Administrative Code
WET	Whole Effluent Toxicity
WLA	Waste Load Allocation

FACT SHEET

Project Title	MASCA Puyallup Plant Building D Expansion.
Proponent:	Matsushita Semiconductor Corporation of America (MASCA)
Proposed Project:	The project entails expansion of the MASCA Puyallup plant. Actions planned include construction of a semiconductor wafer fabrication building (Building D) and an associated accessory buildings. A second waterline will be extended from 39th Avenue SE to a new accessory building. The expansion will increase production from an average of 17,000 wafer-outs per month to 40,000 wafer-outs per month by 1998.
Project Location:	Matsushita Semiconductor Plant, 1111 - 39th Avenue SE, Puyallup, WA 98374.
Purpose:	The expansion will increase production of the existing MASCA site from an average of 17,000 wafer-outs per month to 40,000 wafer-outs per month by 1998.
Lead Agency:	City of Puyallup
SEPA Official:	Mike Casey, AICP, Community Development Director City of Puyallup
Contact Person:	Tom Utterback, AICP, Planning Manager City of Puyallup 218 West Pioneer Puyallup, WA 98371 (206) 841-5557
Licenses Required:	City of Puyallup Grading Permit Building Permit NPDES Construction Permit Notice of Construction Permit

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The Public Hearing on the Draft SEIS was held on Wednesday, July 31,1996 at Ferrucci Junior High School, 3213 Wildwood Park Dr., Puyallup, Washington. Appendix A, immediately following the text of the FEIS contains the responses to substantive comments received at the hearing or in writing. Changes to the text of the SEIS resulting from the comments or further analysis have been marked by a vertical line in the left margin

Location of Subsequent Environmental Review:

The SEPA checklist for the MASCA Building D expansion project is available at the City of Puyallup and the Washington Department of Ecology.

The Puyallup Science Park EIS is available at the City of Puyallup or at Washington Department of Ecology.

Date of Issue of Draft SEIS: July 16, 1996

The Public Comment Period on the Draft SEIS ended August 15, 1996.

Date of Issue of Final SEIS: September 16, 1996

End of Appeal Period: September 26, 1996

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SECTION 1.0 INTRODUCTION AND SUMMARY OF FINDINGS

1.1 PURPOSE AND NEED FOR THE PROJECT

The project entails expansion of the Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant. The MASCA plant is located at 1111 - 39th Avenue SE, Puyallup, Washington (Figure 1-1). Actions planned include construction of a semiconductor wafer fabrication building (Building D - 287,000 square foot) and associated accessory buildings. Completion of a wastewater treatment plant expansion will be carried out in accordance with the building permit already issued. A second waterline will be extended from 39th Avenue SE to a new accessory building and a second tightline for discharge into the Puyallup River will be installed. The expansion will increase production from an average of 17,000 wafer-outs per month to 40,000 wafer-outs per month by 1998.

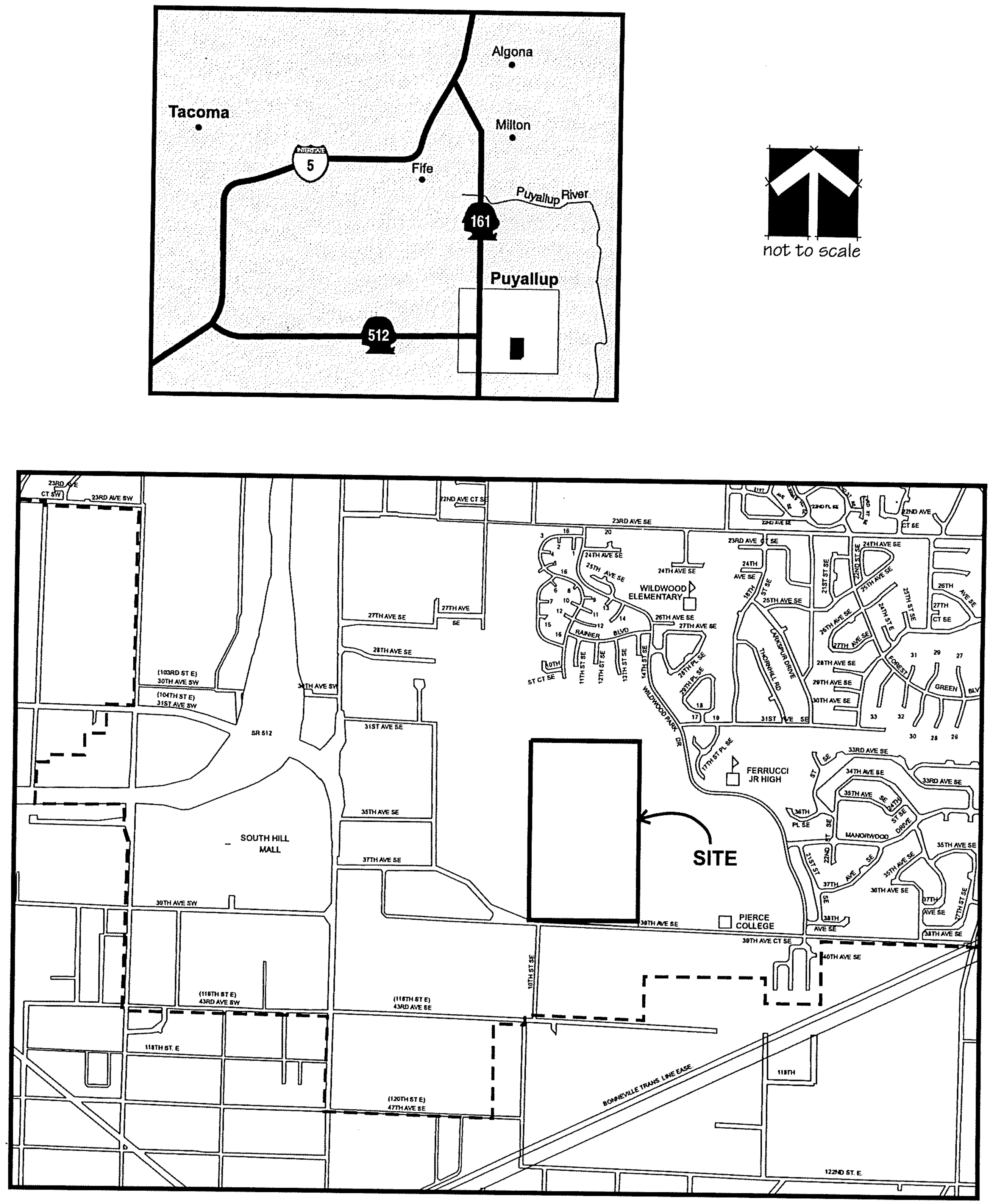
1.2 HISTORY OF SITE

A Draft Environmental Impact Statement (EIS), for the development of the Puyallup Science Park -- a high technology manufacturing facility of solid state memory, integrated circuits was published on December 23, 1980. The manufacturing facility was to include wafer fabrication; assembly of the integrated circuit chips on a frame, packaging, and electrical testing; and finishing of the integrated circuit components for customer distribution. The City of Puyallup (City) issued the Final EIS in February, 1981 (referred to as 1981 EIS). The Fairchild Camera and Instrument Company (Fairchild) were the original owners and developers of the Puyallup Science Park. Since the 1981 EIS, the facility has changed owners twice: National Semiconductor purchased the site in October, 1987, and MASCA acquired the site in February, 1991. In May, 1981, the City and the then owner Fairchild, entered into a Concomitant Agreement. The Concomitant Agreement is still in effect for the site today, and has been included as an Appendix.

In 1981, the facility was proposed at a conceptual level realizing the final building layout would evolve over time. Figure 1-2 is the Conceptual Development Plan. The ten-year development program was expected to be constructed in five major phases as shown on Table 1-1.

Table 1-1
Phases of Site Development

Phase	Year	Building Type	Building Size
I	1981-83	Fabrication and mechanical core	150,000 square feet
II.	1984	Fabrication	90,000 square feet
III.	1985	Office	90,000 square feet
IV.	1986	Office	90,000 square feet
V.	1990	R & D	100,000 square feet
		Total Building Size	**520,000 square feet**



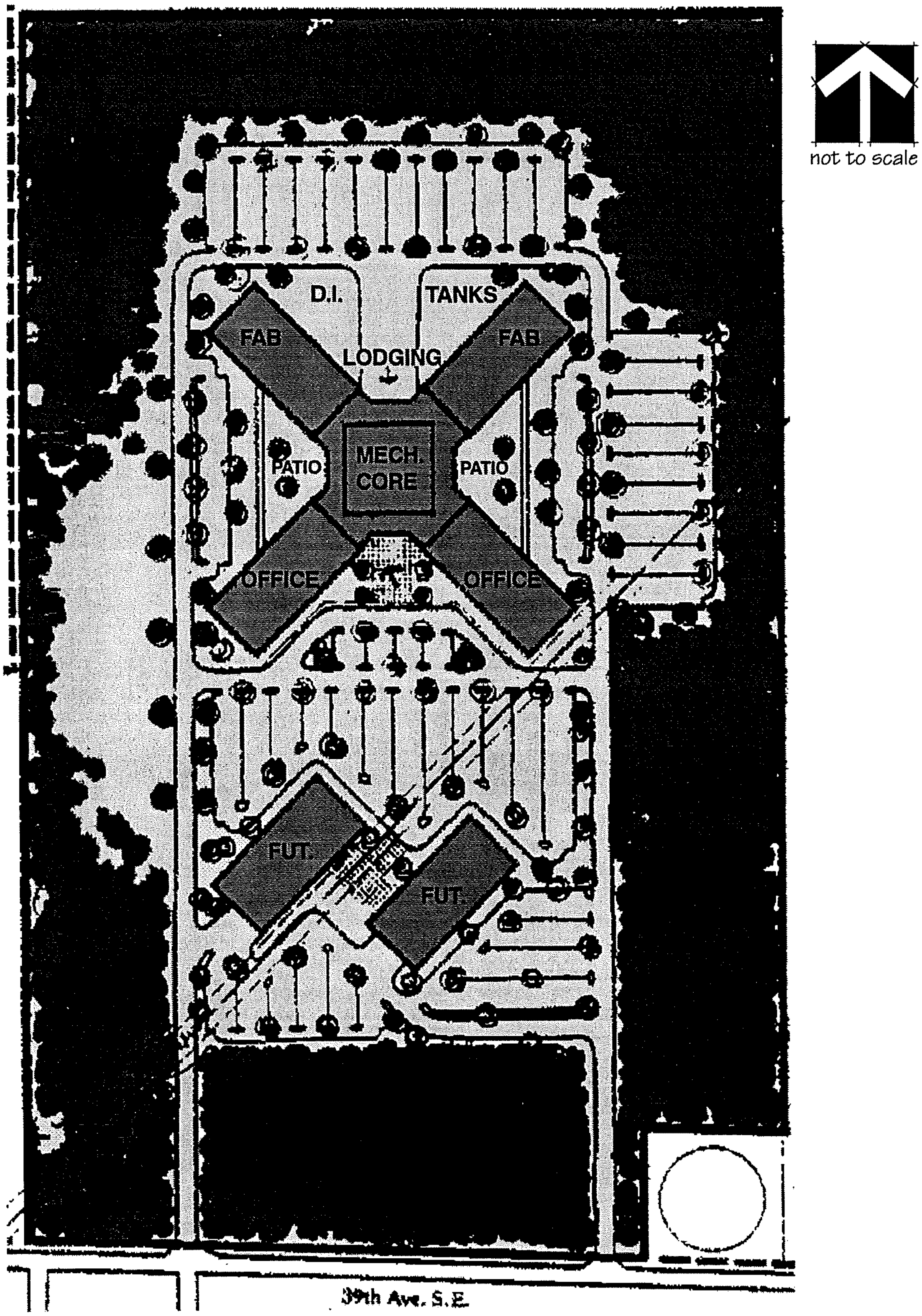
Source: *City of Puyallup*

Figure 1-1:
Vicinity Map

MASCA

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT



Source: *Puyallup Science Park, City of Puyallup, 1980*

Figure 1-2:
1980 Conceptual Master Plan

1.2.1 Structure Development

There are currently seven buildings on the site: A, B, C, DI, H and J (Figure 1-3). The City of Puyallup issued construction permits as follows:

Building A and Building B	September, 1981
Building H (chemical building)	March, 1982
Building DI (water treatment)	March, 1982
Building C (wafer fabrication)	October, 1984
Building J (bulk chemical distribution)	September, 1991
Building K (gas cylinder storage)	July, 1991

Originally, Building A was the central wafer fabrication facility. In 1981, it had utilities in its basement and interstitial level, wafer fabrication on the first floor, and offices and wafer testing on the second floor. This changed after the company received notice from the Puyallup Fire Department (PFD) in September 1990, that the fabrication facility (Building A) was not up to current code requirements, and the facility would have to be retrofitted. The cost of retrofitting the fabrication facility was determined prohibitive. Since the site already had another wafer fabrication facility (Building C), MASCA decided to discontinue wafer manufacturing in Building A and converted the first floor to assembly testing in June 1991. This use continues today.

Building C housed assembly testing on the first floor and offices on the second floor when first constructed in 1985. In 1988, under then-owner National Semiconductor, the building was converted to a second wafer fabrication facility. Building C contained 20,964 square feet of wafer fabrication facilities on the first floor and utilities on the second floor. The new fabrication facility increased the company's wafer output and usage of hazardous materials. The City of Puyallup contracted with the Auburn Fire Department to provide support for any hazardous material incidents.

Changes in Building B occurred to support the changing uses of the other two buildings. In 1981, Building B housed utilities in its basement and offices and utilities on the ground floor. The first floor was converted in 1991, to assembly testing support and utilities. This use continues today.

1.2.2 Current Use

MASCA continues to manufacture, assemble, and test silicon wafers at the facility. It also continues to operate the on-site wastewater treatment plant which was designed to treat wastewater from fabrication facilities producing up to 20,000 wafer-outs per month. Since March 1994, the facility has produced an average of 17,000 wafer-outs per month. The facility encompasses five buildings, an electrical substation, a wastewater treatment plant, water storage tanks, cooling towers, scrubber exhaust fans, and electrical equipment. The plant currently employs roughly 400 people.

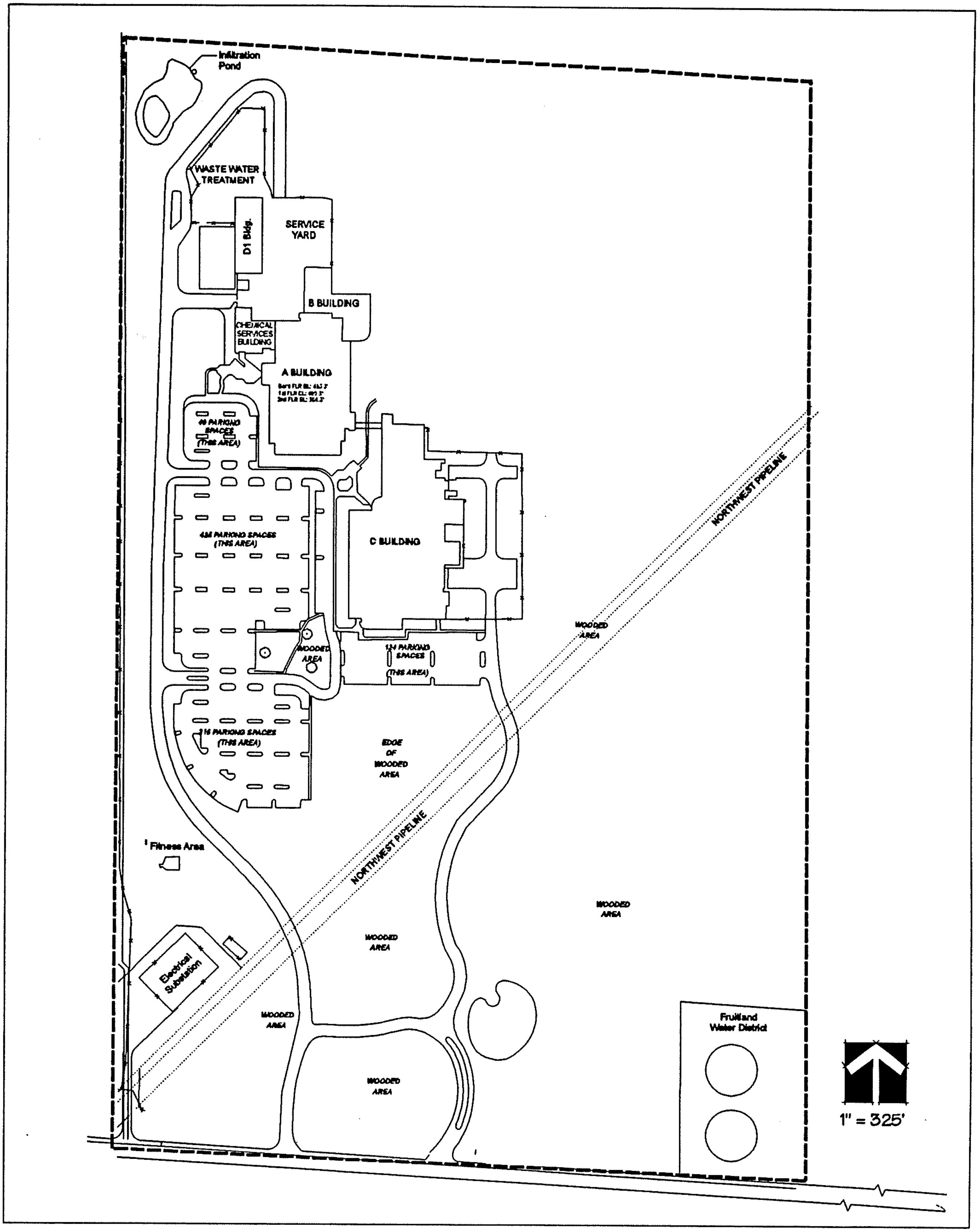


Figure 1-3:
Existing Site Plan

The current development of the site is shown on Table 1-2 and Photo 1-1.

Table 1-2
Current MASCA Development

Usage Breakdown	Square Feet
Building A	
Basement - Utilities	35,100
1st Floor - Assembly/Facility/Hall/Bath	48,300
1st Floor - Assembly Expansion	14,200
2nd Floor - Sort/Facility/Hall/Bath	18,900
2nd Floor - Raised Floor/Lab/Office Expansion	35,100
Building B -	
Utilities	30,900
Building C	
1st Floor - Wafer Fabrication/Backgrind Clean Room	39,000*
1st Floor - QA Areas	6,800
1st Floor - Office/Facility/Hall/Bath	48,100
2nd Floor - Cafeteria	9,200
2nd Floor - Office/Laundry Facility/Hall/Bath	81,800
Building G	
DI Water	12,400
Building H	
Chemical Stores	7,700
Building J	
Bulk Chemical Distribution	3,200
Building K	
Gas Cylinder Storage	1,900
TOTAL	**392,600**

*39,000 square foot Clean Room area includes: 14,300 square foot Class 1 Process Bays; 23,200 square foot Class 1000 Service Chase; and a 500 square foot Class 100 Backgrind

MASCA

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Source: *Soundview Aerial Photography, March 1995*

Photo 1-1:
Aerial Photo

1.3 ANALYSIS FRAMEWORK

In 1995, MASCA prepared a State Environmental Policy Act (SEPA) Environmental Checklist (95-31-023) that covered the proposed Building D expansion. The City of Puyallup determined that the project could have a significant adverse effect on the environment, and requested that a Supplemental Environmental Impact Statement (SEIS) be prepared. Scoping has been completed and the following issues have been identified for analysis in the SEIS:

Air Quality -- MASCA currently operates without air pollution controls on the solvent fans vent. Air emissions are likely to increase with the proposed expansion. The concern was raised over MASCA's compliance with existing air quality standards and the related health issues associated with air emissions. Therefore, an additional issue (Air Quality) as been identified and included in the analysis of this SEIS

Stormwater -- The project proposes changes in the physical layout as well as increased usage of chemicals. An assessment is needed of the potential impacts related to (1) the possible surface/groundwater conveyance of contaminated runoff on- and off-site, and (2) the potential for processed/industrial wastewater conveyance on- and off-site.

Plants and Aesthetics -- The project proposes to disturb a 75-foot wide tree buffer along the northern perimeter of the site. The issue raised in scoping was the potential for retention or other revegetation measures that would buffer/screen the site. The proposed project involves a taller "Building D" than was evaluated in the 1981 EIS. There is a concern about off-site visual impacts, given the current and potential adjacent land uses.

Environmental Health (*Emergency Response Capabilities*) -- The project contains a more defined description of the physical plant and operations, with a greater emphasis upon manufacturing use than was evaluated in the 1981 EIS. Broader use of hazardous materials is proposed than earlier projected, although the proposed project does not include any chemical manufacturing on-site. As a result, evaluation of the following issues is required:

- A review of any recent hazardous materials incidents;
- An assessment of the risks to the community posed by the existing manufacturing facility including hazardous material storage, on- and off-site transport, and usage;
- An assessment of MASCA's emergency response program; and
- An assessment of the PFD's hazardous materials response capabilities.

Environmental Health (*Odor*) -- Changes in the physical layout and operations of the plant may result in increased odors at the property perimeter and off-site, above the level analyzed in the 1981 EIS. The SEIS will analyze the odors generated from the solvent exhaust system at MASCA. Analysis is needed of vapor concentrations at MASCA building makeup air intakes, at property lines, and at the limits of the City's "Light Manufacturing" zone under typical and worst case conditions.

Environmental Health (*Noise*) -- Changes in the physical layout and operations of the plant may result in potential noise impacts at the property boundary and off-site beyond those analyzed in the 1981 EIS.

Utilities (*Sanitary Sewer*) -- The 1981 EIS evaluated the sanitary sewer and industrial waste treatment for the plant at a conceptual level. The proposed project is expected to result in an additional quantity of sewage beyond that estimated in the 1981 EIS as well as changes in the type of effluent in the system. Analysis of the quantity and quality of expected effluent in terms of the existing and proposed treatment and conveyance systems is needed.

Utilities (*Water*) -- The proposed project is anticipated to result in a different domestic, manufacturing, and fire flow domestic water demand from that analyzed in the 1981 EIS. There are three water purveyors on-site or in the immediate vicinity: City of Tacoma, City of Puyallup, and Fruitland Mutual. The SEIS will analyze the supply and demand for manufacturing and domestic usage during peak flow times in terms of the existing and proposed conveyance system and water entitlements.

A substantial amount of planning and environmental investigation has already occurred for this facility. Plans, documents, and personal communications used in this analysis as appropriate and incorporated into this Draft SEIS by reference are listed in Section 4. References. Copies of these reports are available for review at the City of Puyallup or at MASCA.

This SEIS analyzes the effects of the proposed Building D expansion in terms of the issues identified above. In addition, the analysis includes the effects arising from its relationship to the surrounding area.

1.4 SUMMARY OF FINDINGS

1.4.1 Air Quality

MASCA currently operates without air pollution controls on the solvent exhaust fans. MASCA proposes to install a Volatile Organic Compounds (VOC) thermal abatement system for the existing Building C and the proposed Building D solvent fans vents. MASCA has applied for a Notice of Construction (NOC) permit from Puget Sound Air Pollution Control Agency (PSAPCA) for the facility. PSAPCA will use the Building C VOC permit application to ascertain the current status and obtain the compliance of the proposed expansion (Building D). As a condition of approval for the permits, PSAPCA will continue to require MASCA to examine their entire chemical usage, process flow, and acid scrubber efficiency; and update all chemical inventories, Material Safety and Data Sheets (MSDS), and emission inventories; and investigate the air pathways for silica-containing compounds. Installation of the VOC thermal abatement system will effectively mitigate air quality impacts, and prevent MASCA as being classified as a major air emissions source.

1.4.2 Stormwater

Any increase in stormwater runoff will contribute to localized flooding the middle and lower area of the State Highway Basin (See Figure 3-1 in Section 3.2). The original concept of using infiltration to avoid increases in surface runoff is not working as planned because much of the infiltrated water re-surfaces within a short distance of the detention pond; and rather than substantially reducing the quantity of runoff flowing to downstream areas, the infiltration only attenuates the runoff peak rate, which aggravates the existing flooding problems. Although modifying the existing pond to infiltrate better and constructing an infiltration/detention pond to handle the stormwater runoff from the proposed expansion would not fix the downstream flooding problems, they would help reduce the severity.

The existing on-site detention/infiltration pond is substandard by today's standards. Even with modifications, the existing pond will not meet current standards. However the modifications will allow the pond function more closely to the way it was originally designed and bring it closer to meeting current standards.

The cumulative impacts of MASCA's stormwater discharge together with other basin development results in a high probability of water quality degradation in the downstream waters. As with the water quantity issues, mitigation will not prevent or eliminate water quality problems in the basin. However, by reducing the volume and type of pollutant discharge, cumulative downstream water quality impacts would be lessened. To accomplish this, MASCA will be required to remove the process wastewater discharge from the detention/infiltration pond and reroute it to discharge via Outfall #001. This will reduce the volume of water discharged into the existing pond, leaving more storage volume for stormwater, and eliminate potential groundwater pollution from the process wastewater. In addition, MASCA will be required to pre-treat all stormwater runoff prior to discharge.

1.4.3 Plants and Aesthetics

The 1981 Concomitant Agreement established a 75 foot vegetative buffer along the property boundary. The existing buffer along the north end of the site is a second growth forested area that currently provides marginal screening of the existing development. However, this area is enhanced by being surrounded by undeveloped land that is forested. Although there are no current plans to develop the surrounding land, the land is zoned for urban level development.

The construction of the proposed access road along the north property boundary would remove 45 linear feet of the south slope in the central portion of the landscaped buffer. Approximately 0.54 acres of the total 1.24 acres of buffer area will be cleared of existing vegetation. The clearing will remove approximately nine of the existing significant trees in the northern portions of the buffer. The cleared area tapers down to 25 feet on the east end of the buffer and 15 feet at the west end.

The removal of existing vegetation, especially near the central portion of the buffer will expose the taller portions of the new and existing development to an observer walking along the north property line. In the west end of the buffer, the exposure of the proposed development is reduced because the size and character of the existing vegetation that will remain after construction is complete will provide more screening.

Currently, the density of the existing vegetation will not screen the proposed development. Most of the vegetation that provides the best screening vegetation will be cleared. The proposed building will be 65 feet tall, more than 20 feet taller than the existing buildings. MASCA is proposing an extensive revegetation plan on the cut slope to mitigate for the impacts to the buffer. In 15 years, the new landscaping is expected to effectively screen the majority of the development from the northern property boundary.

1.4.4 Environmental Health -- Emergency Response Capabilities

Construction of Building D will increase the amounts of hazardous materials that will be stored and used at MASCA over current levels. The facility has a history of hazardous materials incidents that is typical of the semiconductor industry. Most incidents are small and are contained within the plant. The number of hazardous materials incidents may increase as semiconductor manufacturing will double with the Building D expansion. There is a chance for a hazardous materials incident to pose a threat to the community.

In most respects, MASCA appears to be in compliance with codes and other hazardous materials regulations in effect at the time that building construction and equipment installations occurred. With respect to Building D, the likelihood and severity of hazardous materials incidents can be reduced by incorporating current codes, standards, guidelines, and best management practices for the semiconductor industry. Upgrading inspection and maintenance procedures in the existing facility would also be helpful.

Several concerns were discovered in the evaluation of the use and storage of hazardous materials at MASCA, including:

- Toxic Gas Detection -- The existing systems do not meet current good industry practices and maintenance is not being done according to the manufacturers recommendations. This increases the likelihood of a gas release that could impact MASCA employees and the community.
- New Equipment Sign-Off -- The current sign-off procedure is incomplete and inadequate for installing new or modified fabrication equipment. This could also result in an increased risk of employee and community exposure to hazardous materials.
- Safety and Health Department Roles and Responsibilities -- With the addition of Building D, MASCA will not have an adequate safety staff.
- Ventilation Systems -- There is no systematic procedure in place to monitor and document ventilation system performance. Inadequate exhaust ventilation could result in employee exposure and increased risks to emergency responders.

- Secondary Containment -- Some hazardous liquids and gases do not have secondary containment. This may increase the likelihood of a leak.
- Seismic Restraints -- Equipment is not seismically restrained which could lead to a rupture in chemical lines in an earthquake.
- Exit Signs in the Fabrication Area -- Some exit signs are missing which could slow evacuation in a hazardous materials incident.
- Hazardous Gas Storage and Use -- Silane is being used and stored indoors. This could lead to an explosion or intense fire in case of a leak.

MASCA and the PFD have an understanding of the need to work together in providing immediate, effective, and safe response to hazardous materials incidents at the MASCA facility. Both the PFD and MASCA have written policies and guidelines covering response to hazardous materials incidents. The PFD's guidelines are generic, owing to their responsibility to respond to a wide variety of incidents throughout the community. MASCA has guidelines specific to their facility, because their response activities are limited to their site.

Current hazardous materials emergency response to the MASCA facility is conducted first by MASCA personnel, secondarily by the PFD, with support from the Auburn Fire Department. MASCA has some capabilities to respond in a timely manner to hazardous materials incidents that involve small quantities of identified hazardous materials common to and contained in their facility. However, they are not currently staffed to handle larger incidents. They exhibit a high degree of knowledge about their hazardous materials inventory, hazards, and engineering controls. The PFD responds to the MASCA facility by providing incident command and community oversight. Currently, the PFD has a minimal inventory of hazardous materials response equipment. However, they are in the initial stages of helping develop a regional hazardous materials response team of which they will be a part.

1.4.5 Environmental Health -- Odor

There are no complaints about odor causing emissions generated from the MASCA facility. In addition, air emissions modeling indicated that the existing facility does not emit any odor producing compound at or beyond the property boundaries above the highest regulated or acceptable industry standard threshold concentration levels. Air emission modeling for the proposed expansion resulted in the same conclusions. The proposed expansion will have no effect on odor causing air emissions.

1.4.6 Environmental Health -- Noise

The residential zoning located west of the MASCA property is considered sensitive to noise, and is included in an Environmental Designation for Noise Abatement (EDNA) category of "A" (residential). The proposed project will replace the three existing cooler towers adjacent to Building B with six new ones that result in a 10 dBA increase. Even with the new towers, the noise level from the expanded facility is predicted to be below the EDNA level for all zoning categories. Noise levels will be monitored to ensure that they stay below the EDNA level for all zoning categories that surround MASCA.

During the construction phase the use of heavy machinery will cause noise levels to increase. Noise associated with construction will be a short-term impact. Construction activities will be limited to the hours of 7:00 AM until 10:00 PM.

1.4.7 Utilities -- Sanitary Sewer

MASCA has three NPDES permitted discharge locations for domestic and industrial wastewater streams.

Outfall #001 is for process wastewater discharge, which is treated on-site then drains through a five-mile long tightline conveyance pipe to the Puyallup River. It discharges in a combined outfall with treated effluent from the City of Puyallup's Publicly Owned Treatment Works (POTW).

Outfall #002 is a combined process wastewater and sanitary sewer discharge with on-site pre-treatment for the process wastewater. This discharge flows through the Public Sanitary Sewer System to the POTW where it is treated prior to discharge into the Puyallup River.

Outfall #003 is a stormwater detention pond which receives process wastewater from a periodic backflush of the on-site water treatment facility, and surface run-off from the site stormwater collection system.

There is an unknown biological organism that has formed in the tightline from the MASCA plant to the Puyallup River. This organism reacts with the process wastewater discharges and causes the discharge to become acidic, and places the discharge outside of the allowable pH parameters of the NPDES permit. Once a month, MASCA performs a caustic flush of the tightline to purge it from the biological organism. This caustic flush is routed to the upset tank located at the POTW. The discharge is then slowly trickled into the POTW treatment process and then discharged into the River.

Although not confirmed, it is possible that the trickling of flows in the upset tank into the POTW may have caused the POTW to be out of compliance of their NPDES permit. To prevent this from happening in the future, the process of trickling the upset conditions into the POTW will stop, a second tightline and upset tank will be constructed, a process to re-treat the upset flows will be developed, and a testing/monitoring program will be implemented.

The construction of the second tightline will allow for maintenance of the existing tightline without having to stop production. In addition, the second tightline will provide more capacity to handle projected increased flows. A new upset tank will need to be constructed at the downstream end of the tightline. A new upset tank will ensure adequate response time is provided to handle problems at MASCA and in the tightline.

MASCA has already constructed a good portion of the expansion to their on-site wastewater treatment plant. These improvements are designed to accommodate the proposed site expansion. The Washington Department of Ecology (DOE) has already approved the proposed sanitary sewer expansion. There is a potential for impact to the surrounding environment if treatment systems at the MASCA facility fail to remove regulated pollutants. The upgrade to the on-site treatment plant capacity is designed to ensure that the proposed flows from the expanded facility meet the discharge regulation requirements.

There is a potential for solvent wastewater flows from MASCA to harm the POTW treatment system. To eliminate the potential, all process wastewater flows will be combined and discharged via Outfall #001, and not through the POTW. MASCA will be required to revise the on-site process water treatment systems so that all process water discharge from the site is through Outfall #001. This will require a modification to the NPDES permit.

A testing/monitoring plan has been developed to ensure the discharge meets regulation requirements. The City will hire a neutral third party to test MASCA's discharges to ensure compliance with the NPDES permit. In addition, MASCA will be required to conduct an on-going toxic identification evaluation, and remove the problem toxic from the wastewater. Funds to pay for the testing, evaluation, and documentation would be provided by MASCA. Copies of the results and necessary documentation are to be submitted to both DOE and the City.

The past problems with the treatment facility and tightline have raised concerns from the City. MASCA will be required to give the City an increased level of awareness and control over upset, non-compliant flows through the tightline. MASCA will prepare a written set of procedures for shutting down the process water discharge in the tightline until MASCA constructs their own outfall in the Puyallup River.

The Concomitant Agreement between MASCA and the City will need to be revised prior to the operation of Building D to address operational changes of the wastewater treatment plant and the tightline.

1.4.8 Utilities—Water

MASCA is in the City's Zone 5 domestic water service district. MASCA is also the largest user of domestic water in Zone 5. The City of Tacoma supplies water to Zone 5 users through an agreement with the City of Puyallup. The existing system has a maximum agreed upon supply of 2.0 million gallons per day (MGD). Of that 2.0 MDG, MASCA is allowed to use 1.6 MGD per their Concomitant Agreement with the City of Puyallup.

MASCA is projecting that they will use 1.6 MDG at full production of 40,000 wafer-outs. There will be no impacts to the Puyallup water system until total system demand for all Zone 5 users exceeds 1.6 MGD. At this point, the existing pump station would need to be modified to permit additional pumping to the maximum allowed (2.0 MGD) by agreement with Tacoma. Should Zone 5 use exceed 2.0 MGD, additional source development would be required.

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SECTION 2.0 PROPOSED ALTERNATIVES

2.1 PROPOSED PROJECT: BUILDING D EXPANSION—ALTERNATIVE 1

The project entails new construction and modification of existing facilities at the existing MASCA Puyallup plant to increase wafer fabrication to 40,000 wafer-outs per month. Figure 2-1 is a graphically presentation of the proposed site expansion plan. The proposal includes:

- A three level (65 foot tall) 287,000 square foot Uniform Building Code (UBC) designation H-6 semiconductor wafer fabrication building (Building D);
- Associated accessory building UBC classes H2/H7 for storing cylinder gases, bulk chemical distribution, and waste collection;
- A 12,000 square foot accessory water de-ionization (DI) building (Building DI);
- A VOC thermal abatement system;
- Second water line extension from 39th Avenue SE to the new accessory building; and
- Second wastewater tightline parallel to the existing tightline from the MASCA site to the Puyallup River.

Building D will be a wafer fabrication plant with a H6 occupancy on three levels and approximately 92,000 square feet per level. On Level 1 from the northwest corner and extending eastward will be four buildings totaling approximately 10,000 square feet with occupancies of H2/H7. These buildings will house cylinder gases, bulk chemicals for pipe-lining chemicals in the fabrication (similar to the existing Building J) and the fourth building will house collected solvents/corrosives prior to transferring to off-site treatment, storage, and disposal facilities and/or MASCA's on-site wastewater treatment plant. Corrosive fume scrubbers and solvent exhaust fans and/or distrust unit will be located outside Level 1 (one) of building D on the north side.

The new DI building (22,100 square feet) will house additional DI equipment similar to the equipment inside the existing DI building. Equipment to be installed includes the following:

- Media, carbon, thin film composite reverse osmosis membrane, cellulose acetate reverse osmosis membrane, and particle filters;
- DI removal equipment;
- Water pumps;
- Water to water heat exchangers;
- pH monitoring and adjustment equipment;
- Ion exchange resin demineralizers;
- Two, 254 µm ultraviolet lights for killing bacteria and reducing toxic organic compounds;
- Sludge de-watering equipment;
- De-gasifier;
- Analytical equipment for chemicals;
- Water storage tanks placed outside of the DI building; and
- 2,000 kva, 12 kv to 460 volt electrical substation.

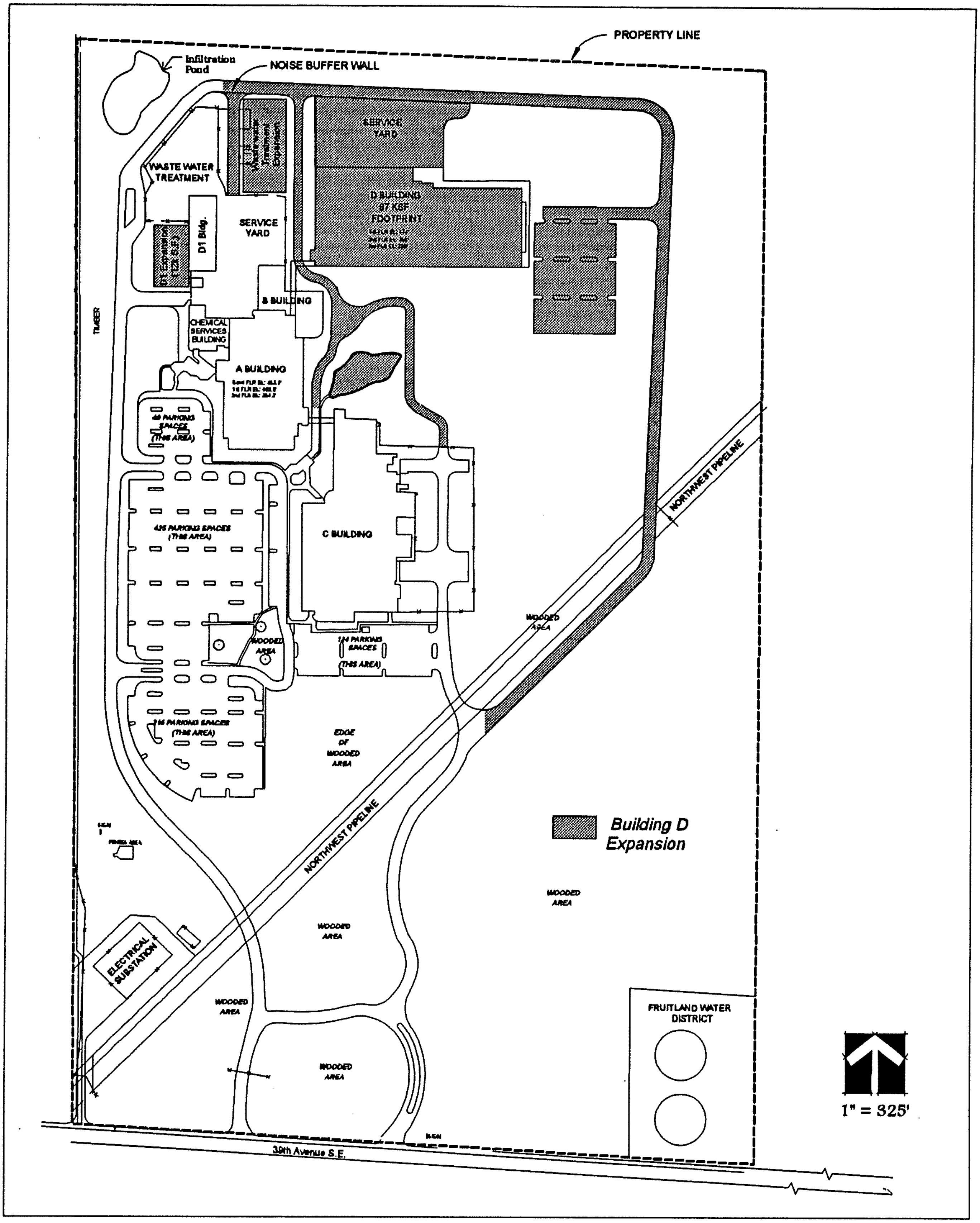
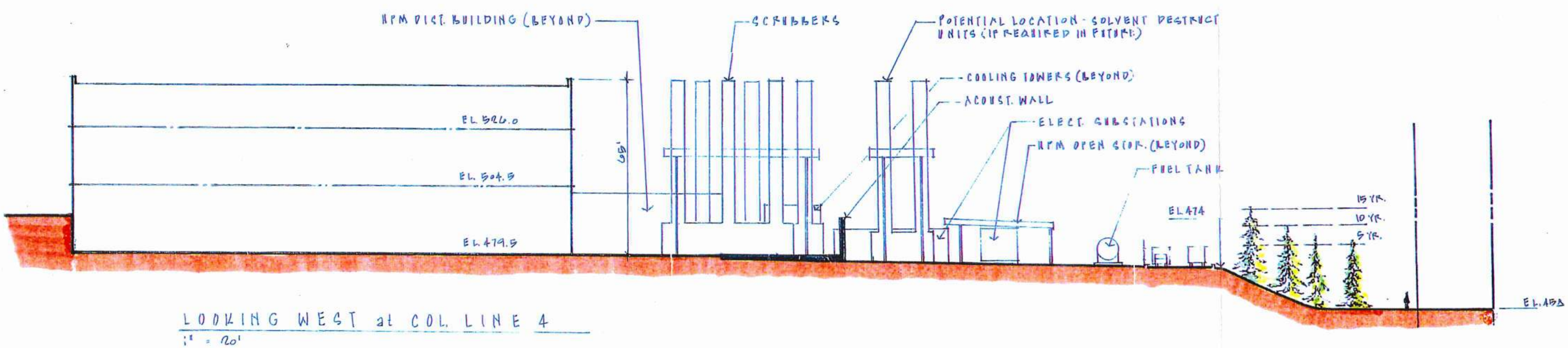


Figure 2-1:
Proposed Expansion Site Plan

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT



Source: *Matsushita Semiconductor Corporation of America*

Figure 2-2:
Section View of Building D Expansion

Additional items to be constructed in the new Building D service yard include the following:

- Six acid exhaust scrubbers;
- Two solvent destruct systems;
- Six 800 ton cooling towers (water flow through each tower will be 1,160 gallons per minute);
- One nitric/hydrofluoric acid exhaust scrubber;
- Two ammonium exhaust scrubbers;
- Two solvent burnable collection tanks;
- One ammonium hydroxide waste collection tank;
- One hydrofluoric acid waste collection tank;
- One phosphoric acid waste collection tank;
- Silane gas cylinder storage and dispense facility;
- Exhaust ducts;
- One hydrogen tank;
- Overhead pipe bridges;
- Six electrical substations (2,500 kva)/gear plus diesel engine driven electrical generators and a supporting ± 6,000 gallon diesel fuel tank;
- Electrical switch gear for generators; and
- Overhead mechanical/electrical bridges that will extend from buildings B and D to the DI building that will form a new pump headworks south of the existing hydrogen tank and westerly across the road into the existing wastewater treatment plant.

Additional items to be constructed in the service yard adjacent to Building B will include the following:

- One argon cryogenic tank, two purifiers, and two vaporizers;
- Two oxygen purifiers and two vaporizers;
- Three nitrogen purifiers;
- Overhead pipe bridges;
- CMO enclosure;
- Pump station for wastewater from Building D to MASCA's wastewater treatment plant;
- 1,000 kva engine-driven electrical generator;
- One 10-foot diameter by 30-foot tall diesel storage tank;
- Six condenser water cooling towers;
- Water condenser water cooling tower pumps and related piping and electrical and controls;
- One electrical building/enclosures for the pump station pump motor drives; and
- Two electrical building/enclosures for the condenser tower pump and fan drives.

Additional items to be constructed in the existing hydrogen tank fenced service yard will include the following:

- Replacing the existing hydrogen tank with an 8,000 gallon tank; and
- Two additional hydrogen vaporizers.

In anticipation of a second discharge outfall into the Puyallup River being necessary to accommodate projected flows, MASCA has already gone through the SEPA and Shorelines Development process to get approval to construct a second outfall. Based on analysis done for the Building D expansion, it has been determined that the existing outfall has capacity for both discharge from the City's POTW and a maximum discharge of 1.88 MGD from MASCA. MASCA is projecting 1.41 MDG of flow to be discharged through the existing outfall (Outfall #001) at full build-out of Building D.

MASCA will construct a second wastewater tightline. The tightline will be constructed from the site to the Puyallup River parallel to the existing tightline and within the same easement. Plans and specifications for the tightline must to be submitted to the City for review prior to issuance of a permit to construct within the easement. The second tightline will be constructed consistent with all applicable City Codes. Any impacts from grading and construction will be effectively mitigated by implementation of a temporary sediment and erosion control plan and compliance with other City standards.

MASCA is currently in the process of expanding their on-site wastewater treatment plant. The DOE has approved the wastewater treatment plant expansion. The expansion of the site was designed to accommodate the proposed Building D expansion.

MASCA has applied for a Notice of Construction (NOC) permit from the PSAPCA for installation of a VOC thermal abatement system. VOC thermal abatement system will be installed for both the existing VOC stack for Building C and the proposed stack for Building D. Installation of the VOC system will bring MASCA under a major source classification by PSAPCA.

The proposed expansion will impact approximately 17,069 square feet of Category IV wetlands. Category IV wetlands of less than one acre in size are non-regulated and do not require mitigation under City Code. Wetlands, however, are under the jurisdiction of the US Army Corps of Engineers (COE), and any impacts to wetlands needs to be permitted by the COE. The wetland fill may qualify under a Nationwide Permit 26 because the fill will be less than one acre in size and the wetlands are located above the headwater of a system.

The site access road will be completed to serve the total site. An additional 125 parking spaces will be constructed on the southeast corner of Building D. Approximately 40,000 cubic yards of material will be hauled from the site, and approximately 80,000 tons of Class A/B gravel barrow will be brought into the site to construct the Building D foundation, service yard, and access road.

In addition to the development of Building D, there will be an internal remodel of portions of buildings A and B. Two new boilers and six new scrubbers will be installed in Building C to support Building D. The scrubbers outward size and general appearance will be similar to those in the Building C service yard. The Building A remodel would include: a computer floor added to the second floor; new assembly equipment added to the first floor; and the relocation of the

Mark-N-Pak equipment on the first floor of Building B to the first floor of Building A. Figure 2-2 is a section view of the proposed expansion.

There will be a projected 700 employees located on-site at full build-out of the site in 1998.

2.2 NO ACTION -- ALTERNATIVE 2

Under the No Action alternative, MASCA would continue existing plant operations. The facility would continue to produce an average of 17,000 wafer-outs per month, with a possible production rate of 20,000 wafer-outs per month. MASCA would be able to operate under the conditions agreed to under the Concomitant Agreement. Existing uses and practices that do not meet current standards, codes, or best management practices would not be mitigated and continue.

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SECTION 3.0 AFFECTED ENVIRONMENT, SIGNIFICANT IMPACTS, AND MITIGATION MEASURES

Eight areas of concern were identified during scoping:

- Air quality
- Storm runoff volumes and water quality
- Plants and aesthetics
- Emergency response capabilities
- Odor
- Noise
- Sanitary sewer
- Water

This section describes existing conditions at the MASCA site and in the surrounding area that is likely to be affected by the proposed expansion. Whenever possible, existing conditions and effects of plant operation are described quantitatively. Information is also provided on the changes that are expected to occur as a result of construction and operation of the proposed expansion.

Measures that would reduce or eliminate expected impacts are listed as mitigation measures. Some mitigation has been identified by MASCA and included in the proposed design. Some measures will be required as a condition of permits that must be obtained from other agencies in order to construct and operate the proposed project. Finally, the analysis by technical experts (see the appendices) has identified other measures that should be imposed to mitigate impacts on the surrounding area and city services.

If a significant change in existing conditions will occur despite all mitigation, that change is also described.

3.1 AIR QUALITY

3.1.1 Issues

Currently, MASCA is classified as a registered source and is not required to obtain an air quality permit from PSAPCA. New emissions sources and the expansion of the facility requires NOC permits from PSAPCA. The concern was raised over MASCA compliance with existing air quality standards and the related health issues associated with air emissions.

3.1.2 Existing Conditions

PSAPCA regulates air quality for Pierce, King and Snohomish counties. The agency has the authority to enforce compliance with federal (e.g. Clean Air Act, New Source Performance Standards), state (e.g. WAC 173-400), and PSAPCA regulations.

There are two types of air pollution regulations: air purity and sources of emission. Air purity rules include ambient air quality standards and other measures aimed at regulating the concentrations of pollutants in ambient air. Emission regulations are designed to ensure that sources of air pollution take reasonable steps to prevent or control releases to the atmosphere.

The MASCA facility has numerous sources of emission, including several acid scrubber stacks and a solvent exhaust fans stack which releases a group of regulated chemicals known as VOCs. The facility is classified by PSAPCA as a registered source of emissions. Emissions reported by MASCA have been lower than the levels necessary to qualify as a synthetic minor or major source, or to require a more thorough review by PSAPCA. Therefore, PSAPCA has not issued regulatory permits for the MASCA facility.

The plans for expansion and recent emission testing have prompted MASCA and PSAPCA to conduct a more thorough review of emissions. MASCA is presently in the process of applying for a NOC permit from PSAPCA. An important issue in this permit is the VOC emissions from the solvent exhaust fans stack. Presently, there are no air pollution controls on the solvent exhaust fans stack.

An inventory of emissions from the MASCA facility was compiled relying primarily on emission testing results conducted in March of 1996. (See Human Health Risk Assessment for the SEIS.) Other sources of information used in the preparation of the emission inventory were data provided by MASCA and various estimation techniques from mass balances or published emission factors. The emission inventory was designed to give a maximum range of potential emissions from the MASCA facility, and as such, differs substantially from the emission rates reported by MASCA. The assumptions that were used to maximize estimated emissions include using the highest of three replicate tests from AMTEST and assuming these emissions are continuous for 24 hours per day and 365 days per year (operational schedule for the MASCA facility), which is consistent with PSAPCA procedures. The computed total uncontrolled VOC emission rate was 52 tons per year which does not violate any emission regulations, but may warrant further PSAPCA review, including the possible need to obtain a Synthetic Minor Air Contaminant Discharge Permit (SMACDP) from PSAPCA.

The analysis identified both potential deleterious health effects from acute chronic exposure to toxic chemicals, and cancer risk from exposure to chemicals. Table 3-1 addresses the short-term hazards for which the 24-hour model impacts are used. The table compares model-predicted current concentrations with regulatory criteria. As the table shows, none of the pollutants presently exceed regulatory criteria.

Table 3-1
Qualitative Comparison of Air Emission Impacts

Chemical	Current (1996) 24 hr. Air Concentration (ug/m3)	Projected Uncontrolled (1997) 24 hr. Air Concentration (ug/m3)	Projected Controlled (1997) 24 hr. Air Concentration (ug/m3)[2]	OSHA Standards (ug/m3)	PSAPCA Acceptable Source Impact Level (ug/m3)
Acetone	32.1	52.6	2.63	1,800,000	5,927.4
Diglycolamines	27.9	45.4	2.27	NA	33.1
Hydrochloric Acid	1.21	NA[1]	2.24	7,500	7
Isopropanol	69.4	114	5.7	983,000	3263.4
Nitric Acid	0.38	NA[1]	0.72	5,200	16.7
Silica	20.6	33.8	1.69	50.0	22
Sulfuric Acid	2.44	NA[1]	4.02	1,000	3.3
Toluene	0.0051	0.0085	0.004	18,800	400
Trimethyl phosphite	0.003	NA[1]	0.004	10,000	33

[1] NA - not available for this pollutant because there are currently acid scrubbers that control acid emissions, and acid scrubbers will be installed as part of the proposed expansion. Acid emissions will never be uncontrolled.
[2] Controlled emissions were computed based on 95% control for the VOC destruct system (applicable only to organic contaminants emitted from solvent fans vent stack)

However, the current levels predicted for sulfuric acid are close to the PSAPCA Acceptable Source Impact Level (ASIL), which is not a standard, but a threshold level used to screen out issues for further study. None of the concentrations of any known or presently suspected carcinogens exceeded the cancer screening risk levels used as regulatory criteria.

Under conditions of the NOC permit issued by PSAPCA, MASCA will be required to closely examine their entire chemical usage, process flow, and scrubber efficiency, and update all chemical inventories, MSDSs, and emissions inventories.

3.1.3 Proposed Action and Potential Significant Impacts

An estimate of future emissions was prepared by scaling the present emission inventory, and air quality modeling was used to estimate ambient fenceline concentrations for comparison with regulatory criteria. One area of difference between existing conditions and future air quality with the proposed action is that MASCA has proposed the installation of a thermal-destruct air pollution control system to reduce VOC emissions from the solvent exhaust fans. For the controlled case, a 95% control efficiency was used for organic chemicals which exit through the solvent exhaust fans stack. This was applied to both Building C and Building D since MASCA proposes to retrofit Building C with a VOC system. It should be noted that these emission rate estimates originate with the AMTEST stack test and differ substantially from the actual MASCA emission inventory reported in the NOC application.

No consideration was given in the present analysis to the two package boiler's MASCA proposes to install as part of the present project. These boilers are commercial units, fired by natural gas and should have minimal air quality impacts from the combustion products, given that the equipment is state-of-the-art (i.e., low NO_x boilers).

The major concern raised during scoping was the toxic chemicals which are released as a result of the process operations at the MASCA facility. If released without controls, emissions would increase significantly from the proposed facility expansion, and might be high enough to classify the MASCA facility as a major source. Such classification would change the regulatory structure for the facility, requiring an air quality operating permit under the new Title 5 program of the Clean Air Act. It would also require federal (Environmental Protection Agency [EPA]) review of the facility's permit. With the use of a VOC-destruct control system, capable of at least 95% control of organic emissions, most of the air quality issues for the plant will be greatly reduced. MASCA has applied for a NOC permit. PSAPCA will require the use of best available control technology (BACT) before granting a NOC permit. The 95% VOC control will meet the BACT requirement.

Sulfuric acid emissions would not be controlled by the VOC destruct system. The modeling results for sulfuric acid show concentrations above PSAPCA's ASIL of 3.3 micrograms per cubic meter. However, MASCA's emission inventory for actual sulfuric acid emissions shows that they are substantially lower (42%) than the emissions used in the present analysis. MASCA and PSAPCA must resolve the issue of potential sulfuric acid impacts during the NOC permit process, or a permit cannot be issued for the expansion.

MASCA has amended the proposed project to include a VOC thermal abatement system to be installed in both buildings C and D. MASCA has applied for a NOC permit from PSAPCA for the abatement system. As conditions of approval for the permit, PSAPCA will require MASCA to:

- Document their chemical usage, process flow, and scrubber efficiency;
- Submit emissions inventories; and
- Install BACT technology.

3.1.4 Analysis of MASCA's Notice of Construction Permit Application

On May 15, 1996, MASCA submitted a permit application for the Authority to Construct the new Building D. This application could also be used by PSAPCA to ascertain the compliance status of both the current facility (Building C) and the projected facility (Building D). The application contains critical information including an emissions estimate for current and projected emissions and specifications of new abatement equipment.

Based on the analysis already completed for the SEIS and discussions with PSAPCA, MASCA has agreed on the need for VOC abatement equipment on Building C and for VOC abatement equipment to be included as part of the design for Building D. The following is a brief analysis of MASCA's NOC Permit Application.

Abatement Status: Currently Building C contains in-line nitric acid scrubbers, in-line "burn boxes" and end-line acid scrubbers. This equipment, based on stack test results (AMTEST 1996), appears to be functioning properly. Currently, no VOC abatement is used for Building C. The design for Building D includes burn boxes, nitric acid scrubbers, ammonia scrubbers, acid scrubbers, and a VOC oxidizer.

Planned Additional Controls: The designs for abatement equipment for both Building C and Building D meet the state-of-the-art technology for the industry. Technically, the facility should meet Best Achievable Control Technology (BACT) requirements, given that without controls the facility has the potential to emit large amounts (>100 tons) of VOCs. The VOC oxidizers planned for both buildings utilize a zeolite wheel rotary concentrator and high VOC destruct temperatures resulting in a 95% control efficiency. The wet scrubbers to be installed for Building D also exceed minimum specifications for BACT and are rated at 98% control efficiency.

Emissions Inventory/Compliance Status: A review of the emissions estimate, included as part of the MASCA Permit Application, reveals some potential problems with the estimate. First, not all VOCs either tested for during the AMTEST stack test or estimated by review of MSDS's (see the Human Health Risk Assessment Appendix), are listed in the emissions inventory; therefore, MASCA may have underestimated VOC emissions. Toluene is still not listed in the inventory, even though the AMTEST results showed these compounds are present in the current air emissions for the facility.

Some of the chemicals listed in the emissions inventory are considerably less than predicted by the stack test data. According to MASCA, the stack test data do not reflect an average emission rate for some chemicals (e.g. isopropyl alcohol). MASCA officials have stated that on the day of the stack test, some chemicals were being used at excessive amounts, that is more than the quantities usually consumed per hour (B. Adams, personal communication, June 4, 1996). This excess chemical usage, according to MASCA, resulted in overestimation of annual emissions, as completed for the SEIS. The production status (i.e. wafers-out) and chemical usage on the day of the stack test has yet to be confirmed. Verification of emission rates should eventually be confirmed by additional stack testing and/or mass balance analysis and compared with the production status. Emission factors can be developed based on a per-wafer analysis. Therefore, compliance with permits or accuracy of emission inventories can be confirmed by comparing wafer production on a given day with either a stack test or mass-balance analysis.

The additional controls to be installed on the VOC stacks for Building C and Building D may avoid classification of the MASCA facility as a major source. PSAPCA has reviewed MASCA's permit application and has requested further information from MASCA. However, given the potential for the facility to emit large volumes of criteria pollutants and Hazardous Air Pollutants (HAP), PSAPCA may suggest that MASCA apply for SMACDP, given current emissions.

3.1.5 Summary of Mitigation Measures

The City has determined that the following mitigation measures will be required as conditions of the expansion.

1. MASCA shall install a VOC abatement system for both buildings C and D prior to issuance of any certificate of occupancy.

2. MASCA shall obtain the appropriate air quality permit(s) from PSAPCA prior to issuance of any certificate of occupancy.

3.1.6 Unavoidable Significant Adverse Effects

There will be no significant adverse impacts with the implementation of the mitigation measures. The installation of a VOC thermal abatement system for both Building C and Building D will reduce current unabated air emissions. The NOC permit will require a verified emissions, chemicals inventory, and BACT for VOC emissions. In addition, continuous emissions monitoring will be required by PSAPCA. Also, MASCA must demonstrate that acid emissions will be eliminated from the VOC stacks or demonstrate that acids are not being emitted from the VOC stack by rigorous testing.

3.2 STORMWATER

3.2.1 Issues

The existing on-site detention pond was sized to accommodate the Building D expansion. However, the potential for water quality impacts to the shallow aquifer, and the cumulative impacts to the drainage problems of the State Highway Basin was not foreseen. The issue raised during scoping was potential conveyance of contaminated runoff into surface and groundwater, as well as the potential increase in storm and process water flows due to the MASCA plant expansion. Concern was also expressed regarding exposure of downstream residents to site-related health hazards.

3.2.2 Existing Conditions

The MASCA site lies in the upper reaches of the Wildwood Creek drainage in the City of Puyallup. The City's August 1988 Stormwater Management Program identifies this area as the State Highway Basin. The 1,740-acre State Highway drainage basin includes portions of the City of Puyallup lying between the Clarks Creek basin on the west and the Shaw Road basin on the east (Figure 3-1). Excess storm runoff in the basin flows northerly, and eventually drains to the Washington State Department of Transportation's large drainage system along State Route (SR) 512.

The upper reach of the basin contains a number of large pothole areas. Except during extreme rainfall, no surface flow leaves these areas. The upland area is relatively flat, with large undeveloped land tracts. The MASCA site lies within this upper basin area. The central part of the basin contains the Wildwood Creek channel and a number of single family residences and small farms, although the predominate land use in the central basin is Wildwood Park and other undeveloped woodlands. The flat lowland area is densely developed with a mix of single and multi-family residences, several commercial uses, and SR 512. The natural drainage course in this lower basin area has been significantly modified by development. Runoff is typically conveyed in storm drains and constructed channels.

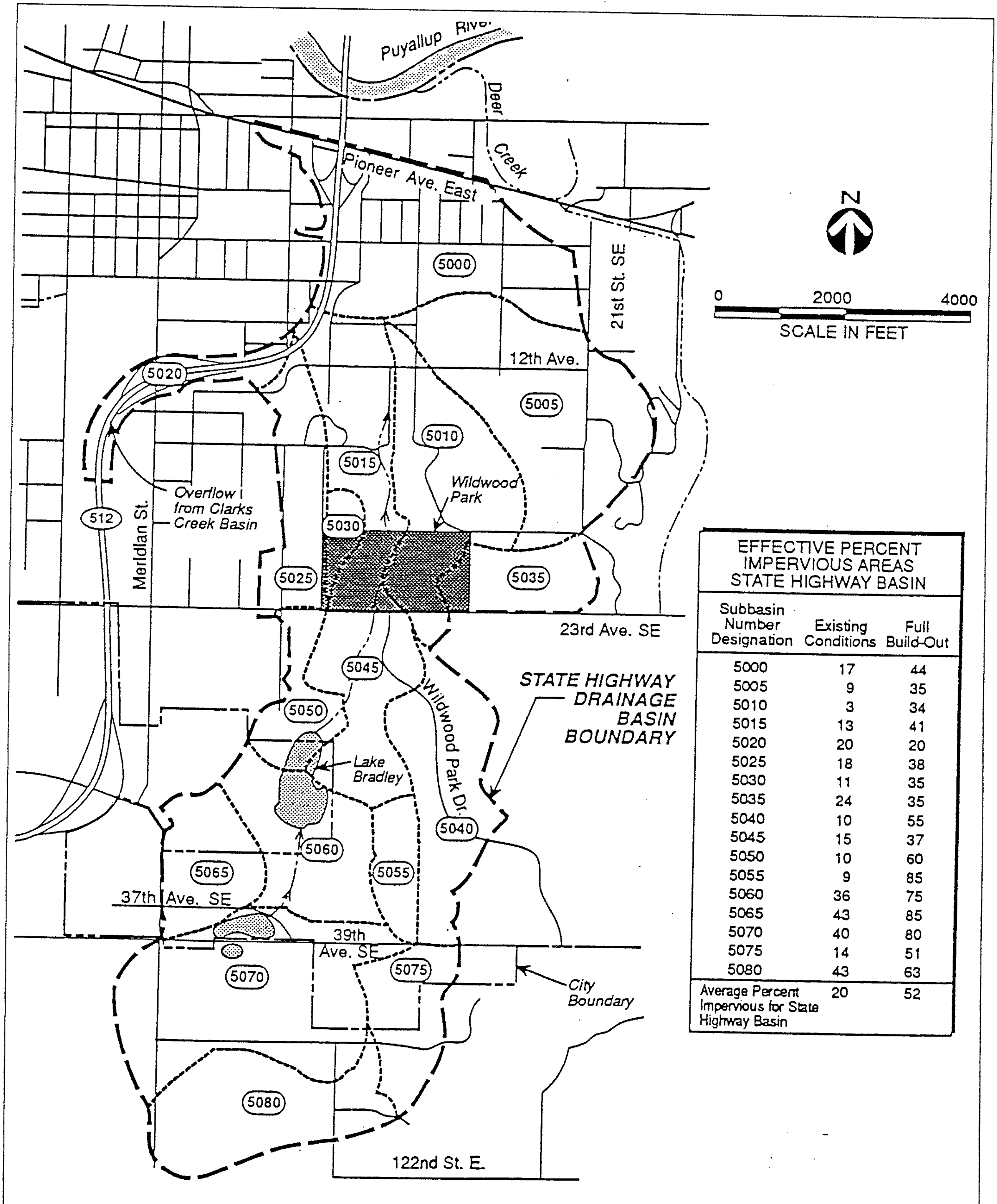
The site is underlain by a shallow, unconfined aquifer (Harding, Lawson and Associates [HLA], 1992). Depth to groundwater varies from 10 to 30 feet across the site.

Six wells are located within a one- (1) mile downgradient of the MASCA site with the closest of these wells 0.4-miles from the site. One of these well is owned by the Fruitland Mutual Water District and is used as a drinking water source. The other five wells are privately owned and used as domestic water sources. Depth to water bearing zones from which these wells produce range from 118 feet to 465 feet.

A diesel spill occurred on the MASCA site in 1986. Water quality sampling was conducted to assess shallow groundwater impacts. Although there was localized on-site contamination, no indication of contamination was found in the downgradient water wells. The water quality report further states that important unknown hydrogeologic conditions may exist on or near the site (HLA, 1992). No conclusions regarding possible connectivity between the shallow on-site aquifer and the deeper zones were made, due to lack of information.

MASCA Stormwater System

The existing MASCA storm drainage system consists of a series of ditches and pipes that collect and convey storm runoff to the infiltration pond, an open pond with an estimated live storage volume of 70,730 cubic feet The original pond was sized to accommodate both storm runoff and the site process water discharge.



EFFECTIVE PERCENT IMPERVIOUS AREAS STATE HIGHWAY BASIN		
Subbasin Number Designation	Existing Conditions	Full Build-Out
5000	17	44
5005	9	35
5010	3	34
5015	13	41
5020	20	20
5025	18	38
5030	11	35
5035	24	35
5040	10	55
5045	15	37
5050	10	60
5055	9	85
5060	36	75
5065	43	85
5070	40	80
5075	14	51
5080	43	63
Average Percent Impervious for State Highway Basin	20	52

Source: *KCM*

Figure 3-1:
State Highway Basin

Currently, the stormwater infiltration pond also receives periodic discharges of process water from a weekly backwash of carbon filters from the on-site wastewater treatment facility. This issue is addressed in the Utilities - Sanitary Sewer Technical Appendix (DEA, 1996).

The pond was designed as a combination detention/infiltration system. This means that during the design storm event, part of the storm runoff would infiltrate, and part would discharge to the downstream areas through the flow control structure. Based on the original drainage plans and calculations, the system was sized to address the 25-year storm event.

Subsequent to the 1981 construction of the site, the City of Puyallup expressed concern over the quantity of stormwater runoff flowing through the detention pond outlet control structure. Discussions between the City and MASCA led to an investigation of ways to increase the pond infiltration rate. In 1984, pond modifications were made to try to improve the infiltration characteristics of the stormwater pond. At that time, approximately 10 feet of native soils were excavated from the bottom of the south half of the pond in an attempt to expose a suspected gravel lens in the soils beneath the pond. The pond modifications appear to have significantly improved the infiltration performance of the MASCA drainage system. However, water infiltrates and seeps out of the hillside via a gravel lens a short distance downhill from the pond, thus short circuiting the system.

Water Quantity

The City's 1988 Stormwater Management Program indicates there are a number of drainage related problems in the State Highway Basin. The current problems consist primarily of "localized" flooding, channel erosion, and sediment deposition in several areas of the lower basin. One of the steep channel sections, near 9th Street SE and 13th Avenue SE (approximately 2.5 miles northwest of MASCA), is reported to have severe erosion problems, which are expected to worsen as development continues in the upstream areas.

During the heavy rains of February, 1996, severe flooding occurred in a number of areas in the basin. Many of these flooded areas were undeveloped land. However, several of the flooded areas were developed residential areas. The most severe flooding appears to have occurred along 12th Avenue SE, where several hundred feet of the road was inundated.

During periods of rainfall, stormwater runoff from the site is collected in a series of catch basins and on-site swales, and conveyed to the MASCA detention/infiltration pond. When the rate of inflow is less than the infiltration capacity of the pond bottom, stormwater runoff infiltrates as soon as it reaches the pond. When the rate of inflow exceeds the infiltration capacity of the pond bottom, water is stored in the detention pond. During long duration storms, or extremely intense storms, the volume of water entering the pond exceeds the storage capacity of the pond. Under these conditions, stormwater flows through the pond over-flow control structure.

Stormwater discharge from the site is regulated by the NPDES Waste Discharge Permit issued to MASCA in 1994. This permit allows site stormwaters and limited process waters to discharge into the infiltration pond. (See the Utility - Sanitary Sewer Technical Appendix [DEA, 1996] for a more complete review of the NPDES Permit and the process water discharge.) The NPDES permit states that no pond overflow of storm or process water is allowed. Significant flow out of the pond was observed during the February 8, 1996, storm. Flow was observed both in the pond control structure and in the hillside seeps from the gravel lens a short distance downhill from the pond. This is specifically prohibited by the NPDES permit.

During normal pond operation, the only pond outlet is through infiltration. Water was observed resurfacing through seeps in the hillside a short distance downstream of the MASCA site. It is believed that the infiltrated water is resurfacing through a gravel lense. As stormwater resurfaces, it enters the outflow channel from Bradley Lake.

In overflow conditions, pond outflow includes the discharge through the flow control structure. The pond outflow both surface and infiltrated, merge with the Bradley Lake outflow, and continues northerly through the basin.

Water Quality

Several basin water quality concerns were identified by the City's Stormwater Management Program. Severe erosion and sedimentation problems occur in the lower channel near 9th Street SE and 13th Avenue SE. The steepness and soil characteristics of several reaches of channel within Wildwood are prone to erosion and sedimentation problems during high flows. Basin wide, there are numerous non-point sources of stream pollution, including oils, grease, pesticides, fertilizers, and industrial sources.

The NPDES permit authorizes stormwater and process wastewater discharge to the on-site pond. The conditions of this permit allow for no pond overflow and require maintenance of the pH between 6.0 and 9.0. Monitoring iron and manganese is also required, but no limits for those pollutants are identified in the permit. The discharge for process water is authorized to include sand, carbon, and DI filter backwash waters. Those are explicitly the only process wastewater discharges from the on-site facility allowed into the detention pond.

The infiltration pond is constructed in coarse, excessively drained soils. These soils do not provide water quality treatment and, therefore, create a potential groundwater pollution problem.

3.2.3 Proposed and Action and Potential Significant Impacts

Site Drainage and Detention

The existing detention/infiltration pond does not met current City standards for the existing development. In addition, water surfacing through the gravel lense (short-circuiting the infiltration process) does not meet current standards. Two alternatives to modify the pond were examined to bring the pond in compliance with current City standards: either seal the pond or allow infiltration.

The first alternative would line the entire bottom of the pond to create a detention pond that would not allow any water to infiltrate. The pond volume required to met current standards for the modeled storm event would be 430,000 cubic feet, or six times the capacity of the existing pond. This alternative would result in an increase in surface water being discharged downstream into the Bradley Lake channel and could add to existing downstream flooding problems.

The other alternative would involve sealing or capping the gravel lense to prevent infiltrated water from short circuiting the infiltration/treatment process, raising the pond's riser as much as possible, and sealing the perforations at the bottom of the riser. These modifications would allow water to infiltrate slowly to groundwater. The modeled pond volume required to meet current standards would be 412,720 cubic feet. This alternative would bring the pond closer to current standards than the alternative of lining the pond completely. In addition, this alternative would reduce discharge (and therefore, flood hazard downstream).

Building D will include approximately 6.9 acres of new impervious surfaces and 4.6 acres of lawn and roadside ditches. There are 16.5 acres of area tributary to the expansion area that will not be disturbed, but were included in the calculations of required storage volume. The peak rate of runoff from the project area will need to match 50% of the existing condition for the two-year storm and match the existing condition for the 10-year and 100-year storm event. In order to achieve this, a separate 120,000 cubic-foot detention pond needs to be provided for the Building D expansion. A new separate detention pond for the Building D expansion needs to be designed and constructed to meet current City and DOE standards.

Water Quantity

The City's 1988 Stormwater Management Program shows that as development of the upper basin occurs, increases in stormwater runoff rates and volumes will occur. The field reconnaissance of the downstream conveyance and observations of flooding clearly demonstrated that any increase in stormwater runoff will adversely impact the middle and lower basin. The original plan to use infiltration to avoid increases in surface runoff is not working because much of the infiltrated water resurfaces within a short distance of the detention pond. This "short circuiting" of the infiltration negates the benefits of infiltration. Rather than substantially reducing the quantity of runoff flowing to downstream areas, the infiltration only attenuates the runoff peak rate.

Since downstream flooding directly impacts several existing residential areas, health and safety are of significant concern. As noted above, any increase in stormwater runoff only aggravates the existing flooding problems.

To mitigate the potential cumulative impacts of full development in the area as well as the MASCA expansion project, the stormwater discharge rate into the Bradley Lake outlet channel must be reduced. Although reducing flow rates from MASCA will not "solve" the basin flooding problems, downstream flooding impacts will be lessened. The following measures would reduce discharge flows:

1. The existing flow control structure should be modified to function as an overflow structure only. This will be accomplished by plugging the perforations in the lower

section of the riser, and capping the short circuit gravel lens. This would allow the pond to function, as much as possible, as required under the existing NPDES permit.

2. A new detention facility that will not infiltrate should be constructed for the expansion area.
3. Process water that is currently discharged into the existing infiltration pond should be diverted to discharge into Outfall #001. The volume of process water discharged to the pond significantly reduces the pond volume available to accept site stormwater.

Since the existing pond is substandard in size, MASCA may decide to discharge stormwater from the existing development into the new detention pond. MASCA will need to calculate the volume of flow to be diverted and include that volume in calculations to determine the size of the new detention pond.

Water Quality

Neither the existing MASCA stormwater facilities nor the proposed improvements contain provisions for water quality treatment. The existing City studies only superficially address basin water quality. Studies by the DOE and other governmental agencies show that untreated urban runoff can lead to reduced levels of dissolved oxygen, and increased turbidity and pollutant loading in the receiving waters. The cumulative impacts of MASCA's untreated stormwater discharge together with that from other development in the basin, results in a high probability of water quality degradation of downstream waters. As with the water quantity issues, mitigation will not prevent or completely eliminate water quality problems in the basin. However, by reducing the rate of pollutant discharge, cumulative downstream water quality impacts will be lessened. Using current DOE design standards, either a wet pond system or bio-filtration swale should be constructed to treat all stormwater runoff from the Building D expansion area. If stormwater from the existing development is to be discharged into the new detention pond, it would also need to be pre-treated.

In addition to the pond modifications, a pretreatment system should be designed for the existing pond in accordance with the DOE stormwater manual. The pretreatment system would provide the existing pond with protection against sediments and oils by removing them the stormwater prior to entering the pond.

The existing pond is underlain by excessively drained soils that create potential groundwater pollution problems from infiltration if the water is not pretreated prior to entering the system. For this reason, process water currently discharged into the infiltration pond should be pre-treated, and discharged via the tightline (Outfall #001) to the Puyallup River. MASCA's NPDES permit should be modified to allow the process water flow to be re-routed from discharging through Outfall #0003 to Outfall #001.

3.2.4 Human Health Risk Assessment

The detention pond receives both stormwater (parking lot run-off) and process wastewater. The process wastewater contains backwash of sand and carbon filters from the deionization water treatment process. Human exposure to these chemicals is possible from this detention pond, either through direct contact or infiltration of the wastewater into surface and groundwater.

Aluminum, manganese, zinc, and phenol were reported above detection limits in the infiltration pond water. However, these chemicals were below toxic threshold levels. Only phenol can be absorbed through the skin, metals are not generally considered to cause toxicity through dermal penetration.

For those chemicals tested, there would be no human health risks to down-stream wells due to stormwater infiltration from MASCA. However, due to the soil types in the pond area, this pond is very susceptible to groundwater pollution in the event of pollution in the stormwater system. The infiltration pond should be modified as discussed above to prevent possible groundwater pollution.

3.2.5 Summary of Stormwater Mitigation Measures

The City has determined that the following mitigation will be required as conditions of the expansion.

1. A pretreatment system shall be constructed to treat stormwater runoff from all impervious surfaces of the entire MASCA site, including the Building D expansion area and excluding runoff from building rooftops. The treatment system shall be designed to treat the six-month, 24-hour design storm event and shall meet all other current City and DOE standards for water quality systems. The system shall be operational prior to any certificate of occupancy for the Building D expansion.

2. The existing detention/infiltration pond, as well as any additional detention ponds, shall be provided with the peak rate runoff control for the entire MASCA site including the Building D expansion. The peak rate runoff control (s) shall be modified to meet current City and DOE standards. During the two-year/24-hour design storm, the peak rate of runoff from the MASCA site shall be no greater than 50 percent of the existing conditions two-year/24-hour peak rate of runoff. During the ten-year/24-hour design storm, the peak rate of runoff from the MASCA site shall be no greater than the existing condition 100-year/24-hour peak rate of runoff. Existing conditions are as defined in the 1992 DOE Stormwater Management Manual, Part B, Page I-4-6. The peak rates of runoff shall be calculated using the Santa Barbara Urban Hydrograph Method. A multiple orifaced flow control structure shall be designed and constructed to meet the peak runoff rate requirements. An emergency overflow structure shall be designed and constructed to accommodate the peak rate of the 100-year/24-hour design storm under developed conditions.

rinse wastewater stream on the downstream end of the on-site treatment plant and discharges through Outfall #002 into the POTW collection and treatment system.

All of these pipes, with the exception of the filter backwashes (Stream 4) and the domestic wastewater (Stream 5), are provided with dual containment systems. For inspection and control purposes, these dual containment systems are routed into a large diameter utility tunnel which is used to provide both the dual containment feature necessary and a method through which any leaks can be manually detected. The routing of the utility tunnel is shown in Figure 4. The individual waste line as well as the combined utility conduit all drain via gravity into the wastewater treatment facility.

Three (3) wastewater discharge locations (outfalls) exist today. All three (3) outfalls are regulated under a NPDES permit issued to MASCA on June 30, 1994. The outfalls include:

Outfall #001 -- This outfall is shared with the POTW. It is located at the end of a five (5)-mile long tightline, and discharges treated wastewater directly into the Puyallup River. Prior to discharge, it is treated through several different processes at the on-site wastewater treatment plant. These wastewater flow rates are relatively high and have a constituent makeup significantly different from those typically treated by the POTW. For these reasons, treatment of this wastewater at the POTW was considered cost-prohibitive by both the City and MASCA. Therefore, MASCA constructed their own wastewater treatment facility on-site to handle the treatment of this wastewater. The majority of the wastewater generated by MASCA is discharged via Outfall #001.

The streams tributary to Outfall #001 include:

1. A F/P/A stream composed of drain wastewater collected from various points around the MASCA plant;

2. A RO system flushing/cleaning solution;

3. A DI mixed bed regenerant;

4. An acidic stream composed of spent process acid baths and acid rinse waters; and

5. A RO system reject water stream.

Outfall #002 -- This outfall discharges wastewater directly into the POTW. This outfall contains organic solvent rinse process wastewater. The organic solvent wastewater flows receive pretreatment at the MASCA wastewater treatment plant prior to discharge to the POTW.

Outfall #003-- This outfall discharges wastewater into the on-site infiltration/detention pond. The flows consist of backwash water from cleaning the carbon, sand, and DI filters used in the process of treating the domestic water supply to produce the high purity water necessary for the production of the semiconductors. The carbon filters are backwashed on a weekly basis. The wastewater backwash is discharged into the infiltration pond. RO is also used in the highly purified water production process. This produces a continuous stream of RO reject water, which discharges into Outfall #001.

3.3.1 Tightline -- Outfall #001

Discharge from Outfall #001 consists of acid wastewater and the F/P/A wastewater. Both wastewater streams receive pre-treatment at the on-site MASCA wastewater treatment plant prior to discharge.

Figure 5 is a flow diagram of the F/P/A treatment process. The wastewater stream containing F/P/A is first stripped of ammonia in an air stripping tower (Photo 1). The ammonia is recovered in another stripping tower, collected, and hauled to a disposal site. The remaining effluent is treated with calcium chloride (CaCl) to form solids containing compounds of fluoride and phosphate. These solids settle out in a clarifier tank. The solids from the bottom of the flocculation tank are dewatered and hauled to an off-site disposal site. Effluent from this process is combined with the acid waste stream for further processing on-site before discharging through Outfall #001.

Photo 1: MASCA Ammonia Stripping Towers

The acid wastewater stream contains acid rinse waters, the previously treated F/P/A effluent, and RO reject water from the on-site purification system. These streams are neutralized by the addition of acids or base as appropriate in a two stage process. The second stage of the process repeats the first stage of the process to ensure that the pH is within the acceptable range (pH 6 to 9) for discharge, as defined in the NPDES permit. Figure 6 is a flow diagram of the acid wastewater treatment process.

The pre-treated wastewater leaves the site in a 10-inch, 5-mile tightline that belongs to the City. The tightline flows in a northwesterly direction to the POTW, as shown on Figure 7. The tightline extends around the westerly exterior edge of the treatment plant grounds to the northwest corner of the site where two (2) unused POTW clarifiers are located, as shown on Photo 2.

Photo 2: Clarifier Tanks at POTW that are currently used by MASCA.

The clarifiers are currently used as both an upset control tank for flow in the tightline, and as a periodic treatment for an unknown biological reaction going on in-side the tightline itself. A control weir in the westerly of the two clarifier tanks keeps a constant head on the 10-inch tightline down from the MASCA plant. After crossing the weir, flow is discharged into another tightline that is tied in with the outfall from the POTW, and discharges into the river approximately a quarter-mile downstream.

The design flow rate of the tightline from MASCA is approximately 1.6 MGD, with current record flows between 0.7 and 1.0 MGD. Testing apparatus in the control weir are used for a weekly, 24-hour composite sample as well as continuous monitoring of the pH level in the discharge stream. In the event of pH fluctuations outside of the allowable pH range of 6.0 to 9.0, an automatic valve just downstream of the control weir shuts. Flow then fills the control structure to an overflow point where the wastewater is diverted into the easterly clarifier tank. The tank has a volume of approximately 380,000 gallons. Once pH ranges in the control weir get back within prescribed limits the automatic valve opens and discharge continues into the river.

Wastewater collected in the upset tanks are slowly bled from the tank into the City's raw sewage stream coming into the POTW. This dilutes the upset condition flows from the tightline with standard wastewater from the City of Puyallup. The combined flow is then treated as standard domestic waste. In practice, the upset flows typically comprise a large portion of the combined flow to the POTW. Therefore the dilution factor is not extremely large. It takes a total of 6 to 12 hours for the upset tank to drain into the POTW system.

In operation of the tightline, it has been noted that while pH of the effluent entering the tightline has been within the allowed ranges, reactions within the tightline itself eventually cause the pH of the effluent coming out of the lower end of the tightline to be too low to be allowed to discharge. As the pH gets near 6.0 at the control weir, large amounts of caustic are added to the flows at the MASCA on-site wastewater treatment plant. This has the effect of elevating the pH in the tightline to chemically attack the materials reacting within the tightline itself. This is referred to as a caustic flush, which takes place approximately once a month. The caustic flush water, which generally has a pH much higher than the allowable pH discharge, is diverted by the automatic valve into the upset tank and then bled into the POTW treatment system. This caustic flush typically takes 4 to 6 hours to complete. "Green slime" material has been noted in the tightline and occasionally gives problems for the probes at the control weir of the system.

The tightline, as well as the clarifier upset tanks at the POTW, are property of the City of Puyallup, even though they only serve flow from the MASCA site. Initial agreements between the City and MASCA for the operation of the tightline and the tanks indicate that MASCA is responsible for treating flows collected in the upset tank. In practice, the upset flows are managed by both parties.

3.3.2 Sanitary Sewer -- Outfall #002

Discharge from Outfall #002 consists of domestic wastes from the MASCA restroom facilities and the laundry facilities. This stream also consists of rinse wastewater from an organic solvent-related processes in the manufacturing. The rinse wastewater stream contains 1-2% organic solvents. The stream is treated prior to release by passing it through two in-line carbon filters. After filtration, flow is treated for pH control and released into the POTW system. Figure 8 is a flow diagram of the solvent rinse treatment process. At the end of the treatment process, there is an upset tank designed to allow batch treatment of problem flows.

Tom U.

CITY OF PUYALLUP

Municipal Administration Building
218 West Pioneer
Puyallup, WA 98371
206/841-4321

FILE COPY

September 14, 1996

TRANSMITTAL: FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MATSUSHITA SEMICONDUCTOR CORP. OF AMERICA (MASCA) BUILDING "D" EXPANSION

The City of Puyallup hereby transmits this Final SEIS to public agencies and interested members of the public. This document covers the proposed "Building D" expansion to the MASCA Puyallup site, which is located at 1111 39th Avenue SE in Puyallup. It is supplemental to an EIS prepared in 1980-81 for the plant's original establishment.

The Draft SEIS for this project was released on July 16, 1996. The thirty day comment period on that document expired on August 15, 1996. A public hearing on the Draft SEIS was held on July 31, 1996. **This Final SEIS includes a response to all comments submitted during the Draft SEIS comment period, including those made in writing as well as verbal testimony from the public hearing. The Final SEIS also contains revisions to the Draft SEIS text and mitigation measures which were warranted given comments received.**

This Final SEIS is being sent to all agencies and parties who received copies of the Draft SEIS. In addition, persons who submitted comments (written or verbal) or requested copies of the Draft SEIS are also being sent copies. *A ten day appeal period follows release of this Final SEIS; no permits associated with this project will be issued until completion of the appeal period. Any appeal of the adequacy of this document must be received by the City of Puyallup no later than 5:00 PM on Tuesday, September 24, 1996. In accord with the Municipal Code, to be considered valid, any appeal must include a statement specifying the reasons for the appeal and a fee of $480.00.*

If you have questions regarding this document or the appeal period, please call Tom Utterback, Planning Manager, at 841-5557.

PUBLIC AGENCIES RECEIVING DOCUMENT

State Dept of Ecology
State Dept of Wildlife
Puyallup Tribe
City of Tacoma Public Utilities
Pierce College
Pierce Transit
WSDOT, Olympic Region
Puget Sound Air Pollution Control
Muckleshoot Indian Tribe
Fruitland Mutual Water Company
Puget Sound Power and Light
Central Pierce Fire and Rescue
Pierce County River Improvement
State Dept of Natural Resources
Attorney General - Ecology Division
Economic Development Board
Puyallup Area Chamber of Commerce
Pierce County Herald
The Morning News Tribune
Puyallup Public Library
Pierce County - South Hill Public Library
City of Auburn Fire Department
City of Tacoma Fire Department
McChord Fire Department

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3. MASCA shall provide additional detention/infiltration, inclusive of a 1.3 factor of safety, to accommodate additional volume of runoff resulting from the additional peak rate control for the entire MASCA site. This may be done by increasing the size of the existing detention/infiltration pond and/or by constructing a new pond. In addition, the gravel lense in the existing pond shall be scaled to prevent further infiltration at that location in the pond. Additionally, MASCA shall remove and dispose of properly any contaminated sediments in the existing pond. The pond(s) shall be designed and constructed to meet current City and DOE standars. The pond(s) shall be operational prior to issuance of any certificate of occupancy for the Building D Expansion.

4. The process water flow from Outfall #003 shall be removed from the existing detention/infiltration pond. This process water shall be pre-treated by MASCA and discharged to Outfall #001. MASCA shall coordinate the change of Outfall #003 into their NPDES permit and shall initiate the amendment process immediately. The conversion shall be completed prior to MASCA's NPDES permit renewal date scheduled for 1999. If DOE denies MASCA the right to discharge process wastewater to Outfall #001, then MASCA, DOE, and the City will mutually agree upon an alternative discharge method prior to discharge of any process wastewater flows from the Building D expansion.

5. MASCA shall implement an erosion control plan in accordance with City and DOE requirements. Erosion control measures shall be maintained throughout construction and beyond as may be necessary.

3.2.6 Unavoidable Significant Adverse Effects

Any increase in stormwater runoff will aggravate the existing downstream flooding problems. Detention will be provided for the proposed expansion to avoid this. Proposed mitigation measures will not prevent or eliminate all water quality problems. However, by reducing the rate of pollutant discharge, cumulative downstream water quality impacts would be lessened.

The existing detention/infiltration pond is substandard by today's standards. Even after the above mitigation measures are implemented, the pond will not meet current DOE or City standards. In addition, during major storm events, the modified control structure will release stormwater in overflow conditions, which is a violation of the current NPDES permit.

3.3 PLANTS AND AESTHETICS

3.3.1 Issues

The 1981 Concomitant Agreement established a 75-foot buffer around the entire property. The current proposal includes removing portions of this buffer to build a road and then replanting portions of the buffer. The proposed expansion calls for Building D to be 65 feet in height. While this is less than allowed under current codes (80 feet), the structure would be taller than the 57-foot building anticipated in the 1981 EIS (Figure 3-2).

Issues raised during scoping include:

- Loss of existing vegetative screening in the 75-foot wide buffer area along the northern property boundary;
- The ability of remaining vegetation to screen the site after road cut impacts;
- Visual impacts to neighboring properties of the MASCA facility, given the taller Building D and changes in the buffer; and
- Effectiveness of the proposed revegetation plan in screening MASCA from adjacent property.

3.3.2 Existing Condition

There is a 75-foot wide by 800-foot long second growth stand of native plant species along the northern property boundary (Figure 3-3). The stand has multiple layers and is approximately 25 to 40 years old. For the purposes of this analysis, a significant tree is considered to be over 12-inches in diameter at breast height (dbh).

Table 3-2 lists the dominant species in the buffer. According to a survey by the applicant's landscape architect, there are approximately 50 existing healthy trees that have a trunk diameter of 12 inches dbh or more within the buffer area (i.e., significant trees). Representative examples include a 30-inch caliper western red cedar approximately 65 feet in height and a 12-inch dbh red alder that is approximately 55 feet tall. In addition to the larger trees, there are many smaller-diameter trees and tall shrubs that fill the mid-level of the understory. The undergrowth gradually increases in density toward the east end of the buffer.

Table 3-2
Dominant Plant Species in Buffer

Trees	Shrubs	Herbaceous Species
western red cedar (*Thuja plicata*)	dull Oregon grape (*Mahonia nervosa*)	pig-a-back plant (*Tolmiea menziesii*)
Douglas fir (*Pseudotsuga menziesii*)	pacific ninebark (*Physocarpus capitatus*)	slough sedge (*Carex obnupta*)
bigleaf maple (*Acer macrophyllum*)	trailing blackberry (*Rubus vitifolius*)	small-fruited bulrush (*Scirpus microcarpus)*
black cottonwood (*Populus balsimifera*)	salmonberry (*Rubus spectabilis)*	sword fern (*Polystichum munitum*)
hazelnut (*Corylus cornuta*)	salal (*Gaultheria shallon*)	creeping buttercup (*Ranunculus repens*)
red alder (*Alnus rubra)*	Indian plum (*Oemleria cerasiformis*)	
vine maple (*Acer circinatum*)	red elderberry (*Sambucus racemosa*)	

Photos 3-1, 3-2, and 3-3 illustrate how much of the existing buffer is composed of deciduous understory shrubs such as salmonberry (*Rubus spectabilis*), vine maple (*Acer circenatum*), and pacific ninebark (*Physocarpus capitatus*). During the winter months, these shrubs are devoid of leaves and provide less screening than during the spring and summer. As a consequence, the current vegetation in the buffer would not be an effective screen for the proposed Building D from off-site properties. The western two-thirds (2/3) of the buffer berm has cross-slopes averaging six percent and is reasonably flat along its length. The eastern one-third (1/3) has cross slopes of about 14 percent and rises to approximately 34 feet.

The property to the north slopes gently northward, down and away. A viewer's eye level would be below the horizontal line of sight of Building D if they were standing at the north property line looking south.

To assess the visual impacts of the project, it is necessary to know the use and zone of the properties from which people may view the site. To the north, the property is a dense second growth coniferous forest owned by the Washington Department of Natural Resources (DNR).

This property would be affected by any changes in the buffer along MASCA's north boundary. DNR has no current plans to develop the property but Pierce College has first right of refusal on the property for possible future development. In addition, the City plans an arterial along the north property line to connect Wildwood Park Drive with 5th Street SE to the northwest of the site.

For purposes of view analysis, the 72-foot long vegetation buffer area along the northern property boundary that would be disturbed by the proposed expansion has been divided into three zones, as shown on Figure 3-3. Each zone has vegetative and topographic characteristics that provide different screening potentials. These are described below:

Zone 1

- This zone contains four existing significant coniferous trees that are located closer to north property line.
- The understory consists of salal, sword fern and blackberry.
- The grade difference between the north property line and the south line of the buffer is four feet.

Zone 2

- This zone contains seven existing significant coniferous trees and seven deciduous trees.
- The foreground and middle ground of the understory are filled with ninebark (approximately four feet tall) and alder saplings that are approximately 15 feet tall.
- The grade difference between the north property line and the south line of the buffer is six feet.

Zone 3

- This zone contains two existing significant coniferous trees and five significant deciduous trees.
- The foreground contains dense alder saplings that are about 15 feet tall, and the middle of the buffer is dense ninebark. There is very little understory.
- The grade difference between the north property line and the southern property line of the buffer is 12 feet.

The revegetation plan proposes to replace the shrub layer with a mix of Oregon grape, indian plum and other species in one to three gallon sizes.

The revegetation plan also proposes to hydroseed all disturbed areas with erosion control grass seed mix and provide an automatic irrigation system to maintain the plantings during the plant establishment period. The proposed retention/revegetation plan, as depicted in Figure 3-5, was tentatively approved by the City on June 11, 1996.

Visual Analysis

The intent of the buffer, as established in the 1981 Concomitant Agreement was to provide physical separation and visual screening of the site from surrounding properties and uses. The 1981 EIS did not, though, require that the buffer provide 100% sight obstruction of on-site features. Since the proposed building will be 65 feet tall and the top of the new slope in the buffer area will range between four and 15 feet higher than the existing grade, the slope itself will screen much of the proposed development. Vegetative screening will rely primarily on the canopies of the existing trees and the new vegetation at the top of the slope. Lower slope and mid-level understory plants horizontal to the observer will not provide screening of the proposed development except at the higher east end. The views from each zone are shown on Figure 3-6.

It is important to note that the MASCA site is bounded by undeveloped property on the north and west sides. The DNR owns the property on the north and Pierce College owns property to the east. The college site is only partially developed but is expected to develop in the long-term. Currently, however, there are few if any viewers who would be affected by the project.

The 60-acre property to the west (known as the Bradley property) is privately owned and zoned residential. Therefore, the effective buffer of the site extends well beyond the current property boundary and would effectively screen the proposed expansion.

Zone 1

With construction of the access road for Building D, the grade difference between the north property line and the top of the proposed slope at the south buffer line would increase by approximately 15 feet and uniformly taper to zero (0) at the east end of the zone. The closeness of the new top of slope to the observer will aid in blocking the view of Building D (Figure 3-7).

In the west end of the buffer, the exposure of the proposed development would not be as great because of the size and character of the existing vegetation that will remain after construction is complete.

One significant conifer tree would be removed from Zone 1 as a result of the site work. In addition, approximately 40% of the existing screening shrubs would be removed, causing the upper half of the north elevation of Building D to be partially visible from the north property line.

3.3.3 Proposed Action and Potential Significant Impacts

Buffer Impacts

The construction of the proposed 26-foot wide access road along the north side of Building D includes side slopes of two horizontal to one vertical (2:1) foot. The grading and fill for the access road would intrude 45 feet into the central portion of the buffer (Figure 3-4). Approximately 0.54 acres (44%) of the total 1.24 acres of buffer area would be cleared of existing vegetation as a result of road construction. Without the use of tree wells or other retention measures, the clearing would potentially remove approximately 21 of the existing significant trees (trunk diameter of 12 inches dbh or more) in the northern portions of the disturbance area. The cleared area tapers down to 25 feet on the east end and 15 feet at the west end. The largest coniferous trees will be removed include a 32-inch cedar and 24-inch fir. The loss of this vegetation will reduce wildlife habitat and open potential views to the site from the adjoining property.

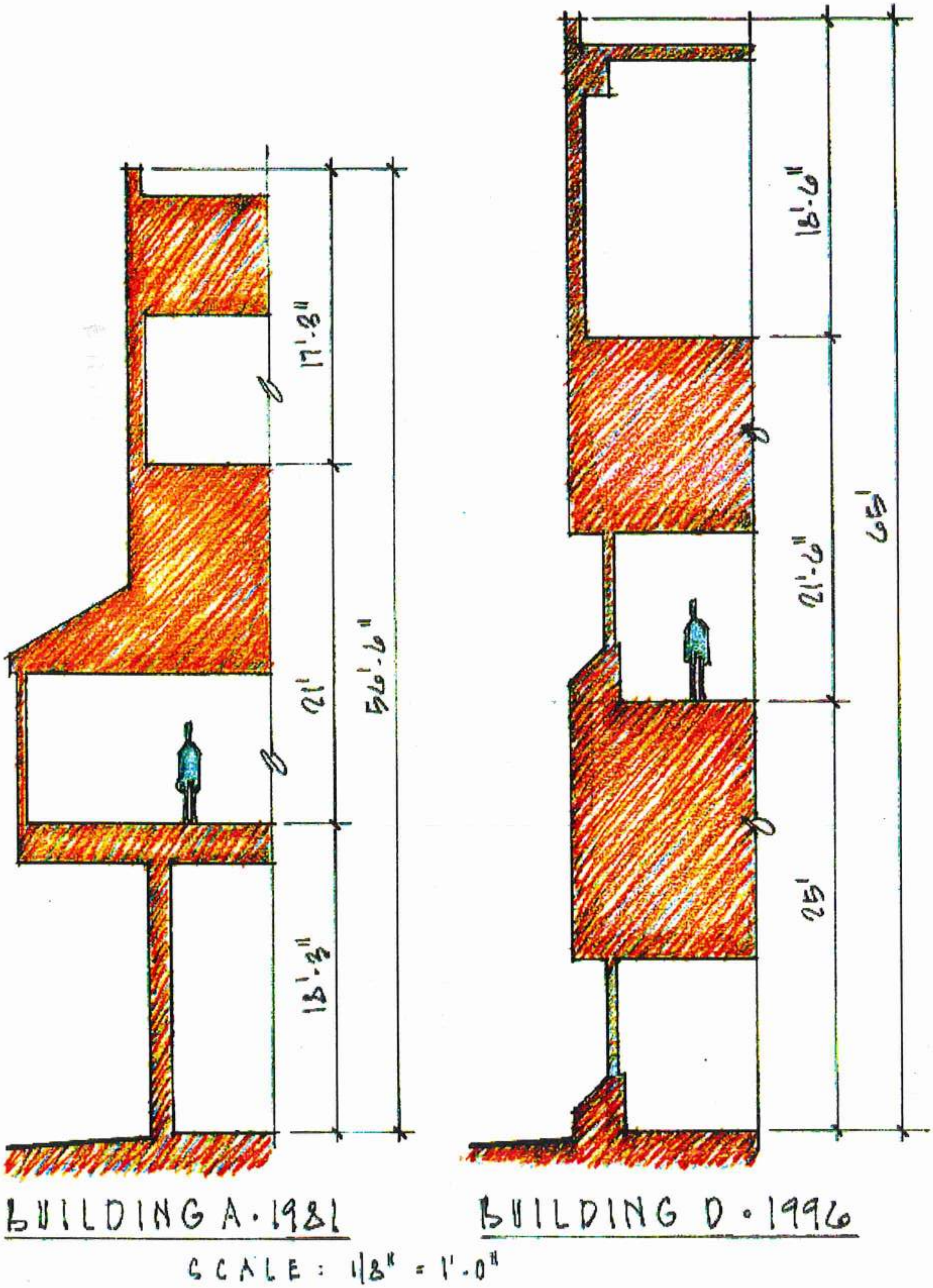
Several options for reducing the impacts to the existing buffer were examined. These options include moving the road south, steepening the fill slopes, and creating tree wells around the bases of the significant trees. The proposed road alignment is necessary to provide access to the service yard. Moving the road south requires either narrowing the road to less than 26 feet, reducing or reconfiguring the service yard, or moving the entire facility southward. Given the level of impact a road re-configuration would have upon the overall project, other means of buffering the northern perimeter have also been explored.

Other options involve steeper fill slopes or the use of retaining walls so as to decrease the total area of impact. However, slopes greater than 2:1 are difficult to revegetate and tend to erode quickly. A retaining wall may be unsightly when viewed from off-site and would not allow much opportunity for revegetation of the existing buffer. The proposed fill will assist in buffering the facility by creating a vegetated earthen berm. Over time, the berm will develop a natural native vegetation that will blend in with the existing vegetation.

According to the landscape architect, the use of tree wells, protective fencing or scalloping the toe of the slope is an option that could be expected to protect an additional 12 of the 21 of the significant trees slated for removal.

For trees higher up on the fill slopes, the depth of the tree well (up to 10 feet) is too great to ensure survival of the tree after construction. In sum, nine of the 50 significant trees located within the buffer area are slated for removal. The remaining 41 will be retained because they are located outside of the grading area or through use of tree well/protective fencing.

The revegetation plan proposed by MASCA includes planting 52 new coniferous trees (a mix of Douglas fir, and western hemlock) (Figure 3-5). The new conifers will range in height from five to six feet and will be balled and burlapped root stock. The plan also includes planting 45 deciduous trees ranging in height from six to eight feet in the cleared buffer area. These would include hazelnut, red alder, and red maple. These will also be ball and burlapped plant stock.



Source: *Matsushita Semiconductor Corporation of America*

Figure 3-2:
Building Heights

Photo 3-1. Facing west from the west end of wetland condition.

Photo 3-2. South edge of north buffer, facing north.

Photo 3-3. South edge of north buffer, facing east.

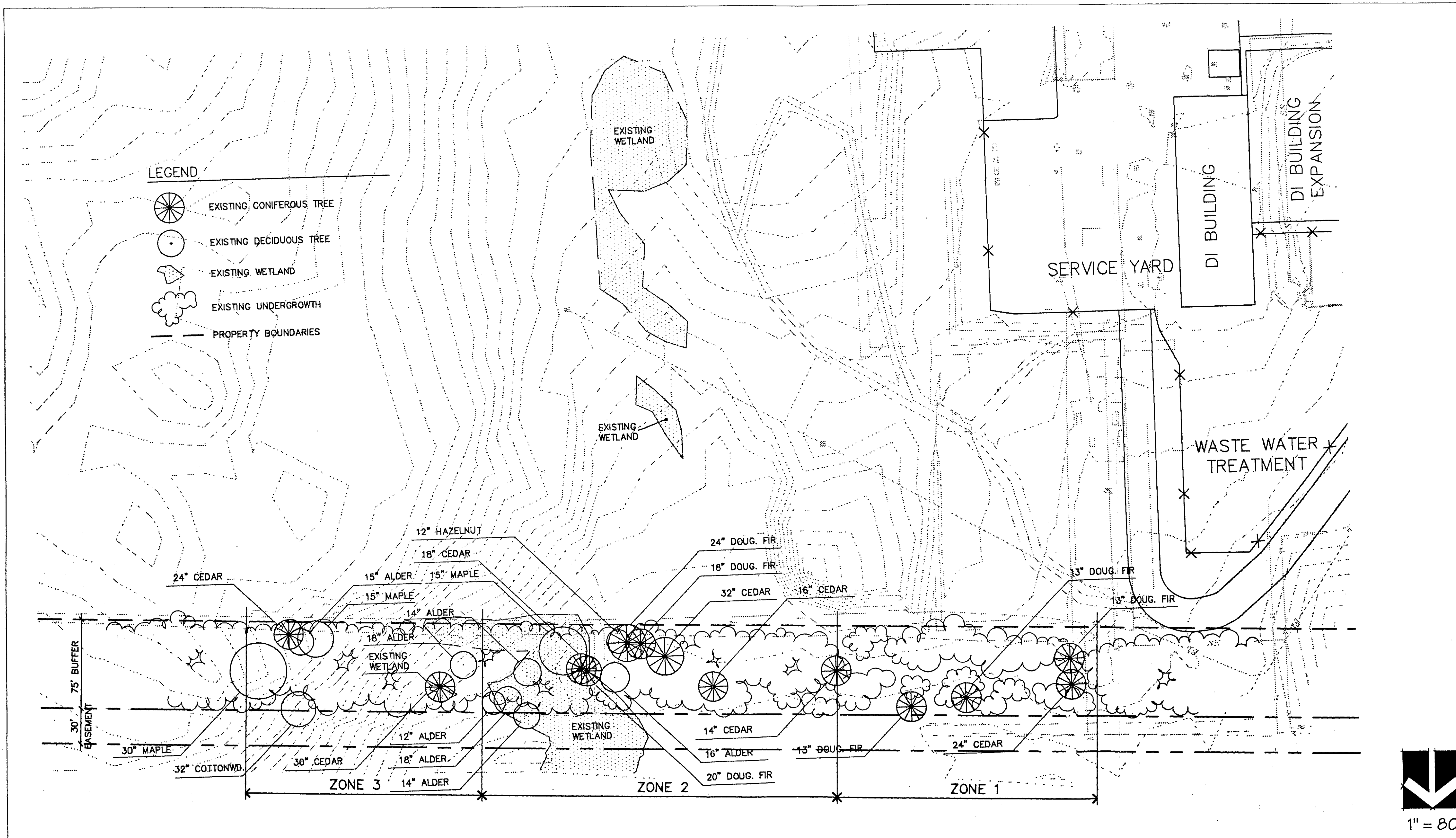


Figure 3-3:
Existing North Buffer Area

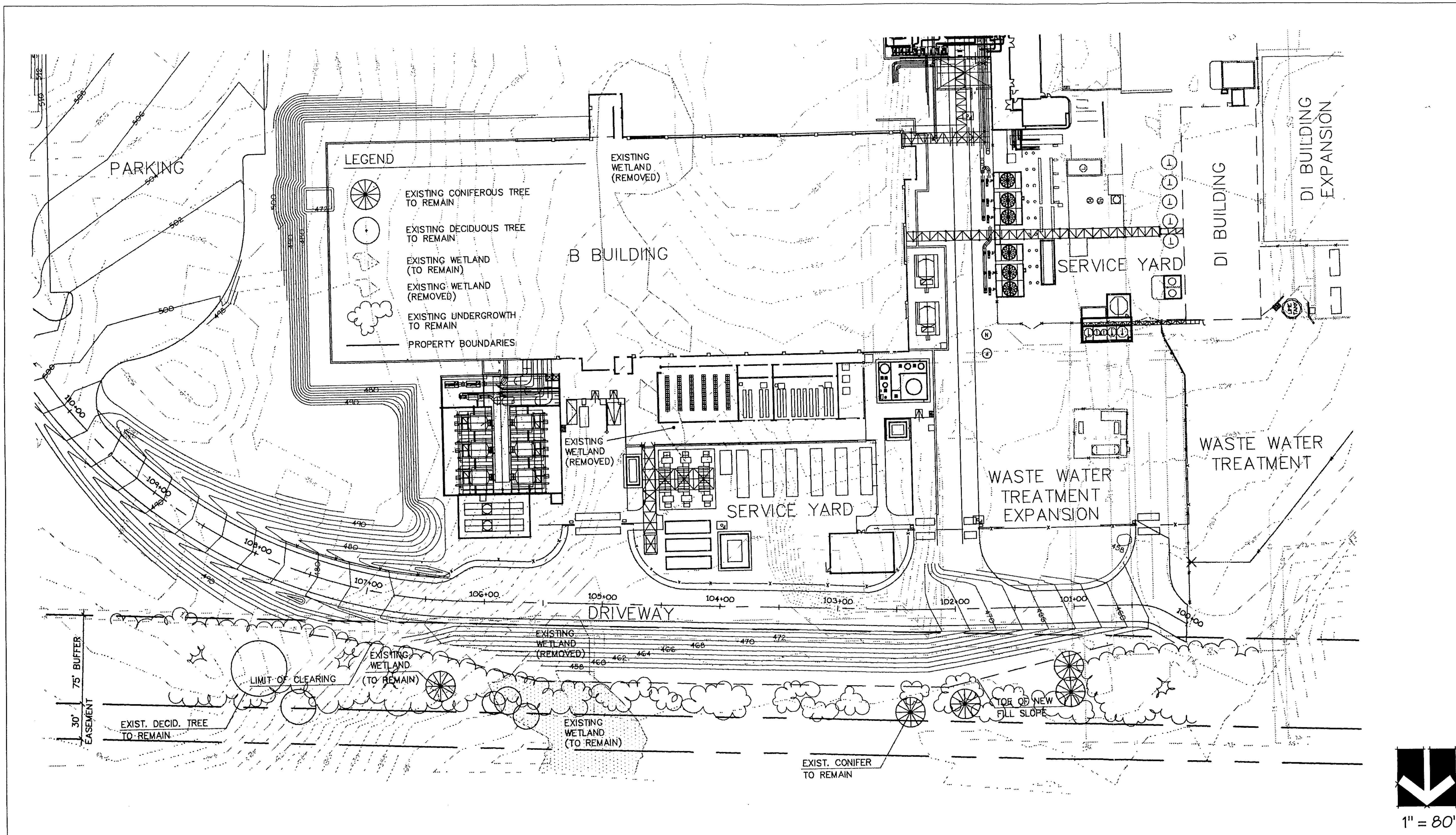
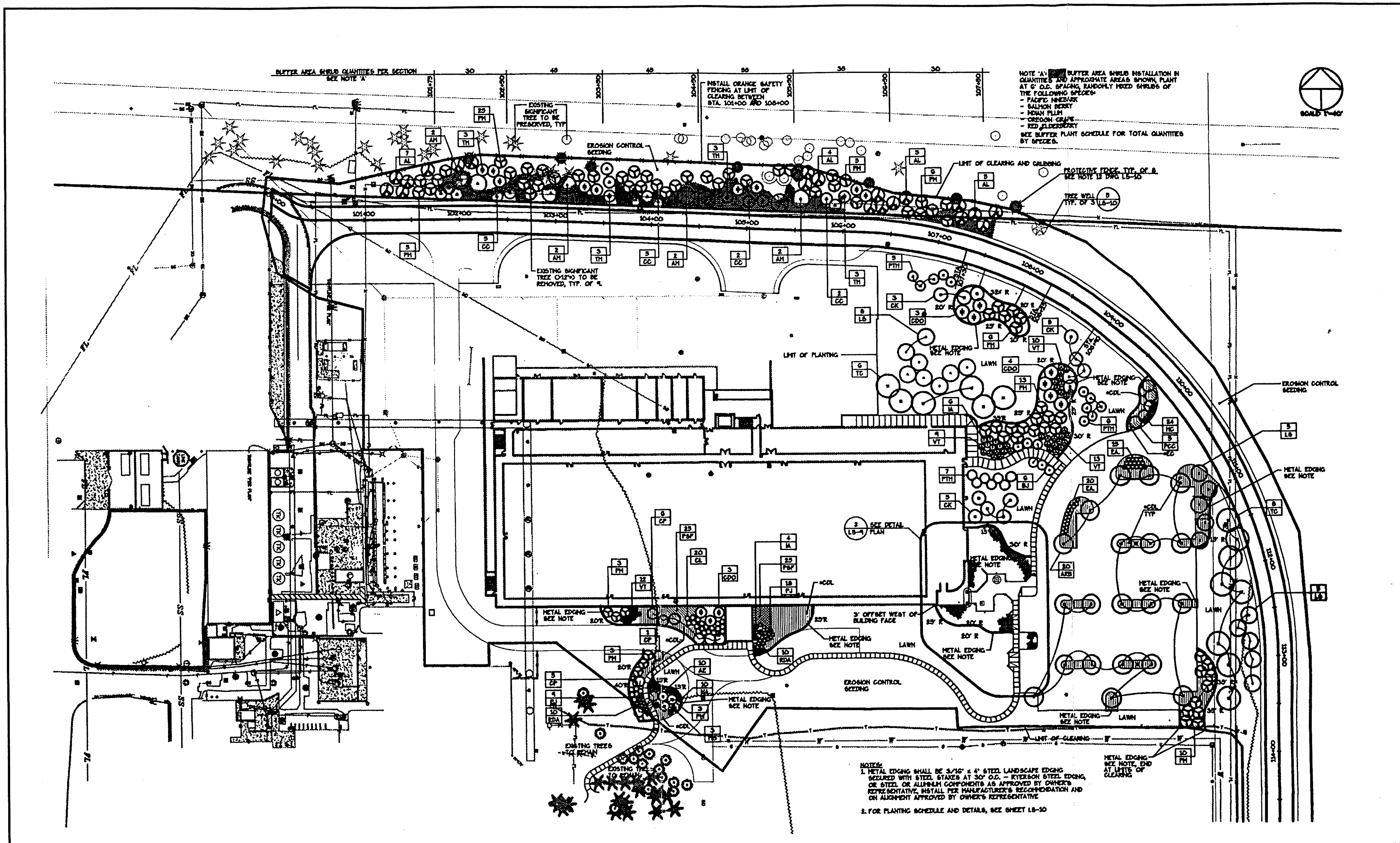
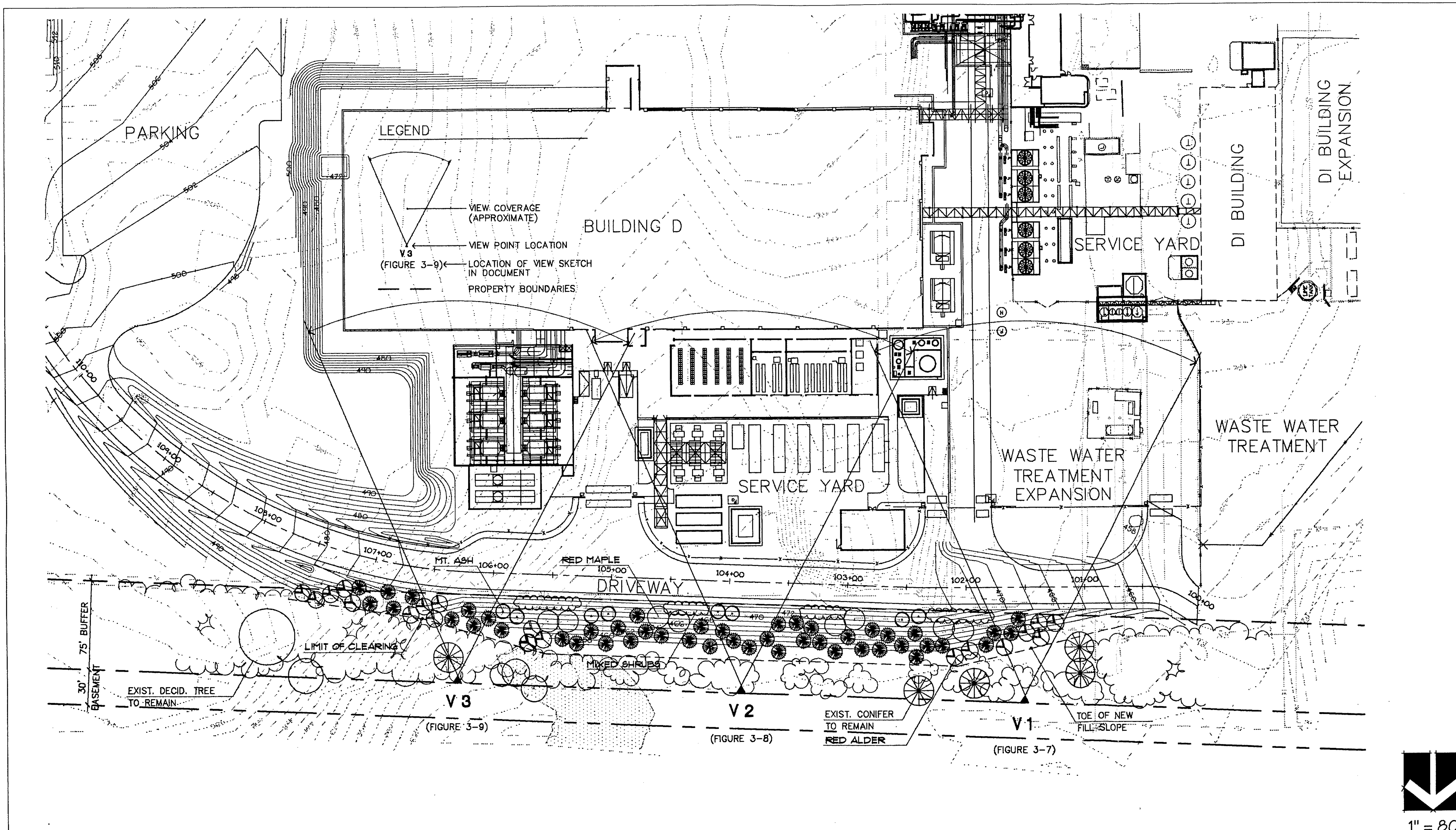


Figure 3-4:
Buffer Area Impact



3-5.
Revegetation Plan



Source: *Richard Carothers Associates*

Figure 3-6:
Views of Proposed Expansion

The proposed revegetation plan includes planting 11 coniferous trees and 15 deciduous trees in this zone. This density of trees is adequate and would provide effective screening of the north elevation of Building D, especially during the spring and summer months. Based on estimated growth rates, it would take approximately 15 years before the plants would effectively screen the development.

Zone 2

With construction of Building D and the access road, the grade difference between the north property line and top of the proposed slope at the south buffer line will increase by 12 feet. The closeness of the new top of slope to the observer will aid in blocking the view of Building D (Figure 3-8).

Seven significant coniferous trees and one deciduous tree along with several non-significant, mid-level trees would be removed. In addition, approximately 50% of the existing screening shrubs would also be removed. This would result in the upper half of the north elevation of Building D and top one-third (1/3) of cooling towers being partially visible from the north property line. A number of significant trees would remain at the east end of Zone 2, close to the north property line.

The proposed revegetation plan includes 28 coniferous trees and 17 deciduous trees, which would provide ample screening of the north elevation of Building D, especially during the spring and summer months. Based on estimated growth rates, it would take approximately 15 years before the plants would effectively screen the development.

Zone 3

With construction of the access road, the grade difference between the north property line and top of the new slope at the south buffer would increase by four feet at the west end and uniformly taper to zero (0) at the east end of the zone. The closeness of the new top of slope to the observer would aid in blocking the view of Building D (Figure 3-9).

A comparison of the existing elevations to the elevations of the proposed road and structures shows that the extreme east end of the buffer is approximately 10 feet higher than the road and 13 feet higher than the base of the structures. The existing vegetation is not dense enough to screen the proposed development, and after buffer impacts, much of the best screening vegetation would be lost. Supplemental planting can be implemented to improve the screening of the proposed scrubber towers, buildings, and other facilities.

No significant trees would be removed in Zone 3, although several non-significant, mid-level coniferous and deciduous trees would be removed in the top of slope area. Approximately 30% of the existing screening shrubs would be removed. As a result, the upper half of the north elevation of Building D and more than three-quarters (3/4) of the height of the scrubbers would be substantially visible from the north property line, especially in the higher eastern portions. Thirteen new coniferous trees and 13 new deciduous trees would be planted within buffer to provide partial screening of the north elevation of Building D, especially during the spring and summer months. Based on estimated growth rates, it would take approximately 15 years before the plants would effectively screen the development.

3.3.4 Mitigation Measures

The City has determined that the following mitigation will be required as a condition of approval of the expansion.

1. MASCA shall fully implement the landscape retention/revegetation plan, as tentatively approved by the City on June 11, 1996 (shown in Figure 3-5), including accompanying specifications and grading notes.

2. A maintenance program for the establishment of the replacement plants shall be prepared to include watering, fertilizing, weeding and feeding on a regular basis. Prior to issuance of building permits for Building D, the applicant shall submit surety, in an amount and form acceptable to the City, to cover the costs of all revegetation in the buffer. This surety shall be held by the City for one full growing season from establishment and shall be released only upon a finding of proper establishment.

3.3.5 Significant Unavoidable Adverse Impacts

Much of the vegetation that provides the best screening would be cleared but since adjacent property is vacant, few viewers will be affected. In addition to retaining as many trees as possible, planting techniques can be implemented to improve screening. However, there will be a short-term adverse impact on aesthetics until the buffer vegetation has become established (approximately 15 years). Even after the vegetation is well established, the scrubber towers will be partially visible from the property boundary due to their height.

3.4 ENVIRONMENTAL HEALTH—EMERGENCY RESPONSE CAPABILITIES

3.4.1 Issue

The proposed expansion will significantly increase the storage, handling, and use of hazardous materials at MASCA over what currently occurs. The hazardous materials used at MASCA may pose increased risks to the community. During scoping, concern was raised over the hazardous materials and the emergency response capabilities of both MASCA and the PFD.

Figure 3-7:
View 1

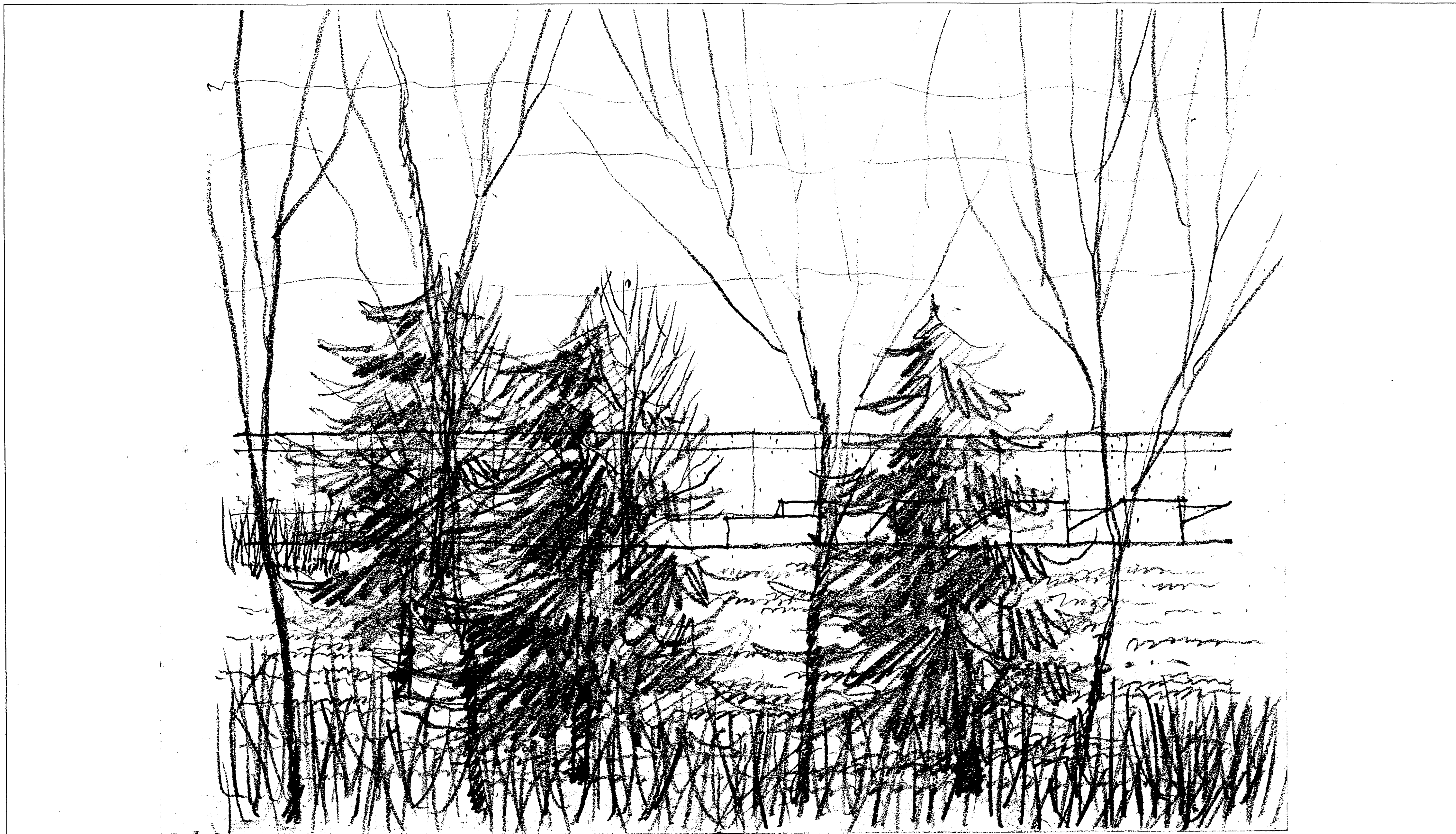


Figure 3-8:
View 2

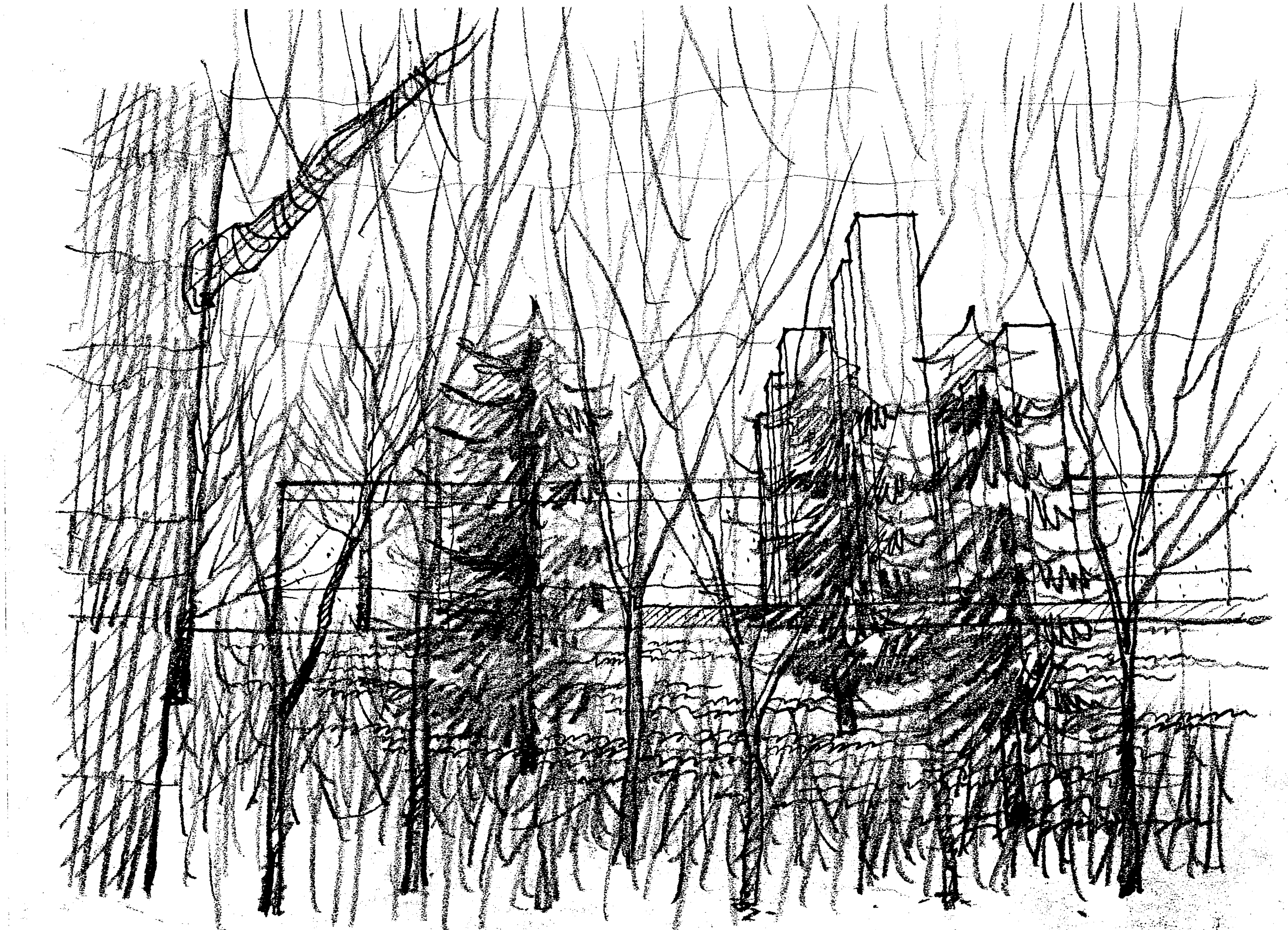


Figure 3-9.
View 3

3.4.2 Storage, Handling, and Use of Hazardous Materials

The storage, handling, and use of hazardous materials in the existing facility was evaluated, and the findings are summarized below.

Toxic Gas Detection

The majority of the toxic gas detection within the existing fabrication areas is performed by chemical tape. These machines are old by industry standards (greater than 10 years) and require on-going maintenance to operate correctly. Although the systems are being maintained, maintenance is not adequately documented and the functionality of the system has been in doubt for a period of months.

The present emergency control station (ECS) located in the security room in is incapable of determining which detection point is in alarm and what level of gas is present. In some cases, gas detection points in exhaust ducts are not installed in optimal locations to detect gas leaks. The alarm system also has difficulty processing multiple alarms. An improperly installed and maintained gas detection system may not detect a hazardous gas leak which could pose risks to workers and the community. While controls exist to limit or minimize the effects of a catastrophic release from an entire cylinder, a poorly functioning gas detection system may allow smaller releases to go undetected for some time.

Silane Storage and Use

In most cases, the storage and use of hazardous gases complies with current Codes, standards, and best management practices. The only exception is the indoor use of silane gas. Silane gas is explosive and requires good ventilation for dilution to safe levels in the event of a leak. Silane may be explosive when confined, current standards require silane to be used and stored in a specially designed outdoor facility to provide the best ventilation. Silane is stored in gas cabinets at MASCA that provide good ventilation. However, if there is a silane leak in a gas cabinet and the ventilation fails, there could be an explosion resulting in significant injuries and building damage. Although silane is not toxic, risk to the community might develop as a result of damage to toxic cylinders stored near the silane. The risk of a silane explosion is small, because ventilation systems are on emergency power. However, MASCA should modify it's current use and storage of silane to be in accordance with the Uniform Fire Code (UFC) and National Fire Protection Association (NFPA) Standard 318.

New Equipment Sign-Off Procedures

Presently, the MASCA Safety and Health Department is administering a procedure for installing new fabrication equipment. The procedure contains two components, a new equipment start-up permit data sheet and a new equipment start-up permit. Both of these are one page long and contain numerous line items and places for initials of responsible parties overseeing portions of the equipment installation. It is not clear that the responsible parties are knowledgeable in the areas requiring their signatures. Additionally, the MASCA Safety and Health Department has ultimate sign-off responsibility for areas in which it does not exercise functional management authority.

The lack of a detailed equipment sign-off procedure encompassing all applicable departments increases the probability that equipment will not be installed safely. A systematic approach that includes detailed documentation and establishes roles and responsibilities is imperative. This is particularly important during a semiconductor expansion involving dozens of pieces of equipment that will use hazardous materials in a complex mechanical scheme.

Ventilation Systems

In a semiconductor fabrication area, local ventilation is the primary means of preventing employee exposure to hazardous vapors. The MASCA ventilation system is very complex and requires documented monitoring to ensure system performance. No such monitoring program currently exists.

In a complex ventilation system, dampers are used to balance the branch ducts. Unless they are secured, dampers can move, blocking exhaust, and causing a loss of hazardous vapor and gas control. Dampers at MASCA are not currently adequately secured. MASCA will be required to install and maintain the ventilation systems in accordance with applicable City standards and codes prior to operation of Building D. A written procedure should also be prepared and implemented by MASCA to ensure on-going exhaust ventilation system functionality whenever modifications are made. Ventilation system capacity testing should be done on a semi-annual basis. The results of the testing should be recorded and posted on stickers located on tested equipment and supporting ductwork.

Double/Secondary Containment

Presently, corrosive gases are not doubly contained when transported in stainless steel, welded lines. While this complies with the minimal standards as set forth in the UFC, this is not in conformance with the guidelines as set forth in the Semiconductor Equipment Material Information (SEMI) Standard F6-92. All toxic and corrosive gases should be doubly contained. Double containment of corrosive gases such as chlorine and boron trichloride is very important. The 316L stainless steel piping used at MASCA can be attacked by corrosive gases and cause failures in the piping. The existing piping runs several hundred feet through areas where a high degree of mechanical activity occurs. This increases the likelihood of a mechanical failure. MASCA will be required to have all hazardous materials piping systems comply with applicable codes, standards, and guidelines including SEMI Standard F6.

Liquid chemicals, such as sulfuric acid and sodium hydroxide used in the facilities Acid Waste Neutralization (AWN) area, have mechanical fittings that are not within the secondary containment. Additionally, the sodium hydrozide secondary containment did not appear to be large enough to contain the tank volume as well as anticipated rain water. Secondary containment for hazardous materials should be provided as required in the UBC and UFC.

Seismic Restraints

With the exception of gas cabinets, restraints to prevent equipment or tanks from falling over in case of an earthquake are not systematically applied. If a significant earthquake occurs and equipment or tanks are not adequately secured, chemical lines connected to the equipment could rupture and release pressurized hazardous materials. Additionally, reservoirs of liquid chemicals in workstations could spill. Seismic restraint requirements of the UBC and SEMI S2-93 should be met.

Exit Signs in the Fabrication Area

Exit signs are either missing or difficult to see in many of the bay and service chases of the fabrication area. This presents a potential risk to employees required to exit in emergencies if they are not familiar with the exit plan. MASCA should install exits signs as required in the UBC.

Chemical Handling

A maintenance employee stated that for cylinder changes of hazardous gases, the "buddy" system is strictly adhered to. However, facilities personnel were observed handling containers of hazardous materials alone. It is an established industry practice that workers use the "buddy" system to prevent a spill or release of a hazardous material. MASCA should enforce the use of the buddy system for handling of hazardous materials.

Safety and Health Department Staffing and Roles and Responsibilities

The present MASCA Safety and Health Department is comprised of two employees, a Safety and Health Manager and a Technician. They are responsible for the safe installation of new equipment, training and leading the emergency response team, and responding to numerous day-to-day demands. The level of professional training and experience of these individuals is below the safety staffs at similarly sized semiconductor facilities. This fact, coupled with a lack of ownership responsibilities in other departments (i.e., equipment maintenance, fabrication), causes problems with respect to safety programs.

The MASCA Safety and Health Department should include a Certified Safety Professional or Certified Industrial Hygienist with a minimum of two years experience in the semiconductor industry. Safety responsibilities should be assigned to functional groups, such as production, equipment and facilities, so that these groups assume a far greater role in overseeing and managing safety for their employees and areas.

3.4.3 Emergency Response Capabilities

Despite high levels of engineering controls, hazardous materials incidents have and will continue to occur at the MASCA facility. Such incidents are difficult, if not impossible, to completely prevent due to human errors, the complexity of systems at MASCA, changing conditions, and the unexpected. The history of hazardous materials incidents at the site was reviewed by CADRE and Miller Health and Safety were primarily contained in the area of the facility where they occurred and mitigated by MASCA employees in a timely manner. The most severe hazardous materials incident reviewed occurred on October 31, 1995. Reports conflict on the severity of a toxic cloud formed when an uncontrolled nitric acid reaction occurred on that date. However, the incident had the potential to jeopardize the safety of plant workers, emergency responders, and the community. The incident was mitigated by MASCA and PFD responders.

MASCA maintains records on incidents at the site, although the documentation appears incomplete. For instance, in 1994, MASCA had 27 incidents that required activation of the Emergency Response Team (ERT). The PFD reported 73 responses to MASCA for various alarms. More details on the alarms can be found in the Environmental Health -- Emergency Response Capabilities Technical Appendix of this SEIS.

MASCA and the PFD understand the need to work together in providing immediate, effective, and safe response to hazardous materials incidents at the MASCA facility. Both the PFD and MASCA have written policies and guidelines covering responses to hazardous materials incidents. The PFD's guidelines are generic, owing to their responsibility to respond to a wide variety of incidents throughout the community. MASCA has guidelines specific to their facility and their response activities are limited to their site. In both agencies, written procedures and guidelines are incomplete and difficult to follow.

Current hazardous materials emergency response to the MASCA facility is conducted by MASCA personnel and the PFD, with support from the Auburn Fire Department. On most work shifts, MASCA can respond quickly to incidents involving small quantities of hazardous materials. In contrast, the MASCA ERT is not currently staffed to handle larger incidents.

The MASCA ERT exhibits a high degree of knowledge about their hazardous materials inventory and engineering controls. Weaknesses in their program would be eliminated by increased staffing and proper training in the areas of the Incident Command System, basic hazardous materials response terminology, chemistry, self-contained breathing apparatus (SCBA), and hazard analysis. In-house training records are inadequate and incomplete. Recent instructor qualifications are minimal, poorly documented, or inadequate. MASCA owns and maintains an adequate inventory of equipment for response to a hazardous materials incident at their facility.

During an incident the PFD assists the MASCA ERT by providing incident command and community oversight but has inadequate training and equipment for hazardous materials response. The PFD has a minimal inventory of hazardous materials response equipment. Currently, the PFD is in the initial stages of improving its hazardous materials response capability. The plan is to develop an independent PFD hazardous materials team and participate in a regional hazardous materials response program with other fire departments. In the past, the PFD has contracted with the Auburn Fire Department to provide hazardous materials response. The significant limitations of this support are the long response times from Auburn, and Auburn

Fire Department's unfamiliarity with Puyallup and its hazardous materials occupancies. An adequate inventory of hazardous materials response equipment is critical to prepare the PFD for hazardous materials incidents at MASCA and elsewhere in the community.

Response to hazardous materials incidents at the MASCA facility would be enhanced if the resources and capabilities of MASCA, the PFD, and a regional team were combined. The goal of MASCA and the PFD is to ensure that MASCA has at least eight fully qualified hazardous materials responders at the facility at all times hazardous production materials are being used. A second goal is to ensure that the PFD can respond with a minimum of three fully trained and equipped hazardous materials responders within five minutes of the notification of an incident. Because of the shift schedules at the PFD, this will require training 21 fire fighters in hazardous materials response. The combined MASCA and PFD team would provide a total of 11 responders. A third goal is to supplement the MASCA and PFD responders with regional responders from other fire departments, when required. At times, hazardous materials incidents may require more than 20 responders. For this program to be successful, all groups will have to cooperate in the development of procedures and training.

3.4.4 Mitigation Measures

Emergency Response Capabilities Mitigation Measures

The City has determined that the following mitigation will be required as conditions of approving the expansion.

Use and Storage of Hazardous Materials

Where Codes, Standards, or Guidelines are cited in the mitigation measures, the currently adopted or published editions shall apply, as follows. Mitigations shall apply to new construction and equipment installations, equipment maintenance and testing, and the implementation of administrative procedures. Mitigations shall not apply retroactively to existing buildings and purchased or installed equipment, unless the Fire Chief has determined that a condition constitutes a distinct hazard to life or property. Guidelines refer to the safety guidelines published by SEMI, Semiconductor Equipment and Materials International.

1. Toxic gas monitoring systems shall be installed and maintained in accordance with the UFC.

2. For hazardous gas monitoring, computer based toxic gas management systems, programmable logic controllers or equivalent technology shall be used. These systems shall provide detailed information at the constantly attended location about the location and severity of a leak.

3. Preventative maintenance on the gas detection systems shall be performed and documented per manufacturer's requirements.

4. All gas detection points installed in exhaust ducts shall be located 3 to 10 duct diameters downstream of an anticipated leak area.

5. End-of-line testing of all detection points shall be performed on an annual basis, when new equipment is installed, or other time frames -- as negotiated with the PFD -- to ensure system functionality.

6. A sign-off procedure for new equipment installation shall be used that is approved by the PFD.

7. Equipment, machinery and processes utilized for dispensing, use, or handling of hazardous materials shall be approved by the PFD, listed by an appropriate approving authority, or designed and constructed in accordance with approved standards for the intended use. SEMI S2, or an equivalent method approved by the PFD, shall be used to determine the suitability of semiconductor manufacturing equipment.

8. All equipment shall be installed and maintained in an operable condition in accordance with the UFC.

9. The ventilation systems shall be installed and maintained in accordance with applicable Codes, Standards, and Guidelines.

10. A written procedure shall be prepared and implemented that ensures on-going exhaust ventilation system functionality whenever modifications are made. Ventilation system capacity testing shall be done on a semi-annual basis. The results of the testing shall be recorded and results shall be posted on stickers located on tested equipment and supporting ductwork.

11. SEMI Standard F6, *Guide for Secondary Containment of Hazardous Gas Piping Systems*, shall apply.

12. Hazardous materials piping systems shall comply with applicable Codes, Standards, and Guidelines.

13. Secondary containment for hazardous materials shall be provided as required in the UBC and UFC.

14. Equipment shall be seismically restrained as required in applicable Codes, Standards, and Guidelines.

15. Exit signs shall be provided as required in the UBC.

16. Silane gas shall be dispensed and stored in accordance with the UFC and NFPA Standard 318.

17. The MASCA Safety and Health Department shall include a Certified Safety Professional or Certified Industrial Hygienist with a minimum of two years experience in the semiconductor industry.

18. Safety responsibilities should be assigned to functional groups, such as production, equipment and facilities, so that these groups assume a far greater role in overseeing and managing safety for their employees and areas.

19. The "buddy" system should be used for handling hazardous materials.

Emergency Response Team Capabilities

MASCA

1. An ERT leader and a minimum of 7 hazardous materials technician level ERT members shall be on-site at all times hazardous production materials are being used at MASCA. In addition, 4 support personnel trained to the operations level shall be on-site to assist MASCA technicians with site control, crowd control, decontamination, supplies, and related actions. The MASCA ERT shall not enter the hot zone until a minimum of 11 technicians are on-site. Although a minimum of 4 support personnel are required, MASCA should have a minimum of 8 support personnel to assist the technicians. Hazardous materials technician, operations, incident command levels are described in NFPA 472.

2. MASCA shall employ the same reporting criteria as the PFD for what is a hazardous materials response at the plant to ensure common reporting terminology is used by both organizations.

3. ERT guides, protocols, and checklists shall be reviewed and updated to establish clear and concise response documentation. Copies shall be provided to the PFD for review and approval annually.

4. Standard protocols for hazardous materials response shall be established using a system like the 7-step method identified in the Environmental Health -- Emergency Response Technical Appendix of the SEIS.

5. Facility specific hazardous materials team training shall be conducted that focuses on a quarterly basis by a qualified instructor. Such training shall focus on the areas of incident command, chemistry, hazard analysis, and basic response terminology. Detailed lesson plans shall be created to establish consistent training. PFD personnel shall be invited to participate in all portions of this training.

6. MASCA shall supply the PFD with 4 radios that can communicate with MASCA's radio system. In addition, each member of the MASCA ERT shall carry a radio dedicated for ERT use during their shift. Three spare, back-up radios shall also be available.

7. An ERT training plan shall be written by MASCA prior to issuance of any certificate of occupancy. The plan shall be approved by the PFD. ERT members shall be trained according to the Plan.

8. Training shall be revised to reflect the terminology and standards used in emergency response by other agencies prior to issuance of any certificate of occupancy. NFPA 472 shall be used to give specific guidance. Areas to focus on include levels of protection and incident command.

9. An ERT leader shall be on-site at all times while Hazardous Protection Material (HPM) use occurs. MASCA ERT leaders shall be trained per NFPA 472 and shall be approved by the PFD based on their training and performance.

10. The incident command system, as identified in the Environmental Health -- Emergency Response Capabilities Technical Appendix of the SEIS, shall be initiated at all incidents regardless of size. Incident command position vests shall be obtained and utilized.

11. SCBA used by the MASCA ERT shall be equipped with 1-hour cylinders and shall be compatible with the SCBA used by the PFD. SCBA shall be available for each member of the ERT on shift. SCBA shall be placed and maintained in a central location for emergency use only.

12. "Threat levels" shall be established for hazardous materials responses at the facility prior to issuance of any certificate of occupancy. These threat levels shall be used as the basis of a plan for notifying and responding with the PFD. The plan shall be approved by the PFD.

13. A member accountability system (Passport System identified in the Environmental Health -- Emergency Response Capabilities Technical Appendix of this SEIS) shall be implemented that is compatible with the PFD and with the Pierce County standard prior to issuance of any certificate of occupancy.

14. ERT records shall include: rosters, agendas, qualifications of instructors, accountability procedures, copies of handouts, copies of certificates, or documentation of completion. A comprehensive database of hazardous materials training by competency skill shall be maintained for ERT members.

15. MASCA shall develop procedures for the use of smoke removal systems during a hazardous materials incident. These procedures shall be reviewed and approved by the PFD prior to issuance of any certificate of occupancy.

16. MASCA should maintain and continue to progress in the areas of hazardous materials inventory minimization, substitution with less hazardous materials, and implementation of hazardous materials engineering controls.

Puyallup Fire Department

1. The PFD shall train and equip a hazardous materials response team prior to the issuance of any certificate of occupancy. The PFD shall train 21 personnel to the hazardous materials technician level as defined in NFPA 472.

2. MASCA shall fund the initial cost of equipping and training the PFD Hazardous Materials Response Team, not-to-exceed $234,000. Funding shall be provided to the PFD no later than 10 months prior to the issuance of any certificate of occupancy. Annual refresher training and equipment replenishment shall be funded by the City of Puyallup.

3. As a backup to the PFD's Hazardous Materials Response Team, the PFD shall attempt to reach agreements on a regional response team that includes other fire departments.

4. ERT technician training shall focus on hands-on activities, be taught by qualified instructors. MASCA personnel shall be invited to participate in portions of this training.

5. Training, drills and building familiarization visits shall be conducted on a quarterly basis with MASCA personnel. The PFD and MASCA shall work together to preplan responses with respect to sharing equipment, locating the command post, using radios, and organizing command staff.

6. The PFD Fire Prevention Division shall assign line personnel to participate in inspections of the MASCA facility.

7. Hazardous materials training records shall include rosters, agendas, qualifications of instructors, accountability procedures, copies of handouts, copies of certificates, or documentation of completion. A comprehensive database of hazardous materials training by competency skill shall be maintained for hazardous materials response team members.

8. PFD hazardous materials response protocols and checklists shall be reviewed and updated to assure response documentation includes: decontamination procedures,

unified command protocols, handling of contaminated patients, and interfacing with the hospital. MASCA shall be provided copies for review.

3.4.5 Significant Unavoidable Adverse Impacts

Despite high levels of engineering controls, uncontrolled hazardous materials incidents will continue to occur. With proper training and equipment, MASCA and PFD should be able to contain them.

3.5 ENVIRONMENTAL HEALTH -- ODOR

3.5.1 Issue

Changes in the physical layout and operation of the proposed expansion may result in odors at the perimeter of the property and off-site above those analyzed in the 1981 EIS. In order to assess the potential impacts of odors, the vapor concentrations of gases with published odor thresholds were modeled under typical and worse case conditions at the property line and at the limits of the Light Manufacturing Zone.

3.5.2 Odor Regulations

PSAPCA requires industrial sources of air pollutants to file an annual report on their emissions of several categories of pollutants including criteria pollutants. Criteria pollutants are those first regulated by the EPA starting in 1963 and include carbon monoxide, nitrogen oxide, sulfur dioxide, particulate matter, lead, and ozone.

PSAPCA also requires calculation of the emission quantities of a number of toxic air contaminants, some of which are regulated by both the State and Federal governments. Odor causing compounds are not regulated on the basis of their odor, they are regulated on the basis of being hazardous air pollutants by EPA (as defined in the Clean Air Act 112(b)) or toxic air contaminants as defined by PSAPCA (40 CFR Part 372(d)).

MASCA is required by the PSAPCA to register its sources of pollutant emissions and pollution control equipment. This registration includes a calculation of emissions which is updated annually. Table 3-3 summarizes the most recent emission data from MASCA for compounds with distinctive odor characteristics.

Table 3-3
Existing Annual Emission Inventory of Odor Causing Compounds

Compound	1996 Emissions/lbs[1]	Characteristic Odor[2]	Hedonic Tone[3]
Isopropyl alcohol	75,537	sharp, musty	Unpleasant
Acetone	35,006	sweet, fruity	Pleasant to Neutral
Ammonia	54,755	sharp, pungent	Unpleasant
Phosphine [4]	42	garlic or fishy odor	N/A
Hydrofluoric Acid[4]	1,311	strong, irritating [5]	N/A
Ethylene glycol ether	10,237	sweet	Pleasant
Propylene glycol ether	11,990	sweet	Pleasant

Notes:
1 Source: Bob Frisbee/Bryant Adams (pers. comm.)
2 Source: Hellman, T & Francis Small, 1974.
3 Hedonic tone is a judgment of the pleasure or displeasure a person would experience by smelling the compound in question.
4 Source: EPA, March 1992.
5 Source: Center for Disease Control Prevention Guidelines.

3.5.3 Existing Conditions

Air Emissions from Daily Operations

Air emissions were modeled and concentrations were compared to odor thresholds. Table 3-4 summarizes the results of the dispersion modeling and compares modeled concentrations to recognized odor thresholds. The concentrations shown in Table 3-4 are the maximum levels occurring at any given hour at any point along the MASCA property lines.

Under normal operating conditions, no compound exceeded published thresholds at any of the receptors. The point of maximum concentration for all compounds is on the east property line and occurs under meteorological conditions with light winds (three miles per hour) blowing from the west. Winds from the west occur in Puyallup approximately 1.7% of the time or approximately 148 hours a year.

Very little data has been published on the odor threshold for hydroflouric acid. The uncertain reliability of the odor threshold data for hydrogen fluoride makes drawing conclusions as to the likelihood and extent of odor impacts difficult. Hydroflouric acid may exceed the lowest threshold concentration, but stays below the highest threshold concentration at all receptors.

Table 3-4
Maximum Annual Existing Concentrations of Odor Causing Compounds

Compound	Modeled Concentrations-1996[1] (micrograms/cubic meter)	Odor Threshold[2] (micrograms/cubic meter)	Modeled/Threshold[3]
Acetone	551.0	47,412.2	1.2%
Ammonia	772.9	3,700.0	20.9%
Isopropyl alcohol	1,191.7	8,000.0	1.5%
Phosphine	0.66	14 to 280	4.7%
Hydrofluoric Acid	18.5	30 [4]	61.7%
		33.0-133.0	5.6 to 13.9%
		<832.0	2.2%
Ethylene glycol	160.7	24,000[5]	0.67%
Propylene glycol	189.1	24,000[5]	0.79%

Notes:
1 The maximum modeled concentration of an hour's duration occurring at any given hour in a year.
2 Published literature provides a wide range of odor thresholds. Where the research has been critiqued only the thresholds found acceptable are listed here.
3 This is the modeled concentrations divided by the lowest published threshold.
4 This threshold is based upon limited data.
5 Source: EPA, 1992

3.5.4 Proposed Action and Potential Significant Impacts

MASCA proposes to increase wafer production from 17,000 wafer-outs per month to 40,000 wafer-outs per month by the addition of a 300,000 s.f. fabrication building and associated structures. The projected emission inventory and resulting concentrations are shown in Table 3-5.

After Building D is in operation, the maximum concentrations averaged over a one-hour period will be no higher than currently exists with only Building C in operation. This is due to the highest single concentration occurring at a receptor which is affected by the stacks of Building C. The second highest concentration occurs at a receptor affected by both buildings. The point of maximum concentration is on the east property line and occurs under meteorological conditions with light winds of three miles per hour blowing from the west-southwest. An examination of the windrose chart shows that winds from this direction occur at Puyallup approximately 1.7% of the time or approximately 148 hours per year. Based on this, odor concentrations generated from MASCA will not have a significant effect on the environment.

Table 3-5
Projected Annual Emissions and Concentrations of Odor Causing Compounds by 1997

Compound	Emissions (lbs.)	Modeled Concentrations (units)	Modeled/Threshold
Acetone	89,264	551.0	1.2%
Ammonia	139,625	772.9	20.9%
Isopropyl alcohol	192,620	1,191.5	1.5%
Phosphine	106	0.65	4.7%
Hydrofluoric Acid	3,343	18.5	61.7%
Ethylene glycol	26,103	160.7	0.67%
Propylene glycol	30,576	189.1	0.79%

3.5.5 Significant Unavoidable Adverse Impacts

The proposed expansion will have no unavoidable significant odor impacts.

3.6 ENVIRONMENTAL HEALTH -- NOISE

3.6.1 Issue

Changes in the physical layout and operations of the proposed expansion may result in potential noise impacts at the property perimeter and off-site beyond those analyzed in the 1981 EIS. An assessment of the potential noise levels at all affected property perimeters and any resultant mitigation measures was conducted in order to address this issue. The Environmental Health -- Noise Technical Appendix was prepared to analyze the impact that the additional plant equipment proposed in the expansion would have upon noise levels at and beyond the property boundary.

3.6.2 Noise Regulations

The City of Puyallup has adopted DOE noise regulations (Chapter 70.107 RCW, Chapters 173-58,173-60 & 173-62 WAC) as its basis for noise control, and has added Section 6.16. "Noise Control" to its Municipal Code to address issues unique to the City. Section 6.16.060(k) PMC exempts certain industrial noise sources which have been in operation over the three previous years. However, due to the replacement of the cooling towers associated with Building B, the expansion of the wastewater treatment facility, and other changes to the existing facility that may generate additional noise, the exemption provision is not applicable to this project.

Figure 3-10 is the zoning map of the area around the MASCA site. The EDNA designations for each zone is shown on Table 3-6.

Table 3-6
Zoning and EDNA of Adjacent Properties

Boundary to the:	Zoning Category	EDNA	
		Day (dBA)	Night (dBA)
North	"ML" Light Manufacturing	70	70
West	"RM-20" High Density Residential	60	50
Southwest	"CL" Limited Commercial	65	65
South	"ML" Light Manufacturing	65	65
East	"ML" Light Manufacturing	65	65

3.6.3 Existing Noise Levels

Current MASCA operations affect local noise levels by the operation of noise-emitting equipment and the number of employee passenger vehicles and supply trucks entering and exiting the project site. The predominant sources of equipment noise are the acid scrubber fans, pumps, solvent exhaust fans, condensers, and the fans and pumps associated with the wastewater treatment plant.

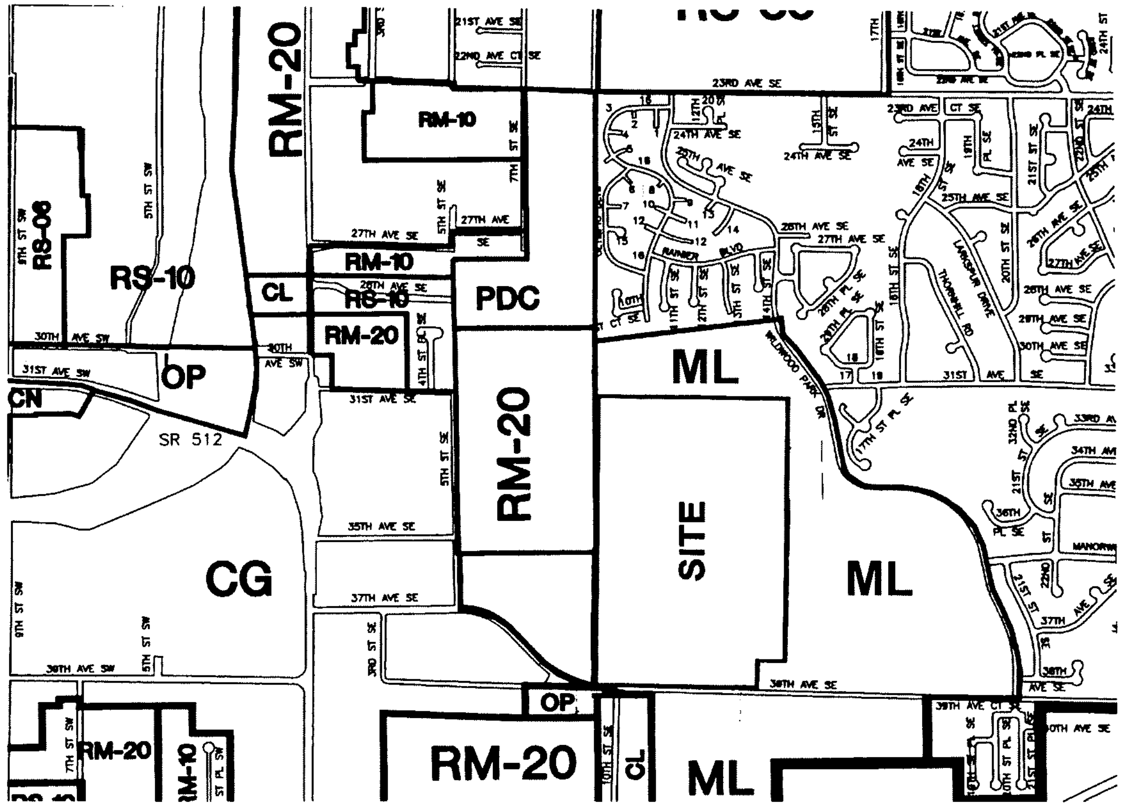
The receivers with the most sensitive noise levels are along the west and northwest property lines due to the residential zoning of the adjacent property.

3.6.4 Proposed and Action and Potential Significant Impacts

Sound levels for the year 1997, with the Building D project complete, were estimated based on information on the mechanical equipment to be installed. In addition to the new equipment associated with Building D, this project will also replace the three existing cooling towers adjacent to Building B with six new ones. The new cooling towers will be approximately 10 dBA louder than those in place now.

With the proposed expansion, none of the receivers modeled exceed the EDNA level for any of the zoning categories, including the night-time levels. However, given the five to 15 dBA variance, MASCA should monitor the noise levels after Building D is in operation. If noise levels exceed the EDNA level for any zoning, MASCA would be required to implement appropriate mitigation, such as the acoustic wall shown on Figure 3-11.

During the construction phase the use of heavy machinery will cause noise levels to increase. Specific noise levels will vary with the type of activity and equipment used. For construction of the MASCA expansion project, the use of bulldozers to clear and grade the site will be the noisiest tasks. It is expected that the use of heavy equipment could produce noise levels ranging from 75 to 95 dBA at a distance of 50 feet.



RESIDENTIAL CATEGORIES

RS-04	URBAN DENSITY SINGLE-FAMILY RESIDENTIAL (4,000 square feet minimum lots)
RS-06	URBAN DENSITY SINGLE-FAMILY RESIDENTIAL (6,000 square feet minimum lots)
RS-08	MEDIUM URBAN DENSITY SINGLE-FAMILY RESIDENTIAL (8,000 square feet minimum lots)
RS-10	LOW URBAN DENSITY SINGLE-FAMILY RESIDENTIAL (10,000 square feet minimum lots)
RS-35	VERY LOW DENSITY SINGLE-FAMILY RESIDENTIAL (35,000 square feet minimum lots)
RM-10	MEDIUM DENSITY MULTIPLE-FAMILY RESIDENTIAL (10 units/acre maximum)
RM-20	HIGH DENSITY MULTIPLE-FAMILY RESIDENTIAL (20 units/acre maximum)
PDR	PLANNED RESIDENTIAL DEVELOPMENT
PDC	PLANNED COMMUNITY DEVELOPMENT

COMMERCIAL CATEGORIES

CG	GENERAL COMMERCIAL (Retail & other commercial uses which rely upon the auto as their principal source of access)
CL	LIMITED COMMERCIAL (Professional office & limited retail uses in a well-designed & landscaped setting)
CBC	CENTRAL BUSINESS DISTRICT (commercial services that preserve & enhance pedestrian scale and the downtown character)

MANUFACTURING CATEGORIES

MP	BUSINESS PARK (intended to provide for modern industrial, research & business park uses)
ML	LIMITED MANUFACTURING (intended to primarily provide light industrial uses as well as limited retail uses that are complimentary to neighboring commercial & residential districts)

OTHER CATEGORIES

MEDICAL OVERLAY	MEDICAL FACILITIES OVERLAY
FAIR	FAIRGROUND ZONE
OP	PROFESSIONAL OFFICE ZONE

DOWNTOWN OVERLAY CATEGORIES

(The intent of the Downtown Overlay Categories is to reinforce the complimentary mix of uses & character in those zones which surround the overall downtown area)

CG-DTN	GENERAL COMMERCIAL, DOWNTOWN OVERLAY
CL-DTN	LIMITED COMMERCIAL, DOWNTOWN OVERLAY
ML-DTN	LIMITED MANUFACTURING, DOWNTOWN OVERLAY
RM-20-DTN	HIGH DENSITY MULTIPLE FAMILY RESIDENTIAL, DOWNTOWN OVERLAY

FAIR PARKING OVERLAY CATEGORIES

(The intent of the Fair Parking Overlay Category is to allow certain events which can only be staged in large open areas while ensuring minimal disruption to existing residential & commercial uses)

RS-08-FPO	SINGLE FAMILY RESIDENTIAL, FAIR PARKING OVERLAY
RM-20-FPO	MULTIPLE FAMILY RESIDENTIAL, FAIR PARKING OVERLAY

not to scale

MASCA

DAVID EVANS AND ASSOCIATES, INC.

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Figure 3-10:
Zoning Map

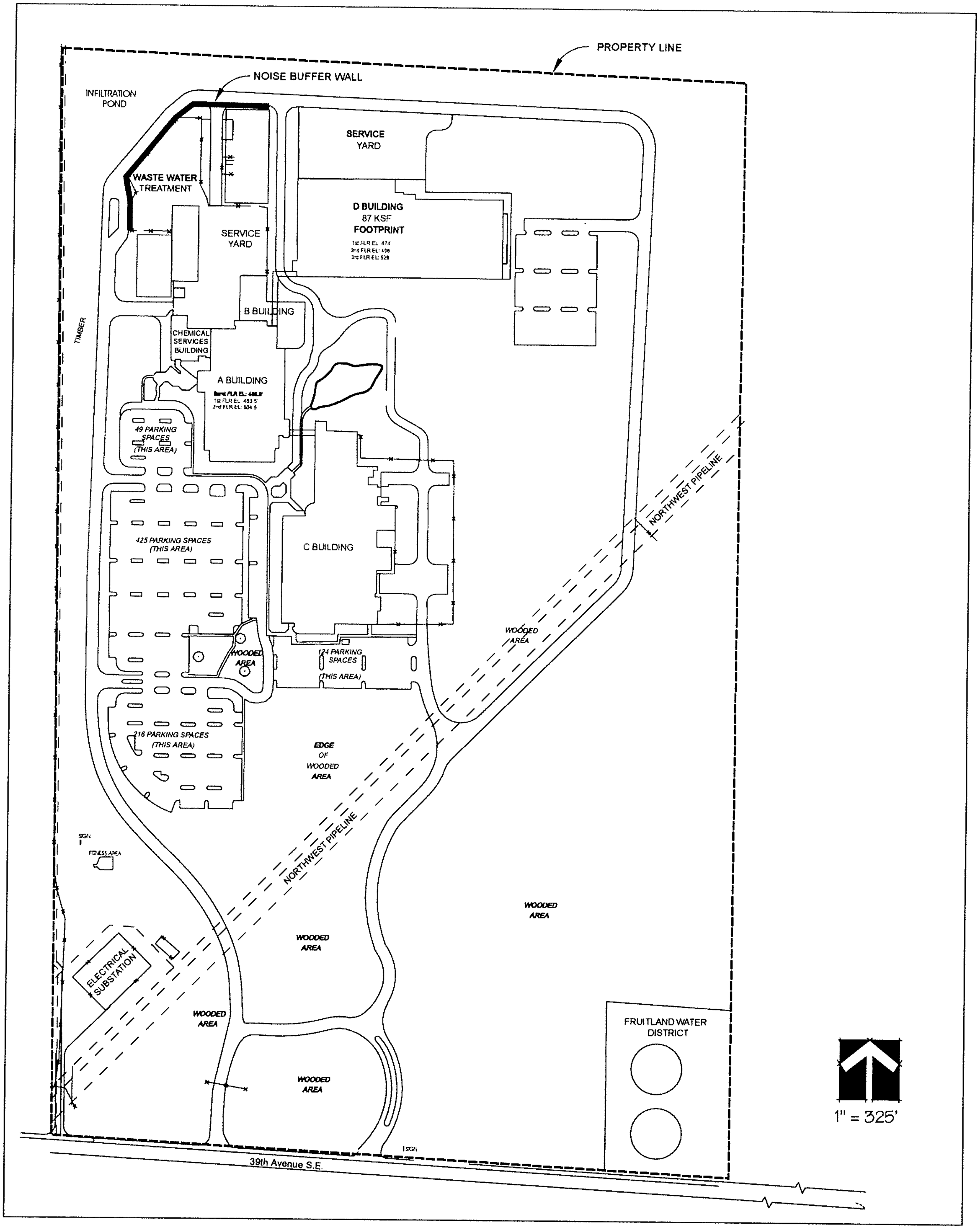


Figure 3-11:
Suggested Sound Wall Location

Construction noise will be a short-term impact. According to City and DOE regulations, construction work should be avoided between the nighttime hours of 10 PM and 7 AM.

3.6.5 Noise Mitigation Measures

MASCA shall commission a certified independent consultant, acceptable to the City, to monitor noise levels annually for three years. These studies shall commence with the issuance of the (temporary) certificate of occupancy. After the initial three years, the City shall conduct random studies as needed. If noise levels exceed the EDNA level for any zone, MASCA will be required to implement appropriate mitigation measures to reduce noise levels to established standards.

3.6.6 Significant Unavoidable Noise Impacts

The MASCA project will have no significant noise impacts during full plant operations. No receivers were projected to exceed EDNA levels applicable for current land use zoning.

3.7 UTILITIES -- SANITARY SEWER

3.7.1 Issue

The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that is contaminated with various types of acids and organic solvents. The 1981 EIS projected various sanitary sewer facility improvements would be constructed over the course of the subsequent decade. These included potential upgrades to the POTW, on-site water re-use, or pretreatment on-site and discharge directly into the Puyallup River. The City, DOE, and Fairchild agreed that more than 90 percent of the plant's wastewater would be treated on-site and conveyed via a tightline to the Puyallup River. The remaining wastewater would be discharged to the City's POTW.

3.7.2 Existing Sanitary Sewer System

The system within the production buildings generates five separate wastewater streams flowing from separate types of process water usage points. The wastewater streams are summarized below:

> The largest stream of flow is an acidic stream produced from the spent process acid rinse system. These acid wastes are piped to MASCA's on-site wastewater treatment facility together with other acid wastes from the site with the exception of fluorides, phosphates,

and ammonia (F/P/A). This wastewater stream leaves the site after treatment via the tightline and discharges through Outfall #001 into the Puyallup River.

The second wastewater stream consists of F/P/A from process wastewater drains and discharge from specially identified sinks/process tools. It also consists of blow down from acid and fluoride fume scrubbers, cleaning solution rinses from the Reverse Osmosis membranes (RO) and DI mix bed regeneration wastewater. The wastewater first is treated by removing F/P/A and then is combined with the acidic waste stream for neutralization. The combined treated wastewater stream discharges via the tightline through Outfall #001 into the Puyallup River.

The third stream is a solvent organic waste stream composed of rinse waters contaminated with less than one percent solvents from the manufacturing process. This stream is drained separately down to the on-site wastewater treatment plant, is treated by active carbon and pH neutralization, then discharged as Outfall #002 to the POTW for additional treatment.

The fourth wastewater stream collected separately on-site is the sand, carbon, and de-ionized filters backwash waters from the water purification system. The backwater rinses solids from the filters. The backwash water does not contain any chemicals, only the solids that were filtered from the water to make it pure. This water is drained in separate lines and discharged into the infiltration/detention pond (Outfall #003).

A fifth stream consists of the domestic wastewater from standard toilet facilities, a laundry room, and other on-site areas. These wastewater streams flow to the sanitary collection lines on-site and then discharge with Outfall #002 into the POTW collection and treatment system.

All of these pipes, with the exception of the filter backwashes (Stream 4) and the domestic wastewater (Stream 5), are provided with dual containment systems.

Three wastewater discharge locations (outfalls) are in place. The three outfalls include:

Outfall #001 -- This outfall is located at the end of a five-mile long tightline, and discharges treated wastewater directly into the Puyallup River, without treatment in the City's POTW. The outfall at the Puyallup River and the tightline are owned by the City. Prior to discharge, the wastewater is treated through several different processes at MASCA's on-site wastewater treatment plant. The majority of the wastewater flow is discharged via Outfall #001. MASCA's wastewater discharge is regulated by it's NPDES permit issued by DOE. The streams tributary to Outfall 001 include:

1. A F/P/A stream composed of drain wastewaters collected from various point around the MASCA plant;
2. A RO system flushing/cleaning solution;
3. A DI mixed bed regenerant;

4. An acidic stream composed of spent process acid baths and acid rinsewaters; and
5. A RO system reject water stream.

Outfall #002 -- This outfall discharges wastewater and process wastewater into the POTW. This outfall contains organic solvent rinse process wastewater. The organic solvent wastewater flows receive pretreatment at the MASCA wastewater treatment plant prior to discharge to the POTW. The average solvent rinse wastewater flow rate in April, 1996, was 34 gallons per minute (gpm) (DOE, 1996). Flow rates in the process water discharge seem to be highly variable.

Outfall #003-- This outfall discharges wastewater and stormwater into the on-site infiltration/detention pond. The flows consist of stormwater and backwash water from cleaning the sand, carbon and final DI filters used in the process of treating the domestic water supply to produce the high purity water necessary for the production of the semiconductors.

3.7.3 NPDES Permit

All three (3) outfalls are regulated under a NPDES Permit issued to MASCA on June 30, 1994. MASCA was fined for non-compliance with their NPDES permit in 1994. The DOE reported that the non-compliance event covered approximately one (1) year. The events included excursions outside of the permitted ranges for pH, biochemical oxygen demand, total suspended solids, fluorides, phosphates, and ammonia. MASCA noted problems with treatment system components breaking, malfunctioning testing probes, and clarifier floc tank overflows. According to DOE, these problems were due to operations and maintenance practices at the on-site treatment plant. MASCA corrected the problems. Since April, 1994, only one non-compliance event has occurred at MASCA. The event resulted from the failure of a calcium chloride addition pump. MASCA fixed the pump and installed a sensor to detect and alarm future pump failures.

Under the NPDES permit, the wastewater generated by MASCA that discharges via Outfall #001 is allowed to have certain contaminants. Under the NPDES permits, both MASCA and the POTW are required to perform Whole Effluent Toxicity (WET) evaluations to ensure that the toxic concentrations of contaminants in the effluent are within the acceptable limits of the permit. In the past year, the POTW operators report that they have been out of compliance for the WET test two times. Reports indicate that in one of the two cases, POTW was receiving or had just received discharge from the MASCA upset tank. This has led the City to speculate that the toxicity problems that they are encountering may be tied to the discharges from the MASCA upset tank. The upset tank operation is of great concern to the City due to the increasing frequency and quantity of discharges to the upset tank. In June, 1996, the upset tank overflowed causing a high pH solution to spill over the upset tank walls and onto the grounds of the POTW. Due to rapid response by the POTW operations staff, this spill did not result in a toxic discharge into the storm sewer which flows directly to the Puyallup River. However, if the City's operating staff had not been present, a discharge would have occurred with possible significant adverse impacts on the river.

Previous NPDES permits required priority pollutant screening tests for Outfall #002 which showed no pollutants at levels of concern to DOE. DOE suspended the continuous tests for Outfall #002 and now require only pollutant screening once per quarter in the last year of the permit cycle and an affidavit by MASCA that no spills of toxic substances have occurred in the reporting period. MASCA reports confirm that no spills of toxic substances have occurred for each of the reporting periods in the last three years.

Under its current NPDES permit, MASCA is required to meet a chronic WET limit at a 5% dilution factor. In April, 1995, DOE notified MASCA of its failure to meet the WET limits and required additional monitoring. The additional monitoring determined that MASCA was not meeting its WET limits and in September, 1995, DOE notified MASCA that it must perform a Toxicity Identification/Reduction Evaluation (TI/RE).

A TI/RE is being performed; however, the results have not conclusively identified the specific pollutant(s) that caused the WET test failures. DOE noted that a cationic surfactant may have been the problem. However, another consultant was asked to review the TI/RE information and concluded that organic materials (surfactants are an organic compound) are not likely to be causing toxicity, but heavy metals such as copper or zinc may be of concern. To date MASCA has not identified the cause of toxicity in its effluent and is continuing the TI/RE process. DOE has indicated that the evaluation should be conducted with more rigorous attention to the sampling protocol.

3.7.4 Impact Analysis

MASCA has started a process of upgrading their facilities for the anticipated expansion. DOE has approved the expansion of the on-site wastewater treatment plant to handle the wastewater flows generated from increasing production from the current maximum of 20,000 wafer-outs per month to a maximum production rate of 40,000 wafer-outs per month. MASCA's NPDES permit also allows for this increase.

Increased Flow Rates

The proposed expansion of the sanitary sewer and process wastewater discharges from the site is expected to increase the existing flow rates. With full build-out of Building D, domestic water demand will be 1.6 MGD. This would lead to a peak Outfall #001 flow rate of 1.3 MGD, a peak Outfall #002 process wastewater flow rate of 0.06 MGD, a peak Outfall #003 wastewater flow rate of 0.05 MGD, and a peak sanitary flow (excluding process wastewater) of 0.07 MGD. These are lower than those projected in the 1981 EIS.

Tightline—Outfall #001. Outfall #001 has a design capacity of 1.6 MGD. Current operating procedures call for the tightline to receive a caustic flush approximately once per month to purge the suspected biological activity in the tightline. The increased flow rates in the tightline may lead to a higher level of deterioration of the line and unknown quantities of ex-filtration. This may result in higher maintenance requirements for the tightline, which belongs to the City of Puyallup. The tightline currently receives little or no on-going maintenance by either the City or MASCA.

Construction of a second tightline to the river is included in the proposed project to avoid interrupting production if the first tightline has to be shut down. Construction of a second tightline to the river would allow flows to be switched into an alternative tightline. Maintenance and inspection of the tightlines would become much easier since flows could be diverted from one tightline to the other. As an additional measure of safety, flow metering and sampling stations should be located at both ends of the two tightlines (existing and new). Continuous flow metering should be provided on both lines to measure line loss or gain (leakage, infiltration).

The hydraulic limitations for the tightline flows will be the pipe from the weir control at the POTW to the combined outfall. The existing outfall pipe has become severely plugged due to broken diffusers that have caused rock and debris to enter the outfall line. The outfall will be repaired during the POTW upgrades scheduled for 1997-99. When the outfall is repaired, it will be able to carry projected peak hour design flows from the POTW of 35.8 MGD. It will be necessary to pump the peak flows from the POTW at the 100-year high flow level in the river, thus an effluent pump station will be included in the POTW upgrade.

Additional flows from MASCA in the 1.3-1.9 MGD range may be accommodated once the new diffuser is repaired. However, when high river elevations and peak flow through the POTW occur simultaneously, flow in the MASCA tightline will back-up. Currently, this condition can be accommodated by temporarily diverting flow to the upset tank located at the POTW. When MASCA constructs a new upset tank, the pipeline hydraulics for a high river/high flow period must be considered in the design of the upset tank.

Conditions must be identified as soon as they occur which could lead to the upset tank becoming full and overflowing. To prevent the upset tank from overflowing, an alarm should be installed that will notify both MASCA and City POTW personnel when the upset tank fills to within one volume of the tightline volume. MASCA should also develop and obtain City approval for an emergency plan for responding to spills/releases of any type from the upset tank or tightlines. MASCA should grant authority to the City to shutdown the tightline flow under conditions where a spill/release from the tightline or upset tank could occur. This protocol (for shutdown) should specifically identify the individuals allowed to make such a decision and who may make such decisions in the absence of the primary decision maker(s).

An agreement between MASCA and the City will be negotiated to take into account the projected changes in the tightline and upset tank operation and configuration. This new agreement will specifically address costs for the operation and maintenance of the new tightline and upset tank and the existing tightline. The agreement will also address monitoring and testing requirements (discussed elsewhere in this section), including who will conduct and pay for the monitoring and testing. The agreement will also be written to clearly identify procedures to be followed for preventing spills/releases from the upset tank and tightlines, including shutdown of the tightline(s).

The planned increase in the MASCA wastewater treatment plant capacity includes one additional F/P/A treatment train which would operate in parallel with the two existing treatment systems. An increase in the treatment capacity for acid waste discharges from the plant, is also proposed. This increase in capacity would provide two acid waste treatment trains which would operate in parallel to treat the maximum load of the acid waste system. These increases in wastewater treatment plant capacity are required in order to meet the NPDES discharge permit conditions for the site for any increase in capacity beyond 20,000 wafer-outs per month. The increase in on-site treatment plant capacity would result in a corresponding increase in on-site use of chemicals for the treatment plant operation. DOE has approved the construction plans for the expansion of MASCA's on-site wastewater treatment facility to accommodate 40,000 wafer-outs.

Sanitary Sewer—Outfall #002. Outfall #002 process wastewater flow rates are anticipated to double with the expansion. The anticipated flow from the domestic waste facilities on-site is also expected to approximately double, based on an approximately 100% increase in workforce at the site. For the majority of the sanitary sewer system, these flow rates are within the existing capacity of the City's system. However, there are two sections that are currently overloaded: the Meridian Branch and the main leading from the Pioneer Street pump station to the POTW.

The overloaded Meridian Branch is expected to be replaced, starting in the spring of 1997 and should be on-line about the time the MASCA facility comes into full production. The existing 36-inch diameter trunk line from the Pioneer Avenue pump station to the POTW serves approximately 80 percent of the POTW service area and is currently in an overloaded condition. MASCA currently represents a very small portion of the flows in that main, and an increase of 50 gallons per minute would be minor as compared to other sources of the overloading problem on that section of pipe.

The hydraulic capacity for the upgraded POTW is based on flow projections from residential, commercial, and industrial growth and development. Projections for sanitary sewer flows from industrial and commercial activities were based on land use. For industrial land use, flows were estimated as 0.0027 MGD/acre. For MASCA this would equate to 0.26 MGD. MASCA's maximum domestic flow (i.e. discharge to Outfall #002) is expected to be 0.13 MGD, which is well under the projected flow for this type of land use. Accordingly, MASCA's sanitary sewer discharge is not expected to adversely impact the future POTW hydraulic capacity.

While the quantity of wastewater from Outfall #002 does not present a significant impact, the quality of the effluent stream poses some risk to the POTW. Risk analysis is a combination of the probability of an event times the magnitude of the harm. The greater the harm, the lower need be the probability of an event for there to be significant risk. Analyzing and quantifying that risk is difficult because of numerous unknown factors. When there is scientific uncertainty concerning significant impacts, SEPA allows agencies to proceed in the absence of the vital information (WAC 197-11-080). To do so, the agency shall indicate in the SEIS its worst case analysis and the likelihood of occurrence, to the extent this information can reasonably be developed.

In the case of MASCA's discharge from Outfall #002 to the POTW, the probability of an upset event occurring may be relatively small, but the potential magnitude of harm is very large. The discharge from the POTW goes directly into the Puyallup River. The City is in the process of expanding the POTW. The treatment process will be modified from a fixed biological growth activated sludge system to a suspended biological growth activated sludge system. In either case, the microorganisms responsible for the breakdown of waste are the same.

A partial or complete failure of the bacterial system could result from toxic discharges out of Outfall #002. The time needed to reestablish the biological population is not known. Because of the many factors involved it is possible that two weeks or more could be needed to return to minimum acceptable levels of treatment. Based on a projected sludge retention time of 10 days, it could be 30 days or more before the treatment process is completely stabilized or operating at design efficiency.

The current discharge through Outfall #002 into the POTW has never been tested to determine if it has caused any impacts to the bacterial regime. In the absence of such data, it is difficult to accurately predict future impacts from the change in volumes and processes proposed for Outfall #002 because of the proposed expansion. Under the circumstances, SEPA requires an analysis of a possible worst case scenario. Under this worst-case scenario, untreated sewage would be discharged to the Puyallup River because storage capacity for the flow is not available on the site. The impacts on the Puyallup River could be long lasting or permanent, and cannot be accurately estimated at this time.

The cause of a non-compliant discharge through Outfall #002 that could impact the POTW may fall into three categories: human error, mechanical failure, and unknown side effects. Human error has been, and always will be, a potential cause of a toxic discharge. The system should be designed to minimize the possibility of such an error resulting in serious harm. But the recent (June, 1996) example of the overflow at the clarifier tank illustrates that human error at MASCA has the potential to occur. It is not possible to predict all the possible scenarios in which human error could play a role that would result in damage to the POTW through the discharge from Outfall #002. Some event as simple as pouring the wrong chemical down the wrong drain or opening the wrong valve may occur.

Any mechanical system, no matter how elaborately designed, has some probability for failure. The treatment system at MASCA for Outfall #002 has numerous places where mechanical failure could result in a toxic discharge. Recently one of the carbon filters plugged and it was necessary to divert the process stream into the upset tank. While this event illustrates successful containment of a potential upset, it also illustrates that mechanical failures occur. A worst case scenario would be the failure of the carbon filter to properly filter toxic substances and a failure of the upset detection system to alert operators of an upset condition. Together, these two events could result in an undetected non-compliant discharge to the POTW.

The third type of event that could cause harm to the POTW through Outfall #002 is from unknown side effects. Computer chip manufacturing technology is evolving with new products being developed continuously. In response, MASCA has altered its manufacturing process several times over the past 12 years to capture "market windows." These new products often require new processes that use new and different chemicals than those currently being used today. In many cases, the development of these new chemicals precedes the ability of the regulatory agencies to detect and monitor the chemical's environmental and human health impacts. The development of chemical extraction methods that allow for accurate detection may be behind the development of the new chemicals. Also, these new chemicals may have unknown synergistic side effects when combined with other substances. Many of these questions are not resolved before the chemicals are put into use in the industry.

As an example, the toxin in Outfall #001 causing MASCA to fail several of its NPDES discharge permit WET tests has not been identified despite having several different tests run. This event highlights how unknown side effects can cause significant impacts. The proposed change in volume of discharge to Outfall #002 and any future changes in manufacturing process or chemicals that discharge via this outfall could produce an unknown side effect on the POTW. A worst case scenario would be a change in process that produces a new toxic chemical that is undetected by current methods and is still present in toxic levels after going through the pre-treatment level. Such a chemical could kill or seriously disrupt the bacteria at the POTW.

To mitigate these potential impacts and reduce the risk of a POTW failure, MASCA should remove the organic solvent wastewater stream from Outfall #002 and thereby prevent discharge to the City's POTW. MASCA should pre-treat the process wastewater on-site and discharge the flows via Outfall #001.

Infiltration Pond -- Outfall #003. Flow rates from the DI plant to Outfall #003 at the infiltration/detention pond are projected to almost double. The existing system uses approximately 0.12 MG in an eight-hour maintenance cycle once per week. The pond volume prior to overflow is approximately 1,276,387 gallons. It takes the existing pond approximately 24-36 hours to drain to its normal, low-water surface condition after each maintenance cycle. Based on expected inflow and outflow rates in the pond, the process wastewater discharge increase is expected to use 19% of the available pond volume once a week when the maintenance cycle is run. This would reduce the volume of water that the pond could absorb from storm drainage for approximately one to one-and-a-half days each week.

The existing pond is underlain by excessively drained soils (Everett soil series). In addition, there is a gravel lense on the northwest side of the pond that releases infiltrated water from the pond a short distance down the hill. These conditions are considered to create a potential ground water pollution problem if the water from MASCA is not pretreated prior to entering the system. To eliminate this problem, MASCA should discontinue process water discharge to Outfall #003 and route the flow to another outfall. The process water may require pretreatment prior to discharge through Outfall #001. According to MASCA's predicted water balance, at full build-out, water use will be a maximum of 1.6 MGD. The current capacity of the tightline is 1.6 MGD which is lower than the allocated capacity of the City/MASCA combined outfall. Outfall #001 has the capacity to handled the additional flow rate from Outfall #003 if a surge tank is constructed to detain and slowly release the high flows associated with a filter backwash operation. MASCA's NPDES permit would need to be modified in order to allow the process water flow to be re-routed from discharging through Outfall #0003 to Outfall #001.

Increased Effluent Loading On Puyallup River System

The increased wastewater flow rates discharged from MASCA via Outfall #001 are anticipated to consist of higher mass loading of the same constituent base as currently exists. The increased wastewater flow discharged would lead to an increased waste loading in the Puyallup River. The increased load in the Puyallup River would lead to a decreased dilution factor and an increase in pollutant concentrations. Due to the sensitive nature of the Puyallup River system, this could have a detrimental impact on the natural ecosystem there. MASCA's current NPDES discharge permit accounts for these increased flow rates and includes conditions to protect against adverse impacts to the river system. The expanded MASCA wastewater treatment plant is designed to meet the standards contained in the NPDES permit but should be verified by testing once complete and fully operational.

The existing wastewater treatment system in place at MASCA is designed to meet the NPDES permit requirements. DOE has already approved the wastewater improvements proposed by MASCA to handle the expansion of the facility. DOE anticipates that the proposed improvements will treat the wastewater sufficiently so that the concentration of pollutants in the discharge would be within the limits of the NPDES permit. The permit requirements limit the concentration of pollutants discharged, but do not completely eliminate impacts on the Puyallup River system and the surrounding environment. DOE is required to take into account the entire Puyallup River system in the NPDES permit process through issuance of the WLA to individual dischargers. There is no indication that the permitted levels of pollutants in the discharge would have additional significant adverse effect on the Puyallup River system.

Literature reviewed indicates that there is a wide variability to the concentration of regulated pollutants that are discharged from the MASCA site. However, no incidence of exceeding permit limits were noted in these results. Since testing is periodic for most constituents, a more rigorous testing procedure may show different results. MASCA and the City shall enter into contracts with a third party to collect grab and 24-hour flow-paced composite samples for compliance with the testing requirements. Testing is to be carried out by a Washington State certified laboratory. The cost of testing will be the responsibility of MASCA. The laboratory shall send the test data to the City for its information and to MASCA for submission of monthly discharge monitoring report to DOE. The monitoring/testing plan should include WET testing quarterly; continuous recording of the results of the tests for flow rates, pH, and continuous, real-time metering provided on Outfall #002 to quantify domestic sewage flows to the City's POTW. The monitoring program should be updated whenever the NPDES discharge permit limits for Outfall #001 are revised by DOE. Monitoring results should be given to both the City and MASCA as soon as the results are available from the certified testing lab performing the analysis.

The existing flow rates of process water in all three outfalls will increase based on MASCA's predicted water balance. The new systems that MASCA is putting in place for the Building D expansion are planned to be less dependent on process water. The newer systems may use somewhat different processes, and hence it is prudent to expect that MASCA would have somewhat different concentrations of constituents, or even different constituents in the discharges. As soon as the new processes are started in the Building D expansion, MASCA will be required to start a complete discharge screen for regulated pollutants. This should identify any new or changed concentrations of regulated pollutants that escape the treatment systems.

Any significant changes in the process or chemical use will be subject to further SEPA review. This SEIS covers existing systems and processes and is limited to the expansion of Building D. Changes to the existing process or new processes that are not part of the Building D expansion, are not covered under this analysis.

Decreased Upset Tank Loading Time

The existing system has two upset tanks in place. One of the upset tanks is for the solvent rinse system (Outfall #002), located at the MASCA treatment plant. The other tank is for the combined acid waste and other treated wastewater which drain through the tightline (Outflow #001). It is located at the POTW. The upset tank volume, in each case, provides time to mitigate any problems that may occur at the wastewater treatment plant on-site, or in lines draining from the manufacturing buildings on-site.

The tightline (Outfall #001) and its upset tank at the POTW currently provide eight to 12 hours of protection in-which the flows from the tightline can be fully diverted into the upset tank. This would be decreased to five and one-half hours at a flow rate of 1.6 MGD. Under all flow conditions, for both present and future conditions, water takes approximately 90 minutes to travel through the tightline. In any situation where diversion to the upset tank is initiated by the automated systems at the discharge end of the tightline, MASCA operators have 90 minutes less than the total time it takes to fill the upset tank shut off flows. This means that MASCA would only have four hours in which to respond at 1.6 MGD flows.

The existing upset tank at the POTW could be removed as a result of the proposed improvements at the POTW. Without the upset tank, caustic flush could be discharged directly into the Puyallup River. The pH of the caustic flush would have a detrimental impact on the Puyallup River system. This is not allowed under the NPDES permit.

If MASCA were to construct a new upset tank somewhere in the vicinity of the existing tank, then the existing upset tank could be taken off-line without impacting the ability of MASCA to provide upset capacity. A new upset/diversion tank with a minimum 500,000 gallon capacity will be provided by MASCA at the outlet of both tightlines. The basis of determining tank size should be provided prior to construction in an engineering report meeting City and DOE requirements. MASCA will own, operate, and maintain the new upset tank.

The upset tank on the current Outfall #002 provides a minimum of 16 hours of protection under full build-out conditions (33.220 gallons/34 gpm/60 min/hr = 16 hours). This gives MASCA operators time to correct problems, or potentially shut down the discharge completely. Also, as indicated previously, this waste stream will be re-routed to Outfall #001 thus allowing diversion into the new upset tank at the terminus of the tightline.

Potential Toxic Sanitary Sewer Flows And Impact On POTW

Currently Outfall #002 is not required to be tested for WET. The toxin causing the problems in the WET test for Outfall #001 has not been identified in a standard priority pollutant screen (Parametrix, 1995; DEA, 1996). Priority pollutant screens are periodically performed on all outfalls, but have not identified problems (Anise, per. comm.). Data are not available to determine if the toxin providing WET test problems in Outfall #001 are in other outfall flows. Combining all process wastewater flows into Outfall #001 may eliminate the uncertainty.

The current standard operating procedure of trickling the upset tank discharge into the POTW headworks should be discontinued and alternate measures of re-treatment be undertaken as a part of this project

The TI/RE should be continued in an attempt to identify the source of the toxins. After the source of the toxin has been identified, then treatment would only have to be for that portion of the system containing the toxin. Since the TI/RE has not been completed, it is not known what flow rates would be associated with treating the toxins at their source.

Historical Ties Between Agencies And MASCA

With the interdependency of the treatment facilities for both the City and MASCA wastewater systems, cooperation between the two entities is essential. As a whole, MASCA tends to be self-reliant. There are problems at the site that are handled at an operational level that may not be made public. MASCA will develop protocols to make the City more aware of these individual problems and how they are handled. Documentation will be copied to both the City and DOE. Additionally, City personnel involved at the POTW should be allowed to observe and conduct sampling at the MASCA wastewater treatment plant as required, and upon limited notice, to ensure the well being of the City's system.

3.7.5 Summary of Mitigation Measures

The City has determined the following mitigation will be required as a condition of the expansion.

1. Flow metering and sampling stations shall be constructed at both ends of the existing tightline and at both ends of the proposed tightline prior to issuance of any certificate of occupancy. Continuous flow metering shall be provided on both lines to measure line loss or gain (e.g. leakage, infiltration).

2. The MASCA wastewater treatment expansion will be completed prior to the discharge of any process waste from Building D.

3. The City will require MASCA to institute testing that will include the following:

   a. Installing pH probes at the inlets and outlets of both tightlines;
   b. Installing flow totalizers at the inlets and outlets of both tightlines;
   c. Installing flow transmitter on existing Parshall flume measuring flows in the sanitary sewer and across the V-notch at Outfall #002. Flow signal shall be transmitted to a new flow recorder at the POTW;
   d. Installing composite samplers, flow proportion capable, at the inlets and outlets of both tightlines; and
   e. Results of flow proportioned composite sampling shall be furnished to the City and MASCA as soon as they become available.

4. A monitoring/testing program for Outfall #001 shall be implemented that utilizes an impartial third party following the monitoring/testing schedule shown below. MASCA and the City shall enter into contracts with a third party to collect grab and 24-hour flow-paced composite samples for compliance with the testing requirements. Testing is to be carried out by a Washington State certified laboratory. The cost of testing will be the responsibility of MASCA. The laboratory shall send the test data to the City for information and to MASCA for submission of monthly discharge monitoring report to DOE. Should MASCA elect to operate their own outfall to the Puyallup River, the City will not require this monitoring/testing schedule.

Parameter	Location(s)*	Frequency*	Sample Type
Flow	Both tightline inlets and outlets	Continuous	Flow totalizer
pH	Both tightline inlets and	Continuous	pH probe

Parameter	Location(s)*	Frequency*	Sample Type
	outlets		
BOD_5	Both tightline outlets	Weekly	24-hour flow-paced composite
TSS	Both tightline outlets	Weekly	24-hour flow-paced composite
Fluoride	Both tightline outlets	Weekly	24-hour flow-paced composite
Phosphorous	Both tightline outlets	Weekly	24-hour flow-paced composite
Ammonia	Both tightline outlets	Weekly	24-hour flow-paced composite
TRCl	Both tightline outlets	Weekly	grab
TTO	Both tightline outlets	Quarterly in 4th year[2]	grab
WET	Both tightline outlets	Quarterly	grab/composite
Mercury	Both tightline outlets	Monthly	24-hour flow-paced composite
Priority Pollutants[1]	Both tightline outlets	Quarterly	24-hour flow-paced composite

* Sampling and testing shall be performed on any day there is flow in a given tightline.
[1]After one year, the City and MASCA will discuss the benefits of continuing the testing.
[2]First sampling year, 1998.

5. The monitoring program shall be updated whenever the NPDES discharge permit limits for Outfall #001 are revised by DOE. Monitoring results shall be given to both the City and MASCA as soon as the results are available from the certified testing lab performing the analysis.

6. Prior to any discharge of process waste from Building D, MASCA shall have operational upset tank(s) with a minimum 500,000 gallon capacity. The basis of tank sizing shall be provided prior to construction in an engineering report meeting City and DOE requirements. The upset tank shall be designed to accommodate pipeline hydraulics for high river/high flow periods.

7. Once the MASCA on-site upset tank is made fully operational, the operation shall be as follows:

   a. When monitoring results show the flows to be out of compliance for pH, MASCA shall immediately notify the City and, the flows shall be automatically diverted to the upset tank. When the upset tank is full and the flows are still not in compliance, flows to the tightlines shall be stopped. The upset tank at the POTW shall be used only to drain and treat wastewater remaining in the tightline following an upset condition, and for diversion of high pH water during the tightline sanitation.

   b. If flow into the upset tank continues to the point where less than 100,000 gallons of capacity remain and corrective measures have not been successful in getting the tested parameter within allowable ranges, MASCA shall shut down flow into the upper end prior to entering the tightline pipe. The City shall have the authority to shutdown the tightline flow under these conditions. Access to the shutdown valve for both tightlines shall be provided for the City on a 24-hour basis.

   c. The upset tank shall be emptied through Outfall #001 only after its contents have been tested and shown to be in compliance with permit limits. Interim flows to the POTW headowrks are discussed in mitigation measure #8.

d. If the upset tank contents cannot be brought into compliance, MASCA shall pump out and transport the contents back to the MASCA treatment facility or to another permitted treatment facility that can legally treat and dispose of the wastewater.

e. If flows from the MASCA treatment plant through the primary tightline are not in compliance, these flows may not be diverted into the secondary tightline until the upset tank has been emptied and has capacity to receive non-compliant flows discharged to the secondary tightline.

8. The current practice of discharging MASCA flows from the existing upset tank into the City's POTW headworks shall be discontinued prior to the completion of the POTW expansion. During the interim, pumping improvements shall be made at the POTW to control the flow rate from the upset tank to the headworks. Cost of such improvements shall be the responsibility of MASCA and be approved by the City. Prior to discharge of MASCA wastewater from the upset tank to the POTW headworks, the tank contents shall be treated by MASCA to pH between 6 and 9, which shall be confirmed by testing by the City. Tank contents shall not be released to the headworks without authorization by the City's Superintendent or Chief Operator and only during hours specified by same.

9. The TI/RE underway to identify the source of toxicity in the MASCA effluent will be in conformance to the RCW's and WACs. When the source of toxicity has been determined, MASCA will promptly take appropriate action to eliminate the source of toxicity either through treatment, manufacturing process changes, or tightline maintenance.

10. MASCA shall alert the City whenever treatment process changes or upsets occur at the MASCA wastewater treatment facility. An emergency response plan providing a written protocol for managing upset conditions and alerting the appropriate individuals shall be developed by MASCA and approved by the City and the DOE prior to Building D operation. MASCA shall also familiarize City personnel with its treatment facilities and operations.

11. Flows from solvent rinse process wastewater discharges from MASCA plant operations presently discharged through Outfall #002 and all flows discharged through Outfall #003 shall be combined and discharged only through Outfall #001. Control shall be implemented to ensure that the wastewater from Outfall #002 receives adequate pretreatment at MASCA prior to discharge to Outfall #001. In addition, all pipes which could divert the solvent rinse process wastewater into Outfall #002 shall be removed. Process wastewater from Outfall #003 will not be discharged to the existing detention/infiltration pond, but will be pretreated before discharge to Outfall #001.

12. MASCA shall coordinate the change of Outfall #002 and Outfall #003 into their NPDES permit and shall initiate the amendment process immediately. MASCA shall begin investigating treatment processes for Outfall #002 and Outfall #003 by preparing an engineering study to investigate methods for elimination of the solvent rinse process wastewater from Outfall #002 and process wastewater stream from Outfall #003. This study

must be conducted, the approach approved, and the construction completed prior to MASCA's NPDES permit renewal date scheduled for 1999.

13. Domestic sanitary sewage flows from the current Outfall #002 will continue to be conveyed to the POTW for treatment. Continuous, real time flow metering shall be provided on Outfall #002 to quantify domestic sewage flows to the City's POTW.

14. When MASCA constructs a second tightline, MASCA shall own, operate, and maintain the tightline.

15. The second tightline shall be designed and constructed to meet the following minimum requirements;

    a. Meet all applicable DOE and City standards;
    b. Be properly located in right-of-way, easements, or on purchased property;
    c. Have at least the capacity of the existing tightline so that one of the tightlines can be taken off-line for maintenance and cleaning;
    d. Be designed and constructed of adequate design and materials to prevent exfiltration and to withstand instantaneous pressures associated with the hydraulic grade line of the system;
    e. Accommodate scouring and/or cleaning of the line to alleviate potential biological growth.
    f. Provide drainage, monitoring, and sampling facilities along the length of the tightline; and
    g. Include an upset tank and related diversion system on the second tightline to prevent discharge of out of compliance wastewater to the Puyallup River.

16. Prior to issuance of any certificate of occupancy, MASCA shall install a high level alarm on the upset tank at the POTW which notifies both MASCA and the City of an impending overflow condition.

3.7.6 Significant Unavoidable Adverse Impacts

The NPDES permit limits the concentration of pollutants allowed in discharge, but does not completely eliminate impacts on the Puyallup River system and the surrounding environment. There is no indication that the permitted levels of pollutants in the discharge would have an additional significant adverse effect on the Puyallup River, but this is not certain.

3.8 UTILITIES—WATER

3.8.1 Issue

Water demand, including domestic, manufacturing, and fire flow use from the proposed expansion may have an impact on the City of Puyallup water system. Water demand and availability (quantity, quality, and fire protection reserve) vis-à-vis the existing and proposed conveyance system and water entitlements were assessed in the Utilities—Water Technical Appendix.

The water system is governed by the Rules and Regulations of the State Board of Health Regarding Public Water Supplies (Chapter 248-54) and (WAC 248-5-380) Design of Public Water Supply Facilities, (WAC 248-54-410) Quantity and Pressure, and (WAC 248-54-420) Reliability.

3.8.2 Existing Conditions

The City of Puyallup's water system is divided into five zones. MASCA is located in Zone 5. The sole water source for Zone 5 is the Tacoma intertie -- a 16-inch gravity line which taps the City of Tacoma's 58-inch transmission line from the 144th Street reservoir. The storage tanks for Zone 4 and Zone 5 are interconnected by a line that is normally closed. Zone 5 receives water from Zone 4 only for fire flow emergencies.

In 1981, Puyallup entered into an agreement with the City of Tacoma which entitled Puyallup to receive 2.0 MGD from the Tacoma system on an interruptable, off-peak basis. The off-peak condition of the agreement allows Puyallup to divert water from the Tacoma system only between the hours of 11:30 PM and 3:30 PM. Therefore, no water is technically available from the intertie during the eight hour period between 3:30 PM and 11:30 PM. Correspondingly, all water that is used in Zone 5 during this "peak" period must be supplied by the Zone 5 storage tank, which is topped-off every day during the off-peak hours (11:30 PM to 3:30 PM).

In order to utilize water for its operations, MASCA must first treat the water in MASCA's own deionizing facility. One of the reasons that the City of Tacoma intertie was chosen as the water source for MASCA is that the Tacoma water has a lower mineral content than the City of Puyallup water. Puyallup's 1981 agreement with the City of Tacoma entitled Puyallup to use up to 2.0 MGD from the Tacoma intertie. The Concomitant Agreement between the City of Puyallup and MASCA allows MASCA to use a maximum 1.6 MGD of the water supplied by the City of Tacoma. The remaining 0.4 MGD is available for other Zone 5 water users.

Currently, the total water consumption in Zone 5 is approximately 0.97 MGD, of which, MASCA consumes approximately 0.92 MGD. The remainder, or 0.05 MGD, is used by the other City of Puyallup water customers located within Zone 5. MASCA's average daily consumption of 0.92 MGD equates to a flow rate of approximately 640 gpm for every hour of every work day. During the last year, MASCA's water usage ranged from a low of 0.66 MGD average daily demand for April to a high of 1.19 MGD average daily demand for September.

The water supplied from the Tacoma intertie is lifted up to the Zone 5 tank via a pump station located on the MASCA site. The pump station is currently configured to pump 1.6 MGD, with capabilities to pump up to 2.0 MGD during a Zone 5 low pressure emergency.

The Zone 5 storage tank has a working storage of 1.30 million gallons (MG), of which 1.07 MG is currently dedicated for MASCA's wafer fabrication and standby fire protection use, and 0.23 MG remains for the other users of Zone 5. Currently, MASCA utilizes nearly 0.69 MG of capacity (including 1981 fire protection standby), and the other Zone 5 customers utilize approximately 0.01 MG of capacity.

In addition to the storage capacity required to provide sufficient process water to the site, the Zone 5 storage tank was also designed to provide an additional 0.54 MG of storage for fire flows. This 0.54 MG of fire reserve was based on a peak fire flow of 4,500 gpm for two hours, which was mandated by the fire codes in 1981. The codes have since changed, and less fire reserve storage is required today.

When MASCA's process water storage of 0.53 MG and fire storage of 0.54 MG were subtracted from the 1.30 MG total available storage, there was an excess available storage of 0.23 MG. This 0.23 MG of storage was designated as "City Demand Storage."

3.8.3 Proposed Action and Potential Significant Impacts

MASCA predicts the average daily water demand requirements for the entire MASCA site at full build-out to be 1.6 MGD (Frisbee pers. comm.). MASCA is projecting that less water will be used in future years due to a change in wafer fabrication technology utilizing more plasma etching and less wet processing. The total process storage requirement for the proposed expansion will be 0.53 MG.

The pump station is currently configured to pump at a rate of 1,700 gpm for 16 hours, which results in a daily flow of 1.6 MGD. During a Zone 5 low pressure emergency, the pumps could operate at a rate up to 2,100 gallons per minute (gpm). The 1,700 gpm pump rate satisfies MASCA's water supply of 1.6 MGD per the Concomitant Agreement. However, if MASCA actually uses their entire 1.6 MGD allotment, the current pump rate of 1,700 gpm will not be sufficient because 0.05 MGD must also be conveyed to other Zone 5 customers. Table 3-7 lists the required pump rates for future Zone 5 demands, assuming a 16-hour pumping period and 2.0 MGD supply from Tacoma.

Table 3-7
Required Pump Rates for Projected Zone 5 Water Use

Date	MASCA's Total Daily Flow (MGD)	Other Zone 5 User's Daily Flow (MGD)	Total Zone 5 Daily Flow (MGD)	Required Pump Rate for 16-Hour Period (gpm)
Current	0.92	0.05	0.97	1,010
Future	1.58	0.05	1.63	1,700
Future	1.23	0.40	1.63	1,700
Future	1.60	0.40	2.00	2,083

Based on these figures, the pump station would require some modification prior to total Zone 5 water demand exceeding an average 1.63 MGD. Timing on the modification would be based on growth in Zone 5.

In January, 1996, the City of Puyallup re-calculated the total fire flow demand for the MASCA site after the construction of the proposed plant expansion. The fire flow is 2,813 gpm for two hours, which equates to a required fire reserve storage of 0.34 MG. This fire flow storage requirement is significantly less than the amount of fire reserve storage of 0.54 MG that was required by the 1981 fire code.

The required fire storage, the required MASCA process water storage, and the required water storage for the other Zone 5 users must all be stored in the Zone 5 tank. Table 3-8 lists the storage requirements for various conditions assuming that 2.0 MGD is available from the Tacoma intertie for a 16-hour period each day, as per the existing agreement between Tacoma and Puyallup. This table does not reflect any fire flow storage from Zone 4 available to Zone 5 when the intertie pipe between the two tanks is manually opened in an emergency or any additional flows available through/from the pump station during an emergency.

Table 3-8
Zone 5 Storage Requirements vs. Daily Flow

Date	MASCA Daily Process Flow	MASCA Process Storage	MASCA Fire Storage	Total MASCA Storage Needs	Remaining Useable Storage in Zone 5 Tank
Current	0.92 MG	0.53 MG	0.54 MG	1.07 MG	0.23 MG
Future	1.60 MG	0.53 MG	0.34 MG	0.87 MG	0.23 MG

MASCA's total storage requirement, based on their worst-case consumption projection of 1.60 MGD, is 0.87 MG. This is less than the 1.07 MG MASCA originally projected. This, again, is due to the change in the fire code requiring less fire flow for MASCA. Even with MASCA's proposed daily consumption increases, there would be no impact to storage in the existing Zone 5 tank on an average daily basis.

3.8.4 Summary of Water Utilities Mitigation Measures

The City has determined the following mitigation will be required as a condition of the expansion.

1. Any water demand by MASCA beyond a peak day demand of 1.6 MGD shall require modifications to the Concomitant Agreement between MASCA and the City. MASCA's average daily, peak day, and peak hour flow rates shall be specifically quantified in the revised Concomitant Agreement. All costs associated with such modifications to the Concomitant Agreement and additional source development shall be the responsibility of MASCA.

2. A tank level monitoring program or peak hour metering of all significant Zone 5 users shall be implemented by the City to identify system-peaking factors in Zone 5, and to determine the amount of tank capacity to reserve for equalization. Cost for such monitoring shall be the responsibility of MASCA.

3. If MASCA requires equalization storage in excess of available capacity, additional on-site storage, or additional source development would be required of MASCA. Costs for additional on-site storage or additional source development shall be the responsibility of MASCA.

4. All MASCA water service connections, including those of a temporary nature, such as the water connection for tightline flushing, shall be equipped with backflow preventers and metering to assist in verifying water system demands and peaking rates prior to any certificate of occupancy. This shall include water used for tightline flushing.

5. Future additional water demand beyond MASCA's 1.6 MGD peak day demand could be supplied from the Tacoma system. The cost of additional source development should be paid by the beneficiaries of the additional capacity. Further development of this source is not guarantees and would require negotiations with the City of Tacoma. Other options incude using Puyallup water with additional treatment by MASCA, if required.

3.8.5 Unavoidable Adverse Impacts

Based on available storage, water availability from Puyallup through the agreement with Tacoma, there would be impacts to the Puyallup water system when water demand for all Zone 5 users exceeds 2.0 MGD.

Should the combination of MASCA's and other Zone 5 use exceed 2.0 MGD, additional source development would be required. This source development could come from the Tacoma intertie, assuming Tacoma was agreeable. Otherwise, additional treatment of water from other sources would be required before use in the MASCA plant.

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Supplemental Environmental Impact Statement

Response To Comments

MASCA Puyallup Plant Building D Expansion

(*Puyallup Science Park*)

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August 29, 1996

The Draft Supplemental Environmental Impact Statement (SEIS) on the potential effects of the proposed expansion of the Matsushita Semiconductor Corporation of America (MASCA) was issued to the public for a 30-day comment period on July 16, 1996. The comment period ended on August 15, 1996. Twenty letters containing comments were received. In addition, a public hearing was held on July 31 to receive comments on the Draft SEIS. The following pages contain excerpts of letters and/or verbal comments received and specific responses to each comment. The actual letters, in their entirety, are also included in this appendix. The comments contained in each letter are marked in the margin. Letters are in order of the date received. The response numbers correspond with the comment numbers. Changes to the text of the SEIS as a result of these comments have been marked with a vertical line in the left margin.

Key issues raised in the comment letters include:

1. Support for the expansion;

2. Effects of water quality from both the existing plant and the proposed expansion;

3. Emergency response procedures and the notification of the public in the event of a hazardous materials spill; and

4. MASCA comments on the Draft SEIS.

A Final Environmental Impact Statement (EIS) for the Puyallup Science Park was issued in 1981. As a result of the EIS, the City of Puyallup entered into a Concomitant Agreement with the owner of the site. This Concomitant Agreement included land use, utilities (water and sewer), stormwater, hazardous materials, and noise agreements. This Concomitant Agreement has been the binding agreement for the development to date.

In December 1995, the City determined that the proposed action constituted a substantial change relative to the project, impacts, and alternatives assessed in the 1981 EIS. Therefore, the City determined (in accord with WAC Section 197-11-600[4][d]) that a supplemental EIS containing new analysis on stormwater, plants and aesthetics, environmental health (emergency response, noise, odor), and utilities (water and sanitary sewer) was necessary. During air emissions testing, the concern was raised over air quality and related health issues associated with air emissions. Therefore, an air quality analysis was added to the SEIS.

The majority of the comments received were from MASCA. Many of MASCA's comments questioned the City's examination of existing conditions and the subsequent mitigation measures. The City determined that new analysis was necessary because the proposed action involves a change in the percentage of research and development use versus manufacturing use on-site and how chemicals/processes differ from that originally envisioned in the 1981 EIS. In addition, the 1981 EIS analysis was conducted on the conceptual design of a semiconductor facility, whereas now the specific facility is known.

Letter received from Lynn Wallace, The Chamber of Eastern Pierce County dated July 29, 1996

Comment 1-1 *The Chamber of Eastern Pierce County supports Matsushita's plans to build a new 300,000 square-foot fabrication plant adjacent to the existing Puyallup facility.*

Response 1-1 Comment noted.

Letter received from Arthur K. Langlie, Associated General Contractors of Washington dated July 29, 1996

Comment 2-1 *As citizens concerned with the expansion of business and future industry, we feel that the fiscal impact of this project on the City of Puyallup and its citizens is immense. Our belief in a jobs-based economy is strengthened when one considers that this site will employ 700 local citizens and have an annual payroll of $44 million. The city will benefit directly from $2 million in property taxes. Thirdly, as the City of Puyallup and Pierce County, as a whole, work diligently between government and private industry to establish a long term solution for waste water issues, we recognize Matsushita as a responsible corporate citizen that has worked consistently to help the region enhance the way water is treated and returned to the environment.*

Response 2-1 Comment noted.

Letter received from Bernie Hines dated July 30, 1996

Comment 3-1 *I whole-heartedly support plans for the new facility at MASCA. It seems consistent with the original plan for the area and the original EIS.*

Response 3-1 Comment noted.

Comment 3-2 *I am disheartened, as a resident of Puyallup that the construction permit seems to be being dragged out for such a long period of time.*

Response 3-2 The City issued a grading permit for the preliminary grading associated with Building D on January 11, 1996. Since that time, the City has renewed the permit several times. MASCA has voluntarily delayed the grading for the expansion.

Letter received from Frank Pfefferkorn, MASCA on July 30, 1996 (Topics: Water, Plants and Aesthetics, Odor, and Noise)

Comment 4-1 *MASCA hopes the final SEIS will further explain and emphasize these improvements in technology, safety, containment, and response that will result from the expansion project.*

Response 4-1 Comment noted.

Comment 4-2 *Under SEPA, all mitigation measures must be based upon adopted policies that are identified and formally designated by the City as possible bases for conditioning a permit under SEPA. RCW 43.21C.060. Mitigation measures must also address specific adverse environmental impacts identified in the EIS and attributable to the project. RCW 43.21C.060; WAC 197-11-660(d). In addition, mitigation measures must be reasonable and capable of being accomplished. RCW 43.21C.060. Not all of the mitigation measures proposed in the draft SEIS meet these legal requirements. MASCA's objections to specific mitigation measures is included in its comments in each technical area addressed by the SEIS.*

Response 4-2 Measures that would reduce or eliminate expected impacts attributed to the proposed project are listed as mitigation measures in the SEIS. Mitigation measures identified address specific adverse environmental impacts attributed to the proposed project. Some mitigation has been identified by MASCA and is included in the proposed design. Some measures will be required as a condition of permits that must be obtained from either the City or other agencies in order to construct and operate the proposed facility. The City feels that all the mitigation measures contained in the SEIS are reasonable and capable of being accomplished.

Comment 4-3 *Because 1.6 MGD of water demand from the plant was analyzed and mitigated in the 1981 FEIS, no new impacts to the water system will be generated by the expansion project. Therefore, no new mitigation measures are necessary so long as the plant demand remains at or below 1.6 MGD. Mitigation measure nos. 1 and 2 should be deleted. Mitigation measures nos. 3 and 4 are acceptable to MASCA as stated.*

Response 4-3 Based on the fact that the proposed expansion would more than double the plant's ability to produce wafers, the City concluded that MASCA would use more than 1.6 MGD of water. This is a reasonable assumption give that MASCA currently uses 0.92 MGD for the production of 17,000 wafer-outs. Under the existing Concomitant Agreement, MASCA is allocated a peak day demand of 1.6 MGD. If production of 40,000 wafer-outs requires a peak day demand of over 1.6 MGD, then the existing Concomitant Agreement will need to be modified as stated in Utilities -- Water Mitigation Measure 1.

Utilities -- Water Mitigation Measure 2 requires the implementation of a tank level monitoring or peak hour metering to identify system-peaking factors in Zone 5 and to determine the amount of tank capacity to reserve for equalization. An analysis of reservoir level fluctuations on a daily or hourly basis has not been done for the reservoirs adjacent to the MASCA plant. A low pressure alarm has been installed in the system. However, this low pressure setting is below the standby storage levels for fire flow. Of concern is the adequacy of equalization storage on an hourly basis without dipping into the fire flow storage. This peak hour equalization storage is in contrast to the daily amount to comply with the City of Tacoma's restrictions on supply during the peak Tacoma system demand period of the day.

If the Puyallup Zone 5 demand peaks cause a drawdown in the tanks below the fire flow storage levels, then the level of fire protection could be jeopardized and reliance would be increased on the secondary pump systems from Zone 4. To utilize gravity feed for fire protection and assure adequate fire flow storage is being maintained in the reservoirs, an equalization storage analysis should be conducted especially since Puyallup Zone 5 system demand will increase through the expansion of the plant.

Comment 4-4 *MASCA supports the adoption of the mitigation measures outlined in the draft SEIS on page 3-30.*

Response 4-4: Comment noted.

Comment 4-5 *MASCA supports the analysis of odor impacts contained in the draft SEIS on page 3-47 and 3-49.*

Response 4-5: Comment noted.

Comment 4-6 *MASCA supports the adoption of the noise mitigation set forth on pages 3-52 of the draft SEIS.*

Response 4-6: Comment noted.

Comment 4-7 *On page 3-50 and on page 8 of the Noise Technical Appendix, the references to Building "C" should be changed to Building "B".*

Response 4-7 Comment noted.

Letter received from Steve Nyman, MASCA dated July 31, 1996

Comment 5-1 *The selection of abatement equipment that is classified as "best-available-control-technology" along with the other proposed measures, will ensure that the proposed expansion will become a world-class facility in both semiconductor manufacturing technology and public safety.*

Response 5-1 Comment noted.

Letter received from Jerry Muff, MASCA dated July 31, 1996

Comment 6-1 *I fully support the mitigation's leading to a better equipped and Haz-Mat trained Puyallup Fire Department and Emergency Response Team from MASCA. The other mitigation's only support a level of cooperation already existing between MASCA Safety Department, The Puyallup Fire Department and the Regional Haz-Mat Team.*

Response 6-1 Comment noted.

Letter received from Gary Brackett, Tacoma - Pierce County Chamber of Commerce, dated August 6, 1996

Comment 7-1 *Please consider this letter supportive of the MASCA Puyallup Plant development at their campus location. This is significant in that the proposed development is within the scope of the original site development plans.*

Response 7-1 Comment noted.

Letter received from Frank Pfefferkorn, MASCA, dated August 9, 1996 (Topic: Stormwater)

Comment 8-1 *The requirement for a wet pond or biofiltration system to treat stormwater runoff from the Building D expansion area should be clarified to include treatment of runoff from existing development that will be used for storage of construction materials and to exclude treatment of runoff from new and existing roofs (which do not require pretreatment before discharge to the detention/infiltration pond).*

Response 8-1 MASCA shall implement an erosion control plan during construction. MASCA shall be required to pre-treat stormwater from the proposed expansion and from the existing facility. Run-off from new and existing roofs will not require pre-treatment.

Comment 8-2 *MASCA agrees that the runoff from the Building D expansion area should be discharged to a detention pond but proposes to increase the size of the existing pond rather than construct a new, separate pond.*

Response 8-2 MASCA has the choice between enlarging the existing pond to accommodate the new and proposed expansion (with a safety factor of 1.3) or constructing a new detention pond sized for the proposed expansion.

Comment 8-3 *MASCA agrees to modify the outlet control structure in the existing detention/ infiltration pond to discharge at the pre-development rates for 50 percent of the two-year storm event, to allow a release for 10-year and 100-year storm events, and to construct an emergency overflow structure to accommodate the 100-year post-development storm event.*

Response 8-3 Stormwater Mitigation Measure 4 has been modified to include the above specifications.

Comment 8-4 *MASCA agrees to remove the process wastewater from Outfall #003 and route it to Outfall #001, if and when DOE provides written approval of the change. If MASCA cannot obtain DOE approval before beginning discharges from Building D, it will construct an interim pretreatment facility (i.e., a wet pond or biofiltration system) to treat the process wastewater from Outfall #003.*

Response 8-4 The process water flow from Outfall #003 shall be removed from the existing detention/infiltration pond. This process water shall be pre-treated by MASCA and discharged to Outfall #001. MASCA shall coordinate the change of Outfall #003 into their NPDES permit and shall initiate the amendment process immediately. The conversion shall be completed prior to MASCA's NPDES permit renewal date scheduled for 1999. If DOE denies MASCA the right to discharge process wastewater to Outfall #001, then MASCA, DOE, and the City will mutually agree upon an alternative discharge method prior to discharge of any process wastewater flows from the Building D expansion.

Comment 8-5 *The suggestion that MASCA pre-treat the stormwater runoff from the existing development before entering the detention/infiltration pond is not supported by current City codes or SEPA. SEPA allows mitigation measures to be imposed only when "based on policies, plans, rules, or regulations formally designated by the [City] . . . as a basis for the exercise of substantive authority . . ." WAC 197-11-660(a). Because City policy does not support adding pretreatment to the existing systems in this instance, such a requirement cannot be imposed under SEPA. From an engineering standpoint, there is no* *room to construct a pretreatment system between the existing stormwater collection system and the pond.*

Response 8-5 The "proposal" as defined under SEPA includes all proposed actions by the applicant. The permits requested include modifications to existing facilities. The renovated buildings will be serviced by the existing parking lots and service roads which discharge runoff to the infiltration pond. Currently, MASCA's stormwater runoff receives no water quality treatment prior to discharge into the infiltration/detention pond.

The soils underlying the existing infiltration/detention pond are coarse, excessively drained soils that do not provide water quality treatment and; therefore, create a potential groundwater pollution problem. In addition, the site is underlain by a shallow, unconfined aquifer and the underground hydrogeologic conditions are unknown. There are six wells within a one-mile downgradient of the MASCA site, with the Fruitland Mutual Water District being the closest. Fruitland Mutual Water District has submitted a comment letter expressing concerns about groundwater contamination from stormwater runoff.

Based on the above risks of significant adverse environmental effects from the proposed project, MASCA will be required to construct a stormwater pre-treatment system for both the proposed expansion and the existing facility. The pre-treatment shall met current City and DOE standards. In order to install the pre-treatment system, MASCA will need to re-evaluate their existing on-site drainage plan to fit a pre-treatment system for the existing development. Under SEPA, new available information is allowed to be used in the analysis if the new information reveals a significant effect that was previously unknown (WAC 197-11-600[4][d]). Since the 1981 EIS, there has been considerable research done on the effects of stormwater run-off and groundwater pollution. Studies by the DOE and other government agencies show that untreated urban run-off can lead to reduced levels of dissolved oxygen, and increased turbidity and pollutant loading in the receiving waters. These impacts were not analyzed in the 1981 EIS.

Letter received from Frank Pfefferkorn, MASCA dated August 9, 1996. (Topic: Air Quality)

Comment 9-1 *MASCA agrees with the SEIS conclusion that no significant adverse impacts to air quality will result from the project. MASCA also agrees to implement the suggested air quality mitigation measures.*

Response 9-1 Comment noted.

Comment 9-2 *The average of the three sulfate, SO_4 samples is 0.374 with a standard deviation of 0.4. The sample results varied from a low of 0.075 to a high of 0.940. The blank for the sampling runs had a reported value of 0.507 mg/l. When the variability of the sample results with the average of 0.374 is compared to the blank reading of 0.507, the SO_4 has to be reported as zero.*

Response 9-2 Sulfate concentrations were detected in the blank at a concentration of 0.666 ug/cubic meter. Three detects of sulfate were reported; 16.5, 18.0, and 11.9 ug/cubic meter. Sulfuric acid analysis will remain as in current text.

Comment 9-3 *The SEIS air quality section contains technical inaccuracies which MASCA would like to have corrected..*

Response 9-3 Air quality testing was performed on an accelerated schedule to try and meet the construction schedule set by MASCA. As a result, the Human Health Risk Assessment Technical Appendix, which the Air Quality section of the Draft SEIS was based on, was prepared using a draft report from the chemical testing laboratory. The Human Health Risk Assessment Technical Appendix was completed prior to the issuance of final laboratory report. Some of the data changed which could affect the results of the analysis. In addition, it appears that the laboratory report contains some technical inaccuracies. The analysis has been corrected in both the Human Health Risk Assessment Technical Appendix and in the Air Quality section of the SEIS. The analysis has not changed the mitigation measures stated in the SEIS.

Comment 9-4 *Certain chemicals that were either not detected or not measured are nonetheless reported as present in the SEIS. Silane, and phosphine are listed as plant emissions in the Draft SEIS, despite the fact that these chemicals were not measured or reported by the laboratory conducting the tests. The values reported in the Draft SEIS for silane and phosphine were actually test results for silicon and phosphate, respectively, from the VOC stack. Neither of these substances are routed to the VOC stack. The SEIS should indicate that these chemicals were not measured.*

Response 9-4 It is true that apparently, the lab methods used did not actually detect silane (silicon Tetrahydride) but instead detected silica particles. The source of these could have been various compounds including silicon dioxide, methylsiloxane polymers (spin-on glass), guardian destruction of silane (resulting in silica), or (most likely) hexamethyldisilozane (HMDS). The text, therefore, will be modified to show that silica was detected and not silane. It should be noted that presence of silica particles is also indication of potential toxicity due to silicosis and other pulmonary pathologies. In fact, the levels detected approach the OSHA limit.

The laboratory results reflect the presence of phosphorous particles and not phosphine; therefore, the text will be changed to reflect this fact. However, this conclusion does not negate the fact that some phosphorous was detected. Possible sources of phosphorous could be destruction of phosphine by the guardians, resulting in phosphorous particles, or (less likely) phosphoric acid.

Phosphate was detected in the blank at 1.78 ug/cubic meter. Detected stack values range from 4.777-16.5 ug/cubic meter. Therefore, the text will remain as written.

Comment 9-5 *With respect to sulfate, which was reported in the Draft SEIS as sulfuric acid, the values reported by the lab were inconclusive.*

Response 9-5 The discussion in the SEIS and the Human Health Risk Assessment Technical Appendix regarding sulfate has been corrected. The analysis has not changed the mitigation measures stated in the SEIS.

Comment 9-6 *The Draft SEIS also indicates that the stack testing showed the presence of ethylene glycol methyl ethers although MASCA does not report the presence of this chemical in its emissions. In fact, MASCA does not use this chemical on the site. A review of the laboratory report indicates that the conclusion that ethylene glycol methyl ethers are present on the site may have been mistaken.*

The analytical method used to measure ethylene glycol methyl ether was gas chromatography with a flame ionization detector. This method does not positively identify compounds by other than their retention time. It does not use molecular weight or colorimetric spectra for identification as do more reliable detection methods.

The lab reported that the identification of ethylene glycol monomethyl ether in the stack could not be confirmed because the retention time shifted from that expected based on the water impinger analysis.

Response 9-6 Preliminary laboratory reports and conversations with laboratory technical staff indicated the reliability of data showing ethylene glycol emissions. In addition, information from MASCA, including their current MSDS chemical inventory book indicate that MASCA uses or has used in the near past reagents containing ethylene glycol ether. However, given that no definitive scientific evidence has proven air emission of this compound, and given the assumed reliability of statements from MASCA staff, the text will reflect changes, including no quantitative evaluation of ethylene glycol ether. It should be reconfirmed by MASCA (chemical inventory) that reagents containing this compound are not being used.

Comment 9-7 *The Draft SEIS mistakenly reports that arsenic was present in the acid stacks although the lab reported that arsenic was non-detectable. The tables in the Human Health appendix should be revised to delete references to arsenic.*

Response 9-7 The preliminary data report, on which the risk analysis was based, did contain reporting errors. After further review of the final data report, it is true that arsine results were not actually reported. Technically, all arsine emissions should be routed through guardian destruction units resulting in conversion of arsenic trihydride to arsenic oxide. This will be confirmed with MASCA. However, assuming a 90% control efficiency (Bay Area Air Quality District assumption), up to 10% of arsenic oxide may be emitted. Therefore, it is questionable whether the laboratory results are truly representative of MASCA emissions. This fact simply reinforces the statement in the SEIS that further stack testing (more comprehensive) is warranted for MASCA. However, all quantitative evaluation of MASCA arsenic emissions will be removed from the text.

Comment 9-8 *Because the SEIS indicates the presence of chemicals that were not found in the laboratory tests, the Draft SEIS implies that MASCA does not accurately report its emissions to PSAPCA.* ***MASCA correctly reports its emissions in accordance with local regulations and federal law.***

Response 9-8 See response 9-7.

Comment 9-9 *The air quality study in the Draft SEIS predicted future air emissions based on a worst case scenario. MASCA is concerned that use of data showing a worst case scenario in the SEIS could create confusion among agencies involved in MASCA's continued air permit processes who receive actual data and projections rather than worst case scenarios. Worst case scenarios are used by PSAPCA only to model odors at property lines and accidental releases in the facility at property lines. To avoid confusion, MASCA requests that the following statement be added at the beginning of the air quality analysis in the SEIS:*

The emissions data contained in this SEIS are the results of a worst case analysis and should not be used or relied upon for any other purpose, permits, or analysis. Furthermore, because the figures contained herein are a worst case analysis, they may differ significantly from the actual emissions reported by MASCA.

Response 9-9 It is true that average values of the stack test data were not used, but rather the maximum detected value. This methodology is suggested by USEPA guidance for toxicity evaluations using limited data sets (e.g. less than 10 data points). Since one stack test with limited analysis may not be truly representative of air emissions, this conservative approach is further warranted as to protect public health in nearby residential areas. Other modeling techniques and accepted methods (BAAQMD) of estimating industrial emissions are actually more conservative. Given the assessment of facts, there is little doubt that, if MASCA VOC emissions were uncontrolled, MASCA would be a Major Source. Statements will be added to the text explaining the conservative technical approach; however, the conclusions will not change.

Letter received from Frank Pfefferkorn, MASCA dated August 9, 1996. (Topic: Sanitary Sewer)

Comment 10-1 *Generally, the sanitary sewer analysis focuses primarily on the existing conditions at the plant rather than the impacts of the proposed expansion. The Final SEIS should clarify that the only new changes to the sanitary sewer system associated with the expansion project will be the construction of a second tightline to the Puyallup River and improvements to MASCA's on-site wastewater treatment plant. Although the impacts to the sewer system from the existing plant will continue, these impacts are permitted under the existing authorizations from the City and State. Additional analysis and mitigation relating to the existing plant exceeds the SEIS scope and is not appropriate at this time.*

Response 10-1 The 1981 EIS spoke in very general terms about both flow rates and treatment of the flows to be generated by the wafer production facility that exists today on the MASCA site. When this facility initially started to produce wafers, the process method tied wastewater flow rates to wafer production. Any changes in the processes of fabrication and assembly would therefore have an unquantifiable effect on the wastewater flow rate. This is pointed out with respect to the change in the wafer etching process from plasma to acid etching which took place several years ago. This change increased the concentration of ammonia in the wastewater. The existing wastewater treatment plant operations were not capable of dealing with this additional ammonia and the discharge flow concentrations began to exceed the allowable release levels.

In order to bring the ammonia releases back into the allowable ranges, changes in the ammonia removal process were instituted. They involved fine tuning the existing system and replacing the ammonia removal system with a newer and larger system. This had the desired effect, but increased the operational costs of ammonia treatment.

In May, 1981, the City of Puyallup entered into the City of Puyallup - Fairchild Concomitant Agreement. This agreement noted that both the existing City of Puyallup treatment plant and conveyance systems were not designed to take the kind of wastewater flows that the site would discharge. To mitigate this, the agreement included the following:

- Fairchild would build an on-site wastewater treatment system.
- The City of Puyallup would construct a sewer discharge tightline capable of a 1.6 MGD flow rate, for the Fairchild flows.
- The City of Puyallup would provide all monitoring equipment along with operation of the clarifier tank, as necessary, to discharge flows to the Puyallup River.

As a treatment method for tightline flows that are diverted into the clarifier, operators at the POTW drain overflows from the clarifier tank by bleeding the volume into the POTW treatment system. MASCA is charged for this on a basis of a meter between the clarifier tank and the POTW treatment system. This method of treatment has come into practice over time and has resulted in some problems.

As stated in the Determination of Significance, the system currently in-place is substantial different than that analyzed in the 1981 EIS. The proposed expansion includes improvements to MASCA's on-site wastewater treatment plant and increase flows to the City's POTW and the Puyallup River. Under SEPA, the range of impacts caused by the proposed project to be analyzed in an EIS include direct, indirect, and cumulative (WAC 197-11-792).

Comment 10-2 *The issue statement should be revised to state that the purpose of the sanitary sewer analysis in the SEIS is to evaluate the environmental impacts of wastewater discharges from the Building D expansion.*

Response 10-2 See Response 10-1.

Comment 10-3 *The description of the existing sanitary sewer system in this section is misleading because it does not describe the treatment of waste streams that occurs on the MASCA site prior to discharge.*

Response 10-3 MASCA's suggested language has been incorporated into the text of the SEIS.

Comment 10-4 *We have corrected the descriptions of test results to be more accurate.*

Response 10-4 The following statement has been added to the SEIS: "Since April, 1994, only one non-compliant event has occurred at MASCA. The event resulted from the failure of a calcium chloride addition pump. MASCA fixed the pump and installed a sensor and alarm to detect future pump failures. MASCA was not fined for this episode."

Comment 10-5 *MASCA has added clarification to the discussion of impacts to differentiate those impacts that are new as a result of the planned Building D expansion from those that exist as a result of the current plant and to clarify which and to what extent these impacts were anticipated at the time of the original permits and evaluated in the 1981 EIS.*

Response 10-5 The proposed expansion will result in higher volumes of wastewater. This will have a direct effect on the sanitary sewer system currently in-place. The mitigation measures in the SEIS are intended to: avoid, minimize, rectify, reduce, compensate, or monitor the effect on the City's sanitary sewer system, ground water, and the Puyallup River.

Comment 10-6 *The Building D expansion project allows increased production which requires larger quantities of water and chemicals than the existing operation. As a result, the on-site wastewater treatment plant must be expanded to accommodate higher volumes of wastewater.*

Response 10-6 The SEIS has been corrected to state that increased production will require larger quantities of water and chemicals than the existing operation. The on-site treatment plant must be expanded to accommodate higher volumes of wastewater. The statement that increased chemical usage is the result of increased treatment plant capacity has been deleted.

Comment 10-7 *The Building D expansion project will double the wastewater flow rates from Outfall #002, rather than increase them six-fold as stated in the Draft SEIS.*

Response 10-7 <u>The Final Engineering Report, Wastewater Treatment Plant Expansion, Puyallup Facility</u> prepared by Kennedy Jenks Consultants predicted that there would be a six-fold increase in wastewater flow rates for Outfall #002 with the production of 40,000 wafer-outs (Kennedy Jenks, 1994).

Based on MASCA's new projected water balance (1996), it is anticipated that there will be a two-fold increase in solvent wastewater. This has been changed in the SEIS.

Comment 10-8 *The Draft SEIS speculates that the small volumes currently discharged to the POTW may impact the bacterial regime. The concern is unsupported by history or scientific analysis. The POTW has not experienced problems in the past with the bacteriological treatment process, despite MASCA's discharge. The bacteria are routinely tested and monitored to ensure proper functioning of the POTW. Moreover, the bacteriological treatment used at the POTW* *would be replicated at the plant if MASCA were to treat the solvent rinse waste stream on-site.*

Response 10-8 The concern with MASCA's Outfall #002 is the unknown totality of pollutants in the present and future discharge and the potential effect on the POTW. This concern is supported by the Class II Inspection Report prepared by DOE, which concludes that MASCA should evaluate the sources of unknown base neutral analytes found at Outfall #002. Characteristics of these unknowns include the ability to be treated and their toxicity. Therefore, the risk of potential negative impacts caused by the unknown constituents in Outfall #002 is too high to allow to continue, especially with the increased volume of discharge anticipated to Outfall #002. The solvent waste water stream shall be rerouted to Outfall #001.

Comment 10-9 *It is preferable to treat this stream [solvent wastewater] at the POTW where the waste stream is highly diluted before it comes into contact with the biological organisms used in the treatment process.*

Response 10-9 It is common industrial practice to treat industrial wastewater in highly concentrated solutions as opposed to highly diluted.

The flow rate for the solvent rinse wastestream was measured as 34 gpm by DOE on April 15, 1996. The nature of the contaminants' impact on the POTW is not a function of their concentration. Many chemicals exist which in very small concentrations can cause major problems. While the impacts on the POTW treatment process, the receiving stream, and/or the biosolids disposal program are not known, the results could be long term or permanent in nature.

Comment 10-10 *The Draft SEIS goes on to speculate as to the worst-case possibility of impacts on the sanitary sewer system, concluding that MASCA should no longer discharge process wastewater to the POTW. MASCA agrees to perform monitoring at Outfall #002 as described in the attached mitigation measures, items 4 and 12. These measures will adequately mitigate any impacts of MASCA's Building D expansion project on the POTW. And, as the Draft SEIS notes, the effect of future chemical processes changes on the POTW are more appropriately addressed when, and if, those changes actually occur.*

Response 10-10 Under SEPA, if the cause of a significant adverse impact is unknown, then the lead agency must proceed with the worse case analysis and the likelihood of occurrence (WAC 197-11-080). There is a reasonable assumption that discharge wastewater from MASCA may have a significant adverse effect on the POTW. For this reason, MASCA will no longer be allowed to discharge process wastewater into the POTW.

Comment 10-11 *MASCA agrees to remove the process water from the discharge to the existing storm water detention pond through Outfall #003 and to plug the gravel lense in the pond.*

Response 10-11 Comment noted.

Comment 10-12 *Impacts of the Building D expansion project on the Puyallup River have already been addressed through the NPDES permitting process. MASCA's NPDES permit was renewed and reissued by the Department of Ecology in 1994, including projected impacts of the expansion project. Compliance with the conditions of the NPDES permit will, as a matter of law, adequately address any potential impacts to the river. Additional monitoring requirements beyond those contained in the NPDES permit are unnecessary.*

Response 10-12 Under SEPA, "in assessing the significance of an impact, a lead agency shall not limit its consideration of a proposal's impacts only to those aspects within its jurisdiction, including local or state boundaries" (WAC 197-11-060).

Compliance with the NPDES permit doesn't totally eliminate impacts to the Puyallup River. MASCA's discharge to the Puyallup River could effect the City's POTW ability to discharge to the river since DOE measures total pollutant loading in the river. For a detailed discussion of mass loading, see the Utilities - Sanitary Sewer technical appendix.

Mitigation measures for monitoring in the Utilities - Sanitary Sewer section of the SEIS are designed to address MASCA's potential impact to the POTW and the shared outfall, not compliance on the NPDES permit.

Comment 10-13 *The discussion of potential removal of the existing upset tank at the POTW should be deleted and the associated drawing on Page 25 of the Technical Section should be eliminated, as it is not an impact of the Building D expansion project but rather of the City's POTW upgrade project. MASCA has submitted comments and is pursuing procedural SEPA remedies with the City on this issue through the environmental review process for the POTW upgrade, which is the proper forum for discussion of this issue. The City and MASCA are working cooperatively to resolve this issue.*

Response 10-13 The proposed expansion will have a direct effect on the clarifier tank currently used at the POTW. The discussion on the upset tank in the SEIS is appropriate.

Letter received from Frank Pfefferkorn, MASCA dated August 13, 1996. (Topic: Emergency Response Capabilities)

Comment 11-1 *The statements contained in the Draft SEIS indicating that chemical use will be greater than that previously contemplated should be revised.*

Response 11-1 The SEIS was revised to reflect that chemical quantity projected in the 1981 EIS is greater than that now projected.

Comment 11-2 *. . . the mitigation measures which require action by the Puyallup Fire Department (PFD) are not within the control of MASCA. Therefore, MASCA is not capable of accomplishing this mitigation. MASCA agrees to provide funding for additional training. MASCA would support a resolution of the City Council instructing the PFD to undertake these measures but does not believe that they should be imposed upon MASCA as a condition of site plan approval.*

Response 11-2 MASCA will not be held responsible for mitigation measures installed upon the City or the Puyallup Fire Department (PFD). The City will be held responsible for all mitigation measures the PFD is committed to in the SEIS.

Comment 11-3 *MASCA would like to reiterate that the proposed Building D expansion project includes state-of-the-art technology that will improve the safety of the plant to provide a safe environment for the work force, the community, and the City of Puyallup.*

Response 11-3 Comment noted.

Letter received from Roger Nottage, Fruitland Mutual Water Company dated August 13, 1996

Comment 12-1 *The acids are a concern if flushed into drains or allowed to enter the detention/ infiltration pond, and ultimately the ground water table.*

Response 12-1 All process waste water will be pre-treated on-site prior to being discharged via Outfall #001. This discharge will be within acceptable levels according to MASCA's NPDES permit.

Comment 12-2 *Also I am concerned about the retention/detention of "storm" water which is allowed to infiltrate the ground. Even if the levels are "below toxic threshold" there is concern for letting this contaminated water infiltrate the ground.*

Response 12-2 MASCA shall pre-treat stormwater for both the proposed expansion and the existing development. The pre-treatment system shall be designed to met current City and DOE standards. See Stormwater Mitigation Measures in the SEIS.

Comment 12-3 *As owners of the Fruitland Mutual Water Company, the Share Holders of the Company want the assurance there are not signs, or increased levels of Volatile Organic Compounds, Semivolatile Organic Compounds, Synthetic Organic Compounds, Herbicides and Pesticides, Aroclors/PCB's, Inorganic Compounds, Cyanide or Heavy Metals associated or caused by the operation, spills or otherwise improper disposal, either by accident, inadvertent or intentional mishandling.*

Response 12-3 The mitigation measures contained in the SEIS will effectively avoid, minimize, rectify, reduce, compensate, or monitor any impact, including those noted by you, that would be associated with the expansion project.

Letter received from Rebecca Inman, Washington Department of Ecology dated August 13, 1996

Comment 13-1 *The final EIS should state that the Matsushita Semiconductor Corp. will continue to comply with all applicable Dangerous Waste Regulations, Chapter 173-303 WAC, for generation and accumulation of regulated quantities of hazardous waste.*

Response 13-1 Comment noted.

Letter received from Rebecca Inman, Washington Department of Ecology dated August 14, 1996

Comment 14-1 *The EIS (page 1-4) recommends that all process wastewater from Matsushita be rerouted to the Puyallup River via Outfall 001. This would require a modification to the existing National Pollutant Discharge Elimination System (NPDES) permit No. WA0039578. Matsushita Semiconductor must submit a permit application along with all necessary information no less than 180 days prior to the re-routing of all process wastewater to Outfall 001.*

Response 14-1 Comment noted. This has been added to the mitigation measures for Stormwater and Utilities -- Sanitary Sewer.

Comment 14-2 *The proponent must also address issues to water quality and human health criteria for pollutants expected to be present in the discharge. "All known* *available and reasonable methods of treatment" (AKART) must be applied to any new proposed discharge. The information submitted must include an evaluation of the existing treatment and conveyance systems to determine hydraulic capacity and the need for additional treatment necessary to meet the water quality and human health criteria, and provisions of AKART. Information should also be submitted in regards to the impact on mixing zones and dilution factors as a result of the new discharge.*

Response 14-2 Comment noted.

Comment 14-3 *Matsushita is responsible for demonstrating compliance with all applicable environmental laws and regulations. The detailed information cited above should be summarized in an engineering report prepared according to Chapter 173-240 WAC.*

Response 14-3 Comment noted. The engineering report will be part of the NPDES requirement.

Letter received from Leslie Ryan, Citizens for a Healthy Bay

Comment 15-1 *With the plant expansion, Matsushita will increase its waste water discharge flow considerably. It is the company's responsibility to make sure its discharges meet the permit effluent limits outlined in its NPDES permit. The City of Puyallup is to be commended for requiring Matsushita to construct its own pipeline to the POTW and overflow tanks. Also, the ongoing studies to determine the biological contaminants disrupting the system are critical to the protection of the City's treatment system and the Puyallup River.*

Response 15-1 Comment noted.

Letter received from Martha Fox, Puyallup Indian Tribe dated August 14, 1996

Comment 16-1 *The combined Outfall for discharges from the Matsushita facility and the City of Puyallup POTW appears to be in the Puyallup River within the 1873 survey boundaries of the Puyallup Indian reservation and is therefore subject to Tribal water quality standards and possibly other Tribal permitting requirements.*

Response 16-1 Comment noted.

Letter received from Frank Pfefferkorn, MASCA, dated August 15, 1996. (Topic: Tribal concerns)

Comment 17-1 *The Tribe and MASCA have agreed to continue discussions on this issue and work together to resolve any issues or concerns raised by the Tribe. MASCA agrees to implement additional mitigation measures mutually agreed upon by MASCA and the Puyallup Tribe to address the Tribe's concerns. These measures may be incorporated as conditions of a modified NPDES permit and should also become conditions of the site plan approval.*

Response 17-1 The City supports voluntary mitigation measures between MASCA and the Puyallup Indian Tribe to address Tribal concerns.

Letter received from Martha Fox, Puyallup Indian Tribe dated August 15, 1996

Comment 18-1 *The Tribe and MASCA have agreed to work together to resolve Tribal concerns arising from the proposed facility expansion, and MASCA has agreed to implement mitigation measures mutually agreed to by the Tribe and MASCA. The measures agreed to by the Tribe and MASCA will address concerns arising from Tribe jurisdictional and regulatory authorities.*

Response 18-1 Comment noted.

Letter received from Joseph Ball dated August 15, 1996

Comment 19-1 *After reading the EIS report prepared by David Evans and Associates, Inc., it is obvious to me that granting permission to expand the facilities at the MASCA site, prior to having MASCA demonstrate the ability to manage their present facility at industry level standards, would not be in the interest of the people of Puyallup. This list of shortcomings is long and the promises to rectify the situation fall short of convincing me they can solve these shortcomings. It is in the interest of all concerned, and it is immanently [sic] logical that MASCA exhibit the ability to manage a smaller plant before granting them permission to build a larger plant.*

Response 19-1 The mitigation measures contained in the SEIS will effectively avoid, minimize, rectify, reduce, compensate, or monitor any impact that would be associated with the expansion project.

Letter received from Eric Lehto dated July 15, 1996 (received August 15, 1996)

Comment 20-1 *How much water degradation will occur and why?*

Response 20-1 Please refer to the Stormwater section of the SEIS for potential effects the proposed expansion could have on water quality.

Comment 20-2 *Will this expansion affect aquifers, ecosystems, and other water supplies that people consume?*

Response 20-2 Please refer to the Stormwater and Plants and Aesthetics sections of the SEIS for potential effects the proposed expansion could have on aquifers and the vegetation buffer.

Comment 20-3 *Will the site meet all current regulations regarding Point Source and Non-point source pollution?*

Response 20-3 Stormwater generated by the proposed expansion will meet current City and DOE regulations. See Stormwater Mitigation Measures in the SEIS.

Comment 20-4 *Will site maintenance be fully documented on systems and machines? Will this information be readily obtainable by the municipalities?*

Response 20-4 Where codes, standards, or guidelines are cited in the Environmental Health -- Emergency Response Capabilities Mitigation Measures, the currently adopted or published editions shall apply, as follows. Mitigation shall apply to new construction and equipment installations, equipment maintenance and testing, and the implementation of administrative procedures. Mitigation shall not apply retroactively to existing buildings and purchased or installed equipment, unless the Fire Chief has determined that a condition constitutes a distinct hazard to life or property. Guidelines refer to the safety guidelines published by Semiconductor Equipment and Materials International.

Comment 20-5 *How will the training and equipment required for the Puyallup Fire Department be paid for? partially or in full? by MASCA or Puyallup before the expansion is implemented?*

Response 20-5 MASCA shall fund the initial cost of equipping and training the PFD Hazardous Materials Response Team, not-to-exceed $234,000. Funding shall be provided to the PFD no later than 10 months prior to the issuance of any certificate of occupancy. Annual refresher training and equipment replenishment shall be funded by the City of Puyallup.

Comment 20-6 *Will all of the current and new dangerous products, and side effect, be disclosed to the public prior to implementation?*

Response 20-6 MASCA shall be required to keep an up-to-date inventory of all chemical and hazardous materials used or stored on the site. Copies of this inventory will be supplied to the PFD. The PFD will receive a copy of the list as soon as it is revised. The inventory of the chemicals uses at the MASCA plant are available at the City Library.

Comment 20-7 *Will the City require MASCA to implement seismic restraints (U.B.C. and Semi S2-93, as described in the EIS Statement) before construction is started?*

Response 20-7 See response 20-4.

Comment 20-8 *Will the Community be made aware of incidents (requiring the use of Hazardous waste responders) that have possible dangerous side effects to ecosystems, humans, and water quality?*

Response 20-8 The community notification system for hazardous material instances is available in the City of Puyallup Hazardous Material Response Plan. This plan outlines the City's emergency response system. This plan is available at City Hall, the PFD Station, and the City Library.

Comment 20-9 *Will the City test the ground water regularly to constantly check site water conditions? Will the site have water sampling wells installed for the testing of ground water? Will the site or City pay for these wells?*

Response 20-9 Ground water monitoring wells are not proposed as mitigation for stormwater. Implementation of the mitigation measures in the SEIS will effectively mitigate any impacts the proposed expansion may have on the ground water.

Comment 20-10 *Will the pipe to the Puyallup sewage from MASCA meet current state and federal regulations? Will there by physical checks of the pipe? Will there be pipe inspections? If not, who will pay for the new pipe?*

Response 20-10 No new pipes are proposed from MASCA to the POTW. The new tightline from MASCA to the Puyallup River will be constructed to meet current local and state regulations. The tightline will be designed, constructed, paid for, owned, and operated by MASCA.

Comment 20-11 *Please refer to the Utilities - Sanitary Sewer section of the SEIS for potential effects the proposed expansion could have on the City's POTW. Will the Puyallup sewage plant be able to handle the additional waste and meet the future demands of the MASCA expansion?*

Response 20-11 The POTW has the capacity to handle the projected wastewater discharge of 0.14 MGD, which is well within the allowable discharge rates for an industrial site and will not adversely impact the future POTW hydraulic capacity.

Comment 20-12 *Will a technology meet current Best Management Practices?*

Response 20-12 Yes, the new tightline will be constructed to meet current City and State codes and standards.

Comment 20-13 *Will MASCA exceed safety standards to ensure the Community's safety?*

Response 20-13 With proper training and equipment, MASCA and the PFD will be able to contain any hazardous materials incident that occurs at the MASCA site.

Comment 20-14 *Will the City require security to be increased at the site? Will the City require a security fence be installed to maintain security?*

Response 20-14 A security fence will not be required by the City.

Comment 20-15 *Does MASCA meet the zoning requirements with the added hazardous chemicals and materials?*

Response 20-15 The MASCA site is currently zoned ML (Light Manufacturing Zone). The quantity of chemicals projected to be used at full production of 40,000 wafer-outs is lower than projected in the 1981 EIS of the site. The Concomitant Agreement between the City and MASCA allows the facility to operate under the ML zoning.

Comment 20-16 *What kind of monitoring will the MASCA pipe receive?*

Response 20-16 Monitoring requirements are listed under Utilities -- Sanitary Sewer Mitigation Measure 4.

Comment 20-17 *Will pipe be upgraded to current standards if needed?*

Response 20-17 See response 20-10.

Comment 20-18 *Will new chemicals effect the pipeline or sewage treatment plant?*

Response 20-18 The mitigation measures under Utilities -- Sanitary Sewer will effectively mitigate impacts to the POTW and the Puyallup River. See the discussion in the Utilities -- Sanitary Sewer section of the SEIS.

Letter received from Mike Grunwald, International Electrical Brotherhood Workers dated August 14, 1996.

Comment 21-1 *On behalf of the nearly 1,200 members of the International Brotherhood of Electrical Workers Local 76, I write in support of the Building "D" Expansion at the Matsushita Semiconductor Plant in Puyallup, Washington.*

Response 21-1 Comment noted.

SUMMARY OF COMMENTS
MASCA Public Hearing
July 31, 1996 - 7:00 PM
Ferrucci Junior High School
Puyallup, Washington

The following is a summary of the comments received at the public hearing.

David Bowden, Obayashi, 1111 - 39th Avenue SE, Puyallup, Washington

Comment 22 *Mr. Bowden explained the proposed expansion plans. The SEIS will explain the details of the expansion, and take out the mystery. Obayashi has formed a partnership with MASCA to do the expansion. Obayashi is part of an international construction company, and has worked on projects with other high tech firms like NEC. Obayashi and MASCA have a long term relationship.*

Mr. Bowden then explained and displayed an example of a "wafer-out". He described the importance of parts and materials being imported, and exported, and how much potential shipping would be generated for the ports. Further that the expansion is a $600 million corporate plan, projecting one year to build, with 800 man-years of construction. The expanded workforce will be about 700 employees. Mr. Bowden mentioned that the semiconductor industry is clean and controlled, and produces no pollution.

Mr. Bowden indicated on the site plan display and the Building D expansion will be 320,000 square foot building, 65 feet in height, and referred to as a "ballroom" or "cleanroom". The quality of the cleanroom must be higher, not to protect the workers, but to protect the integrity of the wafer-outs. The more memory they are required to contain, the more stringent the standards of production.

He went on to explain the advantages of expansion to the City of Puyallup, in that 600-700 people will be utilizing City facilities, and paying taxes. He contends that there would be no major impacts in expansion. Some mitigation measures need to be modified to meet realistic goals.

They include:

Water:

- *The City of Puyallup buys the water from City of Tacoma;*
- *MASCA buys water from the City of Puyallup;*
- *No more than 1.6 mgd goes in and out of the plant; and*
- *Safety valves and systems protect river and wastewater.*

Stormwater:

- *The pond on-site creates the same conditions that were previously existing on site;*
- *MASCA can collect, detain and control outfall; and*
- *MASCA will be building a bigger pond to accommodate expansion.*

Response 22 Comment noted.

Arthur Langlie, Associated General Contractors of Washington, 942 Pacific Avenue, Tacoma, Washington 98402

Comment 23 *Mr. Langlie explained that his organization represents over 100 construction industry professionals in Pierce County that exemplify skill, integrity and responsibility in the industry, including Puyallup's own Abshire Construction and NW Cascade. AGC wishes to encourage the expansion of MASCA project. Over the year-long construction period 800 workers with $60 million worth of payroll will be introduced into the community. $6 million in local and state sales taxes will be paid on the expansion and additional jobs will be created for the citizens of Pierce County.*

AGC sees MASCA as a responsible corporate citizen and is the type of company the community and private industry would like to work with. They have an environmental concern and interest in the safety of their workers and community.

We are confident if AGC members are involved in the construction, the work will be of high quality for which contractors are known in our industry and will result in a superior facility and a safe one.

Response 23 Comment noted.

Deborah Bevier, Economic Development Board, 950 Pacific Avenue, Ste. 410, Tacoma, Washington 98401

Comment 24 *Ms. Bevier explained that Fairchild Camera searched several areas before choosing the City of Puyallup for their facility. As incentive to building, in their respective cities, Shreveport, LA, offered to year tax abatement program, Colorado Springs, CO, offered free utility hook-ups, Nashville, TN, offered free land. The decision to locate in Puyallup was the result of the efforts of many organizations. The EDB was extremely pleased to work in partnership with the City of Puyallup, the Department of Transportation and Pierce County for roadway access. The EDB worked with the City of Puyallup and Pierce County on sewer expansion issues and the City of Tacoma for water supply.*

Approximately three years ago, the EDB began working with MASCA and a representative from Osaka, Japan. The EDB was extremely pleased when MASCA decided to purchase the manufacturing plant. Not only did it save the plant from closing, it also saved many jobs in the Puyallup area.

Ms. Bevier went on to explain that the Economic Development Board was in favor of the expansion because of the benefits to the City of Puyallup, i.e., tax revenue, sales tax revenue, 800 jobs during building, $600 million in support, etc. She would like to see the continuation of the campus environment.

"We all understand that the competition in this industry is as intense as ever. For any company to be successful requires the ability to be able to expand at the appropriate time." "I think you will find that MASCA is the kind of company that is extremely interested in achieving not only safety for it's employees and the public, but to become an aesthetically pleasing part of the Puyallup community."

"Our position at the EDB is to encourage the continued development of this outstanding facility. Therefore, the Economic Development Board for Tacoma, Pierce County supports the planned expansion of MASCA at their Puyallup site."

Response 24 Comment noted.

Steve Nyman, 1914 - 11th Street SW, Puyallup, Washington 98371

Comment 25 *Mr. Nyman has worked at MASCA for 14 years as site mechanical engineer. He started with Fairchild in 1982. Mr. Nyman feels that expansion will bring*

MASCA in line with world class state of the art facilities. "I commend the City of Puyallup for their thoroughness in preparing the SEIS."

MASCA is complying with all regulations, plus doing additional environmentally helpful things, like recycling, reusing industrial by-products (i.e., using ammonia to make fertilizer), participating in a voluntary pollution prevention initiative, 3350 program, and eliminating use of certain chemicals. The facility is in the process of ISO 14001 registration and has won an energy efficiency award.

Mr. Nyman stated that he has two daughters, and his family lives very near the plant. He feels the abatement equipment is the best available control technology and along with the other proposed measures, will ensure that the new expansion will become a world class facility in both semiconductor manufacturing technology as well as public safety.

Response 25 Comment noted.

Nancy Morgan, Neighbor, 3229 - 17th Street SE, Puyallup, Washington 98374

Comment 26 *Ms. Morgan explain where she lives relative to the plant and noted the location of schools which her children currently or previously attended, including Ferrucci Jr. High.*

"I have a couple questions for the City and MASCA. There was a toxic gas leak in October. Why weren't the neighborhood residents informed, and what can be done in the future about a warning system?"

Response 26 The community notification system for hazardous material instances is available in the City of Puyallup Hazardous Material Response Plan. This plan outlines the City's emergency response system. This plan is available at City Hall, the PFD Station, and the City Library.

The hazardous materials incident that occurred in October was reported to the PFD. The release of toxic emissions was brief and had dispersed prior to the PFD arrival at MASCA. The PFD determined that it was not necessary to evacuate the surrounding community. The report on the incident is filed with the City and is available to the public upon request.

Victoria Loney, Chemical Injury Council, P.O. Box 50243, Bellevue, Washington 98015

Comment 27 *Ms. Loney is an advocate for chemically injured workers. She was previously injured and is concerned about the potential effects of exposure to acetone, and other toxic chemicals.*

Ms. Loney listed the chemicals specifically referred to in the SEIS, and had researched the effects of release of each chemical, on the humans exposed.

She encouraged MASCA to educate employees, neighbors, and the community about the chemicals they use and the effects they could have on human health. "When people don't have all the information they end up being exposed to chemicals that can be harmful (i.e., asbestos, Agent Orange, silicon breast implants, chemical warfare in the Persian Gulf, etc.)."

"If there's compliance, I just want to know why we are reading about toxic clouds, chemicals being found together in ponds, in the river, in the storm and in the area."

Response 27 Comment noted.

Jerry Muff, 3530 - 24th Avenue SE, Puyallup, Washington 98374

Comment 28 *Mr. Muff explained that he is the Safety and Health Manager at MASCA. He has 18 years in the semiconductor business, training, some engineering, manufacturing, health, and safety. He has served on the workforce council, school district strategic planning council, boy scout troop leader, and a technical advisor in the area. Mr. Muff's children attended Ferrucci Jr. High, and are now attending Pierce College.*

Mr. Muff indicated that the safety of the plant is very important. The safety of the site has never been a question in his mind. He has reviewed the SEIS draft and particularly the Environmental Health and Emergency Response Capability section. The mitigation measures suggested in the document are in line with the MASCA plan. Mr. Muff fully supports the mitigation leading to a better equipped and hazmat trained Puyallup Fire Department and MASCA emergency response team.

The other mitigation measures only support a level of cooperation that already exists between Puyallup Fire Department, the MASCA Safety Department and the Regional Hazmat Response Team.

Comment 28 Comment noted.

Alan Welch, Chemical Injury Coalition, PO Box 50243, Bellevue, Washington

Comment 29 *Mr. Welch explained the aftermath of a chemical incident, referred to as Chemical Sensitivity or Environmental Illness. The condition would make the victim of exposure chemically sensitive. This would cause them to become ill after exposure to ordinary chemicals like mouthwash, hairspray, etc. With symptoms varying from headaches and joint pains to neurological problems which are most common when chemicals are involved.*

This Environmental Illness could occur over a long period of time. That is, a toxic build-up of chemicals. Once the body is overloaded, then the symptoms would occur. The victim might not know or remember when they were exposed, or to what chemicals. There is very little funding in the State of Washington that has been allocated to researching this illness (only 1.5 million dollars). It is hoped that the developer of this project would want to contribute some funds so research can be done in this area.

The SEIS refers to a "guarantee" of public safety. There can be no guarantee, because there has been inadequate research. The model for study was a healthy, white male. Pregnant women, children, or elderly people are more vulnerable and they are never studied.

Mr. Welch made reference to the gulf war combined chemical exposure, and it's synergistic effect. "What will be the effect on the students, residents and neighborhood? Toxicological studies should be conducted and used in the EIS, and money set aside for this eventuality."

The ordinances citing the amount of "safe exposure" may not be strong enough. The current codes don't address build-up of chemical releases.

Response 29 MASCA is in compliance with all state and federal standards. No impacts were identified in the SEIS for air quality. The implementation of a VOC thermal abatement system will lower the amount of VOC emissions below what is currently emitted from the plant.

Bob Dalton, Good Samaritan Hospital, 407 - 14th Avenue SE, Puyallup, Washington 98374

Comment 30 *One part of the environmental health issue that has not been raised is the relationship between MASCA and the hospital. Hospital staff has worked with Will Winslow for years. He works not only with the fire department but with the hospital. He provided not only training for our entire Emergency Department, he provides information sheets on the chemicals that are involved in the plant and takes every precaution available to keep the medical* *and emergency departments apprised of what they are dealing with in the case of an industrial accident and keeps that up to date.*

This does not especially answer some of the concerns that were raised by the earlier speakers but it shows that an effort has been made to not only work with the fire department and the hazmat people, but also with the medical people that will respond to these emergencies. If someone comes into the hospital from an industrial accident at MASCA we'll know what they have been exposed to, we'll have the information there to deal with that.

Response 30 Comment noted.

Bill Hehn, Instructor, Pierce College, 3628 South 35th, Tacoma, Washington

Comment 31 *The College and MASCA have an excellent working relationship. Pierce college has and will continue to provide training courses that would meet MASCA's employment requirements, such as two year electrical engineering graduates.*

Response 31 Comment noted.

Paul Pelela, 5904 - 36th Avenue E, Tacoma, Washington 98443

Comment 32 *Mr. Pelela has lived in Puyallup all his life, and his children go to Puyallup schools. He endorses MASCA plant, and thinks its a "thing of beauty." Mr. Pelela wants to keep the facility on the hill, and not move it to the valley. He used to play at the facility site as a child.*

Response 32 Comment noted.

Lynn Wallace, Chamber Eastern Pierce County, 322 - 2nd Street SW, Puyallup, Washington

Comment 33 *Ms. Wallace supports the expansion and MASCA in general. The $600 million dollar expansion will add to the sales tax revenue the city receives and create a large property tax break for the citizens of Puyallup. With the addition of 300 new employees, Puyallup will see additional benefits as most of those employees choose to live in and do business in Puyallup.*

Construction is to be done in a timely manner without cutting corners. The company must come on line in the window of opportunity to take of advantage of the market needed to make this profitable for them and the community.

The SEIS has been a great effort by the City and answers many questions.

Response 33 Comment noted.

John Townsend, Resident, 3404 - 27th Place SE, Puyallup, Washington 98374

Comment 34 *Mr. Townsend is a 30 year resident. He expressed concern that there is no discussion of traffic impacts during the construction period and after the construction in over. "What happens when 800 construction workers combined with 400 employees are all leaving at the same time? Could a traffic section be added to SEIS?"*

Response 34 The City determined that traffic was adequately assessed in the 1981 EIS. The traffic projected to be generated by the proposed expansion will be lower than that projected in the 1981 EIS. Traffic was not included in the Determination of Significance for the Building D Expansion project.

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The Chamber of Eastern Pierce County
322 - 2nd St. S.W. • P.O. Box 1298 • Puyallup, WA 98371 • (206) 845-6755 • FAX (206) 848-6164

July 29, 1996

Mike Casey, AICP
Community Development Director
City of Puyallup
218 W. Pioneer
Puyallup, WA 98371

Dear Mike:

The Chamber of Eastern Pierce County supports Matsushita's plans to build a new 300,000 square-foot fabrication plant adjacent to the existing Puyallup facility. **1-1**

The $600 million expansion will add to the sales tax revenue the city receives and create a large property tax break for the citizens of Puyallup. With the addition of 300 new employees Puyallup will see additional benefits as most employees of Matsushita choose to live in Puyallup and do business here.

The Chamber asks that the city work with Matsushita to see that the construction is completed in a timely manner, without cutting corners. The company must come on line in the window of opportunity to take advantage of the market needed to make this profitable for them and our community.

Sincerely,

Lynn Wallace

Lynn Wallace, CEO
The Chamber of Eastern Pierce County

ASSOCIATED GENERAL CONTRACTORS
OF WASHINGTON

RECEIVED
PLANNING & COMMUNITY AFFAIRS
AUG 02 1996
CITY OF PUYALLUP

July 29, 1996

Mike Casey
AICP, Community Development Director
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

Dear Mr. Casey:

I am writing with regard to the Matsushita Semiconductor Corporation (MASCA) proposed plant expansion in Puyallup.

As you are well aware, MASCA is in the process of permitting their expansion for the production of the next generation semiconductor. We are supportive of Matsushita in their endeavors on several levels.

As constructors, this project is important to our industry and particularly the employment base of our region. Over the year long construction project, well over 800 construction workers will be employed, $6 million dollars will be paid in state and local sales tax, and industry suppliers will benefit from over $150 million in construction spending. This project will result in $60 million in wages and benefits to construction workers which will in turn contribute to the local economy. The long term gain is even more impressive. As citizens concerned with the expansion of business and future industry, we feel that the fiscal impact of this project on the City of Puyallup and its citizens is immense. Our belief in a jobs-based economy is strengthened when one considers that this site will employ 700 local citizens (currently MASCA employs over 93% from Pierce County) and have an annual payroll of $44 million. The city will benefit directly from $2 million in property taxes. Thirdly, as the City of Puyallup and Pierce County, as a whole, work diligently between government and private industry to establish a long term solution for waste water issues, we recognize Matsushita as a responsible corporate citizen that has worked consistently to help the region enhance the way water is treated and returned to the environment. This new plant will have an expanded facility for treating waste water, as well as expanding the companies fiscal contribution to city services. It is important to note that Matsushita makes responsibility to clean water, safety and health a priority. **2-1**

Corporate Office & Seattle District Office
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206-284-0061
800-562-2868
FAX 206-285-4546

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Olympia, WA 98501-2383
360-352-5000
800-690-2630
FAX 360-352-4411

Central Washington District Office
105 South 3rd St.
Yakima, WA 98901
509-454-5064
800-574-6074
FAX 509-248-2056

Northern District Office
2211 Rimland Drive
Suite 100
Bellingham, WA 98226
360-647-7762
800-244-6551
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Southern District Office
942 Pacific Avenue
P.O. Box 11105
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206-272-7725
800-637-7717
FAX 206-272-7719

The extent to which corporate obligations have been met favors the expansion of Puyallup's relationship with this company.

Our membership strongly supports the expansion of a diverse economic tax base that includes high tech industry. The future of this type of manufacturing continues to grow, and will remain an important component to the economic health of our region. Matsushita has made the commitment to be a part of our continued economic expansion.

Please contact me if I can be of further information as you go about the review process.

Yours very truly,

Arthur K. Langlie
Membership & Local Government Affairs
Southern District

CC: Roland Dewhurst
AGC Southern District Manager

Jeff Woodworth
AGC Southern District Vice-President

July 30, 1996

RECEIVED
PLANNING & COMMUNITY AFFAIRS
AUG 01 1996
CITY OF PUYALLUP

Bernie Hines
2310 - 21st ST SE
Puyallup, WA 98374

Attn: Mr. M. Casey
SEPA Official
Puyallup, WA

Subject: MASCA SEIS

Dear Mr. Casey,

I am a resident of the City of Puyallup and a member of local 82, Plumbers and Steamfitters union. Since 1983 I have worked in virtually all areas of the MASCA facility including ;

- waste water treatment
- Deionized water building
- Bulk chemical delivery
- Process equipment installation
- Facility equipment installation
- Process gas systems

In the 30 years I've been a member of local 82, I have worked in many facilities. I would rate the MASCA plant as one of the most safest and most professional. I am impressed by the safety training, procedures and systems in place at MASCA. I whole-heartedly support plans for the new facility at MASCA. It seems consistent with the original plan for the area and the original EIS. 3-1

I am disheartened, as a resident of Puyallup that the construction permit seems to be being dragged out for such a long period of time. My two boys attend local schools and the bond issues continue to fail. The increase in tax collection would certainly help ease the common burden, and provide needed funds for education. 3-2

Furthemore this project is estimated ready to employ some 800 hands for about a year. Using $45.00 as an average wage the represents some $75,000,000 in possible wages for working families most from Puyallup and Pierce county.

In conclusion, I have hands on experience at MASCA and it is a very safe facility. I support its expansion and feel it is very necessary for this community.

Sincerely
Bernie Hines
Bernie Hines

Panasonic

Matsushita Semiconductor Corporation of America

1111 - 39th Ave. S.E.
Puyallup, WA 98374

Tel 206-841-6000
Fax 206-841-6516

July 30, 1996

Mr. T. Michael Casey, Director
Planning and Community Development
SEPA Responsible Official
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

Re: Draft SEIS for MASCA Building D Expansion

Dear Mr. Casey:

This letter constitutes MASCA's comments on portions of the draft Supplemental Environmental Impact Statement ("SEIS") prepared for MASCA's Building D expansion project. Additional comments will be forthcoming. MASCA will submit its comments to the various technical issues addressed in the SEIS as it completes its review of each issue or group of issues. The comments contained in this first letter address water, plants and aesthetics, odor, and noise.

General Comments:

MASCA would like to reiterate that the proposed Building D expansion project includes constructing additional chemical storage and handling facilities on the site, as well as pollution control equipment at the plant, using state-of-the-art technology. The expansion, while enabling increased production at the plant, will also improve the safety, training, and practices at the plant to insure a safe environment for the expanded work force, the community, and the City of Puyallup. MASCA hopes the final SEIS will further explain and emphasize these improvements in technology, safety, containment, and response that will result from the expansion project. **4-1**

Although the mitigation measures proposed in the draft SEIS are extensive, MASCA agrees that many of them are important and necessary components of the expansion project. Many of the mitigation measures are, and have always been, part of the design for the plant expansion. Nonetheless, some of the mitigation measures appear to be unnecessary, exceed the City's authority under SEPA, and are inappropriate.

Under SEPA, all mitigation measures must be based upon adopted policies that are identified and formally designated by the City as possible bases for conditioning a permit under SEPA. RCW 43.21C.060. Mitigation measures must also address specific adverse environmental impacts identified in the EIS and attributable to the project. RCW 43.21C.060; WAC 197-11-660(d). In addition, mitigation measures must be reasonable and capable of being accomplished. RCW 43.21C.060. Not all of the mitigation measures proposed in the draft SEIS meet these legal requirements. MASCA's objections to specific mitigation measures is included in its comments in each technical area addressed by the SEIS. 4-2

Comments on Water:

As noted in the Draft SEIS, the concomitant agreement between Fairchild (MASCA as successor in interest) and the City provides for the plant to receive up to 1.6 mgd of water from an intertie with the Tacoma water system. In exchange for this commitment to supply water, MASCA has paid the capital expenses, depreciation, and general operating costs for the intertie system to the City, in addition to its regular water payments.

Impacts associated with the water intertie system and plant demand of up to 1.6 mgd of water were fully analyzed and mitigated in the 1981 FEIS. MASCA's current expansion proposal will not exceed water demand of 1.6 mgd from the intertie system. As noted in the Draft SEIS, "the proposed plant expansion will not have an impact beyond what was identified and mitigated in the 1981 EIS." Draft SEIS, Utilities-Water Technical Appendix, p. i. MASCA does not believe any additional mitigation measures are warranted at this time for water use at or below this level.

Mitigation Measures for Water:

Because 1.6 mgd of water demand from the plant was analyzed and mitigated in the 1981 FEIS, no new impacts to the water system will be generated by the expansion project. Therefore, no new mitigation measures are necessary so long as the plant demand remains at or below 1.6 mgd. Mitigation measure nos. 1 and 2 should be deleted. Mitigation measures nos. 3 and 4 are acceptable to MASCA as stated. 4-3

References for these comments are listed on Exhibit A.

Comments on Plants and Aesthetics:

MASCA supports the adoption of the mitigation measures outlined in the draft SEIS on page 3-30. The mitigation and final conclusions confirm the findings contained in the 1981 FEIS. Specifically, that "The zoning codes of the City of Puyallup will be adhered to throughout the design of the science park. A conceptual master plan is presented...Refinement of the master plan will continue as the project develops." 1981 FEIS, p. 162. 4-4

Comments on Odor:

MASCA supports the analysis of odor impacts contained in the draft SEIS on pages 3-47 through 3-49. No mitigation measures for odor are proposed. 4-5

Comments on Noise:

MASCA supports the adoption of the noise mitigation set forth on pages 3-52 of the draft SEIS. The mitigation is consistent with the 1981 FEIS which deferred mitigation for impacts from on-site equipment until the design phase of future expansions. Accurate noise modeling cannot be performed until the specific equipment to be installed is identified and located on the site. MASCA has provided this information to the City, allowing realistic computer modeling to be performed for the SEIS, resulting in appropriate mitigation measures. 4-6

Finally, two small typographical errors need to be corrected in this section of the draft SEIS. On page 3-50 and on page 8 of the Noise Technical Appendix, the references to Building "C" should be changed to Building "B". 4-7

MASCA looks forward to continuing to work with the City on these issues.

Sincerely,

Frank Pfefferkorn
Vice President
Manufacturing and Engineering
Member of the Board

EXHIBIT A

1. City of Puyallup, Water System Comprehensive Plan Addendum, dated June 1981, Gray and Osborne #81547.

2. City of Puyallup, SEPA Checklist, DNS issued for whole water project, Final Declaration issue dated August 21, 1981.

3. City of Puyallup Ordinance No. 1887, an Ordinance creating a special construction fund entitled "Design and Construction of Water System Improvements, Fairchild Fund No. 1."

4. Letter from R. G. Frisbie (National Semiconductor) to Les Olson (City of Puyallup) dated August 8, 1989.

   Letter from R. G. Frisbie (National Semiconductor) to Les Olson (City of Puyallup) dated August 29, 1989.

   Letter from Les Olson (City of Puyallup) to R. G. Frisbie (National Semiconductor) dated October 6, 1989.

   Letter from Steve Nyman (National Semiconductor) to Tom Heinecke (City of Puyallup) dated May 2, 1990.

   Letter from R. G. Frisbie (National Semiconductor) to Tom Heinecke (City of Puyallup) dated May 7, 1990.

   Letter from R. G. Frisbie (National Semiconductor) to Tom Heinecke (City of Puyallup) dated May 9, 1990.

5. Letter from Tony Vivolo (Gray & Osborne, Inc.) to Tom Heinecke (City of Puyallup) dated May 22, 1990. (Note page 3, item 6, which says the City paid nothing for booster pump capacity and therefore has no real water capacity from the Fairchild storage tank.)

July 31, 1996

Mr. Michael Casey
SEPA Official - City of Puyallup

Dear Mr. Casey:

Good Evening, my name is Steve Nyman. I am a resident of the City of Puyallup. My address is 1914 11th Street Place SW, Puyallup, Washington.

I am the site Mechanical Engineer at Matsushita, and am responsible for design and on-going engineering support of the mechanical systems. I graduated from the University of Washington in 1981 and have been a licensed Professional Engineer for over eight (8) years. Two years ago, Matsushita and myself received national recognition for a very successful "energy conservation" project, in which we reduced our annual energy consumption by 3.5 million kWh.

In the past 14 years, I've been involved in four (4) semiconductor facilities, beginning with Fairchild Semiconductor in 1982. It is a fascinating and challenging industry, being on the leading edge of technology. The proposed expansion will bring a world-class, state-of-the-art facility to Puyallup.

I commend the City of Puyallup for their thoroughness in preparing the SEIS. We have been working very closely with the city's engineers and consultants to develop systems that address the issues in the SEIS. We have been and will continue to comply with all federal, state and local codes and regulations. We are also very pro-active in "voluntary" environmental programs, such as:

- recycling, e.g. not only paper, glass and plastic, but also industrial byproducts. (Ammonium Sulfate, Calcium Chloride Sludge and Solvent Burnable Waste.) For instance, we remove ammonia from our waste stream in such a manner that it is used as fertilizer off-site.
- We are participating in a voluntary pollution prevention initiative called the "33/50 program" for the reduction and eventual elimination of designated chemicals.
- Energy conservation projects, as previously mentioned.
- We are pursuing ISO 14001 certification. ISO 14001 is an international Environmental Management System. An international ISO 14001 committee is expected to release the standard later this Fall.

As stated before, I am a resident of Puyallup. My wife and I are raising two young daughters within two and half miles of the plant. So I have a keen interest in the safety of the facility and the local region.

The selection of abatement equipment that is classified as "best-available-control-technology" along with the other proposed measures, will ensure that the proposed expansion will become a world-class facility in both semiconductor manufacturing technology and public safety! **5-1**

Very truly yours,

Steve Nyman
Mechanical Engineer, MASCA

July 31, 1996

Mr. Michael Casey
SEPA Official - City of Puyallup

Dear Mr. Casey:

My name is Jerry Muff. I live at 3530 24th Avenue SE, in Puyallup. I am the Safety and Health Manager at Matsushita Semiconductor Corporation of America. I have eighteen years of experience in the semiconductor business, including training, engineering, manufacturing and safety and health.

Tonight I speak to you as a Puyallup resident, active in many community functions. I am Chairman of the Workforce Council, reporting to the Puyallup School Board; member of the school district's Strategic Planning Council; committee Chairman for a local Boy Scout Troop and I belong to several Technology Advisory Committees in the community. I speak to you as a parent of two sons who have attended this Junior High School and who both have or are attending Pierce College, right next door to the MASCA facility. I have lived less than two miles away from the MASCA site for 13 years and my children have spend much of their time in schools much closer to the site than that. The safety of the plant has always been important to me as an individual, a parent and a community member. The safety of the site has never been a question in my mind.

I have reviewed the Supplemental Environmental Impact Statement Draft and most specifically the Environmental Health and Emergency Response Capability Section. The conclusions and the mitigation's in this section are very much the same as those proposed future enhancements discussed by the Fire Chief and myself, before the SEIS was requested by The City of Puyallup. I fully support the mitigation's leading to a better equipped and Haz-Mat trained Puyallup Fire Department and Emergency Response Team from MASCA. The other mitigation's only support a level of cooperation already existing between MASCA Safety Department, The Puyallup Fire Department and the Regional Haz-Mat Team. **6-1**

The Regional Hazardous Materials Response Team is assuring levels of training, equipment compatibility and procedures that are alike between all Pierce County Haz-Mat Agencies. They include all local Fire Departments, the McCord Air Force Base Fire Department and Boeing and MASCA Emergency Response Teams.

Thank you all for attending this meeting tonight. Concerned and informed neighbors, are good neighbors.

Very truly yours,

Jerry Muff
Safety and Health Manager, MASCA

TACOMA-PIERCE COUNTY CHAMBER OF COMMERCE

August 6, 1996

RECEIVED
PLANNING & COMMUNITY AFFAIRS
AUG 09 1996
CITY OF PUYALLUP

Mike Casey, AICP
Community Development Director
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

RE: MASCA Puyallup Plant Building

Dear Mr. Casey:

Please consider this letter supportive of the MASCA Puyallup Plant development at their campus location.

The Chamber notes that MSACA has made substantial mitigation commitments to insure that the impacts of this additional development on their site are properly addressed. This is significant in that the proposed development is within the scope of the original site development plans. **7-1**

The Chamber also encourages expeditious approval of the development proposal.

MASCA is part of a vibrant and dynamic industry. DuPont, another city in our community benefitting from significant investment by this industry, has received much attention from its prompt yet considered handling of their project. The actions by individual cities will determine the greater economic success and opportunities for our citizens by the way each economic development project is done.

Sincerely,

Gary D. Brackett, Mgr.
Business and Trade Development

950 PACIFIC AVENUE, SUITE 300, PO BOX 1933, TACOMA, WA 98401
PHONE: 206-627-2175, FAX 206-597-7305

Panasonic

Matsushita Semiconductor Corporation of America

1111 – 39th Ave. S.E.
Puyallup, WA 98374

Tel 206-841-6000
Fax 206-841-6516

August 9, 1996

Mr. T. Michael Casey, Director
Planning and Community Development
SEPA Responsible Official
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

Re: Draft SEIS for MASCA Building D Expansion
Comments re: Stormwater

Dear Mr. Casey:

This letter constitutes MASCA's comments on the stormwater portion of the draft Supplemental Environmental Impact Statement ("SEIS") prepared for MASCA's Building D expansion project.

Comments on Stormwater:

MASCA agrees with the intent of most of the stormwater mitigation measures contained in the Draft SEIS. However, the mitigation requirements should be clarified so that there is no misunderstanding as to the scope or specific requirements of the mitigation measures.

The requirement for a wet pond or biofiltration system to treat stormwater runoff from the Building D expansion area should be clarified to include treatment of runoff from existing development that will be used for storage of construction materials and to exclude treatment of runoff from new and existing roofs (which do not require pretreatment before discharge to the detention/infiltration pond). **8-1**

MASCA agrees that the runoff from the Building D expansion area should be discharged to a detention pond but proposes to increase the size of the existing pond rather than construct a new, separate pond. The mitigation measures should be revised to provide for enlarging the existing pond rather than constructing a new pond. **8-2**

MASCA agrees to modify the outlet control structure in the existing detention/infiltration pond to discharge at the predevelopment rates for 50 percent of the two-year storm event, to allow a release for 10-year and 100-year storm events, and to construct an emergency overflow structure to accommodate the 100-year post-development storm event. The mitigation measure requiring modifications to the outlet control structure should be revised to include these specifications. **8-3**

MASCA agrees to remove the process wastewater from Outfall #003 and route it to Outfall #001, if and when DOE provides written approval of the change. If MASCA cannot obtain DOE approval before beginning discharges from Building D, it will construct an interim pretreatment facility (i.e., a wet pond or biofiltration system) to treat the process wastewater from Outfall #003. **8-4**

Finally, the suggestion that MASCA pretreat the stormwater runoff from the existing development before entering the detention/infiltration pond is not supported by current City codes or SEPA. The Stormwater Technical Appendix contained in the Draft SEIS states that "The current City Stormwater Regulatory Code does not require that existing sites under redevelopment be retroactively upgraded to current standards. Only the new portions of the site need to be designed to meet current code." SEPA allows mitigation measures to be imposed only when "based on policies, plans, rules, or regulations formally designated by the [City] . . . as a basis for the exercise of substantive authority . . . ." WAC 197-11-660(a). Because City policy does not support adding pretreatment to the existing systems in this instance, such a requirement cannot be imposed under SEPA. From an engineering standpoint, there is no room to construct a pretreatment system between the existing stormwater collection system and the pond. For all of these reasons, MASCA requests that the requirement to pretreat stormwater from the existing development should be deleted. **8-5**

All of the mitigation measures for stormwater impacts are enclosed as Attachment A to this letter.

MASCA looks forward to continuing to work with the City on these issues.

Sincerely,

Frank Pfefferkorn

Frank Pfefferkorn
Vice President
Manufacturing and Engineering
Member of the Board

3.2.5 Summary of Stormwater Mitigation Measures

The City has determined that the following mitigation will be required as conditions of the expansion.

1. Either a wet pond system or bio-filtration system shall be constructed to a City approved design to treat stormwater runoff from the Building D expansion area, including any existing area used for the storage of construction materials, with the exception of new and existing roofs which shall discharge directly to the infiltration/detention pond, prior to issuance of any certificate of occupancy for the Building D expansion.

2. MASCA shall increase the physical size of the existing detention/infiltration pond to accommodate the Building D expansion, inclusive of a 1.3 safety factor. MASCA shall fence the pond's perimeter due to its depth. The enlarged pond shall be operational prior to the issuance of any certificate of occupancy for the Building D expansion.

3. DSEIS stormwater mitigation measure number 3 is deleted, and replaced by modifications to the remaining stormwater mitigation measures.

4. The existing detention/infiltration pond outlet control structure shall be modified to match the predevelopment discharge rates for 50% of the 2 year storm, allow a release for the 10 year storm, allow a release for a 100 year storm, and construct an emergency overflow structure designed to accommodate the 100 year post development storm event. The existing gravel lense at the northwesterly end of the pond shall be capped. The bottom of the pond shall be cleaned at the conclusion of the construction. All work to be accomplished in accordance with a City approved design. MASCA shall make these modifications prior to issuance of any certificate of occupancy for the Building D expansion.

5. The process water flow from Outfall #003 shall be removed from the existing detention/infiltration pond and discharge in Outfall #001, when DOE provides written approval of the change. MASCA shall initiate a request to modify the existing NPDES permit to allow for the change. Prior to discharge of process waste from Building D, if DOE has not completed its approval of MASCA's modification request, an interim wet pond system and/or bio-filtration system shall be constructed to a City approved design to treat the process water flow from Outfall #003.

6. DSEIS stormwater mitigation measure number 6 is deleted, based on the SEIS Stormwater Technical Appendix, page 22, Section 4.1 conclusion that "The current City Stormwater Regulatory Code does not require that existing sites under redevelopment be retroactively upgraded to current standards. Only the new portions of the site need to be designed to meet current code."

Panasonic

Matsushita Semiconductor Corporation of America

1111 – 39th Ave. S.E.
Puyallup, WA 98374

Tel 206-841-6000
Fax 206-841-6516

August 9, 1996

Mr. T. Michael Casey, Director
Planning and Community Development
SEPA Responsible Official
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

Re: Draft SEIS for MASCA Building D Expansion
Comments re: Air Quality

Dear Mr. Casey:

This letter constitutes MASCA's comments on the air quality portion of the Draft Supplemental Environmental Impact Statement ("SEIS") prepared for MASCA's Building D expansion project.

Comments on Air Quality:

MASCA agrees with the SEIS conclusion that no significant adverse impacts to air quality will result from the project. MASCA also agrees to implement the suggested air quality mitigation measures. **9-1**

Nonetheless, the SEIS air quality section contains technical inaccuracies which MASCA would like to have corrected. **9-3** As with the sanitary sewer section of the SEIS, MASCA has marked up the text of the air quality section to clarify and correct the information presented therein. Enclosed please find the marked-up text with deletions and additions shown for your convenience (Attachment B). This letter contains explanations of the substantive changes MASCA has suggested as follows:

Certain chemicals that were either not detected or not measured are nonetheless reported as present in the SEIS. Silane, and phosphine are listed as plant emissions in the Draft SEIS, despite the fact that these chemicals were not measured or reported by the laboratory conducting the tests. The values reported in the Draft SEIS for silane and phosphine were actually test results for silicon and phosphate, respectively, from the VOC stack. Neither of these substances are routed to the VOC stack. The SEIS should indicate that these chemicals were not measured. MASCA has revised the tables in the marked up text to so indicate. **9-4**

With respect to sulfate, which was reported in the Draft SEIS as sulfuric acid, the values reported by the lab were inconclusive. The sulfate values averaged 0.34 with a standard deviation of 0.40. The blank value was 0.54. Because the blank values are higher than the average measurement, these results do not indicate the presence of sulfate or sulfuric acid. MASCA has revised the tables in the marked-up SEIS text to indicate that these results were inconclusive. **9-5**

The Draft SEIS also indicates that the stack testing showed the presence of ethylene glycol methyl ethers although MASCA does not report the presence of this chemical in its emissions. In fact, MASCA does not use this chemical on the site. A review of the laboratory report indicates that the conclusion that ethylene glycol methyl ethers are present on the site may have been mistaken.

The analytical method used to measure ethylene glycol methyl ether was gas chromatography with a flame ionization detector. This method does not positively identify compounds by other than their retention time. It does not use molecular weight or colorimetric spectra for identification as do more reliable detection methods. **9-6**

Examination of the data reveals that all of the samples reported as having ethylene glycol methyl ether had lower retention times than the calibration standards. Specifically, the matrix spike run on the impinger samples had a retention time of 11.430. The retention times for the four non-spiked samples were between 11.399 and 11.406--very consistent and noticeably different than that for the known ethylene glycol methyl ether spike. The lab reported that the identification of ethylene glycol monomethyl ether in the stack could not be confirmed because the retention time shifted from that expected based on the water impinger analysis.

The Draft SEIS mistakenly reports that arsenic was present in the acid stacks although the lab reported that arsenic was non-detectable. The tables in the Human Health appendix should be revised to delete references to arsenic. MASCA has revised Tables 4,9,10,11 and 12 found in the Human Health Risk Assessment appendix to reflect these corrections to the air emissions data. The detail for the above summary is attached hereto as Attachment A. The revised tables are attached hereto as Attachment C. **9-7**

Because the SEIS indicates the presence of chemicals that were not found in the laboratory tests, the Draft SEIS implies that MASCA does not accurately report its emissions to PSAPCA. **MASCA correctly reports its emissions in accordance with local regulations and federal law.** **9-8**

The air quality study in the Draft SEIS predicted future air emissions based on a worst case scenario. MASCA is concerned that use of data showing a worst case scenario in the SEIS could create confusion among agencies involved in MASCA's continued air permit processes who receive actual data and projections rather than worst case scenarios. Worst-case scenarios are used by PSAPCA only to model odors at property lines and accidental releases in the facility at property lines. To avoid any confusion, MASCA requests that the following statement be added at the beginning of the air quality analysis in the SEIS: **9-9**

> **The emissions data contained in this SEIS are the results of a worst case analysis and should not be used or relied upon for any other purpose, permits, or analysis. Furthermore, because the figures contained herein are a worst case analysis, they may differ significantly from the actual emissions reported by MASCA.**

MASCA looks forward to continuing to work with the City on these issues.

Sincerely,

Frank Pfefferkorn
Vice President
Manufacturing and Engineering
Member of the Board

ATTACHMENT A

ATTACHMENT A

August 8, 1996
8:30 pm

Subject: Comments on **Section 3.1 AIR QUALITY** File: dseisair.wpd

1. The average of the three sulfate, SO_4 samples is 0.374 with a standard deviation of 0.4. The sample results varied from a low of 0.075 to a high of 0.940. The blank for the sampling runs had a reported value of 0.507 mg/l. When the variability of the sample results with the average of 0.374 is compared to the blank reading 0.507, the SO_4 result has to be reported as zero. **9-2**

   Table 9 on page 19 of the Environmental Health - Human Health Risk Assessement, Technical Appendix must be revised to show the sulfuric acid emission in the VOC Stack to be zero (0), as the data simply does not support any other conclusion.

   Exhibit #1 attached is from the **AMTEST** air emissions report prepared to support the SEIS. Exhibit #1, page 2 of 2 is a copy of page 62 from the April 26, 1996 **AMTEST** report which summarizes some of the results reported by CH2M-Hill's Corvallis Oregon laboratory in table form. Also refer to Exhibit II, page 7 from the **AMTEST** Report.

   The written narrative must also be revised to reflect these facts.

2. Exhibit II clearly indicates that silane (SiH_4) was not measured or reported and this fact is confirmed in the CH2M-Hill laboratory reports. The CH2M-Hill laboratory report shows that the element of silicon (Si) was measured and reported. Also refer to Exhibit II which is page 7 from the **AMTEST** report. Please note on lines 11 and 12 the laboratory results reported as silicon (Si) were converted to silane (SiH_4) by **AMTEST.** The analysis then notes that silicon was "converted" as though silane was present. However, no data supports that silane was actually present, including the **AMTEST** Report.

   As a result, Table 9 on page 19 and Table 12 on page 21 of the Environmental Health - Human Health Risk Assessement, Technical Appendix must be revised to show the silane emission in the VOC Stack to be zero (0) or the reference to silane must be removed from this table altogether. In addition, Table 3-1 in the white papers on page 3-3 must be revised to show the Silane (Silicon Tetrahydride) emission to be zero (0) or the reference to silane must be removed from the table altogether since it was neither measured nor reported. The data simply does not support any other conclusion.

   The written narrative must also be revised to state only the facts.

3. The **AMTEST** Report, page 7, (Exhibit II) clearly reveals that Phosphine (PH_3) was not measured or reported. This is further confirmed in the CH2M-Hill laboratory reports. The CH2M-Hill laboratory analysis reports show that the element of Phosphorous (P) was measured and reported. The **AMTEST** Report further acknowledges this on lines 11, 12, 13 and 14 and notes that the laboratory results reported as phosphorous (P) were converted to Phosphine (PH_3) by **AMTEST.** No data supports that phosphine was actually present.

   See also Exhibit #1.

   As a result, Table 9 on page 19 of the Environmental Health - Human Health Risk Assessement, Technical Appendix must be revised to show the phosphine emission in the VOC Stack to be zero (0) or the reference to phosphine must be removed from this table altogether. In addition, Tables 3-3, 3-4 and 3-5 in the white papers on pages 3-47, 3-48 and 3-49 must be revised to show the phosphine emission to be zero (0) or the reference to phosphine must be removed from the tables altogether since it was neither measured nor reported. The data simply does not support any other conclusion.

   The written narrative must also be revised to state only the facts.

4. The average of the three phosphate samples is 7.4 mg/l with a standard deviation of $\pm$ 5.4. The detection limit was 7.0 mg/l. The sample results varied from nondetectable (0 to 7.0 mg/l) to a high of 12.9 mg/l. The blank for the sampling runs had a reported value of 10.5 mg/l. When the variability of the sample results and the average of the three samples (7.4 mg/l) is compared with the blank reading (10.5), the phosphate result has to be reported as zero.

   See also Exhibit #1.

   Table 9 on page 19 of the Environmental Health - Human Health Risk Assessement, Technical Appendix must be revised to show that no phosphorous containing compounds were in the VOC Stack. The data simply does not support any other conclusion.

   The written narrative must also be revised to state only the facts.

5. A portion of the SEIS analysis is based on the incorrect assumption that anisole and catechol are carcinogenics. Refer to Table 4 on page 14 of the Environmental Health - Human Health Risk Assessement, Technical Appendix and the chemicals anisole and catechol. Washington State lists catechol as a **non-carcinogen** and Washington State **does not** list anisole as a toxic contaminant at all.

In addition, anisole and catechol are not listed in toxicological references from the public agencies as probable carcinogens (page 21, lines 3 and 4 of paragraph 2 of the Environmental Health - Human Health Risk Assessement, Technical Appendix). See also page 21, paragragh 2 of the same Appendix. It is not appropriate to include unsubstantiated "overestimations" in the SEIS. Even the author admits that "Actual toxicological factors have not been calculated for these compounds, both of which are very closedly related to benzene."

All of the statements and references to anisole and catechol as carcinogenics must be removed from the SEIS because as they are not supported by science or fact.

6. Table 10 of the Environmental Health - Human Health Risk Assessement, Technical Appendix, page 20 lists arsine (AsH_3), and yet the CH2M-Hill laboratory results show that arsine was neither measured nor reported. No data supports that arsine, (AsH_3), was present.

   Table 10 on page 20 of the Environmental Health - Human Health Risk Assessement, Technical Appendix must be revised to show that the arsine emission to be zero (0) or the reference to arsine must be removed from the Table altogether since it was neither measured nor reported. The data simply does not support any other conclusion.

   The written narrative must also be revised to state only the facts.

7. Table 9 of the Environmental Health - Human Health Risk Assessement, Technical Appendix, page 19 lists arsenic (As), with a measured emission rate. The **AMTEST** Report shows that no arsenic was detected. The table must be revised to show the arsenic emission to be zero (0). The data simply does not support any other conclusion.

8. The written narrative of the Environmental Health - Human Health Risk Assessement, Technical Appendix and the white pages must be revised to clearly reveal the emission rate predictions for the site once Building D is in full operation are based on the highest value of the multiple stack samples . Statements are being made that MASCA will be in a major source category when the data itself does not support this conclusion. These reports must be revised to simply state the facts, not assumptions.

9. Table 9 and Table 10 in the Environmental Health - Human Health Risk Assessement, Technical Appendix, page 19 and 20 lists Et. glycol ether as detected in the VOC Building C exhaust stack. MASCA does not use this chemical; therefore the report is in error.

ATTACHMENT A

The analytical method used by CH2M-HILL to detect ethylene glycol monomethyl ether (EGME) by gas chromatography (GC) with a flame ionization detector (FID) is sufficiently less reliable than methods which use GC with a molecular identification detector such as the photo diode array for liquid chromatography (LC) or the mass spectrometer (MS) for both LC and GC.

The retention time for the three samples plus a duplicate all from the impinger samples analyzed by CH2M-HILL, although very similar to each other, were noticeably different from that for the EGME in a matrix spike. This suggests that a compound different than EGME was present in the samples. EGME must be removed from the tables.

MASCA does not use EGME. MASCA does use propylene glycol ether. However, this was detected as a separate compound and has no risk for cancer induction and is not listed as a hazardous air pollutant.

The attached Table 9 and Table 10 have been revised by insertion of the correct data.

This report is erroneous for the following three reasons: 1) MASCA does not use EGME, 2) The test which purportedly detected EGME is unreliable and 3) The test results suggest that this compound was not detected.

The written narrative needs to be edited to reflect the revised tables attached.

ATTACHMENT A

EXHIBIT I

AMTEST AIR QUALITY, LLC

AmTest-Air Quality, LLC
30545 S.E. 84th St., #5
Preston, WA 98050
Office: (206) 222-7746
FAX: (206) 222-7849

SOURCE EMISSION EVALUATION

April 26, 1996

Prepared For:

DAVID EVANS AND ASSOCIATES, INC.
AT MATSUSHITA SEMICONDUCTOR
CORPORATION OF AMERICA
SOLVENT FANS STACK
ACID GAS SCRUBBER STACK #5
PUYALLUP, WASHINGTON
MARCH 12-13, 1996

Submitted by:

Kris A. Hansen, QEP
President

Angela F. Blaisdell
Vice President

Stanley B. Moye
Sr. Air Quality Specialist

Am Test-Air Quality, LLC
Preston, Washington

We certify that the information contained herein is accurate and complete to the best of our knowledge.

[slw\c:\winword\r\de@mat96.doc; 96-034]

AMTEST - Matsushita
Lab Data
Water Impingers

Compound	Reporting Limit:	RUN 1 9759 IMP. CATCH 988408	RUN 2 9760 IMP. CATCH 988409	RUN 3 9761 IMP. CATCH 988410	BLANK 9762 IMP. CATCH 988411
Sulfate, SO4 (mg/L)	0.020	0.106	0.940	0.075	0.507
Silicon, Si-ICP (µg/L)	25	5880	7270	5100	134
Total Phosphate (µg/L)	7	9.3	12.9	7U	10.5

* Data to follow in amended report.

U=Not detected at reporting limit.
J=Estimated

Applied Sciences Laboratory
Corvallis Office
2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428
(541) 752-4271
Fax No.(541) 752-0276

2.2 Method 308

Three (3) Method 308 tests were performed at the solvent fans stack on March 12, 1996 to measure emissions of acetone, isopropyl alcohol (IPA), methyl ethyl ketone (MEK), propylene glycol ether, ethylene glycol monomethyl ether, diglycolamine, methacrylate monomer, anisole, catechol, sulfuric acid (H_2SO_4), silane (SiH_4), and phosphine (PH_3). Method 308 was modified to analyze for compounds other than methanol by using two (2) collection tubes containing molecular sieves connected in series rather than a silica gel tube downstream of the impingers. The emission results are summarized on the following computer printouts titled "Summary of Results - Methods 1, 2, 3A, and 4" and "Summary of Method 308 Results." The laboratory analysis results for H_2SO_4 were reported as sulfate ($SO_4^{=}$) and converted to H_2SO_4; the laboratory analyzed the samples for silicon (Si), the results were converted to SiH_4; the laboratory analyzed the samples for phosphorous (P), the results were converted to PH_3. Diglycolamine could not be analyzed because of solubility problems. Anisole and catechol could not be analyzed in the impinger solutions because they are insoluble in water but were analyzed in the carbosieve tubes.

Copies of the laboratory analysis results in units of total micrograms (μg) per sample, milligrams per liter (mg/l), and micrograms per liter (μg/l) are reported in Appendix B of this report. The laboratory results were converted to emission concentration units of milligrams per dry standard cubic meter (mg/dscm). VOC emission rates for each compound are presented in units of mg/min. VOC emission rate calculations were performed using the laboratory analysis data provided by CH2M HILL and the airflow data collected during the Method 1, 2, 3A, and 4 tests conducted concurrently with each Method 308 run.

ATTACHMENT B

1.4 SUMMARY OF FINDINGS

1.4.1 Air Quality

MASCA currently operates without air pollution controls on the solvent **exhaust** fans ~~vent~~. MASCA proposes to install a Volatile Organic Compounds (VOC) thermal abatement system for the existing Building C and the proposed Building D solvent **exhaust** fans ~~vents~~. MASCA has applied for a Notice of Construction (NOC) permit from Puget Sound Air Pollution Control Agency (PSAPCA) for the facility. PSAPCA will use the **Building C VOC** permit application to ascertain ~~the~~ **Building C's** current status and obtain the compliance of ~~both the current facility (Building C) and~~ the proposed expansion (Building D). As a condition of approval for the permit**s**, PSAPCA will **continue to** require MASCA to examine their entire chemical usage, process flow, and acid scrubber efficiency; **and** update all chemical inventories, Material Safety and Data Sheets (MSDS), and emission inventories~~; and investigate the air pathways for silane~~. Installation of the VOC thermal abatement system**s** will effectively mitigate air quality impacts, and **further** prevent MASCA **from** as being classified as a major air emissions source.

~~SECTION 3.0 AFFECTED ENVIRONMENT, SIGNIFICANT IMPACTS, AND MITIGATION MEASURES~~

~~Eight areas of concern were identified during scoping:~~

- ~~Air quality~~
- ~~Storm runoff volumes and water quality~~
- ~~Plants and aesthetics~~
- ~~Emergency response capabilities~~
- ~~Odor~~
- ~~Noise~~

- Sanitary sewer
- Water

This section describes existing conditions at the MASCA site and in the surrounding area that is likely to be affected by the proposed expansion. Whenever possible, existing conditions and effects of plant operation are described quantitatively. Information is also provided on the changes that are expected to occur as a result of construction and operation of the proposed expansion.

Measures that would reduce or eliminate expected impacts are listed as mitigation measures. Some mitigation has been identified by MASCA and included in the proposed design. Some measures will be required as a condition of permits that must be obtained from other agencies in order to construct and operate the proposed project. Finally, the analysis by technical experts (see the appendices) has identified other measures that should be imposed to mitigate impacts on the surrounding area and city services.

If a significant change in existing conditions will occur despite all mitigation, that change is also described.

3.1 AIR QUALITY

NOTE: The emissions data contained in this SEIS are the results of a worst-case analysis and should not be used or relied upon for any other purpose, permits, or analysis. Furthermore, because the figures contained herein are a worst-case analysis, they may differ significantly from the actual emissions reported by MASCA.

3.1.1 Issues

Currently, MASCA is classified as a registered source and as such is **exempt from obtaining** ~~operates without~~ an air quality permit from PSAPCA. New emissions **sources** ~~test data~~ and the expansion of the facility ~~raised concerns that a~~ **requires Notice of Construction (NOC)** permit**s** from PSAPCA ~~was necessary.~~ The **City DS raised** concern**s** ~~was raised~~ over MASCA**'s** compliance with existing air quality standards and the related health issues associated with air emissions.

3.1.2 Existing Conditions

PSAPCA regulates air quality for Pierce, King and Snohomish counties. The agency has the authority to enforce compliance with federal (e.g. Clean Air Act, New Source Performance Standards), state (e.g. WAC 173-400), and PSAPCA regulations.

There are two types of air pollution regulations: air purity and sources of emission. Air purity rules include ambient air quality standards and other measures aimed at regulating the concentrations of pollutants in ambient air. Emission regulations are designed to ensure that sources of air pollution take reasonable steps to prevent or control releases to the atmosphere.

The MASCA facility has numerous sources of emission**s**, including several acid scrubber stacks and a solvent **exhaust** fans stack which release a group of regulated chemicals known as VOC**'s**. The facility is classified by PSAPCA as a registered source of emissions, because **MASCA reported** emissions ~~reported by MASCA~~ have been lower than the levels necessary to **qualify** as a synthetic minor or major source, or to require a more thorough review by PSAPCA.

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The plans for expansion and recent emission testing have prompted MASCA and PSAPCA to conduct a more thorough review of emissions. MASCA is presently in the process of applying for NOC permit**s** from PSAPCA. An important issue in this permit is the VOC emissions from the solvent **exhaust** fans stack ~~vent~~. Presently, there are no air pollution controls on the solvent **exhaust** fans stack ~~vent~~.

An inventory of emissions from the MASCA facility was compiled relying primarily on emission testing results conducted in March of 1996. (See Human Health Risk Assessment for the SEIS.) Other sources of information used in the preparation of the emission inventory were data provided by MASCA and various estimation techniques from mass balances or published emission factors. The emission inventory was designed to give a maximum worst-case to the range of potential emissions from the MASCA facility, and as such, differs substantially from the emission rates reported by MASCA. The assumptions that were used to maximize estimated emissions include using the highest of three replicate tests from AMTEST and assuming these emissions are continuous for 24 hours per day and 365 days per year (operational schedule for the MASCA facility), which is consistent with ~~PSAPCA~~ procedures **for modeling odors at the property line, but not for modeling yearly emissions for PSAPCA. Even using this worst-case scenario** the **DEA** computed total uncontrolled VOC emission rate was 52 tons per year which does not violate any emission regulations. **The report erroneously reported emissions of silane, sulfuric acid and phosphine; these emissions in fact were not reported as present in the CH2M-HILL analytical report.** ~~but may warrant~~ **Nevertheless,** further PSAPCA review, ~~including the possible need to obtain a Synthetic Minor Air Contaminant Discharge Permit (SMACDP) from PSAPCA.~~ **is progressing as a part of the NOC. Effective January 1, 1997, EPA regulations that are administered by PSAPCA will require MASCA to obtain a Synthetic Minor Air Contaminant Discharge Permit or variation thereto.**

The analysis **reviewed emissions to determine what, if any, resulting** ~~identified~~ potential deleterious health ~~effects~~ **risks** from **both** acute **toxic and chronic cancer effects may occur due to exposure to chemicals**. ~~chronic exposure to toxic chemicals, and cancer risk from exposure to chemicals.~~ Table 3-1 addresses the short-term hazards **using** ~~for which~~ the 24-hour **worst-case scenarios generated by the model**. ~~model impacts are used.~~ The table compares model-predicted **worst-case** current concentrations with regulatory criteria. As the table shows, none of the pollutants presently exceed regulatory criteria.

Table 3-1
Qualitative Comparison of Air Emission Impacts

CHEMICAL	Current (1996) 24 Hr. Air concentration	Projected Uncontrolled (1997) 24 hr. Air Concentration (ug/m3)	Projected Controlled (1997) 24 hr. Air Concentration (ug/m3) [2]	OSHA Standards Yearly Volume (ug/m3)	PSAPCA Acceptable Source Impact Level (ug/m3)
Acetone	32.1	52.6	2.63	1,800,000	5,927.40
Diglycolamines	27.9	45.4	2.27	NA	33.1
Hydrochloric Acid	1.21	NA [1]	2.24	7,500	7
Isopropanol	69.4	114	5.7	983,000	3263.4
Nitric Acid	0.38	NA [1]	0.19	5,200	16.7
Silicon Tetrahydride (Silane)	[3]	0	0	6,600	22
Sulfuric Acid	0.072	NA [1]	0.14	1,000	3.3
Toluene	0.0051	0.0085	0.00026	18,800	400
Trimethyl Phosphite	0.0003	NA [1]	0.004	10,000	33

[1] NA - Not available for this pollutant because there are currently acid scrubbers that control acid emissions, and acid scrubbers will be installed as part of the proposed expansion. Acid emissions will never be uncontrolled.

[2] Controlled emissions were computer based on 95% control for the VOC destruct system (applicable only to organic contaminants emitted from solvent fans vent stack.)

[3] Not measured.

~~However, the current levels predicted for silane (silicon tetrahydride) and sulfuric acid are close to the PSAPCA Acceptable Source Impact Level (ASIL), which is not a standard, but a threshold level used to screen out issues for further study.~~ None of the **worst-case** concentrations of any known or presently suspected carcinogens exceeded the cancer screening risk levels used as regulatory criteria. For two pollutants, anisole and catechol the predicted concentrations were significant and may receive further attention. **However, n**either of these pollutants is presently identified as a human carcinogen. **Washington State lists catechol as a non-carcinagen and Washington State does not list anisole as a toxic contaminant at all**. ~~but there is some evidence that these chemicals play a role in the carcinogenic behavior of benzene. If the benzene screening criterion is used for these chemicals, their concentrations closely approach or exceed it~~.

The stack testing revealed that certain compounds **may be** ~~were~~ present in the MASCA emissions which are not presently reported by MASCA to PSAPCA in their annual inventory. Specifically, glycol emissions are reported by MASCA to be zero, while stack testing showed **possible** ~~significant~~ emissions of glycol ethers. **However, this indication is questionable, since 1) MASCA does not use this chemical, 2) the test which detected the chemical is less reliable than other more conclusive methods of analysis, and 3) the test results which rely on measuring chemical retention times, revealed that the 2 sample retention times do not match that expected for glycol ethers**. ~~Under conditions of the NOC permit issued by PSACPA, MASCA will be required to closely examine their entire chemical usage, process flow, and scrubber efficiency, and update all chemical inventories, MSDs, and emissions inventories.~~

3.1.3 Proposed Action and Potential Significant Impacts

An estimate of future emissions was prepared by scaling the present emission inventory, and air quality modeling was used to estimate ambient fenceline concentrations for comparison with regulatory criteria. **Again, the SEIS data presents a worst-case scenario.** One area of difference between existing conditions and **future** air quality with the proposed action is that MASCA has proposed the installation of a thermal-destruct air pollution control system to reduce VOC emissions from the solvent **exhaust** fans ~~vent~~. For the controlled case, a 95% control efficiency was used for organic chemicals which exit through the solvent **exhaust** fans ~~vent~~ stack. This was applied to both Building C and Building D since MASCA proposes to retrofit Building C with a VOC system. It should be noted that these emission rate estimates are a **worst-case scenario based on** ~~originate with~~ the AMTEST stack test and differ substantially from the actual MASCA emission inventory reported in the NOC application.

No consideration was given in the present analysis to the two package boiler~~'s~~**s** MASCA proposes to install as part of the present project. These boilers are commercial units, fired by natural gas and should have minimal air quality impacts from the combustion products, given that the equipment is state-of-the-art (i.e., low NO_X boilers).

The major concern raised during scoping was the toxic chemicals which are **and/or might be** released as a result of the process operations at the MASCA facility. If ~~left uncontrolled~~ **released without controls**, emissions would increase significantly from the proposed facility expansion, and might be high enough to classify the MASCA facility as a major source. Such classification would change the regulatory structure for the facility, requiring an air quality operating permit under the new Title 5 program of the Clean Air Act. It would also require federal (Environmental Protection Agency [EPA]) review of the facility's permit. **However, because MASCA is proposing to add a** ~~With the use of the~~ VOC-destruct control system, capable of at least 95% control of organic emissions **as part of the Building D project**, most of the air quality issues for the plant will be greatly reduced. MASCA **also** has applied for a NOC permit.

Modeling results for the short-term (24-hour) impacts **with (controlled) and without (uncontrolled) the VOC destruct control system** are presented in Table 3-1. ~~Silane emissions (along with other pyrophoric or toxic gases) are first routed through a primary control system which oxidizes the compounds. Subsequently any residual silane must be sent to~~

the acid scrubber. MASCA will be required by PSAPCA under the NOC permit to investigate the air pathways for silane, given that silane was detected exiting the VOC stacks. If silane emissions are sent to the acid scrubber, emissions should not warrant public health concerns. The atmospheric decomposition of silane might be rapid enough to preclude any human hazard or odor impacts, but without a control system, these properties would need further investigation and resolution by PSAPCA.

Sulfuric acid emissions **were reported to be equal to/same as the blank sample.** would not be controlled by the VOC destruct system. **However, no sulfuric acid products are routed to the VOC stack. Instead, sulfuric acid products are routed from the factory to the acid scrubbers. Although the AMTEST results appear to show sulfate in the solvent exhaust fan stack, given the similarity between the chemical sample and the blank sample result, this data is inconclusive.** The modeling results for sulfuric acid show concentrations above PSAPCA's ASIL of 3.3 micrograms per cubic meter. However, **Also,** MASCA's emission inventory for actual sulfuric acid emissions shows that they are substantially lower (42%) than the **AMTEST results would predict.** emissions used in the present analysis. MASCA and PSAPCA must resolve the issue of potential sulfuric acid impacts during the NOC permit process, or a permit cannot be issued for the expansion. **Sulfuric acid emissions will be evaluated and addressed in the PSAPCA permitting process.**

Evaluation for carcinogenic substances reveals none are present. Refer to the attached revised Table 10.

The long-term analysis of carcinogenic substances shows that both anisole and catechol would be controlled by the VOC destruct system, and their concentrations would fall well below the regulatory criteria for benzene, if it was later determined that these chemicals were suspected human carcinogens.

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MASCA has amended the proposed project to include a VOC thermal abatement system to be installed in both buildings C and D. MASCA has applied for a NOC permit from PSAPCA for the abatement system**s**. As conditions of approval for the permit, PSAPCA will require MASCA to:

- **Document their** ~~examine their entire~~ chemical usage, process flow, and scrubber efficiency; **and**
- **submit** ~~update all chemical inventories, MSDSs, and~~ emission inventories.
- ~~investigate the air pathways for silane, given that silane was detected exiting the VOC stacks.~~

3.1.4 Analysis of MASCA's Notice of Construction Permit Application

On May 15, 1996, MASCA submitted a permit application for the Authority to Construct the new Building D. This application could also be used by PSAPCA to ascertain the compliance status of both the current facility (Building C) and the projected facility (Building D). The application contains critical information including an emissions estimate for current and projected emissions and specifications of new abatement equipment. ~~Based on the analysis already completed for the SEIS and discussions with PSAPCA, MASCA has agreed on the need for VOC abatement equipment on Building C and for VOC abatement equipment to be included as part of the design for Building D.~~

The following is a brief analysis of **MASCA's** ~~the~~ **PSAPCA** Permit Application.

> **Abatement Status:** Currently Building C contains in-line nitric acid scrubbers, in-line "burn boxes" and end-line acid scrubbers. This equipment, based on stack test results (AMTEST 1996), appears to be functioning properly. Currently, no VOC abatement is used for Building C. The design for Building D includes burn boxes, nitric acid scrubbers, ammonia scrubbers, acid scrubbers, and a VOC ~~incinerator.~~ **oxidizer**.

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Planned Additional Controls: The designs for abatement equipment for both Building C and Building D meet the state-of-the-art technology for the industry. Technically, the facility should meet Best Achievable Control Technology (BACT) requirements, given that without controls the facility has the potential to emit large amounts (>100 tons) of VOCs. The VOC ~~incinerator~~ oxidizers planned ~~designs~~ for both buildings utilize a zeolite wheel rotary concentrator and high VOC destruct temperatures resulting in a 95% control efficiency. The wet scrubbers to be installed for Building D also exceed minimum specifications for BACT and are rated at 98% efficiency.

Emissions Inventory/Compliance Status: A review of the emissions estimate, included as part of the MASCA Permit Application, reveals some **inconsistencies between** ~~potential problems with~~ the estimate **and the analyical results for the this SEIS**. ~~First,~~ Not all VOCs either tested for during the AMTEST stack test or estimated by review of MSDS's (see the Human Health Risk Assessment Appendix), are listed in the emissions inventory. t~~herefore, MASCA may have underestimated VOC emissions.~~ Ethylene glycol ether and toluene are ~~still~~ not listed in the inventory, even though the AMTEST results showed these compounds are present in the current air emissions for the facility. **However, not all of the AMTEST results were conclusive nor are all of the AMTEST report findings supported by the written CH2M-HILL Laboratory reports.**

Some of the chemicals listed in the emissions inventory are considerably less than predicted by the stack test data. **This is to be expected because the predictions were based on a worst-case scenario**.

According to MASCA, the stack test data does ~~do~~ not reflect an average emission rate for some chemicals (e.g. isopropyl alcohol). MASCA officials have stated that on the day of the stack test, some chemicals were being used at excessive amounts, that is more than the quantities usually consumed per hour (B. Adams, personal communication, June 4, 1996). This excess chemical usage, according to MASCA, resulted in overestimation of annual emissions, as completed for the SEIS. The production status (i.e. wafers-out) and chemical usage on the day of the stack test has yet to be confirmed. Verification of emission rates should eventually be confirmed by additional stack testing and/or mass balance analysis and compared with the production status. ~~Emission factors can be developed based on a per wafer analysis. Therefore, compliance with permits or accuracy of emission inventories can be confirmed by comparing wafer production on a given day with either a stack test or mass balance analysis.~~

It is also important to note that there were several basic errors included in the AMTEST report. These are:

A. VOC Stack

The VOC stack samples in addition to VOCs were analyzed for silicon, sulfate, and phosphate. Apparently the intention was to extrapolate concentration assumptions about silane and phosphine from the analysis.

1. The report includes positive values for silicon but silane was not tested for, nor reported by the lab. No silane combustion products are routed to VOC stack. Silane is routed from the factory to furnaces which are exhausted to the acid scrubbers.

2. Sulfate values reported by the lab were similar to the blank control sample sulfate value. The sample values were .076, 0.94 and .105 (ave. = 0.34 with SD of 0.40); the blank value was a little higher at 0.54. This demonstrates that no sulfate was gathered from the VOC stack.

3. The value reported by AMTEST for phosphine was actually the value obtained by the lab for phosphate (PO_4). The phosphate value was then converted as though it was phosphine. Since phosphine was not tested for by the lab no conclusion can be made in the report about it. Incidentally the reported values for phosphate were similar to the blank control sample, so that correct chemical reporting would conclude it is not present in the VOC stack. Also phosphine from the factory is routed through furnaces which are exhausted to the acid scrubbers. There is no routing of phosphine to the VOC stack.

4. Ethylene Glycol Monomethyl Ether (EGME)

The analytical method used by Analytical Services (CH2M Hill lab) for ethylene glycol monomethyl ether (EGME) by gas chromatography (GC) with a flame ionization detector (FID) does not positively identify compounds other than by their retention time. This method does not identify a chemical by molecular weight or by colorimetric spectra as done by mass spectral detector (MS), and by photo diode array with UV/fluorescence (PDA). GC identification by retention time alone has been found to be sufficiently unreliable so as to have brought about the introduction of the very expensive MS detector for both gas and liquid chromatography and the PDA detector for High Performance Liquid chromatography.

Examination of the data reveals that all of the samples reported as having EGME had lower retention times than that of the calibration standards. Specifically the matrix spike run on the impinger samples had a retention time of 11.430. The retention times for the four non-spiked samples were between 11.399 and 11.406 - very consistent and notably different than that for the known EGME spike. Since the MASCA facility does not use the compound, it should be concluded that EGME was not present.

The laboratory in the narrative of the report for this data stated: "Ethylene glycol monmethyl either (2-methoxyethanol) shifted in retention time from that expected based on the water impinger analysis. Results for this compound are reported but its identity cannot be confirmed." This was for the carbon tube analysis. But the same is true for the impinger sample analysis and although the shift is less than for the tube samples the difference is significant.

B. Acid Scrubber

DEA reported that arsenic was present in the acid stacks, even though the lab reported it as non-detectable. An earlier draft of the AMTEST report was less conclusive, so the DEA report may have relied on the earlier draft, rather than reviewing the actual lab data. Since arsenic was

<u>reported as non-detectable by CH2M-HILL, the table and references to arsenic as being present are in error.</u>

<u>C. Use of one data point in several assay samples.</u>

<u>DEA's use of the highest data point in the three samples tested is not valid chemistry. Standard chemical testing procedures require that multiple data samples be collected and conclusions be drawn from the average of the total values. The spread in the samples show how large the error may be if only one sample is used. Thus, MASCA correctly used the average of the values to estimate annual emissions.</u>

<u>D. Conclusion</u>

<u>If the CH2M-Hill lab data is properly evaluated, errors such as the six listed above will not be incorporated and the data can be used for the intended purpose.</u>

The additional controls to be installed on the VOC stacks for Building C and Building D may avoid <u>MASCA's</u> classification ~~of the MASCA facility~~ as a major source. PSAPCA has reviewed MASCA's permit application and has requested further information from MASCA. However, given the potential for the facility to emit large volumes of criteria pollutants and Hazardous Air Pollutants (HAP), PSAPCA may suggest that MASCA apply for SMACDP, given current emissions.

3.1.5 Summary of Mitigation Measures

The City has determined that the following mitigation measures will be required as conditions of the expansion.

1. MASCA shall install a VOC abatement system for both buildings C and D prior to issuance of any certificate of occupancy.

2. MASCA shall obtain the appropriate air quality permit(s) from PSAPCA prior to issuance of any certificate of occupancy.

3.1.6 Unavoidable Significant Adverse Effects

There will be no significant adverse impacts with the implementation of the mitigation measures. The installation of a VOC thermal abatement system for both Building C and Building D will reduce current unabated air emissions. The NOC permit will require a verified emissions inventory.

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Table 4
Slope Factors, References Doses, and Uncertainty Factors For RBSC Chemicals

	Noncarcinogenic					Carcinogenic			
Chemical	Oral RfD mg/kg/d	Inhalation RfC mg/m3/d	Uncertainty Factor	Critical Effect	Source	Slope Factor	Carcinogen Class[h]	Cancer Type	Source
Acetone	0.1		1000	Nephrotoxicity	IRIS				
Ammonia		0.1	30	Respiratory lesions	IRIS				
Anisole[a]									
Arsenic	0.0003		3	Hyperpigmentation, Keratosis	IRIS	1.5	A	Skin	IRIS
Arsine	0.0003	0.00005	3	Anemia, Vascular changes	IRIS	15.1	A	Skin	IRIS
Bis(-ethylhexyl)phthalate[b]	0.02		1000	Increases relative liver weight	IRIS	0.014	B2	Hepatocellular carcinoma, ademona	IRIS
Boron trifluoride		0.0007	NA	Necrosis	HEAST				
Catechol[c]									
Chlorine	0.1		100	Decreased body weight	IRIS				
Chloroform	0.01		1000	Fatty Cyst formation in liver	IRIS	0.0061	B2	Kidney tumors	IRIS
Dichloroethylene	0.02		1000		IRIS				
Fluoride[d]	0.06		1	Fluorosis	IRIS				
Manganese	0.005		1	CNS effects	HEAST				
Methacrylate	0.001		300	Increased SGOT, brain lesions	IRIS				
PGMEA[e]		2	300	Mild reversible sedation	IRIS				
PGME[f]		2	300	Mild reversible sedation	IRIS				
Phenols	0.6		100	Fetotoxicity	IRIS				
Phosphine	0.0003		100	Renal necrosis	IRIS				
Trimethyl phosphite[g]						0.037	C	Uterine tumors	HEAST
Zinc	0.3		3	Decrease in erythrocyte superoxide dismutase	IRIS				

~~a adopted from benzene~~
~~b same as di(2-ethylhexyl)phthalate~~
~~c adopted from benzene~~
~~e adopted from PGME~~
~~g adoopted from trimethyl phospahte~~
h Carcinogen classification: A = human carcinogen
C = possible human carcinogen
B2 = probable carcinogen

a Anisole is not listed on the PSAPCA toxic nor carcinogen category.
b The same as Di(2-ethylhexyl)phthalate
c Catechol is listed as a non-carcinogen but a toxic compound by Washington State.
d Fluorine was listed by the DEA SEIS but it undoubtedly was meant to be Fluoride.
e PGMEA [Propylene-glycol-monomethyl-ether acetate] adapted from PGME.
f PGME [Propylene-glycol-monmethyl-ether].
g Adapted from trimethyl phosphate.
h Carcinogen classification: A = human carcinogen
C = possible human carcinogen
B2 = probable carcinogen

ATTACHMENT C

Table 9
MASCA Stack Test DAta

MASCA Stack test Data 12 & 13 March 1996			Emission estimate 1995 (Fab C) from stack test data[1]		emission estimate for Fab "C" and Fab "D" extrapolated for 1997 or 1998.	
Chemical	mg/min from stack[8]	Use ratio[5]	lb/95 yr from Lab report value	ton/95 yr from lab report value	lb/yr FABs C+D with VOC oxidizer	ton/yr FABs C+D with VOC oxidizer
VOC (Organic Solvent) Stack						
Acetone[2]	24,989	0.4878	14,115.60	7.06	1,058.67	0.53
Anisole	2,600	1.19	3,582.85	1.79	268.71	0.13
Catechol[3]	842	0.333	324.69	0.16	24.35	0.01
Unknown solvent[4]	5,652	00.00	0.00	0.00	0.00	0.00
IPA	62,158	0.704	50,673.19	25.34	3,800.49	1.90
Me-Methacrylate[3]	ND[7]	-	-0.00	0.00	-0.00	-0.00
MEK[3]	ND[7]	-	-0.00	0.00	-0.00	-0.00
Phosphine[3,6]	not analysed	-	-0.00	0.00	0.00	-0.00
Prop. glyc.ether	8,855	1.49	15,278.59	7.64	1,145.89	0.57
Silane[6]	not analysed	-	-0.00	0.00	0.00	-0.00
Sulfuric acid	0	1.099	0.00	0.00	0.00	0.00
Toluene	4.4	-	0.00	0.00	0.00	0.00
Total VOCs			69,929.34	34.93	6767.6	3.38
Total HAPs			324.69	0.16	24.35	0.01
ACID STACKS		Use Ratio[5]	Value times 3.73 air volumes in 4 stacks			
Ammonia	11,422	1.235	60,929.34	30.46	193,146.01	96.57
Arsenic[3]	ND[7]	-	-0.00	-0.00	0.00	0.00
Boron trifluoride	ND[7]	-	-0.00	-0.00	-0.00	0.00
Hydrochloric acid[3]	250	0.238	257.00	0.13	398.35	0.20
Hydrofluoric acid[3]	237	0.613	627.52	0.31	972.66	0.49
Nitric acid	68.9	0.654	194.63	0.10	301.68	0.15
Phosphoric acid	0	-	0.00	0.00	0.00	0.00
Sulfuric acid	14.8	1.099	70.25	0.04	222.69	0.11
TOTAL ACIDS			62,080.00	31.04	195,040.00	97.52
TOTAL HAPs			880.00	0.44	1,380.00	0.69
Sum Total HAPs			1,204.69	0.60	8,147.60	4.07

1 The VOC emissions in tons per year = mg/min (from CH2 M Hill lab data) x 1158 x use ratio[5].
2 Acetone is not a VOC.
3 These are EPA Hazardous Air Pollutants (HAPs).
4 This unknown solvent had a retention time that was constant and slightly less by a consistant amount than that for an ethylene glycol monomethyl ether spike.
5 This column lists the ratio of the use rate during the 12 & 13 of March 1996 AMTEST stack test divided by the use rate during the total year 1995.
The bulk use rate at is monitored second by second as the bulk feed pumps are tied into a computerized tracking system.
The non bulk chemical usage is tracked by daily inventory.
6 Note that neither silane nor phosphine were tested nor reported by Analytical Services Laboratory. But values reported as silicon were expressed as silane by Amtest. Similarly values measured from inductive coupled plasma (ICP) for phosphorous was reported as phosphine by Amtest.
7 ND means not detected at the method detection limit.
8 Taken from the average of the three samples taken from solvent and an acid stack March 12 & 13, 1996 stack test by AMTEST.

Table 10
Comparison of Site-related Data to Inhalation RBSCs

Chemical	Source of Emission	1995 Site Annual Air Conc. ug/m^3	1997 Site[e] Annual Air Conc. ug/m^3	Hazard RBSC (ug/m^3) Adult Resident	Hazard RBSC Adult Trespasser	Hazard RBSC Child Resident	Hazard RBSC Child Trespasser	Cancer RBSC (ug/m^3) Adult Resident	Cancer RBSC Adult Trespasser	Cancer RBSC Child Resident	Cancer RBSC Child Trespasser
Acetone	AMTEST	3.8	0.19	486.7	3406.7	208.6	1460				
Ammonia	AMTEST	5.79	2.90	486.7	3406.7	208.6	1460				
Anisole[a]	AMTEST	0.43	0.02					a	a	a	a
Arsine	AMTEST	Not analyzed	<0.00002	0.24	1.7	0.104	0.73	0.0003	0.002	0.0006	0.0004
Boron trifluoride	AMTEST	ND[f]	<0.00002	3.41	23.85	1.46	10.22				
Catechol[b]	AMTEST	0.32	0.02					b	b	b	b
Dichloroethylene	TetraTech	0.0002	.0006	97.3	681.3	41.7	292				
Ethyl.glycol methyl ether	AMTEST	ND[f]	0	970	80	40	292				
Hydrofluoric acid	AMTEST	0.29	0.17	292	2044	125	876				
Methacrylate	AMTEST	ND[f]	0	4.87	34.07	2.09	14.6				
PGMEA[c]	MASCA	0.10	0.01	9733.3	68133.3	4171.43	29200				
PGME[d]	AMTEST	1.11	0.06	9733.3	68133.3	4171.43	29200				
Phosphine	AMTEST	Not analyzed	<0.0002	1.46	10.22	0.6257	4.38				
Trimethylphosphite	TetraTech	0.00003	0.00003					0.31	2.15	0.66	4.6

[a] Anisole is not listed on the PSAPCA toxic nor carcinogen category.
[b] Catechol is listed as a non-carcinogen but a toxic compound by Washington State.
[c] PGMEA [Propylene-glycol-monomethyl-ether acetate] adapted from PGME.
[d] PGME [Propylene-glycol-monmethyl-ether].
[e] The 1997 VOC emission are reduced 95% and the inorganics by 50% by added controls on VOC and acid stacks planned for the expansion.
[f] ND means notdetected at the method reporting limit.

Table 11
Risk Estimates for Inhalation Pathways (cancer)

	Risk 1995		Risk 1997	
Chemical	Adult	Child	Adult	Child
ANISOLE/CATECHOL	No known risk[a]	No known risk[a]	No known risk[a]	No known risk[a]

[a] WA STATE classifies catechol as a non-carcinogen and anisole is not classified as a carcinogen or toxic.

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Table 12
Qualitative Comparison of Toxicity

Chemical	1995[1] 24 hr. Air Conc. ug/m³	1997[2] 24 hr. Air Conc. ug/m³	ACGIH ug/m³	ASIL ug/m³
Acetone	32.09	2.63	1.8E+06	5,900
Diglycolamines	27.9	2.27	NA	33.1
Hydrochloric acid	1.21	2.24	7,500	7
Isopropanol	69.4	5.71	99.83E+05	3,263
Nitric acid	0.38	0.19	5,200	16.7
Silicon tetrahydride[3]	0	0	6,600	22
Sulfuric acid	0.72	0.14	1,000	3.3
Toluene	0.0051	0.00026	188,000	400
Trimethylphosphite	0.0003	0.0003	10,000	33

[1] The values for 1995 are from the ISCST3 modeling by Carl Bloom.
[2] The values for 1997 use 1995 x 0.05 undestroyed by VOC oxidizer and x 0.5 for acids.
[3] Silane was not measured but since it is exhausted through furnaces and then to acid scrubbers its emission is estimated to be zero.

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August 9, 1996

Mr. T. Michael Casey, Director
Planning and Community Development
SEPA Responsible Official
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

Re: Draft SEIS for MASCA Building D Expansion
Comments re: Sanitary Sewer

Dear Mr. Casey:

This letter and attachments constitutes MASCA's comments on the sanitary sewer portion of the draft Supplemental Environmental Impact Statement ("SEIS") prepared for MASCA's Building D expansion project.

__Comments on Sanitary Sewer__:

There are several areas within the analysis of sewer impacts that need to be modified. Generally, the sanitary sewer analysis focuses primarily on the existing conditions at the plant rather than the impacts of the proposed expansion. The Final SEIS should clarify that the only new changes to the sanitary sewer system associated with the expansion project will be the construction of a second tightline to the Puyallup River and improvements to MASCA's onsite wastewater treatment plant. Although the impacts to the sewer system from the existing plant will continue, these impacts are permitted under the existing authorizations from the City and State. Additional analysis and mitigation relating to the existing plant exceeds the SEIS scope and is not appropriate at this time. **10-1**

MASCA has incorporated a number of mitigation measures to address the impacts of the expansion project. Further, MASCA has agreed to additional measures after consultation and negotiation with the City. All of the mitigation measures for sanitary sewer impacts are enclosed as Attachment A to this letter.

MASCA has marked up the text of the Draft SEIS, clarifying and correcting the information presented therein. These revisions will more accurately inform the public and agencies about the project. Enclosed please find the marked-up text with deletions and additions shown for your convenience (Attachment B). This letter contains explanations of the substantive changes MASCA has suggested as follows:

Page 3-54: The issue statement should be revised to state that the purpose of the sanitary sewer analysis in the SEIS is to evaluate the environmental impacts of wastewater discharges from the Building D expansion. We also have clarified the facts recited in the issue statement to more accurately reflect the plant's history. 10-2

Section 3.7.2: The description of the existing sanitary sewer system in this section is misleading because it does not describe the treatment of waste streams that occurs on the MASCA site prior to discharge. Suggested language to clarify this section is included in the revised text enclosed herewith. 10-3

Section 3.7.3: We have corrected the descriptions of test results to be more accurate. See enclosure. 10-4

Section 3.7.4: MASCA has added clarification to the discussion of impacts to differentiate those impacts that are new as a result of the planned Building D expansion from those that exist as a result of the current plant and to clarify which and to what extent these impacts were anticipated at the time of the original permits and evaluated in the 1981 EIS. Significant revisions to this section are further explained below. 10-5

Page 3-58: The Building D expansion project allows increased production which requires larger quantities of water and chemicals than the existing operation. As a result, the onsite wastewater treatment plant must be expanded to accommodate higher volumes of wastewater. Accordingly, MASCA has deleted the statement that increased chemical usage is the result of increased treatment plant capacity. 10-6

Page 3-58: The Building D expansion project will double the wastewater flow rates from Outfall #002, rather than increase them six-fold as stated in the Draft SEIS. 10-7

Page 3-59 to 3-61: The Draft SEIS speculates that the small volumes currently discharged to the POTW may impact the bacterial regime. This concern is unsupported by history or scientific analysis. The POTW has not experienced problems in the past with the bacteriological treatment process, despite MASCA's discharge. The bacteria are routinely tested and monitored to insure proper functioning of the POTW. Moreover, the bacteriological treatment used at the POTW would be replicated at the plant if MASCA were to treat the solvent rinse waste stream onsite. It is preferable to treat this stream at the POTW where the waste stream is highly diluted before it comes into contact with the biological organisms used in the treatment process. 10-8 10-9

The Draft SEIS goes on to speculate as to the worst-case possibility of impacts on the sanitary sewer system, concluding that MASCA should no longer discharge process wastewater to the POTW. For the reasons stated above, we 10-10 believe this conclusion is also unfounded. MASCA agrees to perform monitoring at Outfall #002 as described in the attached mitigation measures, items 4 and 12. These measures will adequately mitigate any impacts of MASCA's Building D expansion project on the POTW. And, as the Draft SEIS notes, the effect of future chemical processes changes on the POTW are more appropriately addressed when, and if, those changes actually occur. **10-10**

Page 3-61: MASCA agrees to remove the process water from the discharge to the existing storm water detention pond through Outfall #003 and to plug the gravel lense in the pond. Revisions to the text have been suggested to clarify this discussion. **10-11**

Page 3-61 to 3-62: Impacts of the Building D expansion project on the Puyallup River have already been addressed through the NPDES permitting process. MASCA's NPDES permit was renewed and reissued by the Department of Ecology in 1994, including projected impacts of the expansion project. Compliance with the conditions of the NPDES permit will, as a matter of law, adequately address any potential impacts to the river. Additional monitoring requirements beyond those contained in the NPDES permit are unnecessary. **10-12**

Page 3-63: The discussion of potential removal of the existing upset tank at the POTW should be deleted and the associated drawing on Page 25 of the Technical Section should be eliminated, as it is not an impact of the Building D expansion project but rather of the City's POTW upgrade project. MASCA has submitted comments and is pursuing procedural SEPA remedies with the City on this issue through the environmental review process for the POTW upgrade, which is the proper forum for discussion of this issue. The City and MASCA are working cooperatively to resolve this issue. **10-13**

MASCA looks forward to continuing to work with the City on these issues.

Sincerely,

Frank Pfefferkorn
Vice President
Manufacturing and Engineering
Member of the Board

3.7.5 Summary of Mitigation Measures

The City has determined the following mitigation will be required as a condition of the expansion,

1. Flow metering and sampling stations shall be constructed at both ends of the existing tightline and at both ends of the proposed tightline prior to issuance of any certificate of occupancy. Continuous flow metering shall be provided on both lines to measure line loss or gain (e.g. leakage, infiltration).

2. The MASCA wastewater treatment expansion will be completed prior to discharge of process waste from Building D.

3. The City will require MASCA to institute testing that will include the following:

   a. Installing pH probes at the inlets and outlets of both tightlines;

   b. Installing flow totalizers at the inlets and outlets of both tightlines;

   c. Installing flow transmitters on the existing Parshall flume measuring flows in the sanitary sewer and across the V-notch Weir at Outfall #002. Flow signals shall be transmitted to a new flow recorder at the POTW;

   d. Installing composite samplers, flow proportion capable, at the inlets and outlets of both tightlines;

   e. Results of flow proportioned composite sampling shall be furnished to the City and MASCA as soon as they become available.

4. The monitoring/testing program for Outfall #001 will be per NPDES requirements as outlined in the following table. MASCA to do additional testing of Priority Pollutants quarterly for one year, then review with the City to discuss the benefits of continuing this additional testing.

   MASCA to add testing on Outfall #002 as defined in the following table.

   MASCA/City will enter into contracts with a third party to collect Grab/24-hour flow-paced composite samples for testing requirement on Outfall #001 and Outfall #002. Testing to be carried out at Washington State certified lab. Cost to be responsibility of MASCA. Lab shall send data to City for information, and to MASCA to submit discharge monitoring report monthly to DOE.

   Should MASCA elect to operate their own outfall to the Puyallup River, the City will not require this monitoring/testing schedule for Outfall #001 (only).

Outfall #001:

Paramter	Location(s)*	Frequency*	Sample Type
Flow*	Both tightline inlets and oulets	Continuous	Flow totalizer
pH*	Both tightline inlets and oulets	Continuous	pH probe
BOD,	Both tightline outlets	Weekly	24-hour flow-paced composite
TSS	Both tightline outlets	Weekly	24-hour flow-paced composite
Fluoride	Both tightline outlets	Weekly	24-hour flow-paced composite
Phosphorous	Both tightline outlets	Weekly	24-hour flow-paced composite
Ammonia	Both tightline outlets	Weekly	24-hour flow-paced composite
TRCL	Both tightline outlets	Weekly	Grab
TTO	Both tightline outlets	Quarterly in *** fourth year	Grab
WET	Both tightline outlets	Quarterly	Grab/24-hour flow-paced composite
Mercury	Both tightline outlets	Monthly	24-hour flow-paced composite
Priority Pollutants	Both tightline outlets	Quarterly**	24-hour flow-paced composite

*Sampling and testing shall be performed on any day there is flow in a given tightline.
**The need for quarterly Priority Pollutants tests will be reviewed annually by the City and MASCA to determine if this frequency is appropriate to adequately monitor this outfall.
***First sampling event in year 1998.

Process Waters to Outfall #002

Parameter	Location(s)*	Frequency*	Sample Type
Flow	Outfall WEIR**	Continuous	Flow totalizer
Priority Pollutants and Production Chemicals*	Outfall WEIR**	Monthly***	24-hour flow-paced composite

*Production chemical tests shall be those tests, in addition to the Priority Pollutants (40 CFR Part 403), determined by the City as needed to measure MASCA production chemicals that are known to be toxic or harmful to the City's POTW. Introduction of new production chemicals at MASCA may result in the addition of new test requirements. MASCA shall notify the City of new chemical usage in advance and furnish the City updated monthly chemical use reports.
**Location shall be upstream of connection with MASCA sanitary sewer facilities and prior to discharge to the City sanitary sewer system.
***The need for monthly Priority Pollutants and Production Chemical tests will be reviewed by the City and MASCA annually to determine if this frequency is appropriate to adequately monitor this outfall.

5. The monitoring program shall be updated, with mutual consent between the City and MASCA, whenever the NPDES discharge permit limits for Outfall #001, Outfall #002 or the City's POTW are revised by DOE. Monitoring results shall be given to both the City and MASCA as soon as the results are available from the certified testing lab performing the analysis.

6. Prior to discharge of process waste from Building D, MASCA shall have operational an upset tank serving Outfall #001 at the MASCA wastewater treatment facility. In addition, MASCA will have operational an upset tank at the POTW with a minimum capacity equal to the volume of the larger tightline. The upset tank facilities at the POTW shall be designed to accommodate pipeline hydraulics for high river/high flow periods.

7. Once the MASCA on-site upset tank is made fully operational, the operation of the upset tank(s) shall be as follows:

   a. When monitoring results show the flows to be out of compliance for pH, MASCA shall immediately notify the City and the flows shall be diverted automatically to the upset tank at MASCA. When the upset tank at MASCA is full and the flows are still not in compliance, flows to the tightlines shall be stopped. The upset tank at the POTW shall be used only to drain and treat wastewater remaining in the tightline following an upset condition, and for diversion of high pH water during tightline(s) sanitation.

b. The upset tank at the POTW shall be emptied using one of or a combination of, the following three methods, as approved by the City, and not through the City's POTW headworks:

i) Treat, or

ii) Dilute with tightline, or

iii) Haul away

8. The current practice of discharging MASCA flows from the existing upset tank at the POTW into the City's POTW headworks shall be discontinued prior to the completion of the POTW expansion (first phase expansion - 1997/1998). During the interim, pumping improvements shall be made at the POTW to control the flow rate from the upset tank to the headworks. Cost of such improvements shall be the responsibility of MASCA and be approved by the City.

9. The TI/RE underway to identify the source of toxicity in the MASCA effluent will be performed in conformance to the RCW's and WAC's. When the source of toxicity has been determined, MASCA will promptly take appropriate action to eliminate the source of toxicity either through treatment, manufacturing process changes, or tightline maintenance.

10. MASCA shall alert the City whenever treatment process changes or upsets occur at the MASCA wastewater treatment facility. An emergency response plan providing a written protocol for managing upset conditions and alerting the appropriate individuals shall be developed by MASCA and approved by the City and the DOE prior to discharge of process waste from Building D. MASCA shall also familiarize City personnel with its treatment facilities and operations.

11. Control shall be implemented to ensure that the wastewater to the sanitary sewer receives adequate pretreatment at MASCA prior to discharge. The process water flow from Outfall #003 shall be removed from the existing detention/infiltration pond and discharge in Outfall #001, when DOE provides written approval of the change. MASCA shall initiate a request to modify the existing NPDES permit to allow for the change.

12. Domestic sanitary sewage flows from the current Outfall #002 will continue to be conveyed to the POTW for treatment. Continuous, real time flow metering shall be provided on the sanitary sewer to quantify total process and sewage flows to the City's POTW. Process flow to Outfall #002 shall be separately monitored pursuant to Provision No. 4. Total sanitary sewer flow as measured by the Parshall flume shall be the basis for assessment of treatment charge.

13. When MASCA constructs a second tightline, MASCA shall own, operate, and maintain the tightline.

14. The second tightline shall be designed and constructed to meet the following minimum requirements:

    a. Meet applicable DOE and City standards;

    b. Be properly located in right-of-way, easements, or on purchased property;

    c. Have at least the capacity of the existing tightline so that one of the tightlines can be taken off-line for maintenance and cleaning;

    d. Be designed and constructed of adequate design and materials to prevent exfiltrations and to withstand instantaneous pressures associated with the hydraulic grade line of the system;

    e. Accommodate scouring and/or cleaning of the line to alleviate potential biological growth;

    f. Provide drainage, monitoring and sampling facilities along the length of the tightline; and

    g. Include a diversion system on the second tightline to the MASCA on-site upset tank (provision No. 6) and the upset tank at POTW in order to prevent discharge of out of compliance wastewater to the Puyallup River.

Attachment B

3.7 UTILITIES -- SANITARY SEWER

3.7.1 Issue

The current and future wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that is contaminated with various types of acids and organic solvents. The 1981 EIS ~~projected~~ anticipated that various sanitary sewer facility improvements ~~to~~ would be constructed over the course of the subsequent decade. These included potential upgrades to the POTW, ~~or~~ on-site water re-use, ~~Neither of these systems were put into place. The site is primarily served by on-site treatment and tightline discharge to the Puyallup River.~~ or "pretreatment on the site and discharge directly to the Puyallup River, thereby eliminating the wastewater treatment plant handling of the process and cooling waters." 1981 FEIS, pages 150, 151, 152, and 153. Consistent with the FEIS, the City, DOE, and Fairchild agreed that more than 90% of the plant waste water would be treated on-site, and conveyed via tightline to the Puyallup River. The small amount of effluent that required treatment through the biological process used at the City's POTW was discharged to the sanitary sewer. The environmental impacts of MASCA's Building D expansion project on the sanitary sewer system are evaluated herein.

3.7.2 Existing Sanitary Sewer System

The system within the production buildings ~~consists~~ **generates** five separate wastewater streams flowing from separate types of process water usage points. The wastewater streams are summarized below.

The largest stream of flow is an acidic stream produced from the spent process acid rinse system. These acid wastes are piped **to MASCA's on-site wastewater treatment facility** together with other acid wastes from the site with the exception of fluorides, phosphates, and ammonia (F/P/A). This wastewater stream leaves the site **after treatment** via the tightline and discharges through Outfall #001 into the Puyallup River.

The second wastewater stream consists of F/P/A from process wastewater drains and discharge from specially identified sinks**/process tools.** It also consists of blow down from acid and fluoride fume scrubbers, ~~and~~ cleaning solution **rinses** from the Reverse Osmosis **membranes** (RO) and DI **mix bed regeneration wastewater.** ~~processes.~~ This **wastewater first is treated by removing fluorides, phosphates, and ammonia, and then this treated wastestream is combined with the acidic waste stream for neutralization. The combined treated** wastewater stream discharges **via the tightline** through Outfall #001 **into the Puyallup River.**

The third stream is a solvent organic waste stream composed of rinse waters contaminated with **less than 1%** solvents from the manufacturing process. This stream is drained separately down to the on-site wastewater treatment plant, **is treated on-site by activated carbon and pH neutralization,** and is **then** discharged ~~through~~ **as** Outfall #002 **to the sanitary sewer** for ~~additional~~ **final** treatment at the POTW.

The fourth wastewater stream collected separately on-site is the **sand filter, carbon filter, and** de-ionized **final** filter backwash waters from the water purification system. **These filters remove minerals and particulates from the water supply. The backwash water rinses these solids from the filters. The backwash water contains no chemicals - only the solids that were filtered from the water to make it ultrapure.** This water is ~~also~~ drained in separate lines and discharged into the infiltration**/detention** pond (Outfall #003).

A fifth stream consists of the domestic wastewater from standard toilet facilities, ~~and a~~ laundry room**, and other on-site areas**. ~~This~~ **These** wastewater stream**s** flows ~~separately~~ to the sanitary ~~discharge point from~~ **collection lines on** the site and discharge~~s through~~ **with** Outfall #002 into the POTW **collection and treatment** system.

All of these pipes, with the exception of the ~~carbon~~ filter backwash**es** (Stream 4) and the domestic wastewater (Stream 5), are provided with dual containment systems.

~~As a result of the above~~, **T**hree wastewater discharge locations **(outfalls)** are in place. The three outfalls include:

Outfall #001 -- This outfall is located at the end of a five- (5) mile long tightline, and discharges **treated** wastewater directly into the Puyallup River, without ~~flowing~~

treatment in ~~through~~ the City's POTW. Both the Puyallup River Outfall #001 and the tightline are owned by the City. MASCA's right to discharge through Outfall #001 is regulated by its NPDES permit, originally issued June, 1985, and most recently approved by DOE in 1994. MASCA is solely responsible for the quality of the effluent it discharges to the Puyallup River and for compliance with NPDES quality standards. Prior to discharge, the wastewater is treated through several different processes at ~~the~~ MASCA's on-site wastewater treatment plant. The majority of the wastewater flow is discharged via Outfall #001. The streams tributary to Outfall #001 include:

1. A F/P/A stream composed of drain wastewaters collected from various points around the MASCA plant;
2. A RO system flushing/cleaning solution;
3. A DI mixed bed regenerant;
4. An acidic stream composed of spent process acid baths and acid rinsewaters; and
5. A RO system reject water stream.

Outfall #002 -- This outfall discharges wastewater and process wastewater into the POTW. This outfall contains ~~traditional domestic waste flows and~~ organic solvent rinse process wastewater. The organic solvent wastewater flows receive pretreatment at the MASCA wastewater treatment plant prior to discharge to the POTW. The average solvent rinse wastestream flow rate seen throughout 1993 was 10 ~~54~~ gallons per minute. Total flows to the POTW averaged 54 gpm during 1993. Flow rates for this ~~in the process water~~ discharge seem to be highly variable.

Outfall #003 -- This outfall discharges wastewater and stormwater into the on-site **Infiltration/**detention pond. ~~This~~ **The** flow**s** consists of stormwater and backwash water from cleaning the **sand filters,** carbon filters**, and final DI water filters** used in the process of treating the domestic water supply to produce the high purity water necessary for the production of ~~the~~ **semiconductors**.

3.7.3 NPDES Permit

All three (3) outfalls are regulated under a NPDES Permit **which was renewed for the second time and reissued** ~~issued to MASCA~~ on June 30, 1994. MASCA was fined for non-compliance with **the previous** ~~their~~ NPDES permit in 1994. The DOE reported that the non-compliance event covered approximately one (1) year. The events included excursions outside of the permitted ranges for pH, biochemical oxygen demand, total suspended solids, fluorides, phosphates, and ammonia. They noted problems with treatment system **components** ~~pipe~~ breaks**ing**, malfunctioning testing probes, and clarifier **floc** tank overflows. According to DOE, these problems were due to operations and maintenance practices at the on-site treatment plant. MASCA corrected **the** ~~this~~ problems. ~~by installing a new ammonia treatment process and second upset tank on-site.~~ Since then, DOE has been generally satisfied with the performance of the plant. (Ahmed pers. comm.). **Since April of 1994, only one non-compliance event has occurred at MASCA. The event resulted from the failure of a $CaCl_2$ addition pump. MASCA fixed the pump and installed a sensor to detect and alarm future pump failures. No fine resulted from this event.**

Under the NPDES permit, the wastewater generated by MASCA that discharges via Outfall #001 is allowed to have certain contaminants **consistent with DOE prescribed measurement thresholds.**. Under ~~the~~ **their respective** NPDES permits, both MASCA and the POTW are required to perform Whole Effluent Toxicity (WET) evaluations to ensure that the toxic concentrations of contaminants in the effluent are within the acceptable limits of the permit. In the past year, **(12/94 through 9/95),** the POTW operators report that ~~they have~~ **the POTW has passed** ~~been out of compliance for~~ the WET test **each quarter,** ~~two times~~ **although results for 12/94 and 7/95 show increased toxicity when compared to other quarterly WET tests. These two test results meant that the POTW did not meet the performance standard of WAC 173-205-020, and that the City must continue their WET testing. Verbal operator** reports indicate that in one of the two cases, **the** POTW was receiving or had just received discharge from the MASCA upset tank. This has led the City to ~~believe~~ **speculate** that the toxicity problems that they are encountering may be tied to the discharges from the MASCA upset tank. The upset tank operation is of great concern to the City due to the increasing frequency and ~~severity~~ **quantity** of discharges to the upset tank. In June, 1996, the upset tank overflowed causing a high pH solution to spill over the upset tank walls and onto the grounds of the POTW. Due to rapid response by the POTW operations staff, this spill did not result in a toxic discharge into the storm sewer which flows directly to the Puyallup River. However, if the City's operating staff had not been present, a discharge would have occurred with possible significant adverse impacts on the river.

Previous NPDES permits required priority pollutant screening tests for Outfall #002 which ~~resulted in~~ **showed** no pollutants at levels of concern to DOE. **Based on this compliance history** DOE suspended the continuous tests for Outfall #002 and now require only pollutant screening once per quarter in the last year of the permit cycle and an affidavit by MASCA that no spills of toxic substances have occurred in the reporting period. MASCA ~~has prepared a~~

~~statement indicating~~ **reports confirm** that no spills of toxic substances have occurred **for each of the reporting periods** in the last three years.

Under its current NPDES permit, MASCA is required to meet a chronic WET limit at a 5% dilution factor. In April, 1995, DOE ~~was~~ notified ~~that~~ MASCA's **of its** failure to meet the WET limits **and** ~~would~~ required additional monitoring. The additional monitoring determined that MASCA was not meeting its WET limits and in September, 1995, DOE notified MASCA that it must perform a Toxicity Identification/Reduction Evaluation (TI/RE).

A TI/RE ~~was~~ **is being** performed; however, the results ~~were~~ **have** not conclusively ~~in terms of~~ identifiedying the specific pollutant(s) that caused the WET test failures. DOE noted that a cationic surfactant may have been the problem. However, another consultant was asked to review the TI/RE information and concluded that organic materials (surfactants are an organic compound) are not likely to be causing toxicity, but heavy metals such as copper or zinc may be of concern. To date MASCA has no~~t positively~~ identified the cause of toxicity in its effluent and ~~will need to continue~~ **is continuing** the TI/RE process. DOE has indicated that the evaluation should be conducted with more rigorous attention to the sampling protocol.

3.7.4 Impact Analysis

MASCA has started a process of upgrading their facilities for the anticipated expansion. DOE has approved the expansion of the on-site wastewater treatment plant to handle the wastewater flows generated from increasing production from the current maximum of 20,000 wafer-outs per month to a maximum production of 40,000 wafer-outs per month. ~~The existing~~ **MASCA's approved** NPDES permit also ~~has provisions~~ **allows** for this increase.

Increased Flow Rates

The proposed expansion of the sanitary sewer and process wastewater discharges from the site is expected to increase the existing flow rates. With full build-out of Building D, domestic water demand will be 1.6 MGD. This would lead to a peak Outfall #001 flow rate of 1.3 MGD, a peak Outfall #002 process wastewater flow rate of 0.06 MGD, ~~and~~ a peak Outfall #003 wastewater flow rate of 0.05 MGD, **and a peak sanitary flow excluding process wastewater of 0.07 MGD. These flows are less than those projected in the 1981 FEIS page 146.**

WASTE STREAM	1981 FEIS MGD	1996 SEIS MGD	Variance MGD
Sanitary Sewer to POTW	0.23	0.13	(0.10)
Process Wastewater	2.07	1.3	(0.77)

Tightline - Outfall #001. Outfall #001 has a design capacity of 1.6 MGD. Current operating procedures call for the tightline to receive a caustic flush approximately once per month to purge the suspected biological activity in the tightline. The increased flow rates in the tightline may lead to a higher level of deterioration of the line and unknown quantities of ex-filtration. This may result in higher maintenance requirements for the tightline, which belongs to the City of Puyallup. The tightline currently receives little or no on-going maintenance by either the City or MASCA. Construction of a second tightline to the river is included in the proposed project to avoid interrupting production if the first tightline has to be shut down. Construction of a second tightline to the river would allow flows to be switched into an alternative tightline. Maintenance and inspection of the tightlines would become much easier since flows could be diverted from one tightline to the other. As an additional measure of safety, flow metering and sampling stations should be located at both ends of the two tightlines (existing and new). Continuous flow metering should be provided on **the new tightline** ~~both lines~~ to measure line loss or gain (leakage, infiltration). **Continuous flow metering stations already are in place at both ends of the existing tightline.**

The hydraulic limitations for the tightline flows will be the pipe from the weir control at the POTW to the combined outfall. The existing outfall pipe has become severely plugged due to broken diffusers that have caused rock and debris to enter the outfall line. The outfall will be repaired during the POTW upgrades scheduled for 1997-99. When the outfall is repaired, it will be able to carry projected peak hour design flows from the POTW of 35.8 MGD. It will be necessary to pump the peak flows from the POTW at the 100-year high flow level in the river, thus an effluent pump station will be included in the POTW upgrade.

Additional flows from MASCA in the 1.3-1.9 MGD range may be accommodated once the new diffuser is repaired. However, when high river elevations and peak flow through the POTW occur simultaneously, flow in the MASCA tightline will back up. Currently this condition can be accommodated by temporarily diverting flow to the upset tank located at the POTW. When~~ the existing tank is removed for the POTW upgrades and~~ MASCA constructs ~~a new~~ **replacement** upset tank **at the POTW**, the pipeline hydraulics for a high river/high flow period must be considered in the design of the **replacement** upset tank.

Conditions must be identified as soon as they occur which could lead to the upset tank becoming full and overflowing. To prevent the upset tank from overflowing, an alarm should be installed that will notify both MASCA and City POTW personnel when the upset tank fills to within one volume of the tightline volume. MASCA should also develop and obtain City approval for an emergency plan for responding to spills/releases of any type from the upset tank or tightlines. ~~As part of the revised Concomitant Agreement,~~ MASCA should grant authority to the City to shut down the tightline flow under conditions where a spill/release from the tightline or upset tank could occur. This protocol (for shutdown) should specifically identify the individuals allowed to make such a decision and who may make such decisions in the absence of the primary decision maker(s).

~~The existing Concomitant~~ **An** Agreement between MASCA and the City will be ~~r~~enegotiated to take into account the projected changes in the tightline and upset tank operation and configuration. This new agreement will specifically address costs for the operation and maintenance of the new tightline and **the existing and planned replacement** upset tank and the existing tightline. The agreement also will address monitoring and testing requirements (discussed elsewhere in this section), including who will conduct and pay for the monitoring and testing. The agreement also will be written to clearly identify procedures to be followed for preventing spills/releases from the upset tank and tightlines, including shutdown of the tightline(s).

The planned increase in the MASCA wastewater treatment plant capacity includes one additional F/P/A treatment train which would operate in parallel with the existing **two** treatment systems. An increase in the treatment capacity for acid waste discharges from ~~a~~ **the** plant is also proposed. This increase in capacity would provide two acid waste treatment trains which would operate in parallel to treat the maximum load of the acid waste system. These increases in wastewater treatment plant capacity ~~would be~~ **are** required in order to meet the NPDES discharge **permit conditions** ~~guidelines~~ for the site for any increase in capacity **beyond 20,000 wafer outs per month**. The increase in on-site treatment plant capacity would result in a corresponding increase in on-site use of chemicals for the treatment plant operation. **DOE has approved the construction plans for the expansion of the MASCA WWTP to accommodate 40,000 wafer outs.**

Sanitary Sewer-Outfall #002. Outfall #002 **process wastewater** flow rates are anticipated to **double with the plant expansion.** ~~increase by a factor of six based on process wastewater discharge estimates~~. The anticipated flow from the domestic waste facilities on-site is also expected to approximately double, based on an approximately 100% increase in workforce at the site. **These combined projected flows are less than the maximum flow to the sanitary sewer which occurred previously when National Semiconductor operated on the site with 1,100 employees. The 1981 FEIS projected the maximum "domestic wastewater" flow from the site to be 0.23 MGD (Page 146). The Building D expansion results in a projected total domestic wastewater flow of 0.13**

MGD, significantly less than the maximum flow planned for in the 1981 FEIS. For the majority of the sanitary sewer system, these flow rates are within the existing capacity of the City's system. However, there are two sections that are currently overloaded: the Meridian Branch and the main leading from the Pioneer Street pump station to the POTW.

The overloaded Meridian Branch is expected to be replaced starting in the spring of 1997, and should be on-line about the time the MASCA facility comes into full production. The existing 36-inch diameter trunk line from the Pioneer Avenue pump station to the POTW serves approximately 80 percent of the POTW service area and is currently in an overloaded condition. MASCA currently represents a very small portion of the flows in that main, and an increase of 50 gallons per minute would be minor as compared to other sources of the overloading problem on that section of pipe.

The hydraulic capacity for the upgraded POTW is based on flow projections from residential, commercial, and industrial growth and development. Projections for sanitary sewer flows from industrial and commercial activities were based on land use. For industrial land use, flows were estimated as 0.0027 MGD/acre. For MASCA this would equate to 0.26 MGD. This estimated flow is comparable to the flow projections of 0.23 MGD identified in the 1981 FEIS (Page 146). MASCA's maximum domestic flow (i.e., discharge to Outfall #002) is expected to be ~~0.14~~ 0.13 MGD, which is well under the projected flow for this type of land use. Accordingly, MASCA's sanitary sewer discharge is not expected to adversely impact the future POTW hydraulic capacity.

While the quantity of wastewater from Outfall #002 does not present a significant impact, the quality of the effluent stream poses some risk to the POTW. Risk analysis is a combination of the probability of an event times the magnitude of the harm. The greater the harm, the lower need be the probability of an event for there to be significant risk. Analyzing and quantifying that risk is difficult because of numerous unknown factors. When there is scientific uncertainty concerning significant impacts, SEPA allows agencies to proceed in the absence of the vital information (WAC 197-11-080). To do so, the agency shall indicate in the SEIS its worst case analysis and the likelihood of occurrence, to the extent this information can reasonably be developed.

In the case of MASCA's discharge from Outfall #002 to the POTW, the probability of an upset event occurring ~~may be relatively~~ **is very** small, but the potential magnitude of harm is very large. The discharge from the POTW goes directly into the Puyallup River. The City is in the process of expanding the POTW. The treatment process will be modified from a fixed biological growth activated sludge system to a suspended biological growth activated sludge system. In either case, the microorganisms responsible for the breakdown of waste are the same.

A partial or complete failure of the bacterial system could result from toxic discharges out of Outfall #002. The time needed to reestablish the biological population is not known. Because of the many factors involved it is possible that two weeks or more could be needed to return to minimum acceptable levels of treatment. Based on a projected sludge retention time of 10 days, it could be 30 days or more before the treatment process is completely stabilized or operating at design efficiency.

The current discharge through Outfall #002 into the POTW has never been tested to determine if it has caused any impacts to the bacterial regime. **The Outfall #002 discharge has been occurring since 1983. MASCA reports that the general nature of the wastes being treated in the system has remained the same over time. At 10 gpm, this waste stream is a small percentage of the POTW's total dry weather flow (0.3%) and an even smaller percentage (0.1%) of the POTW's total wet weather flow. History and the high dilution of Outfall #002 by other POTW influents suggest that the risks associated with discharge of this waste stream to the POTW are minimal.** ~~In the absence of such data, it is difficult to accurately predict future impacts from the change in volumes and processes proposed for Outfall #002 because of the proposed expansion. Under the circumstances, SEPA requires an analysis of a possible worst case scenario. Under this worst case scenario, untreated sewage would be discharged to the Puyallup River because storage capacity for the flow is not available on the site. The impacts on the Puyallup River could be long lasting or permanent, and cannot be accurately estimated at this time.~~

The cause of a non-compliant discharge through Outfall #002 that could impact the POTW may fall into three categories: human error, mechanical failure, and unknown side effects. Human error has been, and always will be, a potential cause of a toxic discharge. The system should be designed to minimize the possibility of such an error resulting in serious harm. But the recent (June, 1996) example of the overflow at the clarifier tank illustrates that human error at MASCA has the potential to occur. It is not possible to predict all the possible scenarios in which human error could play a role that would result in damage to the POTW through the discharge from Outfall #002. Some event as simple as pouring the wrong chemical down the wrong drain or opening the wrong valve may occur.

Any mechanical system, no matter how elaborately designed, has some probability for failure. The treatment system at MASCA for Outfall #002 has numerous places where mechanical failure could result in a toxic discharge. Recently one of the carbon filters plugged, and it was necessary to divert the process stream into the upset tank. While this event illustrates successful containment of a potential upset, it also illustrates that mechanical failures occur. A worst case scenario would be the failure of the carbon filter to properly filter toxic substances and a failure of the upset detection system to alert operators of an upset condition. Together, these two events could result in an undetected non-compliant discharge to the POTW.

The third type of event that could cause harm to the POTW through Outfall #002 is from unknown side effects. Computer chip manufacturing technology is evolving with new products being developed continuously. In response, MASCA has altered its manufacturing process several times over the past 12 years to capture "market windows." These new products often require new processes that use new and different chemicals than those currently being used today. In many cases the development of these new chemicals precedes the ability of the regulatory agencies to detect and monitor the chemical's environmental and human health impacts. The development of chemical extraction methods that allow for accurate detection may be behind the development of the new chemicals. Also, these new chemicals may have unknown synergistic side effects when combined with other substances. Many of these questions are not resolved before the chemicals are put into use in the industry. **However, no chemical was found to have been used and/or is currently being used that was not in full compliance with the Toxic Substance Control Act (TSCA). MASCA follows a formal process before any chemical is brought on site to determine the proper methods for transport, handling, storage, internal use, waste treatment, and ultimate disposal. This formal process assists MASCA in successfully segregating and treating/disposing of their wastes.**

As an example, the toxin in Outfall #001 causing MASCA to fail **several of** its NPDES discharge permit **WET tests** has not been identified despite having several different tests run. This event highlights how unknown side effects can cause **potential** significant impacts. The proposed change in volume of discharge to Outfall #002 and any future changes in manufacturing process or chemicals that discharge via this outfall could produce an unknown side effect on the POTW. A worst case scenario would be a change in process that produces a new toxic chemical that is undetected by current methods and is still present in toxic levels after going through the pre-treatment level. ~~The~~ **Such a** chemical could ~~kill or~~ seriously disrupt the bacteria at the POTW. **However, MASCA has committed to inform the City of all changes in the manufacturing process which will result in the use of new or substantially increased levels of chemicals. This notification will provide the City an opportunity to evaluate any potential impacts to the POTW at that time.**

~~To mitigate these potential impacts and reduce the risk of a POTW failure, MASCA should remove the organic solvent wastewater stream from Outfall #002 and thereby prevent~~

~~discharge to the City's POTW. MASCA should pre-treat the process wastewater on-site and discharge the flows via Outfall #001.~~

Infiltration Pond-Outfall #003. Flow rates **from the DI plant** to Outfall #003 at the infiltration**/detention** pond are projected to almost double ~~from the DI plant~~. The existing system uses approximately 0.12 MG **(16,044 cubic feed (CF))** in an eight-hour maintenance cycle once per week. The pond volume prior to overflow is ~~between 150,000 to 200,000~~ **170,640 CF (approximately 1,276,387 gallons)**. ~~and~~ **This 16,044 CF** takes approximately 24-36 hours to drain to ~~its~~ **the pond's** normal, low-water surface condition **after each maintenance cycle**. Based on expected inflow and outflow rates in the pond, the process wastewater discharge increase ~~could be~~ **is** expected to use ~~all~~ **.19%** of the available pond volume for a short period of time **once a week when the maintenance cycle is run**. This would ~~significantly~~ reduce the volume of water that the pond could absorb from storm drainage for approximately one to one-and one-half days **each week**.

The existing pond **has a gravel lense on the northwest side of the northerly half, which consists of** ~~is underlain by~~ excessively drained soils (Everett soil series) **being present near the bottom of the pond.** ~~and~~ **This lense could** ~~is considered to~~ create **a** potential ground water pollution problems with infiltration if the water is not pretreated prior to entering the system. To eliminate this problem, MASCA should discontinue process water discharge to Outfall #003 and route the flow to another outfall **and/or plug the excessively draining lense to allow the water to infiltrate.** The process water **may** ~~would~~ require pretreatment **prior** to discharge through Outfall #001. According to MASCA's predicted water balance, at full build-out, water use will be a maximum of 1.6 MGD. ~~This is~~ **The** current capacity of the tightline

is 1.6MGD, which, ~~and~~ is lower than the allocated capacity of the City/MASCA combined outfall. Outfall #001 has the capacity to handle the additional flow rate from Outfall #003 **if a surge tank is constructed to detain and slowly release the high flows associated with a filter backwash operation**. MASCA's NPDES permit would need to be modified in order to allow the process water flow to be re-routed from discharging through Outfall #003 to Outfall #001.

Increased Effluent Loading On Puyallup River System

The increased wastewater flow rates discharged from MASCA via Outfall #001 are anticipated to consist of higher **mass loadings** ~~concentrations~~ of the same constituent base as currently exists. The increased wastewater flow discharged would lead to an increased waste loading in the Puyallup River. The increased load in the Puyallup River would lead to a decreased dilution factor and an increase in pollutant concentrations. Due to the sensitive nature of the Puyallup River system, this could have a detrimental impact on the natural ecosystem there. ~~It may also put the MASCA plant outside of its~~ **MASCA's current** NPDES discharge permit **accounts for these increased flow rates and includes conditions to protect against adverse impacts to the river system.** ~~parameters~~. The expanded MASCA wastewater treatment plant is designed to **meet the standards contained in the NPDES permit but should** ~~take this into account, but the results of these efforts would need to~~ be verified by testing once complete and fully operational.

The existing wastewater treatment system in place at MASCA is designed to meet the NPDES permit requirements. DOE has already approved the **waste water** ~~sanitary sewer~~

improvements proposed by MASCA to handle the expansion of the facility. DOE anticipates that the proposed improvements will treat the wastewater sufficiently so that the concentration of pollutants in the discharge would be within the limits of the NPDES permit. The permit requirements limit the concentration of pollutants discharged, but do not completely eliminate impacts on the Puyallup River system and the surrounding environment. DOE is required to take into account the entire Puyallup River system in the NPDES permit process through issuance of the WLA to individual dischargers. There is no indication that the permitted levels of pollutants in the discharge would have additional significant adverse effect on the Puyallup River system.

Literature reviewed indicates that there is a wide variability to the concentration of regulated pollutants that are discharged from the MASCA site. However, no incidence of exceeding permit limits were noted in these results. Since testing is periodic for most constituents, a more rigorous testing procedure may show different results. ~~A new monitoring/testing program should be implemented that utilizes an impartial third party. The neutral third party would be hired by the City with testing, calibration, and reporting expenses paid by MASCA.~~ **MASCA/City will enter into contracts with a third party to collect Grab/24-hour flow-paced composite samples for compliance with the testing requirement on Outfall #001 and Outfall #002. Testing is to be carried out by a Washington State certified lab. The cost of testing will be the responsibility of MASCA. The lab shall send the test data to the City for information, and to MASCA for submission of the monthly discharge monitoring report to DOE.** The monitoring/testing plan should include WET testing quarterly; continuous recording of the results of the tests for flow rates,~~ammonia fluoride, temperature,~~ and pH; continuous, real-time metering provided on Outfall #002 to quantify domestic sewage flows to the City's POTW; ~~and pH measurement on a continuous basis at Outfall #002.~~ The monitoring program should be updated whenever the NPDES discharge permit limits for Outfall #001 are revised by DOE. Monitoring results should be given to both the City and MASCA as soon as the results are available from the certified testing lab performing the analysis.

The existing flow rates of process water in all three outfalls will increase based on MASCA's predicted water balance. The new systems that MASCA is putting in place for the Building D expansion are planned to be less dependent on process water. The newer systems may use somewhat different processes, and hence it is prudent to expect that MASCA would have somewhat different concentrations of constituents, or even different constituents in the discharges. As soon as the new processes are started in the Building D expansion, MASCA will be required to start a complete discharge screen for regulated pollutants. This should identify any new or changed concentrations of regulated pollutants that escape the treatment systems.

Any significant changes in the process or chemical use will be subject to further SEPA review. This SEIS covers existing systems and processes and is limited to the expansion of Building D. Changes to the existing process or new processes that are not part of the Building D expansion, are not covered under this analysis.

Decreased Upset Tank Loading Time

The existing system has two upset tanks in place. One of the upset tanks is for the solvent rinse system <u>**(Outfall #002)**</u> located at the MASCA treatment plant. The other tank is for the combined acid waste and other treated wastewater which drain through the tightline (Outfall #001), It is located at the POTW. The upset tank volume, in each case, provides time to mitigate any problems that may occur at the wastewater treatment plant on-site; or in lines draining from the manufacturing buildings on-site.

The tightline (Outfall #001) and its upset tank at the POTW currently provide eight to 12 hours of protection in which the flows from the tightline can be fully diverted into the upset tank. This would be decreased to five and one-half hours at a flow rate of 1.6 MGD. Under all flow conditions, for both present and future conditions, water takes approximately 90 minutes to travel through the tightline. In any situation where diversion to the upset tank is initiated by the automated systems at the discharge end of the tightline, MASCA operators have 90 minutes less than the total time it takes to fill the upset tank **to** shut off flows. This means that MASCA would have only four hours in which to respond at 1.6 MGD flows.

The existing upset tank at the POTW would **may** be removed as a result of the proposed improvements at the POTW. Without the upset tank, caustic flush would be discharged directly into the Puyallup River. The pH of the caustic flush would have a detrimental impact on the Puyallup River system. This is not allowed under the NPDES permit.

If MASCA were to construct a new upset tank somewhere in the vicinity of the existing tank, then the existing upset tank could be taken off line without impacting the ability of MASCA to provide upset capacity. A new upset/diversion tank **may be required if the City needs the land, currently occupied by the existing tanks, for POTW expansion.** with a minimum 500,000 gallon capacity will be provided by MASCA at the outlet of both tightlines.

~~The basis of determining tank size should be provided prior to construction in an engineering report meeting City and DOE requirements. MASCA will own, operate, and maintain the new upset tank.~~

The upset tank on the current Outfall #002 provides a minimum of **twenty-seven** ~~nine~~ hours of protection under full build-out conditions **(33,220 gallons/20 gpm/60 min/hr = 27 hours).** This gives the **MASCA** operators time to correct problems or potentially shut down the discharge completely. Also, as indicated previously, this waste stream may ~~will~~ be re-routed to Outfall #001 thus allowing diversion into the **existing POTW upset tank or a new replacement tank constructed by MASCA** ~~new upset tank~~ at the terminus of the tightline.

Potential Toxic Sanitary Sewer Flows And Impact On POTW

Currently Outfall #002 is not required to be tested for WET. The toxin causing the problems in the WET test for Outfall #001 has not been identified in a standard priority pollutant screen (Parametrix, 1995; DEA, 1996). Priority pollutant screens are periodically performed on all outfalls, but have not identified problems (Anise, per. comm.). Data **is** ~~are~~ not available to determine if the toxin providing WET test problems in Outfall #001 are in other outfall flows. Combining all process wastewater flows into Outfall #001 **might** ~~will~~ eliminate the uncertainty.

The current standard operating procedure of trickling the upset tank discharge into the POTW headworks should be discontinued and alternate measures of re-treatment be undertaken as a part of this project.

The TI/RE should **continue to** be **performed in conformance with the RCW's and WAC's** ~~continued~~ in an attempt to identify the source of the toxins. After the source of the toxin has been identified, then treatment would only have to be for that portion of the system containing the toxin. Since the TI/RE has not been completed, it is not known what flow rates would be associated with treating the toxins at their source.

Historical Ties Between Agencies and MASCA

With the interdependency of the treatment facilities for both the City and MASCA wastewater systems, cooperation between the two entities is essential. As a whole, MASCA tends to be self-reliant, **with the result that**. ~~There are~~ problems at the site that are ~~handled~~ **solved** at an operational level ~~that are~~ **may** never **be** made public. **With the Building D expansion** MASCA **should develop protocols for sharing information with the City.** ~~will make the City more aware of these individual problems and how they are handled. Documentation will be copied to both the City and DOE.~~ Additionally, City personnel involved at the POTW should be allowed to observe ~~and conduct sampling~~ at the MASCA wastewater treatment plant as required and upon limited **advance** notice. **This will help** to ensure the well being of the City's system.

Panasonic

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August 13, 1996

Mr. T. Michael Casey, Director
Planning and Community Development
SEPA Responsible Official
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

Re: Draft SEIS for MASCA Building D Expansion
Comments re: Emergency Response Capabilities

Dear Mr. Casey:

This letter constitutes MASCA's comments on the Emergency Response Capabilities section of the Draft Supplemental Environmental Impact Statement (DSEIS) prepared for MASCA's Building D expansion project.

Comments on Emergency Response Capabilities

MASCA believes that emergency response is an important component of the expansion project. Many of the mitigation measures for Emergency Response Capabilities proposed in the Draft SEIS are based on the premise that the proposed expansion project will result in a greater emphasis on manufacturing and increased usage of chemicals beyond that analyzed in the 1981 FEIS. We would like to comment on the actual use of the site, and actual usage of chemicals and gases.

The planned uses of the site were described in the 1981 FEIS to include wafer fabrication, assembly, testing and finishing and support manufacturing processes, 1981 FEIS, p. 14. Wafer fabrication buildings were to be constructed in three separate phases, presumably referring to three different fabrication buildings, 1981 FEIS, p. 43. The proposed project adds a second fabrication building to the existing fabrication facility, well within the 1981 FEIS projected range of facilities on the site.

The chemical usage projections for a single fabrication building contained in the 1981 FEIS were greater than the current projections for both the current building and Building D combined. Specifically, the 1981 FEIS anticipated that 25 separate chemicals would be used comprising a total of 1,039,012 gallons. In 1995, the existing building used 540,293 gallons comprised of 35 separate chemicals. The estimated chemical usage in 2001 with the Building D expansion operating at full capacity is 1,290,019 gallons, only slightly higher than the 1981 FEIS projected for use in just one building. The statements contained in the Draft SEIS indicating that chemical use will be greater than that previously contemplated should be revised. A more thorough summary of MASCA s analysis of these issues and the historical documents that support these statements are attached as Attachment A. 11-1

Although MASCA agrees to most of the mitigation measures for emergency response listed in the Draft SEIS, MASCA is concerned about the enforceability of some of these mitigation measures. Under SEPA, mitigation measures must be reasonable and capable of being accomplished, RCW 43.21C.060. Not all of the mitigation measures proposed in the Draft SEIS meet this legal requirement. Specifically, the mitigation measures which require action by the Puyallup Fire Department (PFD) are not within the control of MASCA. Therefore, MASCA is not capable of accomplishing this mitigation. MASCA agrees to provide funding for additional training for the hazardous material response team at the PFD and agrees that the actions requested of the PFD are important. MASCA would support a resolution of the City Council instructing the PFD to undertake these measures but does not believe that they should be imposed upon MASCA as a condition of site plan approval. **11-2**

MASCA would like to reiterate that the proposed Building D expansion project includes state-of-the-art technology that will improve the safety of the plant to provide a safe environment for the work force, the community, and the City of Puyallup. **11-3**

MASCA looks forward to continuing to work with the City and the Fire Department with respect to its Emergency Response Capabilities and improving the safety of the plant.

Sincerely,

Frank Pfefferkorn
Vice President
Manufacturing and Engineering
Member of the Board

Comments on Environmental Health (Emergency Response Capabilities)

In their Determination of Significance dated December 22, 1995, on the Building D project ("Project"), the City claims in several locations that the Project will result in 1) greater emphasis on manufacturing and 2) increased usage of chemicals beyond that cited in the 1981 FEIS. This is reiterated on pages 1-8 of the SEIS under the titles of "Stormwater" and "Environmental Health (Emergency Response Capabilities)".

However, as the attached historical documents attest, the SEIS findings should be modified to state the Project is closely aligned with expansion plans, as predicted in the 1981 FEIS. The following MASCA findings support this fact.

The proposed expansion Project is consistent with the February, 1981, FEIS. Table 1 in the FEIS on page 43 identified wafer fabrication buildings to be constructed in Phase I, II, and V on the Puyallup site. The FEIS, page 14 under Section III, Summary, clearly states on lines 3, 4, 5, and 6, "The purpose of this proposal to rezone property is to provide a suitable site for the development of a high technology manufacturer of solid state memory integrated circuits." Further, lines 6, 7, 8, 9, 10, 11, and 12 clearly describe the Project's primary manufacturing process, "The manufacturing processes that will be located in the facility are: 1. Wafer fabrication for integrated circuit chips. 2. Assembly of integrated circuit chips on a frame and packaging. 3. Electrical testing and finishing of the integrated circuit components for customer distribution." Lines 13 through 20 identify "support" manufacturing processes. Consistent with the 1981 FEIS description, this expansion Project proposes to construct a second wafer fabrication building (Building D). Also, sufficient land area remains for future fabrication buildings.

Exhibit I, attached hereto, dated 12-Aug-96, with its attachments (Exhibits IV and V) details the quantity of chemicals identified in 1981 to be used in the first fabrication buildings as 1,039,012 gallons comprised of 25 separate chemicals. The actual 1995 gallonage for one fabrication building was 540,293 comprised of 35 separate chemicals. The number of chemicals used in 1995 is reduced to 32 when one recognizes that the 10:1 HF (line 34) solution is one part 49% HF (line item 33) combined with 10 parts of DI water and the 6:1/5:1/20:1 BOE solutions (lines 37, 38, 39) are DI water dilutions of BOE. The number of chemicals used in 1995 is further reduced to 26 if each chemical that used less than 100 gallons in 1995 is deleted. With the addition of the Building D Project, the estimated gallonage to be used in the year 2001 is 1,290,019, and the estimated number of chemicals increases to 27. This level of chemical usage is consistent with the 1981 FEIS.

The 1981 estimated chemical usage based on one fabrication building was 1,039,012 gallons. The quantity of chemicals to be used by today's estimate in 2001 is 1,290,019 gallons. This is 38% less and a decrease of 788,005 actual gallons used for two fab buildings, compared to the 1981 projections. Clearly, the 1981 FEIS historical documents projected chemical usage on the site to be greater than actually will be used as a result of the Building D project. Historical documents used to make Exhibit 1 are: 1) the July 15, 1981, memo from City Fire Marshal Richard Carmen to City Manager John Adamson. This memo with attachments is marked Exhibit IV, pages 1 through 10; and 2) the June 22, 1981 letter to City Engineer Warren Gray from R. B. Wolf, Fairchild, with copy to Gray and Osborne, transmitting the proposed Fairchild Wastewater Treatment Plant Engineering Report. Table 2 of that report (Exhibit V, page 2 of 2) details the estimated weekly volumes of treatment chemicals proposed to be used in the wastewater plant and water treatment plants.

Further, the general types of chemicals forecasted to be used on-site in 1981 and actually used in 1995 have not changed appreciably. In fact the treatment processes used today in MASCA's WWTP will continue with the building D addition. These treatment processes were described in the 1981 CH2M-Hill Engineering Report ("Report") prepared and approved by DOE. This Report was a pre-design document that is required for any company preparing their application for a NPDES Permit. While remaining basically the same design, some system changes have occurred over the years to improve the efficiency and reliability of the treatment process. The system changes include:

1. The calcium/lime reaction tank has been increased from one 5,500 gallon tank to two 12,000 gallon tanks so that the calcium reaction with the fluoride and phosphates will have sufficient time to take place.

2. Originally, calcium addition was made using lime. Currently, CaCl2 is used as the calcium source so that TSS's can be reduced and excess calcium reduced.

3. Originally, calcium addition was made based on the pH of the solution. This method resulted in over-supplying the calcium requirements and to excessive calcium concentrations in the clarifier effluent. In 1995, MASCA interconnected the process tools in the fabrication area directly to the PCL (Programmable Logic Controller) that operates the WWTP. Calcium is now added based on the receipt of a signal from the fab that a specific fluoride or phosphate source has been drained to the system. This interconnection has resulted in consistent removal of fluoride and phosphate.

4. In 1994, a second generation ARRPS system was installed in order to improve ammonia stripping efficiency. This allows MASCA to meet their new WLA in their third NPDES permit. Efficiency changes included:

    a. Ammonia is now removed prior to the removal of the fluoride and phosphates so that excess calcium from the CaF and CaP reactions would not precipitate out onto the ammonia stripping tower packing after the influent's pH was increased from 9 to 12.

    b. The pH of the stripping tower's influent was increased to 12+ to make the ammonia ion freer and thus more easily/more efficiently removed in the stripping tower.

    c. The height of the ammonia stripping tower packing media was doubled. This allowed for a 2x increase in air-to-liquid contact area and thus greater removal efficiency.

    d. Air flow through the stripper and absorber was increased by 50%.

e. Modified the operating procedures for the absorber so that the removal time of the ammonium sulfate from the absorber was optimized to provide the greatest ammonia removal efficiencies in the stripper.

The work accomplished under item 2 above, has allowed MASCA to meet their current NPDES Permit requirements for ammonia removal one and one-half years prior to the required NPDES Permit compliance deadline date.

5. The pH neutralization system remains basically the same in 1996 as compared to the 1981 Engineering Report. The minor changes made to the system over time include:

   a. The rough pH control tank has been increased in size from 5,500 gallons to 12,000 gallons. The effluent from the tank is now removed from the bottom of the tank.

   b. The polish pH control tank has been increased in size from 1,600 gallons to 3,000 gallons. The effluent from the tank is now removed from the bottom of the tank.

6. The digital PLC has been replaced with a digital/analog PLC with a redundant processor that will automatically come on-line should the lead processor fail. This unit provides for full PID control of the treatment system.

SUMMARY

The current expansion Project is consistent with that predicted in the 1981 FEIS. The amount of chemicals used for two fab buildings (after the Building D expansion) is less than what would be expected by doubling the 1981 predicted levels for one building.

Also, as demonstrated by the continued use of the original treatment process, the general nature of the chemicals used on-site, and therefore treated on site, have remained the same or very similar as that predicted in the 1981 FEIS. Finally, because the NPDES Permit's mass daily limits have now been defined as WLA's to the MASCA facility, and these WLA's have resulted in lower allowed concentration limits in the permit, it is reasonable to assume the treatment processes have become more efficient and that MASCA's methods for separating various waste streams are effective. These statements are confirmed by the monthly Discharge Monitoring Reports filed with the DOE.

Exhibit VII, attached, compares the various discharge limits of the three NPDES permits issued to-date to the Puyallup site.

Exhibit II, attached, lists in table form 1) the estimated cylinder gas and bulk gas usage for 1981, 2) the actual gas usage for 1995, and 3) the estimated 2001 gas usage with both fabrication buildings operating at full capacity.

The table in Exhibit III, attached, identifies various statements within the 1981 FEIS and Concomitant Agreement about the chemicals and gases proposed to be utilized on the site.

The Concomitant Agreement, on page 20, details the procedure to be followed for notifying the City of Puyallup regarding cylinder gas use projections. Exhibit IV lists the toxic gases initially identified to be used on-site. Exhibit V and VI are pages from the WWTP Engineering Report prepared for the DOE that constituted the design criteria for the first Fairchild WWTP constructed in 1982. Based on Exhibit IV's date of July 15, 1981, and on Exhibit VI's date of July 16, 1981, the City had possessed as early as August, 1981, a listing of the toxic gases to be used on the site and their estimated usage rates. That usage rate correlates to the "1981 Estimated Yearly Volume" column on Exhibit II.

Given that the historical data did not forecast use quantities for the non-hazardous gases and bulk gases (hydrogen, oxygen, and nitrogen), the estimated usage of toxic cylinder gases in 1981 was 12, 276 pounds. The actual 1995 cylinder gas usage was 23, 919 pounds. If the 1995 values are adjusted to exclude argon, nitrogen, helium, and nitrous oxide non-hazardous gases, the actual consumed poundage is 14,011. This is an "apples to apples" comparison and demonstrates that the poundage of gases used in 1995 was only 14% higher than estimated in 1981 for one wafer fab. This clearly shows that the 1981 FEIS and resultant Concomitant Agreement did an outstanding job of forecasting cylinder gas usage at the Puyallup site through one (1) fabrication building.

Over the years the industry has evolved to using increased quantities of gases for etching wafers. This fact is supported by Exhibits I and II, which show that as projected chemical usage is declining on a per wafer basis (1981 compared to 2001), the usage of gas on a per wafer basis is increasing. The net effect is that the total combined pounds of chemicals plus gases projected to be used per wafer in 2001 is significantly less than what the 1981 projected usage rates would have estimated.

Based on the forecasts detailed in Exhibits I and II and the supporting documentation obtained from City of Puyallup files, it would appear that the SEIS statements, page 108 under **Stormwater** and **Environmental Health (Emergency Response Capabilities)**, regarding increased use of chemicals and greater emphasis on manufacturing are not correct and require modification in the Final SEIS. Therefore, the final SEIS should delete them, and references in the white pages and technical appendix also should be deleted.

EXHIBIT I

Chemical Usage Projection Comparisons

No.	CHEMICAL	1981 Estimated Yearly Volume (Gallons)	1995 Actual Yearly Volume (Gallons)	2001 Estimated. Yearly Volume (Gallons)
	BASES			
1	Potassium Hydroxide	2,600	244	700
2	NaOH/Az 351-B	2,080	0	0
3	Ammonium Hydroxide	0	51,944	142,000
4	Tetramethyl NH3OH		75,680	205,000
	- Microposit MF 321	0	3,790	10,300
	- Microposit MF 319	0		
	Sub Total	**4,680**	**131,658**	**358,000**
	SOLVENTS			
5	Acetone	23,400	15,011	41,000
6	Isopropanol	28,080	43,836	120,000
7	1,1,1 Trichloroethane	19,760	0	0
8	Xylene	2,600	0	0
9	AZ-HMDS	13,000	450	1,300
10	J-100	14,560	0	0
11	EBR	0	9,739	2,700
12	Accuglass (SOG) 110/111/310	0	1,014	2,800
13	EKC 265 Stripper	0	3,079	0
14	ST-22	0	4,900	0
15	Backside Rinse, R200	0	91 [3]	246
16	Propylene Glycol		20 [3]	55 [3]
17	Ethylene Glycol	0	89 [3]	240
18	Methanol, Absolute	0	3 [3]	8 [3]
19	Polymide 7005	0	458	1,300
20	Polyimide Developer 3501	0	554	1,500
21	Polymide Rinse 3512	0	189	510
	Sub Total	**101,400**	**79,433**	**171,659**
	OXIDIZERS			
22	Nitric Acid	7,384	6,893	19,000
23	Hydrogen Peroxide	26,000	55,100	150,000
	Sub Total	**33,384**	**61,993**	**169,000**
	PHOTORESIST			
24	Decane	676	0	0
25	AZ 1350J	780	0	0
26	Krylon	780	0	0
27	SPR-2FX (812L)	0	2,637	7200
28	SPR 818L	0	2	0
29	SPR 824L	0	557	1500
30	SPR FSC-L	0	306	900
	Sub Total	**2,236**	**3,502**	**9600**

Chemical Usage Projection Comparisons

No.	CHEMICAL	1981 Estimated Yearly Volume (Gallons)	1995 Actual Yearly Volume (Gallons)	2001 Estimated Yearly Volume (Gallons)
	ACIDS - CORROSIVE			
31	Phosphoric Acid	17,160	2,953	8,000
32	Sulfuric Acid	26,000	16,913	45,700
33	Hydrofluoric Acid	8,840	4,861	13,000
34	10:1 HF (See Note 1)	15,080	2,193	6,000
35	100:1 HF (Similar to Note 1)	1,040	0	0
36	500:1 HF (Similar to Note 1)	1,560	0	0
37	5:1 BOE (Similar to Notes 1 and 2)	0	990	2,700
38	6:1 BOE (Similar to Notes 1 and 2)	0	2,317	6,300
39	20:1 BOE (Similar to Note 2)	0	3,465	9,400
40	Acetic Acid	12,168	0	0
41	Hydrochloric Acid	12,584	41 [3]	110
42	500 Oxide Etch	11,960	0	0
43	Ammonium Fluoride	520	0	0
44	Aluminum Etch	0	198	550
	Sub Total	**106,912**	**33,931**	**91,760**
	WWTP & DI Chemicals			
45	Lime	650,000	0	0
46	Caustic (NaOH)	130,000	106,760	200,000
47	Sulfuric Acid (H2SO4)	10,400	68,380	140,000
48	Calcium Chloride (CaCl2)	0	54,636	150,000
	Sub Total	**790,400**	**229,776**	**490,000**
	GRAND TOTALS	**1,039,012**	**540,293**	**1,290,019**
	Basic Number of Chemicals [3]	25	26 [3][4]	27 [4]

Notes:

[1 10:1 HF is 1 part 49% HF diluted in 10 parts of deionized water.

[2 BOE is 34.1% NH4F plus 7.2% of 49% HF plus 0.01% FC-93 surfactant plus 58.69% dionized water.

[3 To be considered in the basic chemical count, the use had to be greater than 100 gallons/year.

[4 HF and 10:1 HF are counted as one basic chemical. 5:1 BOE, 6:1 BOE and 20:1 BOE are counted as one ba chemical.

EXHIBIT II

Gases Usage Projection Comparisons

No.	GAS	1981 Estimated Yearly Volume (Lbs.)	[2][3]	1995 Actual Yearly Volume (Lbs.)	2001 Estimated Yearly Volume (Lbs.)
	Cylinder Gas				
1	Ammonia (NH3)	N/A		250	600
2	Antimony Trioxide (SbO3)	64		0	0
3	Argon (Ar)	N/A		7,568	18,163
4	Arsenic Trioxide (AsO3)	13		0	0
5	Arsine (AsH3)	1		1	2
6	Boron Trichloride (BCl3)	N/A		880	2,112
7	Boron Trifluoride (BF3)	N/A		19	46
8	Chlorine (Cl2)	N/A		1,840	4,416
9	2% Diborane (B2H6)	933		152	365
10	Dichlorosilane (SiH2Cl2)	8,835		540	1,296
11	Freon 14 (CF4)	N/A		980	2,352
12	Freon 23 (CHF3)	N/A		630	1,512
13	Freon 116 (C2F6)	N/A		3,990	9,576
14	Helium (He)	N/A		403	1,088
15	Hydrogen Bromide (HBr)	N/A		760	1,824
16	Hydrogen Chloride (HCl)	760		0	0
17	Krypton Neon (Kr/Ne)	0		0	1,500
18	Krypton Neon Fluoride (Kr/Ne/F)	0		0	1,500
19	Methane (CH4)	N/A		1	2
20	Nitrogen (N2)	N/A	[1]	660	1,584
21	Nitrogen Trifluoride (NF3)	N/A		1,010	2,424
22	Nitrous Oxide (N2O)	N/A		1,680	4,032
23	Phosphine (PH3)	74		13	31
24	Silane (SiH4)	41		970	2,328
25	Sulfur Hexafluoride (SF6)	N/A		1,855	4,452
26	Tetrachlorosilane (SiCl4)	1,555		0	0
27	Tungsten Hexafluoride (WF6)	N/A		120	288
	Sub Total	12,276		24,322	61,493
	Poundage less Ar, N2O, He, N2	12,276		14,011	36,626
	Total number cylinder gases	9		21	23
	Total number cylinder gases less Ar, N2O, He, N2	9		17	19(+/-)
	Bulk Gas				
28	Bulk Nitrogen (N2)	N/A	[1][3]	15,304,000	31,000,000
29	Bulk Hydrogen (H2)	N/A	[3]	23,138	38,000
30	Bulk Oxygen (O2)	N/A	[1][3]	294,445	600,000
31	Bulk Argon (Ar)	N/A		0	600,000
	Sub Total			15,621,583	32,238,000
	GRAND TOTALS	12,276		15,645,905	32,299,493

Notes N/A - No identified forecast

[1] No Quantities Forecast, is listed as Used on page 165 of the FEIS.

[2] Gas projection made in Fairchild Engineering Report Addendum 1, dated 7/16/81, see Exhibit VI. Addendum obtained from City files provided to MASCA, 12/95.

[3] Exhibit III lists in table form where the various gases are mentioned in the 1981 FEIS and how gas use was to be detailed in the Concomitant Agreement.

Exhibit III

1981 FEIS Statements Relative to Chemicals and Gases

FEIS PAGE #	# IDENTIFIED		NOTES
	CHEMICALS	GASES	
22	Approx. 25	Some Gases	
60	"Many"		
82 and 83		Nitrogen	Notes nitrogen manufacturing plant to be constructed.
165	Approx. 25	Variety	Gases hydrogen, silane, oxygen, arsine, phosphine. Flammable liquids and acids acetone, isopropyl alcohol, xylene, hydrofluoric acid sulfuric acid, hydrochloric acid.
A-26 - A-32			Fairchild general memo on chemicals and gases.
A-59			V.O.C.'s listed as acetone, isopropyl alcohol, trichloroethylene, [freon TF/CFC-113/1,2;2,-tricholorethane], freon TNC, hexamethyldisilane.
A-74			Silicon, aluminum, gold, titanium, silver, hydrogen, silane, oxygen, arsine, phosphine, acetone, isopropyl alcohol, xylene, hydrofluoric acid, sulfuric acid, and hydrochloric acid.
A-76			"The quantities of chemicals that will be used at the facility are not available at this time, nor will they be until the manufacturing process is sized in the next 26 weeks."
A-87			"Extreme care in the handling of hazardous substances and strict enforcement of safety codes will virtually eliminate any potential threat to neighboring schools and residences. No hazardous emissions will be discharged into the air. See Section VI., I., pg. 65."

CONCOMITANT AGREEMENT PAGE #	# IDENTIFIED		NOTES
	CHEMICALS	GASES	
4			Isolate chemical room/handling area drains from storm water drains.
19	Variety		
20			• 1 year notice of chemical use in advance of the commencement of operation. • Thereafter, "Within ten (10) working days, the City will be notified of any new chemicals developed at the project or handled in the manufacturing process."

Puyallup, Washington

INTER-OFFICE COMMUNICATION

"Put it in Writing"

TO: John Adamson, City Manager **DATE:** July 15, 1981

FROM: Richard Carman, Fire Marshal **REPLY BY:**

SUBJECT: Report on Meeting with Fairchild Representatives on July 6, 1981 at 1330 hours at Fire Station Number 2

Representatives Attending:

City: Dale Pierce, Fire Chief; Richard Carman, Fire Marshal; Dean Farmer, Fire Inspector; Jim Peterson, Building Inspector.

I.C.B.O.: Les Gilles, Seattle Office; John L. Haigh, Senior Fire Protecti Engineer, Seattle Fire Department.

Fairchild Camera and Instrument: Robert Wolf, Construction Manager; Lee Neal, Corporate Manager; Jack Mills, Senior Engineering Manager.

1. DISCUSSION OF HAZARDOUS CHEMICALS

Chief Carman presented to the representatives present a matrix on the chemicals that would be used at Fairchild Camera and Instrument Corporation. This matrix was divided into the following areas: fire leak spill control and containment, a storage separation form, chemical effects, transport containers, and chemical reaction capabilities to each other. Jack Mills agreed to look this matrix form over and make any necessary corrections. See Appendix A.

Key Point

*

Jack Mills presented to Chief Carman a chemical analysis breakdown showing chemical concentrations and volume used by week. See Appendix B.

2. CONSTRUCTION OF THE BUILDING AND STORAGE AND HANDLING OF HAZARDOUS CHEMICALS

The following items were discussed and tentatively agreed to as alternates in lieu of classifying the building as a H-1 occupancy: 1) The building shall be classified as a Group B Division 2 Occupancy with certain stipulations. 2) Separate drains and lines would be provided for the separate chemicals. 3) Inside storage and handling would be according to National Fire Protection Association Standards and Uniform Fire Code. 4) Inch and a half stand pipes would be provided for the interior building and would be placed according to the Fire Marshal. 5) The fab area shall be separated from the remainder of the building by a complete one hour occupancy separation. 6) All hazardous materials introduced to the fab area shall be delivered without passing through required exit corridor or lobbies. Service corridors may be provided for transportation of hazar ous materials. 7) Flammable or combustible materials in the fab area shall not exceed the amounts permitted in Table 9 A 1979 UBC unless stored in approved flammable liquid storage rooms. 8) Plastic duct work, 8 inche or greater in diameter, used as part of the air handling system, shall be provided with internal fire sprinkler protection with sprinklers spaced at twelve feet. Where ducts are used to handle corrosive vapors, sprinklers shall be double dipped in beeswax. 9) Hazardous materials shall be separated in accordance with good fire prevention practices and as provided in the uniform fire code. 10) Toxic pyrophoric or flammable gases shall be located as close to in-use as possible. 11) All fab areas within the building shall be provided with sufficient exhaust ventilation to maintain a safe atmosphere. Where the total area of all fab areas within the building exceeds 1,500 square feet, such ventilation system shall be provided with emergency stand-by power. 12) Detection devices providing constant monitoring shall be provided for all hazardous gases piped into the building. Such detection devices shall sound an alarm and perform such other automatic tasks as may be deemed necessary, such as shutting down hazardous operations. 13) Fire and evacuation plans shall be developed and periodic drills performed to insure safe evacuation of the building. All fire and evacuations planned shall be approved by the Fire Department. 14) Exiting shall be as required for hazardous areas. 15) Electrical control devices for hazardous operations shall be designed to switch to a safe mode in the event of a power failure or shall be connected to an emergency power supply. 16) Chemical storage rooms within the building shall be separated from the remainder of the building by a one hour occupancy separation and shall be vented to the fume scrubber. 17) Hazardous materials storage cabinets shall be approved by the Fire Marshal. 18) Air exhaust systems shall be maintained to provide nine air changes per hour.

3. EQUIPMENT NEEDS REQUIRED FOR PROTECTION

Chief Carman presented Jack Mills with a list of equipment that will be required for protection of Fairchild. The list consisted of 1) 75 foot telescopic ladder-water tower engine. 2) One hazardous materials response vehicle. 3) Four acid suits. 4) Large quantities of foam concentrate in storage. 5) High expansion foam application equipment. 6) Four biopack type respiratory systems. 7) Emergency repair kits for compressed gas cylinders. 8) Additional manpower for Station 2 for adequate first response manning. 9) Increased training in the field for response and containment of hazardous materials spills.

Jack Mills stated that it is not customary for Fairchild Camera and Instrument Inc. to provide the type of equipment and manpower requested by Chief Carman; however, he would take it under advisement with Corporate Officers. Mr. Mills did state that Fairchild would be willing to supply the Fire Department with acid suits which would be kept on the premises, Halon Type portable fire extinguishers for responding engines, increased training in the field for response and containment of hazardous materials spills, and absorbent materials to be carried on engines for absorbing hazardous chemical spills.

It was agreed that Fairchild would arrange for another meeting with representatives of Puyallup Fire Department, Building Department in the month of August for further discussion of projected plans.

RC:dm

Richard Dam[illegible]

FIRE/LEAK/SPILL

CONTROL AND CONTAINMENT

	S.C.B.A	Acid Suit	Flammable	Combustible	Explosive	Suffocating	Absorbed thru Skin	May ignite Combustibles	Heavier than air	USE WATER ******	Dry Chemical	CO2	Alcohol Foam	High Expan. Foam	Soda Ash	Slaked Lime	REACTS WITH WATER***	Use Water Spray			
Nitric Acid	X	X		X	X	X				X											
Sulfuric Acid	X	X									X						X				
Acetic Acid	X	X		X			X			X	X	X	X								
Hydrochloric Acid	X	X		X		X				X					X	X					
Phosphoric Acid	X	X		X	X			X			X	X	X				X	X			
Hydrogen Peroxide	X	X			X			X										X			
Hydrogen Fluride	X	X		X						X											
Acetone	X	X	X		X	X					X	X	X					X			
Isopropyl Alcohol	X	X	X															X			
III Trichloroethane	X	X		X	X		X				X	X		X				X			
Xylenes	X	X	X			X			X		X	X		X				X			
Sodium Hydroxide	X	X		X			X			X											
Po. .sium Hydroxide	X	X		X						X											
Boron Tribromide	X	X		X	\		X				X	X					X				Gas
Na Dichromate	X	X			X				X		X	X		X				X			
Decane	X	X	X		X	X					X	X		X				X			
Iodine	X	X			X					X		X		X				X			
Diborane	X	X	X		X						X	X		X				X			Gas
Silane	X	X	X		X						X	X		X				X			Gas
Dichlorosilane	X	X	X								X	X		X				X			
Argon	X	X		X		X					X	X		X				X			Gas
Ammonia	X	X									X	X		X			X	X			Gas
Propane	X	X	X		X	X					X	X		X				X			
Arsine	X	X	X		X						X	X		X				X			
Helium	X			X		X					X	X		X				X			
Silicon Tetrachloride	X	X		X							X	X		X				X			
Phospine	X	X	X								X	X		X				X			
Hydrogen	X	X	X			X					X	X		X				X			
Oxy n (compressed)	X										X	X		X				X			
Oxygen (liquid)	X	X				X					X	X		X				X			
Ammonium Floride	X	X		X							X	X		X				X			

EXHIBIT IV

STORAGE

SEPARATE FROM

(Check for Electrical compliance)

	Metallic Powders	Carbides	Hydrogen Sulfides	Organic Acid	Combustibles	Organic Materials	Oxidizable Materials	Chlorates	Fulminates	Nitrates	Picrates	Detached Storage	Turpentine	Acids	Metal	Explosives	Organic Peroxides	Wood	Paper	Oil
itric Acid	X	X	X	X	X	X	X						X							
ılfuric Acid	X	X			X			X	X	X	X									
cetic Acid					X		X													
ydrochloric Acid							X													
hosphoric Acid																				
ydrogen Peroxide					X	X	X													
ydrogen Floride	X	X	X	X	X	X	X	X	X	X	X	X	X							
cetone																				
sopropyl Alcohol																				
II Trichloroethane																				
ylenes												X	X							
odium Hydroxide												X		X	X	X	X			
otassium Hydroxide																				
oron Tribromide												X								
a Dichromate																				
ecane																				
odine						X														
iborane																				
ilane																				
ichlorosilane																				
rgon																				
nmonia																				
ropane																				
rsine												X								
elium																				
licon Tetrachloride																		X	X	X
hospine												X								
ydrogen							X													
[illegible] (compressed)																		X	X	X
xygen (liquid)																		X	X	X
nmonium Floride																				
[illegible]	X								X											
[illegible]	X								X											

EXHIBIT IV
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CHEMICAL EFFECTS

	Poisonous	Caustic	Corrosive	Toxic	Oxidzer	Liquid	Powder	Solid	Gas	Crystals	Spontaneous Combust.										
itric Acid		X	X	X		X															
lfuric Acid		X	X			X															
cetic Acid		X				X															
ydrochloric Acid	X	X				X															
hosphoric Acid	X	X				X															
ydrogen Peroxide		X	X	X	X	X					X										
ydrogen Fluride		X	X	X		X															
cetone	X	X				X															
sopropyl Alcohol		X				X															
II Trichloroethane	X	X				X															
ylenes				X		X															
So ium Hydroxide	X		X			X		X													
Potassium Hydroxide		X	X			X		X													
oron Tribromide	X	X																			
a Dichromate	X	X																			
ecane	X	X																			
odine	X	X			X					X											
iborane	X	X																			
ilane	X	X																			
ichlorosilane	X																				
rgon	X																				
mmonia	X	X																			
ropane																					
rsine	X	X																			
elium	X																				
ilicon Tetrachloride	X	X																			
hospine	X	X																			
ydrogen																					
x n (compressed)																					
xygen (liquid)																					
monium Floride	X	X								X											

EXHIBIT IV

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TRANSPORT CONTAINERS

	Glass Bottles	Carboys	Aluminum	Stainless Steel	Tank Trucks	Drums	Barrels	Polyethylene Carboys	Tank Cars	Steel Cylinders	Cans	Boxes	Compressed Gas								
:tric Acid	X	X	X	X																	
:lfuric Acid	X	X			X	X	X		X												
.etic Acid	X	X				X		X													
-drochloric Acid	X	X							X												
.osphoric Acid																					
ydrogen Peroxide	X	X	X					X	X												
drogen Fluride	X							X		X											
cetone																					
opropyl Alcohol																					
.I Trichloroethane																					
ylenes	X				X	X			X												
dium Hydroxide	X					X			X		X										
ot .sium Hydroxide	X					X	X		X			X									
ron Tribromide																					
a Dichromate																					
cane																					
dine																					
iborane												X									
lane												X									
ichlorosilane																					
gon																					
monia																					
ropane																					
rsine																					
elium																					
ilicon Tetrachloride																					
ospine																					
ydrogen																					
xy n (compressed)																					
xygen (liquid)																					
monium Floride																					

EXHIBIT IV
PAGE 7 OF 10

Chemical Reactions to each other on contact

Chemical	No.	1 Acetic Acid	2 Acetone	3 Ammonia	4 Ammonium Flouri	5 Argon	6 Arsine	7 Boron Tribr	8 Decane	9 Diborane	10 Dichlorosilane	11 Na Dichromate	12 Helium	13 Hydrochl. Acid	14 Hydrogen	15 Hydrog. Flourid	16 Hydro. Peroxide	17 Iodine	18 Isopro. Alcohol	19 Phosphoric Acid	20 Phosphine	21 Propane	22 Potassi. Hy	23 Oxygen	24 Nitric Acid	25 Silane	26 Silicon Tetra.	27 Sodium Hydrox.	28 Sulfuric Acid	29 III Trichloro.	30 Xylene	31 Ethyl Glycol	On-site storage Gallons
cetic Acid	1				X							X					X	X		X			X	X	X			X				X	468
etone	2											X					X	X		X				X	X				X				900
monia	3											X				X	X	X		X				X									N/I
monium Flouride	4	X												X						X					X				X				20
gon	5																																N/I
sine	6								X								X	X		X				X	X								N/I
ron Tribromide	7																																2oz
ecane	8																X																26
borane	9											X			X		X	X		X				X	X								N/I
chlorosilane	10																																N/I
a Dichromate	11	X	X	X			X			X		X			X			X					X	X					X		X	X	1
elium	12																																N/I
drochloric Acid	13				X												X						X					X					484
drogen	14											X					X	X		X				X	X								N/I
drogen Flouride	15			X																													960
drogen Peroxide	16	X	X	X			X		X	X					X				X	X		X	X		X				X		X	X	1000
odine	17	X		X			X			X						X							X						X		X	X	2 lbs
sopropyl Alcohol	18											X					X	X		X				X	X								1050
osphoric Acid	19	X	X	X	X		X			X					X								X					X	X		X	X	660
hine	20											X					X	X		X				X	X								N/I
opane	21																X																N/I
tassium Hydro *	22	X										X		X			X	X		X				X	X				X	X			100
ygen	23	X	X	X			X			X					X								X						X		X	X	N/I
tric Acid	24	X	X														X		X										X		X		284
lane	25																																N/I
licon Tetrach*	26																																N/I
dium Hydroxide	27	X												X						X					X				X				4000
lfuric Acid	28				X							X					X	X		X			X	X	X			X					1400
II Trichloro *	29																						X										760
lene	30											X					X	X		X				X	X								600
hylene Glycol	31	X										X					X	X		X				X	X								1

* Potassium Hydroxide
* Silicon Tetrachloride
* III Tichloroethane

N/I No Information Provided

EXHIBIT IV
PAGE 8 OF 10

APPENDIX B

Table 1

PROCESS CHEMICALS

Chemical	Concentration (%)	Volume (gal/wk)
1. Acids, General		
Nitric acid	71%	142
Sulfuric acid	98	500
Acetic acid	99	234
Hydrochloric acid	38	242
Phosphoric acid	85	330
Hydrogen peroxide	32	500
2. Acids, Hydrofluoric		
Hydrofluoric acid	49%	170
10:1 HF	(a)	290
100:1 HF	-	20
500 Oxide etch	(b)	230
Ammonium fluoride	-	10
500:1 HF	-	30
3. Solvents		
Acetone	-	450
Isopropyl alcohol	-	540
1,1,1-Trichloroethane	-	380
Xylene	-	50
HMDS	(c)	250
J-100	(d)	280
4. Bases		
Sodium hydroxide	52%	40
Potassium hydroxide	45	50
5. Low Volume Chemicals		
Boron tribromide	1 ounce/week	
Sodium dichromate in water	1/2 gal/week	
Ethylene glycol	1 ounce/week	
Decane	13 gal/week	
AZ 1350 J Photoresist	15 gal/week	
Iodine crystals	1 pound/week	
Krylon	15 gal/week	
$POCI_3$	1 ounce/week	

[a] 10 parts of water to one part of 49% HF.
[b] 10:1 HF buffered with ammonium fluoride.
[c] 5% hexamethylidisilande in 95% xylene.
[d] A mild sulfonic acid in 17% phenol including 44% Tetrachloroethylene by weight.

EXHIBIT IV
PAGE 9 OF 10

Table 1 (continued)

Chemical	Concentration (%)	Volume (gal/wk)
6. Chemicals Used in Vapor Phase Processes		
Dichlorosilane		
Tetrachlorosilane		
Arsine		
Arsenic trioxide		
Antimony trioxide		
Phosphine		
Silane		

FAIRCHILD
CAMERA AND INSTRUMENT CORPORATION

464 ELLIS STREET, MOUNTAIN VIEW, CALIFORNIA 94042 (415) 962-5011 CABLE FAIRSEMCO MOUNTAIN VIEW, CALIF
Puyallup Project Office - P.O. Box 5000 Puyallup, WA 98371

June 22, 1981

JUN 23 1981

Warren H. Gray, P.E.
City Engineer
City of Puyallup
P.O. Box 458
Puyallup, WA 98371

Dear Mr. Gray:

Enclosed for your information is a copy of the Engineering Report submitted by Fairchild and its consultant, CH2M-Hill, to the Washington State Department of Ecology on this date.

Further detail concerning the future operation of the clarifiers at the Puyallup STP is required by DOE. It is requested that a meeting between the parties concerning this subject be convened as soon as practical. Mary Jo Mueller of CH2M-Hill will be in contact with you shortly to schedule such a meeting, on behalf of Fairchild.

Very truly yours,

R. B. Wolf, P.E.
FAIRCHILD CAMERA & INSTRUMENT CORP.

cc. Tony Vivolo, P.E. (Gray & Osborne, Inc.)

EXHIBIT V
PAGE 1 OF 2.

Table 2

TREATMENT CHEMICALS

Chemical	Concentration	Volume (Gal/Wk)
1. WASTEWATER TREATMENT		
Lime	10% As $Ca(OH)_2$	12,500
Caustic	30%	2,500
Sulfuric Acid	98%	200
2. WATER TREATMENT		
Boiler Feedwater	Nonphosphate/Nonchromate	
Cooling Tower Make Up Water	Nonphosphate/Nonchromate	
Reverse Osmosis Feedwater	98% Sulfuric Acid	

EXHIBIT V
PAGE 2 OF 2

FAIRCHILD ENGINEERING REPORT
ADDENDUM 1: RESPONSE TO COMMENTS
FROM DOE DATED JULY 16, 1981

1. The contaminated KOH used for cleaning in the sputtering area will be hauled to the hazardous waste disposal facility in Arlington, Oregon or sent to an approved recovery operation.

2. The J-100 solvent is rinsed from the wafers with isopropyl alcohol. This contaminated solution will be hauled to the hazardous waste disposal facility in Arlington, Oregon or sent to an approved recovery operation.

3. Two of the low volume chemicals shown in Table 1 of the Engineering Report require further clarification. The AZ 1350 J photoresist is an organic polymer that depolymerizes when exposed to light, more specifically, it is a cresol formaldehyde resin in a diazoketone sensor. The AZ 1350 J photoresist solution is 82% ethyl cellusolve acetate. The krylon is cis-polyisoprene.

4. The chemicals used in the vapor phase have not been detected in scrubber water. This is primarily due to the way they are used. Unlike the other chemicals shown in Table 1 the vapor phase compounds are not rinsed over the surface of the wafer and then discharged, rather they are introduced <u>into</u> the wafer during the process of building the layers that will form the circuit. Very small quantities of these chemicals are used:

Chlorosilane (90% dichlorosilane and 10% tetrachlorosilane)	19,010 liters/week
Arsine	Currently not planned for use. If used, ≤ 1 liter/week
Arsenic trioxide	Currently not planned for use. If used, ≤ 0.25 lb./week
Antimony trioxide	1.25 lb./week
Phosphine	2,835 liters/week
Silane	252 liters/week
Diborane	132 liters/week
Hydrochloric Acid	34,020 liters/week

110L1

EXHIBIT VI

P. 1 of 1

EXHIBIT VII

NPDES PERMIT CONDITION COMPARSION

YEAR	1985				6/27/91				6/30/94			
	MONTHLY AVERAGE		DAILY MAXIMUM		MONTHLY AVERAGE		DAILY MAXIMUM		MONTHLY AVERAGE		DAILY MAXIMUM	
	mg/l	#/DAY	mg/l	#/DAY	mg/l	#/DAY	mg/l	#/DAY	mg/l	#/DAY	mg/l	#/DAY
001	PUYALLUP RIVER VIA POTW OUTFALL											
FLOW	0.375 MGD		0.576 MGD		0.7 MGD		1.0 MGD		1.6 MGD		1.88 MGD	
pH	6 TO 9				6 TO 9				6 TO 9			
TSS	15	47	30	144	15	88	30	175	15	200	30	400
BOD_5	15	47	30	144	15	88	30	175	7	88	13	175
F	16		26		16	93	26	152	16		26	
P	3		5		3	18	5	29	3		5	
NH_3	30		60		20	117	32	187	11	147	18	240
TTO							1.37		NARRATIVE STATEMENT			
Hg ppb											.08 ppb	
TRCL											.05	
002	SANITARY SEWER - CITY OF PUYALLUP POTW											
FLOW	0.025 MGD		0.045 MGD		0.04 MGD				0.076 MGD			
pH	6 TO 9				6 TO 9				6 TO 9			
TTO			1.37				1.37		NARRATIVE STATEMENT			
XYLENE			5		NO REQUIREMENT				NO REQUIREMENT			
ACETONE IPA	CITY REQUIREMENT FOR FLAMMABLES				CITY RE'QUIREMENT FOR FLAMMABLES				CITY REQUIREMENT FOR FLAMMABLES			
003	STORMWATER RETENTION POND - STORMWATER + CARBON/SAND/FINAL FILTER BACKWASHES											
FLOW	0.15 MGD		0.3 MGD		NO POND OVERFLOWS				NO POND OVERFLOWS			
pH	6 TO 9				6 TO 9				6 TO 9			

File: tabnpdes.wpd
January 20, 1996 RGF

FRUITLAND MUTUAL WATER COMPANY

P.O. Box 73759 • 11309 - 94th Avenue East • Puyallup, WA 98373 • (206) 848-5519

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DEVELOPMENT SERVICES

AUG 14 1996

CITY OF PUYALLUP
STAFF INITIALS ________

August 13, 1996

Tom Utterback, Planning Manager
City of Puyallup
218 West Pioneer
Puyallup, Washington 98371

RE: Comments to the Draft Environmental Impact Statement
Matsushita Semiconductor Corporation - Building "D" Expansion

Dear Mr. Utterback:

The Fruitland Mutual Water Company is an adjoining property owner and directly affected by the proposed Matsushita Semiconductor Building "D" Expansion. Our particular concerns are with the handling and proper disposal of chemicals, and the infiltration of storm water. These two issues cause a potential threat of contamination to the ground water resource from which we service.

Fruitland owns, operates and maintains a major domestic well located in the southeast corner of the original Matsushita parcel. This well has been the backbone of the water company since 1986 when it was dug. This well pumps 1000 gallons per minute and produces an average 236 million gallons of domestic drinking water per year. It supports the entire east side of our service area, including the South Hill Mall and the commercial zones along Meridian Street, in and outside the City.

As Manager for Fruitland Water, I have reviewed the DEIS. One area of concern I wish to comment on refers to the various chemicals used in the semiconductor process. The acids, such as sulfuric acid, sodium hydroxide, hydrofloric acid, acetone and other acids and corrosive chemicals are a concern if flushed into drains or allowed to enter the detention/infiltration pond, and ultimately the ground water table. 12-1

Also I am concerned about the retention/detention of "storm" water which is allowed to infiltrate the ground. Case in point, the statement that waters sampled in the (existing) detention/infiltration pond (revealed) aluminum, arsenic, manganese, zinc, lead copper, phenol, chloroform, and bis(2-ethylhexyl) phthalate (HHRA-3.1-(1)-15). Waters from this detention/infiltration pond contaminate the potable ground water. The report continues to state "it has not been determined whether water from the detention/infiltration pond infiltrates into the potable groundwater" (HHRA-3.1-(2)-15), yet earlier in the report it states "The infiltration pond is constructed in course, excessively drained soils. These 12-2 soils do not provide water quality treatment and therefore, create a potential groundwater pollution problem" (3.2.2-(17)-3-11). Don't wait for contaminants to just "show up" in the ground water. Eliminate them from entering the potable ground water from the source. Once polluted, it would be inconceivable to treat 420 feet of the earth between the surface and the aquifer from which we draw water. Even if the levels are "below toxic threshold"(HHRA-4.0-(1)-23), there is concern for letting this contaminated water infiltrate the ground. 12-2

Fruitland Water Company encourages and supports the City of Puyallup to stand firm on the mitigation measures and the proper treatment and disposal of the chemicals, hazardous materials, the sanitary and storm waters and other potential contaminates that could, and do, enter the ground waters. As owners of the Fruitland Mutual Water Company, the Share-Holders of the Company want the assurance there are no signs, or increased levels of Volatile Organic Compounds, (VOC's), Semivolatile Organic Compounds (SVC's), Synthetic Organic Compounds (SOC's), Herbicides and Pesticides, Aroclors/PCB's, Inorganic Compounds (IOC's), Cyanide or Heavy Metals associated or caused by the operation, spills or otherwise improper disposal, either by accident, inadvertent or intentional mishandling. 12-3

If you wish to discuss these or other items about the DEIS, you may contact me at (206) 848-5519.

FRUITLAND MUTUAL WATER COMPANY

Roger A. Nottage
General Manager

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600 • (206) 407-6000 • TDD Only (Hearing Impaired) (206) 407-6006

August 13, 1996

Mr. T. Michael Casey
City of Puyallup
218 W Pioneer
Puyallup WA 98371

Dear Mr. Casey:

Thank you for the opportunity to comment on the supplemental environmental impact statement (EIS) for the Puyallup Science Park, MASCA Puyallup Plant expansion proposed by the Matsushita Semiconductor Corporation of America. We reviewed the supplemental EIS and have the following comments.

The final EIS should state that the Matsushita Semiconductor Corp. will continue to comply with all applicable Dangerous Waste Regulations, Chapter 173-303 WAC, for generation and accumulation of regulated quantities of hazardous waste. 13-1

If you have any questions, please call Mr. Leon Wilhelm with our Hazardous Waste and Toxics Reduction Program at (360) 407-6362.

Sincerely,

Rebecca J. Inman

Rebecca J. Inman
Environmental Review Section

RI:
96-4865

cc: Abbe White, SWRO
Leon Wilhelm, SWRO

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

P.O. Box 47600 • Olympia, Washington 98504-7600 • (206) 407-6000 • TDD Only (Hearing Impaired) (206) 407-6006

August 14, 1996

Mr. T. Michael Casey
City of Puyallup
218 W. Pioneer
Puyallup WA 98371

Dear Mr. Casey:

We sent you a letter on August 13, 1996 regarding the supplemental environmental impact statement (EIS) for the Puyallup Science Park, MASCA Puyallup Plant expansion proposed by the Matsushita Semiconductor Corporation of America. Since then we have additional comments.

The EIS (page 1-4) recommends that all process wastewater from Matsushita be rerouted to the Puyallup River via outfall 001. This would require a modification to the existing National Pollutant Discharge Elimination System (NPDES) permit No. WA0039578. Matsushita Semiconductor must submit a permit application along with all necessary information no less than 180 days prior to the re-routing of all process wastewater to outfall 001. 14-1

The proponent must also address issues to water quality and human health criteria for pollutants expected to be present in the discharge. "All known available and reasonable methods of treatment" (AKART) must be applied to any new proposed discharge. The information submitted must include an evaluation of the existing treatment and conveyance systems to determine hydraulic capacity and the need for additional treatment necessary to meet the water quality and human health criteria, and provisions of AKART. Information should also be submitted in regards to the impact on mixing zones and dilution factors as a result of the new discharge. 14-2

Final approval by the Department of Ecology of the proposed re-routing will occur through the NPDES permit modification process, subject to all required public notice and other procedures.

Matsushita is responsible for demonstrating compliance with all applicable environmental laws and regulations. The detailed information cited above should be summarized in an engineering report prepared according to Chapter 173-240 WAC. The engineering report should be submitted to Ecology for review and approval concurrent with Matsushita's submission of a formal request to modify the NPDES permit. 14-3

Michael Casey
August 14, 1996
Page 2

If you have any questions, please call Mr. Anise Ahmed with our Water Quality Program at (360) 407-6289.

Sincerely,

Rebecca J. Inman

Rebecca J. Inman
Environmental Review Section

RI:
96-4865

cc: Anise Ahmed, SWRO
Abba White, SWRO

Citizens
for a
Healthy
Bay

771 Broadway
Tacoma, WA 98402
Phone (206) 383-2429
Fax (206) 383-2446

August 14, 1996

Tom Utterback
Planning Manager
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

Re: Matsushita Semiconductor Draft Supplemental Environmental Impact Statement

Dear Mr. Utterback,

Citizens for a Healthy Bay (CHB) appreciates the opportunity to comment on the Draft Supplemental Environmental Impact Statement (DSEIS) for Matsushita Semiconductor. After a brief review of the document, CHB supports the efforts of the City of Puyallup requiring further protection measures of the company's waste water discharge systems.

With the plant expansion, Matsushita will increase its waste water discharge flows considerably. It is the company's responsibility to make sure its discharges meet the permit effluent limits outlined in its NPDES permit. The City of Puyallup is to be commended for requiring Matsushita to construct its own pipeline to the POTW and overflow tanks. Also, the ongoing studies to determine the biological contaminants disrupting the system are critical to the protection of the City's treatment system and the Puyallup River. **15-1**

CHB will continue to follow the expansion of the Matsushita plant. As outlined in the DSEIS, the plant expansions and treatment system upgrades will require amendments to Matsushita's current NPDES permit. CHB looks forward to a more in depth review of the proposed waste water discharge system at that time.

Sincerely,

Leslie Ryan

Leslie Ryan
CHB Environmental Policy Analyst

LAW OFFICE
of the
PUYALLUP INDIAN TRIBE

August 14, 1996

VIA FAX AND MAIL

Tom Utterback, Planning Manager
City of Puyallup
218 West Pioneer
Puyallup, Washington 98371

Re: Draft Supplemental Environmental Impact Statement
Matsushita Semiconductor Corp of America (MASCA)
Building "D" Expansion

Dear Mr. Utterback:

The Puyallup Tribe requests an extension of time to provide comments on the Matsushita Draft Supplemental EIS. The combined outfall for discharges from the Matsushita facility and the City of Puyallup POTW appears to be in the Puyallup River within the 1873 survey boundaries of the Puyallup Indian Reservation and is therefore subject to Tribal water quality standards and possibly other Tribal permitting requirements. The Tribe requires additional time to develop information on the proposed facility expansion and its impacts on Tribal interests before providing comments on the Draft EIS. 16-1

Please contact me at 593-0229 if you have any questions about this request.

Sincerely,

Martha Fox

Martha A. Fox, Attorney
Tribal Law Department

cc: Russ Ladley
Bill Sullivan

2002 East 28th Street • Tacoma, Washington 98404 • (206) 593-0227 • Fax (206) 272-9514

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PLANNING & COMMUNITY AFFAIRS

AUG 1 9 1996

CITY OF PUYALLUP

Panasonic

Matsushita Semiconductor Corporation of America

1111 – 39th Ave. S.E.
Puyallup, WA 98374

Tel 206-841-6000
Fax 206-841-6516

August 15, 1996

Mr. T. Michael Casey, Director
Planning and Community Development
SEPA Responsible Official
City of Puyallup
218 West Pioneer
Puyallup, WA 98371

Re: Comments on Draft SEIS Mitigation Measures

Dear Mr. Casey:

This letter constitutes MASCA's final comments on the draft Supplemental Environmental Impact Statement ("SEIS") for the MASCA Plant Building D Expansion Project.

As you are aware, the Puyallup Tribe of Indians is greatly concerned regarding the environmental quality of the Puyallup River and the environment near its lands. MASCA is also aware that the Tribe has significant regulatory authority to protect these natural resources. MASCA acknowledges that the proposed plant expansion will affect these tribal concerns. MASCA is committed to working cooperatively with the Tribe to address and resolve any issues related to its plant expansion.

As a result, MASCA has recently begun discussions with the Puyallup Tribe regarding any concerns the Tribe might have with respect to the MASCA plant and the proposed expansion. The Tribe and MASCA have agreed to continue discussions on this issue and work together to resolve any issues or concerns raised by the Tribe. MASCA agrees to implement additional mitigation measures mutually agreed upon by MASCA and the Puyallup Tribe to address the Tribe's concerns. These measures may be incorporated as conditions of a modified NPDES permit and should also become conditions of the site plan approval. **17-1**

Therefore, MASCA requests that the Final SEIS reflect this commitment by requiring an additional mitigation measure as follows:

> The mitigation measures shall be modified to include all measures mutually agreed upon by MASCA and the Puyallup Tribe of Indians.

Please do not hesitate to contact me if you have any questions regarding this matter.

Sincerely,

Frank Pfefferkorn
Vice President
Manufacturing and Engineering
Member of the Board

LAW OFFICE
of the
PUYALLUP INDIAN TRIBE

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PLANNING & COMMUNITY AFFAIRS
AUG 1 9 1996
CITY OF PUYALLUP

August 15, 1996

Tom Utterback, Planning Manager
City of Puyallup
218 West Pioneer
Puyallup, Washington 98371

Re: Draft Supplemental Environmental Impact Statement
Matsushita Semiconductor Corp of America (MASCA) Building "D" Expansion

Dear Mr. Utterback:

The Puyallup Tribe is withdrawing its request for a fifteen day extension of time to provide comments on the Matsushita Draft Supplemental EIS (SEIS). This letter will serve as the Tribe's comments on the SEIS.

As indicated in Mr. Pfefferkorn's letter to you of this date, the Tribe and MASCA have agreed to work together to resolve Tribal concerns arising from the proposed facility expansion, and MASCA has agreed to implement mitigation measures mutually agreed to by the Tribe and MASCA. While the measures agreed to by the Tribe and MASCA will address concerns arising from Tribal jurisdictional and regulatory authorities, the Tribe believes that some or all of these measures will be appropriate for inclusion as mitigation measures in the SEIS. We request that, after consultation with the City of Puyallup, the mitigation measures in the SEIS be modified to include appropriate measures mutually agreed upon by MASCA and the Puyallup Tribe. **18-1**

Please contact me at 593-0229 if you have any questions about this matter.

Sincerely,

Martha Fox

Martha A. Fox, Attorney
Tribal Law Department

cc: Russ Ladley
Bill Sullivan

2002 East 28th Street • Tacoma, Washington 98404 • (206) 593-0227 • Fax (206) 272-9514

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DEVELOPMENT SERVICES
AUG 15 1996
CITY OF PUYALLUP
STAFF INITIALS ______

To: Tom Utterback, Planning Manager

Re: MASCA Plant Expansion

From: Joseph P. Ball
1522 28th PL SE
Puyallup, Wa 98374

Date: 15 August 96

This letter is by way of public comment on the MASCA Plant Expansion. After reading the EIS report prepared by David Evans and Associates, Inc., it is obvious to me that granting permission to expand the facilities at the MASCA site, prior to having MASCA demonstrate the ability to manage their present facility at industry level standards, would not be in the interest of the people of Puyallup. The list of shortcomings is long and the promises to rectify the situation fall short of convincing me they can solve these shortcomings. It is in the interest of all concerned, and it is immanently logical that MASCA exhibit the ability to manage a smaller plant before granting them permission to build a larger plant. **19-1**

Of course, I am interested in the creation of more jobs, albeit low paying jobs. Also, I am not asking for more than industry level standards to be followed at this site. I do not think other cities and counties in the United States would be interested in having MASCA come in and run a plant below industry level standards either.

Thank you for the opportunity to comment on this important matter.

Sincerely,

Joseph P. Ball

Joseph P. Ball

Eric Lehto
2802 Briarwood Court North
Puyallup, Washington 98374
(206) 924-0603

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DEVELOPMENT SERVICES
AUG 15 1996
CITY OF PUYALLUP
STAFF INITIALS ______

Tom Utterback, Planning Manager
City of Puyallup
218 West Pioneer
Puyallup, Wa 98371

July 15, 1996

Dear Tom:

The expansion currently proposed by the MASCA Puyallup Plant appears to expand the use and storage of hazardous materials and chemicals. As a father, homeowner and a taxpayer, this expansion concerns me greatly. The value in dollars to the tax base of Puyallup compared to the possible long term effects might not be in the best interest of the city and its people. Given the dense population surrounding the plant, a serious comprehensive study from water quality to plant safety should be performed; therefore, Conducting tests Such as over the four natural seasons of the year would answer most concerns, which seems quite prudent with what is at stake. furthermore, I have added some questions that I would like answered.

1) How much water degradation will occur and why? **20-1**

2) Will this expansion affect aquifers, ecosystems, and other water supplies that people consume? **20-2**

3) Will the site meet all current regulations regarding Point Source and Non-point source pollution? **20-3**

4) Will site maintenance be fully documented on systems and machines? Will this information be readily obtainable by the municipalities? **20-4**

5) How will the training and equipment required for the Puyallup Fire Department be paid for? partially or in full? by MASCA or Puyallup before the expansion is ~~completed~~ implemented? **20-5**

6) Will all of the current and new dangerous products, and side effect, be disclosed to the public prior to implementation? **20-6**

7) Will the city require MASCA to implement seismic restraints (U.B.C and Semi S2-93, as described in the E.I.S Statement.) before construction is started? **20-7**

8) Will the Community be made aware of incidents (requiring the use of Hazardous waste responders) that have possible dangerous side effects to ecosystems, humans, and water quality? **20-8**

9) Will the city test the ground water regularly to constantly check site water conditions?

10) Will the site have water sampling wells installed for the testing of ground water?

11) Will the site or city pay for these wells? **20-9**

12) Will the pipe to the Puyallup sewage from MASCA meet current state / & the federal regulations? 12A Will there be physical checks of the F? 12B Will there be pipe inspections?

Cont on pg 3 of 3

13) If not on question 12, or 12ABCDE, who will pay for the new pipe? **20-10**

14) Will the Puyallup sewage plant be able to handle the additional waste and meet the future demands of the MASCA expansion? **20-11**

14A) Will A technology Meet current Best Management Practices? **20-12**

14B) Will MASCA Exceed Saftey Standards to insure the Communities Saftey? 20-13

15) If not on Question 14, Who will pay for the upgrades?

16) Will the city require security to be increased at the site? 20-14

17) Will the city require a security fence be installed to maintain security?

18) Does MASCA Meet the Zoning requirments with the added Hazardous chemicals and Materials 20-15

Thank you for your time.

Sincerely,

[signature] July 16, 1996

Eric Lehto

12C) What kind of monitoring will the MASCA pipe recive? 20-16

12 D) will pipe be upgraded to current standard if needed? 20-17

12 E) Will New Chemicals effect the pipe line or sewage treatment plant- 20-18

GARY PORTER, President MIKE GRUNWALD, Business Manager DAN MILLER, Recording Secretary

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PLANNING & COMMUNITY AFFAIRS
AUG 15 1996
CITY OF PUYALLUP

International Brotherhood of Electrical Workers

Suite 101
3049 South 36th

Local Union 76
Chartered June 6, 1894
TACOMA, WASHINGTON 98409

Telephone
475-1190 • 475-1192
FAX # (206) 475-0844
E.I.A.P. (206) 474-3646

August 14, 1996

City of Puyallup
Planning & Community Development
330 - 3rd Street SW
Puyallup, Washington 98371

Attn: T. Michael Casey, Director

VIA FAX: 840-6678

Dear Mr. Casey:

On behalf of the nearly 1,200 members of the International Brotherhood of Electrical Workers Local 76, I write in support of the Building "D" Expansion at the Matsushita Semiconductor Plant in Puyallup, Washington. 21-1

A number of I.B.E.W. Local 76 members live within a 5-mile radius of the Plant and have expressed no concerns regarding any possibility of personal or environmentally harmful incidents associated with MASCA's chip production process.

We urge you to approve the Draft Supplemental Environmental Impact Statement on this Expansion and use every mechanism within your power to expedite the permitting process.

Sincerely,

Mike Grunwald
Business Manager

MG/jh
opeiu#23

FROM PUYALLUP-PLANNING 8106260308

#2

CITY OF PUYALLUP - FAIRCHILD

CONCOMITANT AGREEMENT

THIS AGREEMENT made and entered into this 29th day of May, 1981, by and between the CITY OF PUYALLUP, Puyallup, Washington, a municipal corporation, hereinafter referred to as "City," and FAIRCHILD CAMERA AND INSTRUMENT CORPORATION, a Delaware Corporation, hereinafter referred to as "Fairchild."

WHEREAS, Fairchild acquired from the owners of certain parcels of property an option to purchase approximately ninety-five (95) acres of real estate situated in the City of Puyallup, Pierce County, Washington, as more particularly described on Exhibit "A" attached hereto (the "Property"), for the purpose of constructing in a number of phases and operating thereon a manufacturing facility for the manufacture and development of solid state integrated circuits (the "Project"); and

WHEREAS, to permit the purchase of the Property and construction of the Project by Fairchild, the owners of the Property who are NUPACIFIC COMPANY, an Oregon Corporation, LEAVITT LAND ASSOCIATES, a Washington General Partnership, and BEIM & JAMES PROPERTIES II, a California Limited Partnership (collectively called "Owners"), applied to the City for a rezoning of the Property to change the land use classification from Residential Single Family District (RS-1) to Industrial District (I); and

WHEREAS, a final Environmental Impact Statement for the rezoning application was prepared by the City and issued on February 23, 1981 (the "EIS"), and on March 23, 1981, after a public hearing and based upon findings, conclusions, and recommendations of the Puyallup Planning Commission, the City

City of Puyallup
P.O. Box 458
Puyallup 98371

36 —

DEPUTY

PIERCE COUNTY WASH

JUN 26 1981

81 JUN 26 P3:10

RECORDED

81 JUN 26 P3:

adopted Ordinance No. 1865 (the "Ordinance") which amended the zoning classification of the Property from Residential Single Family District (RS-1) to Industrial District (I). The findings recommended by the Planning Commission and found by the City Council regarding specific impacts of the Project are recited as "Findings" in this Agreement and are set forth in relation to the impact to be mitigated; and

WHEREAS, the Ordinance specifically provides that prior to becoming valid a concomitant agreement will be executed containing conditions as prescribed by the Puyallup City Council. Those conditions relate directly and exclusively to the mitigation of public needs and impacts which would arise from the Project proposed by Fairchild and which were identified in the EIS. The conditions require that certain improvements be made with respect to roads, sewer, water, storm drainage, and further establish certain requirements with regard to site plan, handling of hazardous materials, noise and miscellaneous impacts of the Project; and

WHEREAS, the intention of this Agreement is to satisfy the condition precedent to the validity of the Ordinance and to set forth the various obligations of the parties with respect to mitigation of the impacts for the Project as identified in the EIS; and

WHEREAS, certain improvements to the sewer and water systems of the City and to SR 161 were identified as necessary to mitigate impacts identified by the EIS and the State of Washington has committed to provide financial assistance to accomplish such improvements and to encourage the location of Fairchild in the City.

NOW THEREFORE, in consideration of the validation of the Ordinance by the City providing for change in the land use classification of the Property from Residential Single Family District (RS-1) to Industrial (I), and with the obligations of Fairchild hereunder conditioned upon the purchase of the Property and construction of the Project by Fairchild, it is hereby agreed as follows:

I

CONDITIONS AND COVENANTS

A. STORM DRAINAGE

1. Findings:

   A. Development of the Property will intensify storm water runoff.

   B. There are no storm drainage facilities adjacent to the Property.

   C. To avoid downstream impacts, storm drainage must be retained and discharged at a rate no greater than the predevelopment condition.

2. Conditions:

   A. Fairchild will construct and maintain the storm drainage retention facilities within the Property so that there will be no increase in the rate of runoff of storm water from the Property as a result of construction of the Project. Storm drainage lines shall be constructed from the retention facilities to the natural drainage areas that presently accommodate drainage from the Property. Such drainage lines will be designed with sufficient capacity to accommodate the anticipated runoff and will be in compliance with the building permit issued by the City for the Project.

B. Outside chemical handling areas will have separate drains connected to collection tanks and not into the storm drainage lines thus preventing any contamination of storm water by chemicals that might be spilled at such chemical handling areas.

B. WATER

1. Findings:

A. The present City water system is adequate to service domestic needs of its present users.

B. The Project will require a supply of water substantially beyond the ability of the existing City water system to provide.

C. A Tacoma water transmission line is believed to be available to provide the supply required by Fairchild through phase V of the Project on a sixteen hour per day peak flow interruptible basis.

2. Conditions:

A. The City will use its best efforts to enter into a contract with the City of Tacoma for the supply of water to the Project to meet the peak daily demand of 1.6 million gallons per day on a sixteen hour per day peak flow interruptible basis. The City will use its best efforts to enter into such a contract within ten (10) days of the execution of this Agreement and if it is unable to do so within that period of time it will promptly notify Fairchild.

B. The City will use its best efforts to complete the design, bid and construction of the water line and pump station required to provide water at the rate of 1.6 million gallons per day from the water system of the City of Tacoma to the Property prior to June 1, 1982. The City will within 30 days of the execution of this Agreement, notify Fairchild of the schedule it intends to follow, will use its best efforts to complete the construction by June 1, 1982, and will notify Fairchild as soon as practical if any of the dates established in the proposed schedule cannot be met. It is understood that Fairchild desires to have the water storage tank constructed as soon as possible. The City will use its best efforts to complete the design, bid, and construction of the storage tank as soon as reasonably possible, recognizing the need to meet first the other dates for construction established by this Agreement for improvements to the adjacent roads and the sewer system of the City.

C. Fairchild will be responsible for the cost of design, constructing, and project management of a water project described in 2B (B water) above. Should the City elect to expand the facilities beyond those needed by Fairchild, the City will be responsible for the costs of such oversizing over and above the water project costs to Fairchild. An engineers estimate will be made of the costs of the Fairchild water project and a separate engineers estimate will be made of any water project that would include oversizing by the City. The City would assume the difference in cost between the two estimates. The engineers estimates will be subject to value engineering in accordance with 2D (B water) below. That should the parties not reach agreement as to the engineers estimates, then the two water projects would be submitted to bid as alternatives to determine the cost of each project. The costs determined by either the engineers estimate or failing agreement the bid will establish the proportional share that the City and Fairchild will assume with regard to the actual construction cost.

D. The plans and specifications prepared for the City for construction of such facilities will be subject to value engineering at the request of Fairchild. The recommendations of the value engineer will be approved by the City Engineer if the recommendations are consistent with the codes, specifications and standards acceptable to the City, and with generally accepted engineering practices, as determined by the City Engineer. If the City Engineer determines not to adopt the recommendations of the value engineer, he will provide Fairchild in writing with reasons for the disapproval. The cost of the value engineering requested by Fairchild will be borne by

Fairchild. The City will cooperate with Fairchild in supplying preliminary plans and specifications for submission to the value engineering firm selected. The firm must be professionally recognized in the field and selected by Fairchild from a list of at least three (3) such firms mutually approved by the City and Fairchild. It is understood that such value engineering may extend the time required to complete construction of the various water improvements identified in paragraph 2.B. (B. WATER) above.

E. It is recognized that a consistent quality in the water supply to the Project is essential to the manufacturing to be conducted on the Property by Fairchild. The City will attempt to provide in the contract with the City of Tacoma a provision for notice from the City of Tacoma that at such time as the City of Tacoma's major source of supply changes, or any event occurs which seriously affects the quality of the water being supplied, the City and Fairchild will receive sufficient notice to allow Fairchild to analyze such new source and determine whether it is acceptable for its use. The City will notify Fairchild seven (7) days prior to any change in the major source of water or of any event which seriously affects the quality of the water being supplied to the Project through its system, including, without limitation, such changes as drawing water from the Puyallup River or the use of the 23rd Avenue well. In case of emergencies when seven (7) days notice is not possible, the City will notify Fairchild as quickly as is feasible of such change or event.

F. The City will use its best efforts to obtain loan funds from the State of Washington under Referendum 38 with which to accomplish the construction of the necessary water line, pump station and additional storage capacity required to provide the necessary water supply to the Project. The loan will be made by the State at an interest rate of six percent (6%) per annum for a period of ten (10) years for the amount requested of 1.6 million dollars. If a flexible loan amortization schedule can be negotiated between the City and the State which would allow payment of the loan on a schedule more closely related to actual water usage of the Project, then the portion of the water use rate charged to Fairchild by the City which relates to the payment of the loan to the State will be based upon the amortization schedule agreed to between the City and the State.

G. In addition to the payment to the City for the amortization of the loan from the State referred to in paragraph 2.D. above, Fairchild will be billed for the water used by the Project. The charge for the water actually used by Fairchild will consist of the charge for such water made to the City by the City of Tacoma plus any related City taxes. Maintenance and operating costs of the City will be separately included in the Fairchild water bill and will consist of directly related costs for piping, pumping, storage, depreciation and other system costs for providing Fairchild's expected water usage. Should the City elect to expand the facilities needed to provide Fairchild with 1.6 million gallons of water per day, the maintenance and operation costs will be borne by the City. The City will provide Fairchild with a detailed accounting of the costs attributable to Fairchild and will provide estimated costs for each element of the maintenance and operation charges. The cost details will consist as a minimum of pumping costs, labor and other maintenance costs, power costs, prorated administration costs and depreciation costs. The depreciation cost will be based on expected lives of 50 years for piping and storage, 30 years for structures, and 20 years for pumps and other equipment. Depreciation will be charged on a straight line basis over the expected life involved. Fairchild will furnish the City, on a quarterly basis, with a projection of its water requirements for the subsequent twelve months. If Fairchild uses less water than projected and the City uses the excess, the City will credit Fairchild for the amount used by the City. If the City does not use the excess, Fairchild will pay for the same. If Fairchild uses more water than it projected, the City will charge for such excess at a higher rate only if such excess use resulted in the City being charged a higher rate therefor by the City of Tacoma; but if higher rates charged by the City of Tacoma result from use of water by the City, the City will be responsible for such higher rates and not Fairchild.

C. SEWER

1. Findings:

A. Portions of the sewer collection system between the Property and the City sewage treatment plant are currently near capacity. Efforts are underway to improve the capacity of the system.

B. The collection system does not have adequate capacity to handle the wastewater discharged from the Project.

C. The parties assume that the State of Washington will allow an industrial wastewater system which would employ a sewer line from the Project to the City sewage treatment plant. This assumption is based upon the engineering information provided by Fairchild to the Department of Ecology and the belief that the Department of Ecology will issue a discharge permit approving such a system.

2. Conditions:

A. The City will use its best efforts to complete, prior to June 1, 1982, the design, bid, and construction of the sewer line, the treatment plant facility improvements specified in paragraph 1.C. (Sewer) above, and the extension to and connection with the existing sanitary sewer system. The City will within 30 days of the execution of this Agreement notify Fairchild of the schedule it intends to follow to complete such construction by June 1, 1982 and will further notify Fairchild as soon as possible if any of the dates established in the proposed schedule cannot be met.

B. The estimated cost to: (1) construct the 1.6 million gallons per day sewer line for the processed water from the Property to the treatment plant, (2) provide all monitoring equipment at the clarifier just prior to discharge of treated waste water into the Puyallup River, and (3) construct the extension to and connection with the existing sanitary sewer system of the City, is a maximum of 1.6 million dollars.

C. The City will use its best efforts to coordinate approved construction or rehabilitation projects with the construction of the improvements identified in 2.A. (C. SEWER) above, for the purpose of reducing the cost of constructing such identified sewer improvements to the incremental increase over and above the cost of such coordinated construction or rehabilitation projects.

D. The City will use its best efforts to negotiate with the State of Washington Department of Ecology a Referendum 26 loan with which to accomplish the construction of the sewer line and treatment plant projects and the extension to and connection with the existing sanitary sewer system. The loan will be made by the State at an interest rate of eight percent (8%) per annum for a period of twenty-five (25) years for the amount requested of 1.6 million dollars. If a flexible loan amortization schedule can be negotiated between the City and the State which would allow payment of the loan on a schedule more closely related to actual water usage of the Project, then the portion of the water use rate charged to Fairchild by the City which relates to the payment of the loan to the State will be based upon the amortization schedule agreed to between the City and the State. The City and Fairchild will enter into a latecomer agreement, pursuant to RCW Ch.35.91, to allow Fairchild to recover an appropriate portion of the costs constructing the extension to and connection with the existing sanitary sewer system.

E. The EAA grant monies to be received by the City from the State in the amount of $400,000 will be applied against the capital costs of the sewage line, monitoring equipment at the treatment plant, and the extension to and connection with the existing sanitary sewer system.

F. The plans and specifications prepared by the City for construction of such sewage facilities will be subject to value engineering at the request of Fairchild. The recommendations of the value engineer will be approved by the City Engineer if the recommendations are consistent with the codes, specifications and standards, acceptable to the City and with generally accepted engineering practices, as determined by the City Engineer. If the City Engineer determines not to adopt the recommendations of the value engineer, he will provide Fairchild in writing with reasons for the disapproval. The cost of the value engineering requested by Fairchild will be borne by Fairchild. The City will cooperate with Fairchild in supplying preliminary plans and specifications for submission to the value engineering firm selected. The firm must be professionally recognized in the field and selected by Fairchild from a list of at least three such firms mutually approved by the City and Fairchild. It is understood that such value engineering may extend the time required to complete construction of the various sewer improvements identified in paragraph 2.A (C. SEWER).

G. The waste from the Project will consist of two separate discharges:

1. The first will be biologically treatable waste from cafeterias, restrooms, etc.

The biological waste will be collected separately and discharged to the City's sanitary system through an extension of the City's existing sanitary sewage collection system. Fairchild will be billed for treatment of the biological waste in accordance with the City's residential waste fee structure adjusted on the basis of population equivalent flows from the Project or by a new industrial sewage rate developed by the City, whichever rate is less unless this limitation is prohibited by a superior governmental authority.

2. The second will be processed waste water which has been pretreated by Fairchild. Monthly usage fees for the processed industrial waste water, exclusive of principal and interest costs covering the amortization of the loan from the State, will reflect actual operation costs for that portion of the treatment plant costs of processing Fairchild's discharges attributable to the treatment of such discharges, together depreciation costs allocated on the basis of Fairchild's use of that portion of the treatment plant. Maintenance and operating costs will be separately itemized and shall consist of directly related costs for piping, pumping, clarifier operation, monitoring, other system costs, and depreciation to provide for Fairchild's expected discharge of 1.6 million gallons per day and 8 million gallons per week. The City will provide

Fairchild with a detailed accounting of the costs attributable to Fairchild and estimated costs for each element of the maintenance and operation charges. The cost details will consist as a minimum of pumping costs, labor costs, maintenance and operation costs, power costs, depreciation costs, and prorated administration costs. Depreciation costs are to be based on an expected life of 50 years for piping, 30 years for structures and 20 years for pumps and other equipment. Depreciation will be charged on a straight line basis over the expected life involved.

D. ROADS

1. Findings:

A. Fairchild will provide access to the Property via 39th Avenue S.E. which connects to Meridian Avenue at 110th St.; and Shaw Road and Wildwood Park Drive to the east.

B. The improvements recommended for construction as part of phase I and phase II of the Project will allow 39th Ave. S.E. to Meridian to operate below capacity through 1990. Beyond 1990 SR 161 will most likely operate beyond capacity to 100th St.

C. The Washington State Department of Transportation has submitted a letter, attached as Exhibit "E," committing the State to make certain improvements to SR 161 as identified by the EIS. The parties to this Agreement together with the State Department of Transportation will enter into a

"Tri-Party Agreement" which will require that such improvements be completed by the Department of Transportation prior to the beginning of phase II by Fairchild.

D. Additional roads will be constructed to the north of the Property as overall development occurs in the area. Responsibility for financing those roads will belong to the developing party.

2. Conditions:

A. Construction vehicles for the Project will travel to the Property on 39th Ave. S.E. via Meridian Avenue. Any alternative routing necessitated by street construction will be subject to the prior approval of the City Engineer, which approval will not be unreasonably withheld.

B. With regard to SR 161 improvements specified by the Ordinance, such improvement will be accomplished through the execution of the "Tri-Party Agreement" among the City, the State of Washington, and Fairchild. The "Tri-Party Agreement" will implement the commitments of the State Department of Transportation, as evidenced by the letter attached hereto as Exhibit "B," State of Washington House Concurrent Resolution No. 17, attached as Exhibit "C," and House Committee Amendment to Senate Bill No. 3698 Section 25, attached as Exhibit "D." The improvements required to SR 161 will be the responsibility of and accomplished by the State Department of Transportation.

C. Based on impacts of the Project as identified in the EIS, the Ordinance will require realignment of 110th and 39th Ave. S.E. and construction of a four lane artorial with appropriate left turn lanes. The Ordinance requires such realignment and construction from SR 161 to the east property line of the Property. In the interests of the community, the City and Pierce County have determined that such work should extend from SR 161 to Shaw Road. The cost of this work will be funded through a local improvement district which will be composed of all benefited property owners together with contributions from Pierce County which will reduce the total project cost of this work (the "LID"). The City will identify a legally appropriate benefit area and assessment method and will consider adoption of a resolution initiating the LID. The City will provide Fairchild at the signing of this Agreement with information regarding the identified benefit area, the assessment method and an estimate of Fairchild's assessment cost for the LID.

D. After completion of phase II of the Project, Fairchild will be responsible for one-half the cost of construction of an access road along the northerly property line of the Property, or, at the option of the City, such other access road as may be designated by the City with Fairchild's cost not to exceed the cost that would be required to construct one-half of the access road along the northerly property line of the Property. Based on a current surveyor's estimate, the latter alternative would be equivalent to the cost of constructing a road of approximately 825 feet in length to such standards as are consistent with the City's classification for that access road. Completion of phase II of the Project is defined as the point in time when employment on the Property is greater than fifteen hundred (1500) employees.

E. The road improvements identified above in this Agreement mitigate the impacts to roads of the Project identified in the EIS and required by the Ordinance.

E. SITE PLAN

1. Findings:

A. Certain additional impacts and mitigation measures were identified as a result of the site plan submitted with the EIS.

B. The site plan submitted does not represent the final location of structures within the Project. It would be impossible to do so until such time as an appropriate analysis is made based upon topography and drainage.

2. Conditions:

A. A site plan will be submitted to the City Planning Director prior to submission of any building permit application for the Project. The site plan will depict access to the Project, perimeter landscaping, building and parking area coverage, and general building location. This will be depicted using the building envelope system; that is, no building will be allowed to be constructed outside of an area identified by the envelope line.

B. The general landscape plan will be submitted to the City Planning Director for approval prior to the issuance of the first building permit for the Project which approval will not be unreasonably withheld. A seventy-five (75) foot buffer area will be maintained on the west, south, north, and east sides of the Property and as much of the natural vegetation as is reasonably possible will be retained in the buffer area. Noise generating plant equipment will be located at least 400 feet from the boundary lines of the Project.

C. An outdoor lighting plan will be submitted to the City Planning Director for approval prior to the issuance of a building permit for that area of the Project for which a building permit is being requested, which approval will not be unreasonably withheld.

F. <u>HAZARDOUS MATERIALS</u>

1. Findings:

A. Fairchild will utilize a variety of potentially hazardous chemicals in the manufacturing process and appropriate measures should be taken to insure safety to employees and the public.

2. Conditions:

A. All chemicals on the Property will be stored in approved safety containers and containment enclosures and recovered for proper disposal. Hazardous substances are to be handled properly and all appropriate industrial and City personnel will receive proper training in the handling thereof and in fire safety measures.

B. Fairchild will notify the City of the chemicals to be used in the Project. Such notification will be provided one year in advance of the commencement of operation. Within ten (10) working days, the City will be notified of any new chemicals developed at the Project or handled in the manufacturing process.

G. NOISE

1. Findings:

A. It is anticipated that potentially significant noise will be generated from the Property both during construction and after occupancy, and appropriate measures should be taken to mitigate such potentially significant impacts.

2. Conditions:

A. Washington State Noise Regulations will be complied with in the construction and operation of the Project. Regulations to be met are those that are based on residential occupancy of the adjacent property.

H. MISCELLANEOUS

1. Findings:

A. Truck deliveries will be made to the Property after occupancy at a frequency of about nine vehicles per day.

2. Conditions:

A. Truck deliveries to the site will be limited to the hours between 7:00 a.m. and 7:00 p.m. seven days a week.

II

ADDITIONAL CONDITIONS AND COVENANTS

A. The obligations of Fairchild set forth in this Agreement are conditioned upon the purchase of the Property and construction of the Project by Fairchild.

B. Should construction of phase I of the Project not be commenced by March 23, 1984, the City reserves the right to initiate proceedings to rezone the Property.

C. The City, County, State, have been engaged in efforts to obtain loans and grants to defray all or part of the off-site costs associated with the Project. The City will continue its best efforts in this regard and will encourage the County and State to continue their efforts to obtain such loans and grants from the Urban Arterial Board, HUD, UDAG, EAA, and other such sources as may be identified. Additional funds from such loans and grants shall be applied to the off-site improvements for water, sewer, and roads to reduce the financial liabilities of all parties directly impacted by the Project.

III

EFFECT OF AGREEMENT

A. This Agreement will be a covenant running with the land and binding upon the parties hereto, successors and assigns of Fairchild, and any subsequent owners of the Property.

B. This Agreement limits Fairchild's financial commitment for off-site public improvements required to mitigate the

CONSENT

Owners hereby consent to the foregoing Agreement and agree that the same constitutes a covenant running with the land with respect to the Property, and by granting such consent Owners shall not become obligated to perform any of the obligations of Fairchild or the City set forth in this Agreement.

LEAVITT LAND ASSOCIATES, a
Washington General Partnership

By ______________ Partner

By ______________ Partner

BEIM & JAMES PROPERTIES II, a
California Limited Partnership

By BEIM & JAMES A CALIF. LIMITED PARTNERSHIP
Its General Partner
By: ______________
GENERAL PARTNER OF BEIM & JAMES

NUPACIFIC COMPANY, an Oregon
corporation

By ______________
Its ASST. VICE PRESIDENT

~~By~~ ______________
Its ______________

STATE OF WASHINGTON)
) ss.
County of King)

On this 12th day of June, 1981, before me personally appeared William H. Jepsen, to me known to be the Asst Vice President of NUPACIFIC COMPANY, the corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year first above written.

Patricia J. Carlson
NOTARY PUBLIC in and for the State of Washington, residing at

[SEAL]

STATE OF WASHINGTON)
) ss.
County of King)

On this 10th day of June, 1981, before me personally appeared Thomas E. Leavitt and Donald H. Leavitt, to me known to be Partners of LEAVITT LAND ASSOCIATES, the partnership that executed the foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said partnership, for the uses and purposes therein mentioned.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year first above written.

Diane A. Pollard
NOTARY PUBLIC in and for the State of Washington, residing at Kirkland

[SEAL]

State of CALIFORNIA
County of SANTA CLARA } SS.

On this the 29th day of May 1981, before me, the undersigned Notary Public, personally appeared

JOHN K. JAMES

known to me to be the person(s) whose name(s) is subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

OFFICIAL SEAL
MARIE E. HEADLEY
NOTARY PUBLIC · CALIFORNIA
SANTA CLARA COUNTY
My comm. expires JUL 2, 1982

Marie E Headley

GENERAL ACKNOWLEDGEMENT FORM

STATE OF WASHINGTON)

State of CALIFORNIA
County of SANTA CLARA } SS.

On this the 8th day of June 1981, before me, the undersigned Notary Public, personally appeared

RICHARD P. ABRAHAM

known to me to be the person(s) whose name(s) is subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

OFFICIAL SEAL
MARIE E. HEADLEY
NOTARY PUBLIC · CALIFORNIA
SANTA CLARA COUNTY
My comm. expires JUL 2, 1982

Marie E Headley

GENERAL ACKNOWLEDGEMENT FORM

[SEAL]

EXHIBIT "A"

Real Property situated in the City of Puyallup, County of Pierce, State of Washington, being a portion of the Southeast one-quarter of Section 3, Township 19 North, Range 4 East of the Willamette Meridian, described as follows:

The West one-half of the Southeast one-quarter of Section 3, Township 19 North, Range 4 East of the Willamette Meridian.

Together with: The West 295 feet of the East one-half of the Southeast one-quarter of Section 3, Township 19 North, Range 4 East of the Willamette Meridian, except the South 335 feet thereof.

EXCEPT ROAD RIGHT OF WAY FOR 112th STREET E.

Exhibit "B"

VOL 043 PAGE 1202

JOHN SPELLMAN
Governor

W. A. BULLEY
Secretary

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION
Highway Administration Building • Olympia, Washington 98504 • (206) 753-6005

March 24, 1981

Mr. Richard T. Shrock, Director
Department of Commerce and
Economic Development MS: AX-13
Olympia, WA 98504

RE: **Fairchild Development - Puyallup Vicinity**

Dear Mr. Shrock:

Subsequent to Deputy Secretary V. W. Korf's March 11, 1981 letter, there have been additional meetings and actions relative to the Fairchild Company's proposed location in the vicinity of Puyallup. I would like to document the decisions reached, which appear to resolve any state involvement on the state highway in response to the development.

On March 23, 1981, the Puyallup Planning Commission approved the property rezone with certain stipulations. I understand an agreement will now be executed with all involved parties to document actions on the zoning stipulations. The Department's commitment, of course, is predicated on the use of the rezoned property by Fairchild Camera and Electronics.

As noted in Mr. Korf's letter, we do not perceive the major issues affecting the rezone to be the state highway system. In response to concerns affecting SR 161, we studied the several concerns and believe they can be mitigated. The SR 161 traffic operation concerns are summarized as follows:

1. Extension of southbound left-turn lane on SR 161 to 110th Street.
2. Signalization of SR 161 and 110th Street intersection.
3. Intertie of the present signals at the intersection of Meridian/SR 161 and 112th Street/SR 161 with the proposed 110th Street/SR 161 signal.
4. Additional lane capacity on SR 161 between SR 512 and 110th Street with some lane tapers between 110th and 112th Street.

Mr. Richard T. Shrock
March 24, 1981
page 2

These are the improvements that have been identified for which mitigation must occur by 1983. These will be resolved as follows:

Items 1, 2 and 3 - The Department, in conjunction with Pierce County, is prepared to complete these improvements for costs over and above any financial participation by the developer.

Item 4 - The additional lane capacity and auxiliary lanes were recognized by Mr. Korf in his letter as the responsibility of the state. We believe with some flexibility as to exact scheduling, these improvements can be staged in construction contracts to meet the 1983 deadline identified in the rezone decision.

With the continued cooperation of all parties, we see no obstacle in the resolution of transportation problems as they relate to SR 161 and the Fairchild Development. It is our understanding the commitments in this letter satisfy the state highway conditions in the zoning decision.

The Department of Transportation will continue to be available as the specifics of the proposed rezone agreement are negotiated. I would suggest that District Administrator A. R. Morrell (753-7205), remain as the prime contact for additional information or assistance.

Very truly yours,

W. A. BULLEY
Secretary of Transportation

WAB:dp

cc: A. R. Morrell
W. R. Thorton, Director
Pierce County Public Works
3551 Bridgeport West
Tacoma, WA 98466

IN THE LEGISLATURE
of the
STATE OF WASHINGTON

THE SEAL OF THE STATE OF WASHINGTON 1889

CERTIFICATION OF ENROLLED

HOUSE CONCURRENT RESOLUTION NO. 17

Adopted by the House March 21, 198 1
as amended

Adopted by the Senate March 23, 198 1

CERTIFICATE

I, Vito T. Chiechi, Chief Clerk of the House of Representatives of the State of Washington, do hereby certify that the attached is enrolled House Concurrent Resolution No. 17 *as adopted by the House of Representatives and the Senate on the dates hereon set forth.*

Vito T. Chiechi *Chief Clerk*

State of Washington
47th Legislature
1981 Regular Session

by Representatives Wilson, Nelson (G), Mitchell, Houchen, Scott, Sprague, Grimm, Ehlers, Erickson, King (R), Clayton, Martinis, Walk, Sanders, Johnson, Lundquist, Gallagher, Eberle, Bonder and Granlund; Senators Bauer, ·itz, Bluechel, Bottiger, Charnley, Clarke, Conner, Craswell, Deccio, ·ning, Fuller, Gallaghan, Gaspard, Goltz, Gould, Guess, Haley, Hansen, ·ayner, Hemstad, Hughes, Hurley, Jones, Kiskaddon, Lee, Lysen, McCaslin, Moore, Newhouse, Paterson, Quigg, Rasmussen, Ridder, Scott, Talley, Talmadge, Vognild, von Reichbauer, Wojahn and Woody

Read first time March 21, 1981; on motion, rules suspended, advanced to second reading; amended; rules suspended and advanced to third reading; adopted.

WHEREAS, The electronics and related high-technology industries are growth industries and environmentally suitable, it is in the state's interest to stimulate plant investment by companies representing these industries in order to provide diversified and long-term employment opportunities for the residents of Washington State; and

WHEREAS, Successful recruitment of such investment offers the opportunity for both economic diversification and geographic ·ispersion of employment and revenue benefits in Washington ·te; and

WHEREAS, These perceptions and economic goals are universally shared by other states and many foreign countries and there is vigorous competition for these investments, which includes the provision of substantial investment incentives; and

WHEREAS, Washington State currently has the opportunity to locate two recognized leaders in the electronics industry, subject to resolution of public works improvements in Snohomish and Pierce Counties related to the proposed plant sites; and

WHEREAS, The perception of these two companies about Washington State's desire and willingness to assist in their pending location decisions, and their actual decisions, will be ·substantial influence on other companies in these industries, including those the Department of Commerce and Economic Development is currently providing confidential assistance;

NOW, THEREFORE, BE IT RESOLVED, By the House of Representatives of the State of Washington, Senate concurring, that the 1981 regular session of the legislature will take appropriate action, including the provision of funds, to assist on a fair share basis, Snohomish and Pierce Counties and the electronics companies, in providing the necessary public service improvements to ensure the location of these companies. For both Pierce County and Snohomish County, the specific commitment the legislature is to provide a level of funding sufficient to ensure state financial assistance for necessary improvements to roads identified in the impacted area dropping below level of service "D" as defined by the Washington State Department of Transportation; and

BE IT FURTHER RESOLVED, That it is the stated policy of the Washington State Legislature to create and maintain a business climate that is conducive to the further location of high-technology industries in Washington State.

Passed the House March 21, 1981.

Speaker of the House.

Passed the Senate March 23, 1981.

President of the Senate

3 PAGE 1207

ED CONCURRENT
TION NO. 17

BY
ATIVES Wilson, Nelson (G),
buchon, Scott, Sprague, Grimm,
ckson, King (R), Clayton,
alk, Sanders, Johnson, Lundquist,
Eberle, Bender and Granlund;
uer, Benitz, Bluechel, Bottiger,
larke, Conner, Craswell, Deccio,
ller, Gallaghan, Gaspard, Goltz,
s, Haley, Hansen, Hayner, Hemstad,
ley, Jones, Kiskaddon, Lee, Lysen,
oore, Newhouse, Peterson, Quigg,
Ridder, Scott, Talley, Talmadge,
n Reichbauer, Wojahn and Woody.

: Encouraging the location of
logy industries in Washington

RECORD—

the Chief Clerk of the House

1 ______ for introduction

1 ______ Read first time

ipted and r...ed to Committee

______ Reported back by
Committee with the recommendation
On motion, rules suspended; Advanced
to second reading under suspension
of rules.

3-21-81 Read second time and
AMENDED. ORDERED ENGROSSED,
Advanced to Third Reading
under suspension of rules.

3-21-81 Read third time and

ADOPTED ~~Yeas~~ ~~Nays~~

3-21-81 Sent to Senate

Vito Chiechi, Chief Clerk

SENATE RECORD—

3-23-81 Received from House
Read first time and ~~referred to Committee on~~
Advanced to second reading
under suspension of ~~rules~~
rules.
~~Committee with recommendation~~

3-23-81 Read second time and

On motion and upon consent of the
House, rules were suspended to allow
additional Senate sponsors.
Advanced to third reading under suspension
of rules.

3-23-81 Read third time and

ADOPTED Yeas 40, Nays 7

3-23-81 Returned to House

/s/ Sid Snyder, Secretary of Senate

3/23/81 Received from the
House consented to Senate
motion to add sponsors.

3/23/81

Signed by the Speaker of the H

3/24/81

Signed by the President of the

______ By the

EXHIBIT D

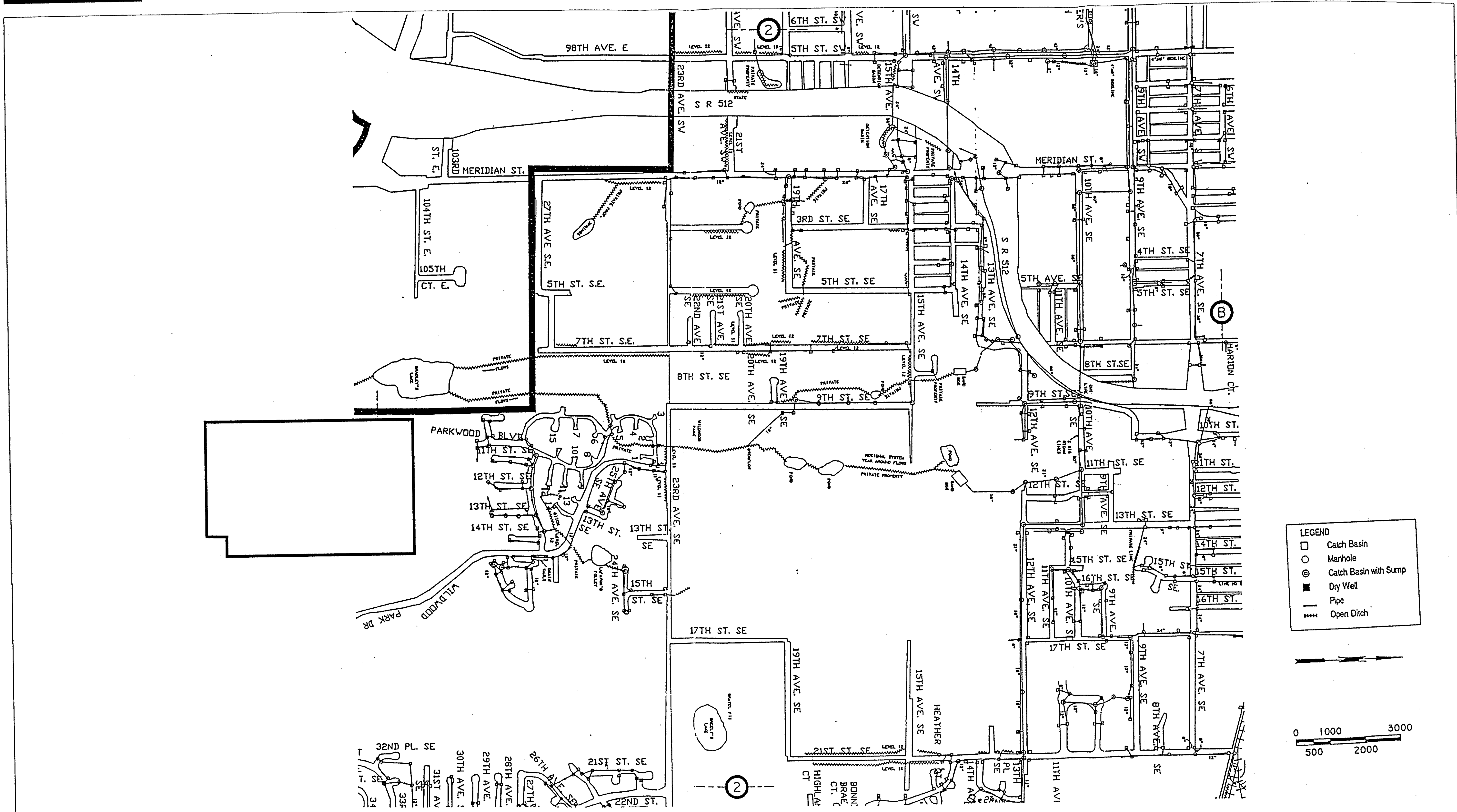
HOUSE COMMITTEE AMENDMENT TO
SENATE BILL #3698, SECTION 25

NEW SECTION. Sec. 25. The legislature recognizes the economic importance to the state of attracting new environmentally suitable high-technology industrial development, and that the availability of transportation services is a significant factor in locating such industries. In furtherance of the provisions and objectives of House Concurrent Resolution No. 17, passed by the 1981 regular session of the legislature, the transportation commission and department of transportation shall, therefore, lend their cooperation, and allocate so much of the funds provided by sections 17 through 19 of this act as are reasonably necessary, to fund the state's fair share of the improvements contemplated by House Concurrent Resolution No. 17.

MASCA

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT



Source: *Stormwater Management Program Final Report, City of Puyallup, August 1988*

DAVID EVANS AND ASSOCIATES, INC.

Figure 7:
Downstream Drainage System
STORMWATER

Supplemental Environmental Impact Statement

Stormwater--Technical Appendix

MASCA Puyallup
Building D Expansion
(*Puyallup Science Park*)

Prepared for:

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Acronym	Definition
cfs	cubic feet per second
City	City of Puyallup
CN	Curve Number
DEA	David Evans and Associates, Inc.
DOE	Washington Department of Ecology
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
HLA	Harding Lawson Associates
LUST	Leaking Underground Storage Tank
MASCA	Matsushita Semiconductor Corporation of America
MTCA	Mode Toxic Control Act
MGD	Million Gallons of Water Per Day
NPDES	National Pollutant Discharge Elimination System
O&G	Oil and Grease
POTW	City of Puyallup's Publically Owned Treatment Works
QA/QC	Quality Assurance/Quality Control
SCS	Soils Conservation Service
SEIS	Supplemental Environmental Impact Statement
SR	State Route
Y&W	Yrjanainen and Warren

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1. INTRODUCTION

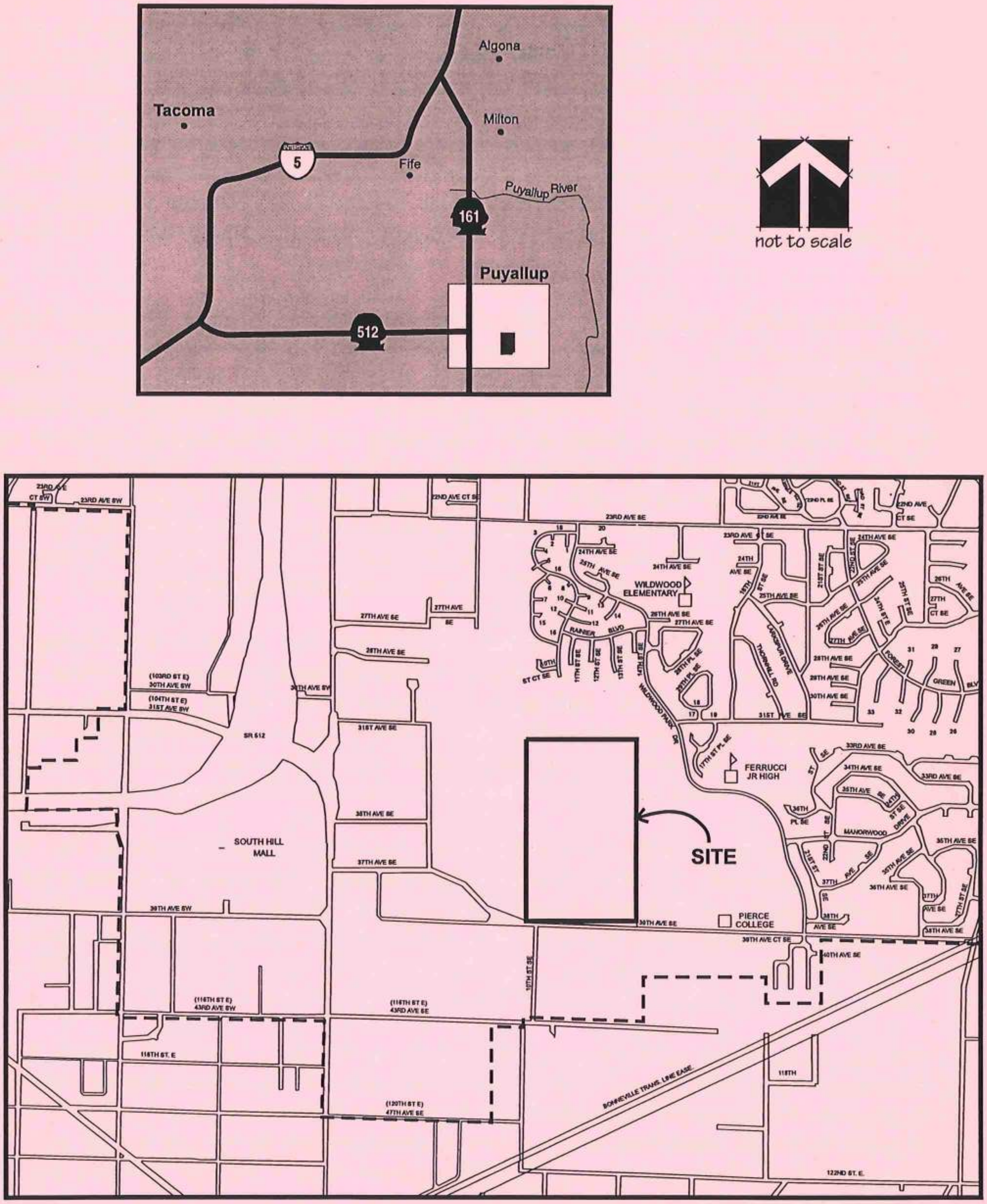
The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitent zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.

The site is served by gravity sewers, which drain to the City of Puyallup Publicly Owned Treatment Works (POTW), and by a tightline system which drains to the Puyallup River. The tightline discharges treated wastewater which bypasses the POTW but utilizes the POTW outfall. Periodic backwash water from carbon filters is discharged into an existing on-site infiltration pond. All three discharges are permitted and regulated under a National Pollutant Discharge Elimination System (NPDES) permit.



Source: *City of Puyallup*

Figure 1:
Vicinity Map
STORMWATER

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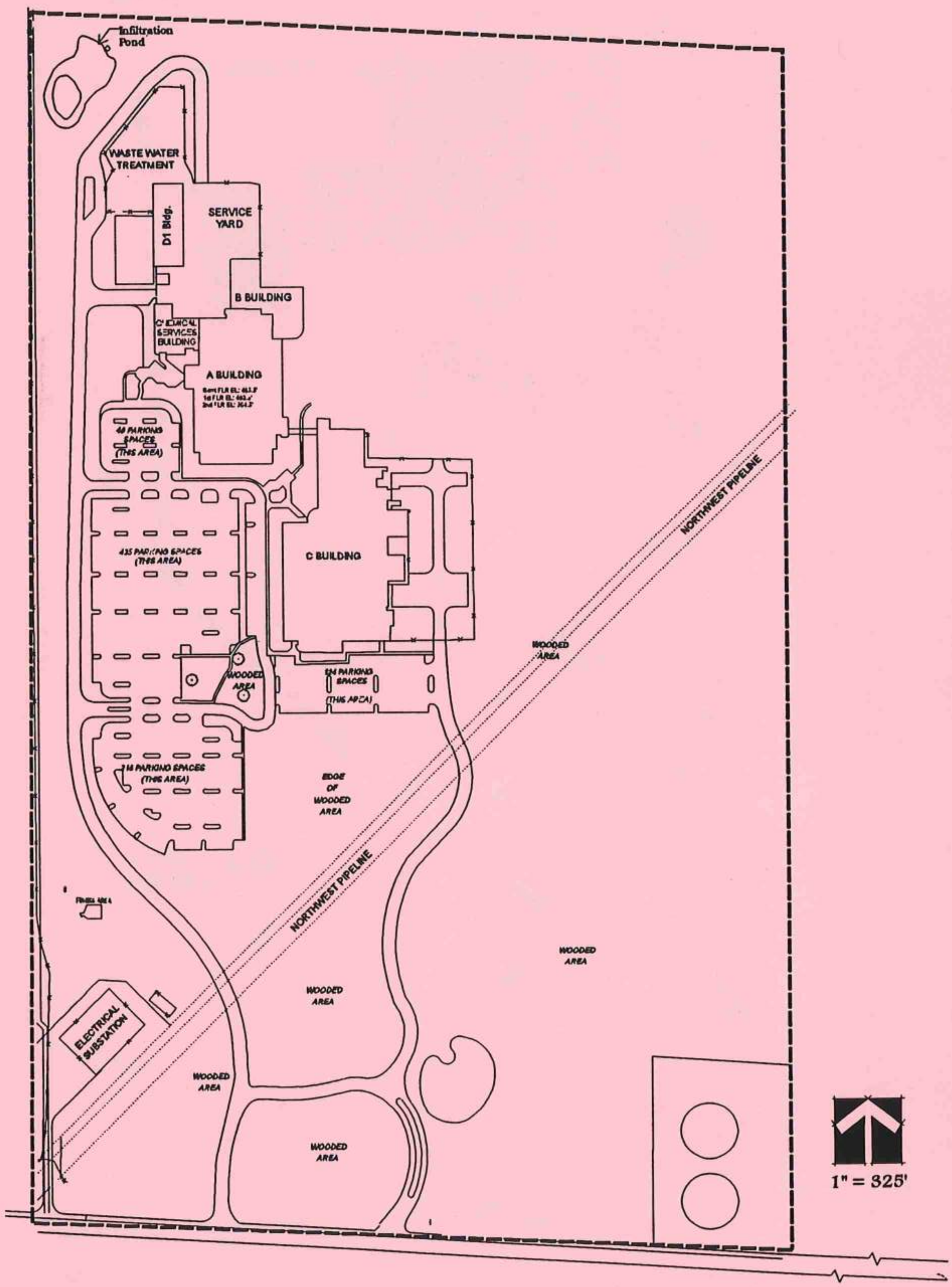
Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA



DAVID EVANS AND ASSOCIATES, INC.

Figure 2:
Existing Site Plan
STORMWATER

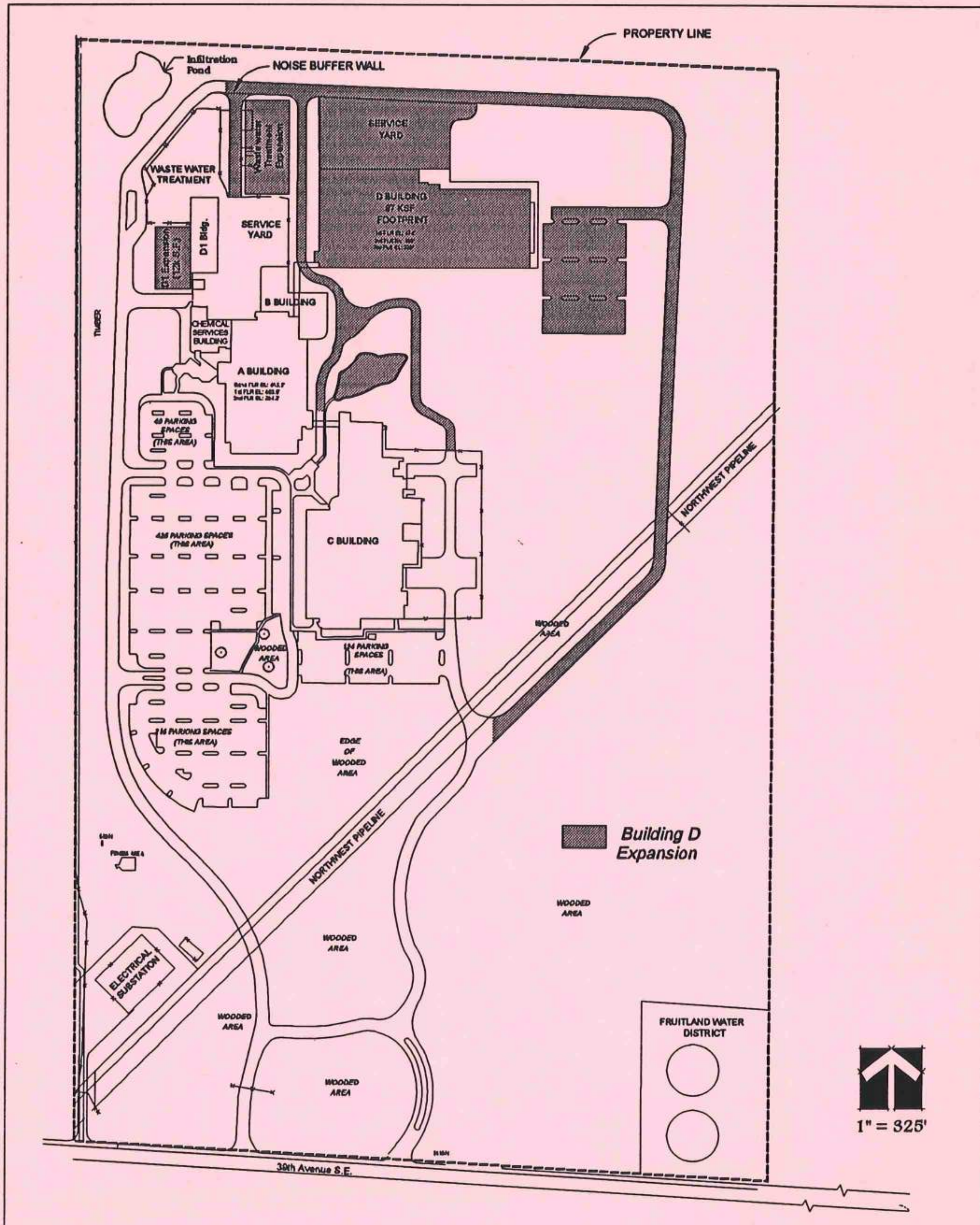


Figure 3:
Proposed Expansion Site Plan
STORMWATER

1.1 PROJECT BACKGROUND

The general drainage basin in which the MASCA development is located has known surface and sub-surface drainage problems. This drainage investigation has been prepared in an effort to quantify the drainage impacts of the proposed Building D project; and if impacts are present, develop recommended mitigation.

Several previous drainage analyses have been conducted for the MASCA site. As part of the initial 1981 construction process, site drainage and detention was evaluated. The drainage analysis method in use at that time was the Yrjanainen and Warren (Y&W) Method. The Y&W Method is a simplified model used to estimate detention basin volumes for small land development projects, and is especially useful where the more complex unit hydrograph methods are neither warranted nor practical. The original Y&W Method drainage analysis and design led to construction of a 72,108 cubic feet storm infiltration pond in the northwest corner of the MASCA site. The 1981 site Master Plan included the proposed Building D as a future site addition, and sized the infiltration pond to accommodate the future plant expansion, based on 1981 standards.

Subsequent to the 1981 construction, the City expressed concern over the quantity of stormwater runoff flowing through the infiltration pond outlet control structure. Discussions between the City and MASCA lead to an investigation to look for ways to increase the pond infiltration rate. In 1984, pond modifications were made to try to improve the infiltration characteristics of the stormwater pond. At this time, approximately 10 feet of native soils were excavated from the bottom of the pond. This was done in an attempt to expose a suspected gravel lens in the soils beneath the pond. The pond modifications appear to have significantly improved the infiltration performance of the MASCA drainage system.

Currently, the stormwater infiltration pond also receives periodic discharges of process water from a weekly backwash of carbon filters from the on-site wastewater treatment facility. This issue is addressed in the Utilities - Sanitary Sewer Technical Appendix (DEA, 1996).

The site is underlain by glacial till and advance outwash deposits. These deposits are comprised of gravel, silt, and clay. Groundwater is found only ten to thirty feet below ground surface; flow is generally towards the northwest. Groundwater is used as a drinking water source in the area: six wells used as potable sources are within a one-mile downgradient of the MASCA site. Depths to water bearing zones which these wells tap range from 118 to 465 feet (Harding, Lawson & Associates [HLA], 1992).

1.2 BASIN DESCRIPTION

The MASCA site lies in the upper reaches of Wildwood Creek in the City of Puyallup (Figure 4). The City's August 1988 Stormwater Management Program identifies the area as the State Highway Basin. The 1,740-acre State Highway drainage basin includes portions of the City lying between the Clarks Creek basin on the west and the Shaw Road basin on the east. The basin is generally bounded by State Route (SR) 512 and 5th Street SE on the west, 21st Street SE on the east, Pioneer Avenue on the north, and 123rd Street E on the south. Excess storm runoff in the basin flows northerly, and eventually drains to the Washington State Department of Transportation's large drainage system along SR 512.

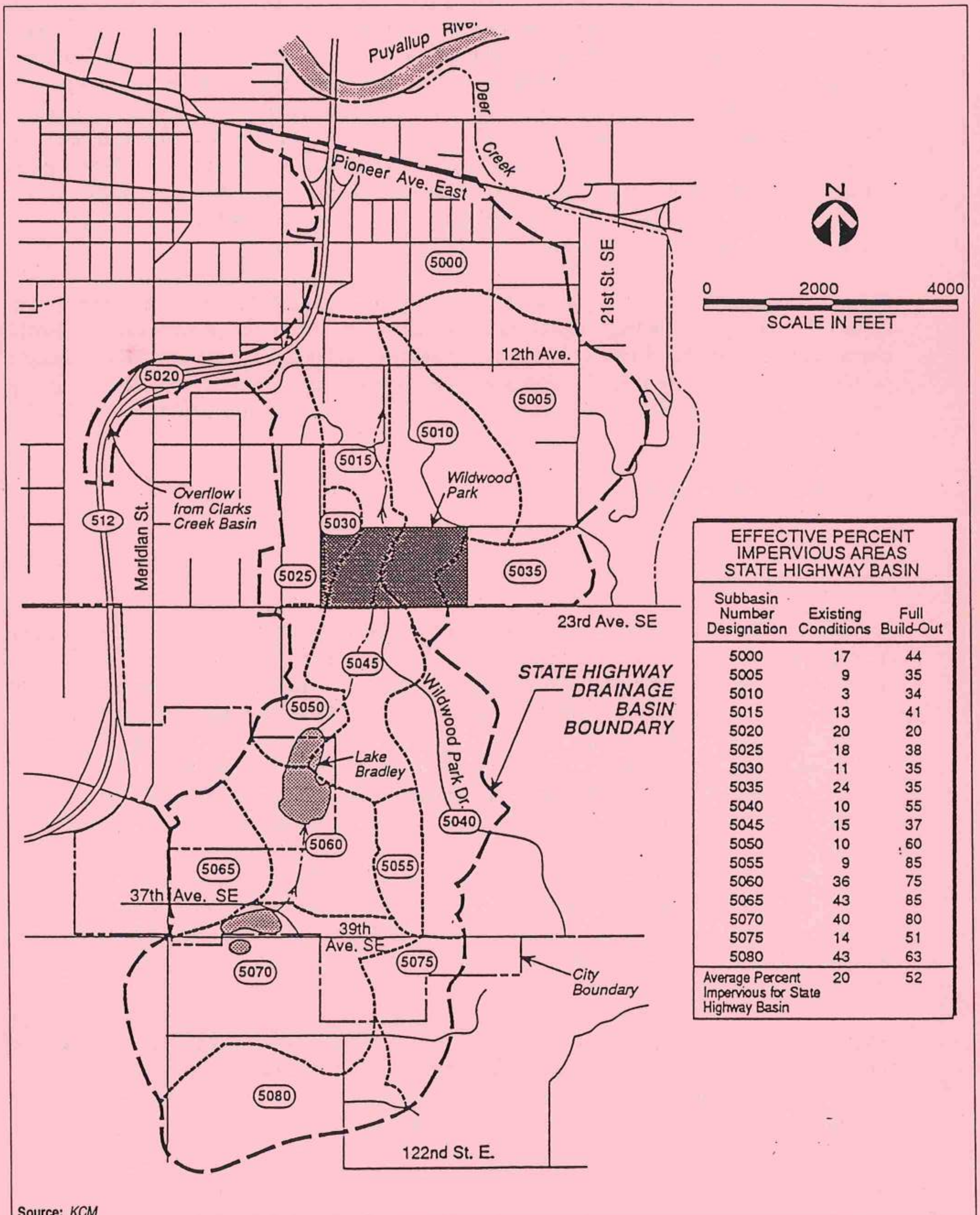
The upper reach of the basin contains a number of large pothole areas. Except during extreme rainfall, no surface flow leaves these areas. Soils in the area are highly permeable and accumulated runoff infiltrates rapidly into the ground following storm events. The upland area is relatively flat, with large undeveloped land tracts. The MASCA site lies within this upper basin area.

The central part of the basin contains the Wildwood Creek channel. Topography in the central region is steep, with a well defined channel. The area contains a number of single family residences and small farms, although the predominate land uses in the central basin is Wildwood Park and other undeveloped woodlands. Soils in this part of the basin are generally of the Alderwood-Everett association. Surface runoff in these soils types is slow to medium, with low to moderate erosion hazard. Although the drainage problems in the central basin are relatively minor at this time, the significant development occurring in the upper basin could lead to flooding and erosion impacts in the central and lower basin areas.

The flat lowland area is densely developed with a mix of single and multi-family residences, several commercial uses, and SR 512. The natural drainage course in this lower basin area has been significantly modified by development. Runoff is typically conveyed in storm drains and constructed channels. Soils in this lower area are typically of the Puyallup-Sultan association. These soil types are considered moderately to well drained. Surface runoff is slow to medium, with low to moderate erosion hazard.

1.3 GROUNDWATER

Based on a 1992 Site Characterization Report by HLA, the site is underlain by a shallow, unconfined aquifer. The unconfined nature of the aquifer means that water is not trapped and held in the shallow soils due to impermeable subsurface soils. Rather, water entering the shallow aquifer continues to flow either to deeper aquifer, or to lower water bodies which appear back on the surface, such as lakes, rivers, or wetlands. Depth to groundwater varies from 10 to 30 feet across the site. The general hydraulic gradient is to the west at a slope of approximately 2%. The report reveals that the gradient direction has local variabilities in flow direction towards the north, west, southwest, and northeast.



EFFECTIVE PERCENT IMPERVIOUS AREAS STATE HIGHWAY BASIN

Subbasin Number Designation	Existing Conditions	Full Build-Out
5000	17	44
5005	9	35
5010	3	34
5015	13	41
5020	20	20
5025	18	38
5030	11	35
5035	24	35
5040	10	55
5045	15	37
5050	10	60
5055	9	85
5060	36	75
5065	43	85
5070	40	80
5075	14	51
5080	43	63
Average Percent Impervious for State Highway Basin	20	52

Source: *KCM*

Figure 4
State Highway Basin
STORMWATER

Six wells are located within a one-mile downgradient of the MASCA site (HLA, 1992). The closest of these wells is 0.4 miles from the site. One of these wells is owned by the Fruitland Mutual Water District and is used as a drinking water source. The other five wells are privately owned water wells. Depth to water bearing zones from which these wells produce range from 118 feet to 465 feet. At the time of the report, water quality sampling was conducted to assess shallow groundwater impacts due to a diesel spill which occurred in 1986. Although there was localized on-site contamination, no indication of contamination was found in the downgradient water wells. The report further states that important unknown hydrogeologic conditions may exist on or near the site. No conclusions regarding possible connectivity between the shallow on-site aquifer and the deeper zones were made, due to lack of information.

MASCA is currently conducting a Mode Toxic Control Act (MTCA) State and Pierce County approved cleanup. Quarterly reports are routinely filed with the Pierce County Health Department and the DOE Leaking Underground Storage Tank (LUST) Manager. The cleanup is proceeding in accordance with the plan using a pump and treat technology and THC levels are decreasing. The plume does not appear to have traveled beyond the extraction wells.

1.4 DRAINAGE PROBLEMS

1.4.1 Water Quantity

The City's 1988 Stormwater Management Program indicates there are a number of minor drainage related problems that exist in the State Highway Basin. The current problems consist primarily of localized flooding, channel erosion, and sediment deposition in several areas of the lower basin. One of the steep channel sections near 9th Street SE and 13th Avenue SE is reported to have severe erosion problems, and is expected to worsen as development continues in the upstream areas (this location is about 2.5 miles northwest of MASCA). The City of Puyallup's 1988 Stormwater Management Program also indicates that as development throughout the basin increases, the other identified problems areas are likely to be impacted.

During the February, 1996, period of heavy rainfall, severe flooding occurred in a number of areas in the basin. Many of these flooded areas consisted of undeveloped land. However, several of the flooded areas were developed residential areas. The magnitude and extent of the flooding is based on flooding observations by DEA staff, reports of local residents, and field observations of high water marks.

The most severe flooding appears to have occurred along 12th Avenue SE, where several hundred feet of the road was inundated. Water appears to have completed blocked the roadway, and partially covered a number of adjoining residential lots. Based on photographs of the flooding, depth of the inundation appeared to be three feet or deeper.

Along 12th Street SE, several residential lots were flooded. No evidence of structure damage was found, although flooding appears to have impeded access to the residences. Based upon photos and staff experience depth of the flood waters also appeared to be three feet or deeper.

Flooding is reportedly to have occurred in the playground area west of Wildwood Park Drive near 24th Avenue SE. Flood waters were reported to be about 0.5 feet deep. No evidence of residential structure damage was apparent.

1.4.2 Water Quality

Several basin water quality concerns are expressed in The Stormwater Management Program. Severe erosion and sedimentation problems have been identified in the lower channel near 9th Street SE and 13th Avenue SE (approximately 2.5 miles northwest of the MASCA site). The steepness and soil characteristics of several reaches of channel within Wildwood are prone to erosion and sedimentation problems during high flows. Basin wide, there are numerous non-point sources of stream pollution, including oils, grease, pesticides, fertilizers, and industrial sources.

1.5 ISSUES

In 1981, the existing on-site infiltration pond was sized in an attempt to accommodate the Building D expansion according to the applicable standards. What was not anticipated at that time, was the potential for water quality impacts to the shallow aquifer and/or deeper aquifers, and the cumulative impacts to the State Highway basin drainage problems. Since that time, Department of Ecology (DOE) and City of Puyallup standards have changed substantially. The assumptions made then are not appropriate now.

The pond was sized according to a model that is no longer used. The work associated with this SEIS has also found that the infiltration/detention pond can overflow and/or short circuit the system. This technical report has been prepared to assess the potential impacts related to possible conveyance of contaminated runoff into surface and groundwater, and to assess the potential storm and process water impacts due to the MASCA plant expansion.

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2.0 METHODS

2.1 LITERATURE REVIEW

To obtain background information regarding drainage facilities and issues, available records were reviewed. Sources of information included the MASCA drainage plans and calculations, The Stormwater Management Program, and correspondence among MASCA, the City, and various consultants. A detailed list of the information sources is provided in the references section.

2.2 DATA COLLECTION AND OBSERVATIONS

To confirm basin problems identified in the City's Stormwater Management Program (1988), and to determine if new problems have developed, a field reconnaissance of the MASCA detention system and downstream drainage course was conducted. The field reconnaissance was conducted by staff from DEA on several occasions (February 8, 14-18, 24-25, 1996) under different weather conditions.

The MASCA infiltration pond, pond outlet control, and outlet channel between the infiltration pond and the Lake Bradley outlet were inspected on February 8, 1996. This date occurred toward the end of five days of heavy rainfall (72-hour storm equaled a 50-year event). During this field observation, the MASCA infiltration/detention pond was in overflow condition. Stormflow was observed in the pond outlet control structure, and was also observed escaping the pond through a gravel lens along the northerly edge of the pond. Immediately downstream of the pond, a substantial amount of seepage was observed. During normal operation, the gravel lens is above the infiltration pond water elevation and seven feet higher than the bottom of the pond.

Because of the inconclusive results of a dye test was conducted on February 17 and 18, 1996, a second test was conducted on February 24 and 25, 1996. The second dye test used approximately 10 times the quantity of dye as used during the first test. Traces of dye were observed seeping into a swale area between the infiltration pond and Bradley Lake 30 hours after placement of the dye in the infiltration pond. The area of seepage is outside of the normal infiltration pond outlet channel, and upgradient from the lower end of the Bradley Lake outlet pipe. Field observations showed that traces of dye may also be present in Bradley Lake. The field methods are however based on visual observation under ultraviolet illumination, and can be influenced by other factors. Neither field methods, nor analysis satisfactorily identified the source of the apparent dye in the swale. Natural sources of color similar to the dye used are apparent in the area.

Further dye testing was not deemed to have a high likelihood of clarifying the issue. Conclusion on failure modes of the infiltration/detention pond are based only on field observation made in the February 8, 1996, storm event.

Detailed measurements and observations of the entire drainage system from the MASCA infiltration pond, downstream to the State Highway were made during the period February 14 through 16, 1996. (Weather during this reconnaissance period was dry.) The purpose of the reconnaissance was to identify conditions and areas that may have changed since publication of the City's Stormwater Management Plan. Quantitative analysis of the downstream system was not conducted as part of this study. Identified problems regarding downstream conveyance, erosion, and sedimentation are based on field observations and review of existing published studies.

2.3 ANALYSIS

As noted above, the existing infiltration pond was originally sized using the Y&W Method. The Y&W Method is a simplified method used to approximate rainfall-runoff volumes for stormwater infiltration ponds. The Y&W Method does not accurately represent the time distributions that occur with rainfall and runoff. Although better rainfall-runoff models existed at the time, these models typically required extensive manual calculations to evaluate a single scenario, or required the use of time share computing. The Y&W Method was the accepted infiltration pond sizing method at the time.

The current design criteria calls for using a hydrograph generation and routing method such as the Soil Conservation Service (SCS) Unit Hydrograph Method, or the Santa Barbara Unit Hydrograph Method to compute runoff and size the detention facility. The city's current standards require an allowable release rate of one-half of the two-year pre-developed rate for the two-year storm, the 10-year pre-developed rate for the 10-year storm, and the 100-year pre-developed rate for the 100-year storm.

The existing infiltration pond cannot be evaluated using current design methods because of the outflows leaving the pond through the gravel lens, and water surfacing a short distance downhill, causes the existing system to not operate as designed. An analysis of process water discharges that currently exist at MASCA is included in the Utility - Sanitary Sewer Technical Appendix (DEA, 1996).

To evaluate potential future MASCA stormwater ponds, three scenarios were analyzed. All of the analyses used the Waterworks Program to generate the SCS runoff hydrograph and to route the hydrograph through infiltration ponds. Land uses, ground cover, soil class curve number (CN) and impervious area was based on the original MASCA Master Plan. The site data used included:

Soil Class	Type C/D -- 75% of Site Type A -- 25% of Site
Existing Site Ground Cover	94.2 acres forested, average CN = 67.5

Developed Site Including Building "D"	Impervious Area = 37.35 acres, Average CN=98 Lawns/Landscaping = 22.10 acres, Average CN=81.5 Undisturbed Forest = 34.70 acres, Average CN=74.5
24 Hour Precipitation	Two Year Stòrm = 2.0 inches 10 Year Storm = 3.0 inches 25 Year Storm = 3.5 inches 100 Year Storm = 4.0 inches

The first assessment was conducted to compare the current pond volume to that which would be required under today's regulatory environment. Again, the Waterworks Program was used to compute runoff hydrographs for the site. The difference lies in that hydrographs were computed for both the pre- and post-development conditions. As noted above, current design standards call for releasing the two year post development storm at one-half the two-year pre-developed rate, and the 10- and 100-year post-development storms at the 10- and 100-year pre-development rates. Modeling of the system was based on the pond functioning as a detention/infiltration pond. The assumed infiltration rate was based on lowest rate identified for 1984 pond modifications. Copies of the Waterworks Program calculations titled "New Infiltration pond with Infiltration" are included in Appendix A.

Design criteria for the second analysis is the same as the first scenario, except that the modeling assumed that the detention/retention pond would be connected into a detention pond, only there would not be infiltration. This scenario assumes that the pond bottom would be sealed to prevent infiltration of stormwater. Copies of the Waterworks Program calculations titled "New Infiltration pond without Infiltration" are included in Appendix A.

Design criteria for the third analysis applies current detention standards to that portion of the site being developed under the proposed Building D expansion. This scenario assumes construction of a separate, new pond for the Building D development. The new pond will function as a detention pond, with no infiltration. Copies of the waterworks project calculations titled "New Detention Pond/New Development Only" are included in Appendix A. Approximately 28 acres of area was found to be tributary to the new development area. Of this, approximately 6.9 acres will be impervious, and 4.6 acres will be grass or roadside ditches. The remaining 16.5 acres will be undisturbed by the project, but will contribute drainage to any system built for the new Building D. Figure 5 displays soils types and project areas on the site.

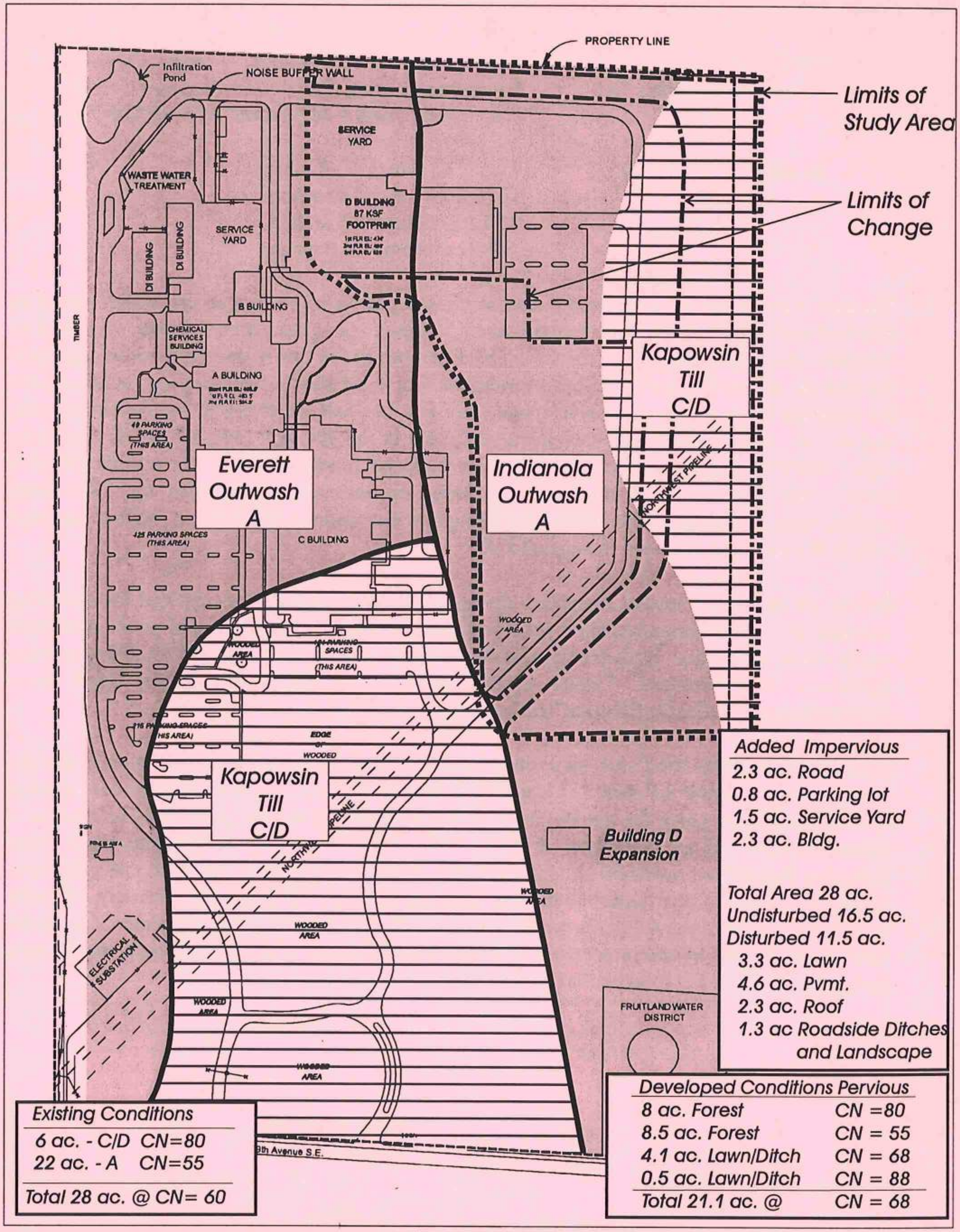


Figure 5
Soil Types
STORMWATER

3.0 EXISTING CONDITIONS

3.1 MASCA STORMWATER SYSTEM

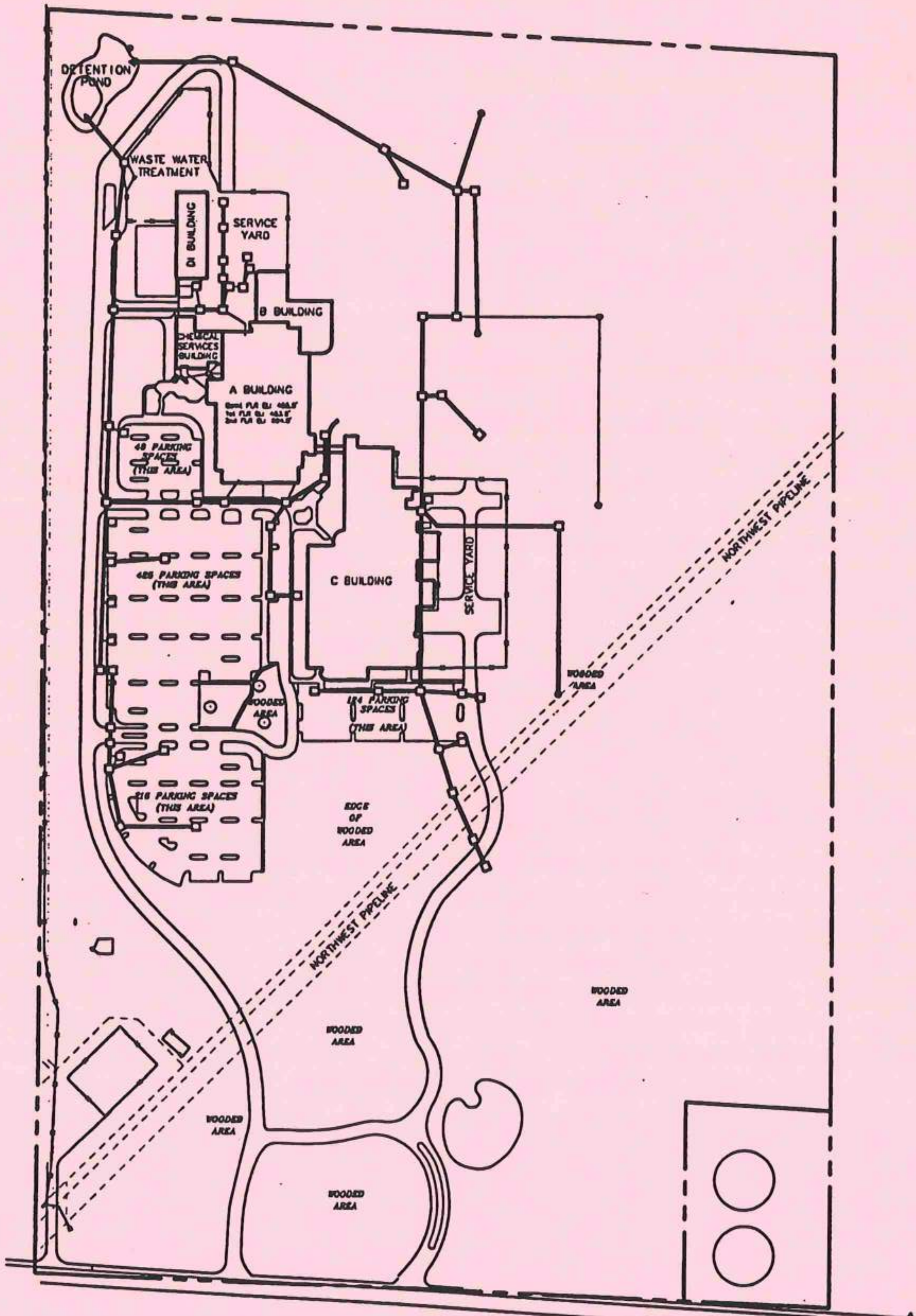
The existing MASCA storm drainage system consists of a series of ditches and pipes that collect and convey storm runoff to the infiltration pond (Figure 6). The detention system is an open pond with an estimated live storage volume of 70,730 cubic feet, and an estimated dead storage volume of 10,000 cubic feet.

The pond was designed as a combination retention/detention system. This means that during the design storm event, part of the storm runoff would infiltrate, and part would discharge to the downstream areas through the flow control structure. Based on the original drainage plans and calculations, the system was sized to address the 25-year storm event. The original design pond volume was 72,108 cubic feet, and includes approximately 1,400 cubic feet of dead storage. The maximum design release rate through the flow control structure was 16.5 cubic feet per second (cfs). Water flowing out of the hillside through a gravel lens was observed approximately five feet from the original bottom of the pond. This is referred to as "short circuiting because the water does not truly infiltrate as the pond was designed.

The 1984 pond modifications increased both the dead storage volume and the infiltration rate for the pond. (Converse Consultants, 1984). As-built plans of the pond modifications were not available, as such, the actual increased in storage volume is unknown. As noted, the modification also resulted in an increased infiltration rate. Tests conducted in 1984 show the infiltration rate of the pond to be as much as 44.6 cfs. This may reflect the short circuiting observed in the February 8, 1996, storm.

Stormwater discharge from the site is also regulated by the NPDES Waste Discharge Permit issued to MASCA in 1994. This permit allows site stormwaters and limited process waters to discharge into the Infiltration/Detention pond. (See the Utility - Sanitary Sewer Technical Appendix [DEA, 1996] for a more complete review of the NPDES Permit and the process water discharge.) The NPDES permit states, "no pond overflow permitted" (page 9 of 28 of Permit No. WA.003957-8). Significant flow out of the pond was observed during the February 8, 1996, storm. Flow was observed both in the pond control structure and in the hillside seeps from the gravel lens a short distance downhill from the pond. This is not in accordance with that permit, and the two functions -- detention and infiltration -- need to be separated.

Plant Building D Expansion
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT



DAVID EVANS AND ASSOCIATES, INC.

Figure 6:
Site Drainage Plan
STORMWATER

3.2 DOWNSTREAM DRAINAGE SYSTEM

Stormwater discharge from the MASCA infiltration pond flows northerly through a 24-inch discharge pipe for approximately 175 feet, before daylighting at a shallow, poorly defined channel approximately 200 feet north of the north property line (Figure 7). The swale directs flow northerly before discharging to a pool about 20-feet in diameter. The primary water source for the pool is the outlet pipe from Bradley Lake.

Discharge from the lake outlet then flows northerly for approximately two miles to a diversion facility located in Wildwood Park. During normal runoff condition, discharge flows northwesterly, to a point between 7th Street SE and 9th Street SE. The channel then turns north, and flows through a mix of channel, culverts, and small ponds before connecting to the State Highway drainage system near 13th Avenue SE.

During flood events, when the diversion pipe trash rack is clogged with debris, the Wildwood Park overflow diverts part of the runoff north, down the park ravine, through the residential areas East of 9th Street SE, and connects to the State Highway drainage system near 10th Avenue SE. Overflow conveyance through this reach consists of a series of open channels, culverts, several small ponds, and piped storm drains.

A summary of the measurements and observations of the downstream areas is included in Appendix B.

3.3 WATER QUANTITY

During periods of rainfall, stormwater runoff from the site is collected in a series of catch basins and on-site swales, and conveyed to the MASCA pond. When the rate of inflow is less than the infiltration capacity of the pond bottom, stormwater runoff infiltrates as soon as it reaches the infiltration pond. When the rate of inflow exceeds the infiltration capacity of the pond bottom, water is stored in the infiltration pond. During long duration storms, or extremely intense storms, the volume of water entering the pond exceeds both the infiltration and storage capacity of the infiltration pond. Under these conditions, the system fails as an infiltration pond and stormwater flows through the pond over-flow control structure, and through the gravel lens.

During normal pond operation, the only pond outlet is through infiltration. Water was observed seeping out of the hillside a short short distance downhill of the MASCA site. It is believed that the infiltrated water is resurfacing through a gravel lense. As stormwater resurfaces, it enters the outflow channel from Bradley Lake.

Pond operation under overflow conditions is similar to that described above. The principal difference is that in overflow conditions, pond outflow also includes the discharge through the flow control structure. The pond outflow merges with the Bradley Lake outflow, and continues northerly through the basin.

3.4 WATER QUALITY

The Stormwater Management Program includes a discussion of water quality issues in the City's drainage basins. Only erosion and sediment deposition was identified as non-point quality issues for the State Highway Basin. Of greater concern in the report, is the potential for future water quality degradation due to the cumulative effects of basin development. Each land parcel developed without water quality controls contributes pollutants such as oils, grease, pesticides, fertilizers, and industrial chemicals. The report recommends that to avoid future degradation, the City implement a requirement for water quality facilities for all new development. MASCA will need to install the controls outlined in the City's Public Work's standards and in the Puyallup Municipal Code.

Existing water quality facilities on-site are limited to the swales along the southerly road network. A majority of the parking lots and loading areas are not treated by this system. The DOE Stormwater Management Manual lists infiltration ponds as effective treatment facilities but only in Hydrologic Soils - Group B. Group A soils, such as the portion of the site containing the existing pond, are excessively well drained and considered a potential source of groundwater pollution because they provide no filtration benefit.

4.0 PROJECT IMPACTS AND MITIGATION

4.1 SITE DRAINAGE AND DETENTION

As shown in the calculations in the Appendix, future conditions will include approximately 6.9 acres of new impervious surfaces, 4.6 acres of lawn and roadside ditches, and 16.5 acres of area tributary to the new project area will not be disturbed. The peak rate of runoff from the project area will need to match 50% of the existing condition for the two-year storm, and will need to match the existing condition for the 10- and 100-year storm events. The allowable release rate does not take into account the existing pond because it is undersized by today's standards.

Using current design criteria for a combination detention/infiltration pond, the computed storage volume necessary for the entire site with the Building D expansion is 412,720 cubic feet. Stormwater release through the pond outflow control structure varies depending on the rate and volume of pond inflow. For the design storms, the release rates are 0.84 cfs for the two-year storm, 4.20 cfs for the 10-year storm, and 11.74 cfs for the 100-year storm. Since the pond is modeled as a detention/infiltration pond, there would be additional discharge through the shallow aquifer. A factor of safety of 1.2 also needs to be applied to the pond volume, based on DOE recommendations for Unit Hydrograph (SCS) based models.

The second design concept is based on current design criteria, but without infiltration. The computed volume under this scenario is 430,000 cubic feet. Stormwater release from the pond varies depending on the magnitude of rainfall. For the design storm events, the release rates are the same as that of the combination detention/infiltration pond alternative. The principal difference is that there would be no additional discharge due to infiltration. Again, a factor of safety of 1.2 should be applied.

Although modifications to the MASCA detention system would not fix the downstream flooding problems, pond modifications would help reduce the severity. Using the current design standards, the release rate would be reduced substantially. Table 1 shows the computed release rates for the two-, 10-, 25-, and 100-year storm events for each of the scenarios evaluated plus for the original pond design.

Table 1
Infiltration Pond Release Rates

Pond Alternative	2-Yr. Storm	10-Yr. Storm	25-Yr. Storm	100-Yr. Storm	Pond Volume
Original 1981 Design	n/a	n/a	16.5 cfs	n/a	72,108 cu. ft.
Modified Pond, with Infiltration	0.84 cfs	4.20 cfs	n/a	11.74 cfs	412,720 cu. ft.
Modified Pond, without Infiltration	0.84 cfs	4.20 cfs	n/a	11.74 cfs	430,000 cu. ft.

The current City Stormwater Regulatory Code does not require that existing sites under redevelopment be retroactively upgraded to current standards. Only the new portions of the site need to be designed to meet current code. This is the last scenario analyzed. For the 28 acres of the site tributary to the Building D expansion area, a separate infiltration pond must be built. It should have a minimum of 121,000 cubic feet of storage volume. As before, a factor of safety of 1.2 should be applied to this number for the redevelopment area. Release rates are projected at 0.14 cfs for the two- year storm, 0.67 cfs for the 10-year storm, and 1.52 cfs for the 100-year storm.

4.2 WATER QUANTITY

The City's 1988 Stormwater Management Program shows that as development of the upper basin occurs, increases in stormwater runoff rates and volumes will occur. The field reconnaissance of the downstream conveyance, dye testing of the infiltration/detention pond, and observations of flooding clearly demonstrate that any increase in stormwater runoff in the basin will adversely impact the middle and lower basin. The original concept of using infiltration to avoid increases in surface runoff is not working as planned because much of the infiltrated water resurfaces within a short distance of the infiltration pond. This "short circuiting" of the infiltration negates the benefits of infiltration. Rather than substantially reducing the quantity of runoff flowing to downstream areas, the infiltration only attenuates the runoff peak rate.

Since downstream flooding directly impacts several existing residential areas, health and safety are of significant concern. As noted above, any increase in stormwater runoff only aggravates the existing flooding problems.

To mitigate the potential cumulative impacts due to the MASCA expansion project, the stormwater discharge rate into the Bradley Lake outlet channel shall be reduced. Although reducing flow rates from MASCA will not "solve" the basin flooding problems, downstream flooding impacts will be lessened. Discharge flow rates could be reduced by doing the following three things:

1. Modifying the existing flow control structure to function as an overflow structure only. This can be accomplished by plugging the perforations in the lower section of the riser, and capping the short circuit gravel lens. This would allow the pond to function, as much as possible, as required under the NPDES permit.

2. Constructing a new detention facility for the Building D expansion area. The system should be designed to not infiltrate.

3. Removing process water discharge for the existing infiltration pond. The volume of process water discharge to the pond significantly reduces the pond volume available

to accept site stormwater. This also would allow the pond to function, as much as possible, as required under the NPDES permit.

4.3 WATER QUALITY

Neither the existing MASCA stormwater facilities nor the proposed improvements contain provisions for water quality treatment. The existing City studies only superficially address basin water quality. Studies by the DOE and other governmental agencies show that the untreated urban runoff can lead to reduce levels of dissolved oxygen, and increased turbidity and pollutant loading in the receiving waters. The cumulative impacts of MASCA's untreated stormwater discharge together with other basin development results in a high probability of water quality degradation on the downstream waters. In addition, the potential for groundwater quality impacts will be increased.

The existing soils on the site provide no filtration benefit. The existing process water flows to the pond consist of backwash water from the carbon filters in the on-site water purification system that are back washed once per week. The backwash was tested for the presence of priority pollutants in the course of this SEIS and were found to pose no significant potential human health problem even for someone swimming in the pond. The impact to groundwater quality would be less than that to human health. However, because the soils are excessively drained, inadvertent spills or intentional contamination of the flows to the pond pose an substantial impact on those groundwater sources in the immediate vicinity now, and an increased potential impact in the future due to increased flow rates.

As with the water quantity issues, mitigation will not prevent or eliminate water quality problems in the basin. However, by reducing the rate of pollutant discharge, cumulative downstream water quality impacts will be lessened. Water quality measures shall include either:

- A wet pond system constructed to treat stormwater runoff from the Building D expansion area; or

- A bio-filtration swàle constructed to treat on-site storm runoff from the Building D expansion area.

In addition, the following measures shall be instituted to protect groundwater quality:

- Process water currently discharged into the infiltration pond will be pre-treated, and discharged via the tightline to the Puyallup River. This will provide an upset capacity of these process waters and remove then as a potential source of groundwater pollutants. MASCA's NPDES permit will need to be modified in order the process water flow to be re-routed from discharging through Outfall #0003 to Outfall #001.

- For the portion of the site that will continue to drain to the existing infiltration pond, water quality pre-treatment measures such as filtration, bio-filtration, or water quality ponds would need to be constructed. The design should follow current DOE standards.

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5.0 MITIGATION MEASURES

Using current DOE and City design standards, either a wet pond system or bio-filtration swale shall be constructed to treat stormwater runoff from the Building D expansion area prior to issuance of any certificate of occupancy.

A new separate detention pond for the Building D expansion shall be designed and constructed to meet current City and DOE standards. This pond shall be operational prior to the issuance of any certificate of occupancy.

If any stormwater from the existing development will be discharged into the new pond, it shall be pre-treated in accordance with City and DOE standards. In addition, the new pond shall be sized (according to City and DOE standards) to accommodate both the proposed expansion and any additional discharge from the existing development.

The existing detention/infiltration pond outlet control shall be modified to maximize potential infiltration by sealing perforations in the riser pipes - using it only as an overflow discharge structure - and the gravel lense shall be capped. Additionally, the contaminated sediments shall be removed. MASCA shall make these modifications prior to issuance of any certificate of occupancy.

The process water flow from Outfall #003 shall be removed from the existing detention/infiltration pond. This process water shall be pre-treated by MASCA and discharged to Outfall #001. These modifications shall be completed prior to temporary or final occupancy.

A pretreatment system shall be constructed to treat stormwater runoff from the existing development that discharges into the existing pond prior to temporary or final occupancy.

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6.0 REFERENCES

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Appendix A
Drainage Calculations

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                                 MASCA
New Detention Pond/ New Development only
Current City Design Standards
=====================================================================
                             BASIN SUMMARY


BASIN ID: DE-00.5        NAME: DEVELOPED EAST 6 month Storm
SCS METHODOLOGY
TOTAL AREA.......:  28.00 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV            IMP
PRECIPITATION....:   1.40 inches   AREA..:   21.10 Acres    6.90 Acres
TIME INTERVAL....:     10.00 min   CN....:   68.00           98.00
                                   TC....:   28.07 min     28.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 200.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:27.00 s:0.0400
TcReach - Channel L: 600.00 kc:42.00 s:0.0040
PEAK RATE:   1.80 cfs  VOL:   0.73 Ac-ft  TIME:    510 min

BASIN ID: DE-002         NAME: DEVELOPED EAST 2 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  28.00 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV            IMP
PRECIPITATION....:   2.20 inches   AREA..:   21.10 Acres    6.90 Acres
TIME INTERVAL....:     10.00 min   CN....:   68.00           98.00
                                   TC....:   28.07 min     28.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 200.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:27.00 s:0.0400
TcReach - Channel L: 600.00 kc:42.00 s:0.0040
PEAK RATE:   2.98 cfs  VOL:   1.55 Ac-ft  TIME:    510 min

BASIN ID: DE-010         NAME: DEVELOPED EAST 10 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  28.00 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV            IMP
PRECIPITATION....:   3.00 inches   AREA..:   21.10 Acres    6.90 Acres
TIME INTERVAL....:     10.00 min   CN....:   68.00           98.00
                                   TC....:   28.07 min     28.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 200.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:27.00 s:0.0400
TcReach - Channel L: 600.00 kc:42.00 s:0.0040
PEAK RATE:   4.94 cfs  VOL:   2.60 Ac-ft  TIME:    510 min
```

New Detention Pond/ New Development only
Current City Design Standards

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BASIN SUMMARY

```
BASIN ID: DE-100        NAME: DEVELOPED EAST 100 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  28.00 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV           IMP
PRECIPITATION....:   4.00 inches     AREA..:   21.10 Acres    6.90 Acres
TIME INTERVAL....:     10.00 min     CN....:   68.00         98.00
                                     TC....:   28.07 min     28.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 200.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:27.00 s:0.0400
TcReach - Channel L: 600.00 kc:42.00 s:0.0040
PEAK RATE:   8.80 cfs  VOL:   4.14 Ac-ft  TIME:    510 min

BASIN ID: EE-002        NAME: Existing EAST 2 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  28.00 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV           IMP
PRECIPITATION....:   2.20 inches     AREA..:   28.00 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min     CN....:   60.00          0.00
                                     TC....:   44.17 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
PEAK RATE:   0.28 cfs  VOL:   0.22 Ac-ft  TIME:   1360 min

BASIN ID: EE-010        NAME: Existing EAST 10 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  28.00 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV           IMP
PRECIPITATION....:   3.00 inches     AREA..:   28.00 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min     CN....:   60.00          0.00
                                     TC....:   44.17 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
PEAK RATE:   0.67 cfs  VOL:   0.74 Ac-ft  TIME:   1350 min
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New Detention Pond/ New Development only
Current City Design Standards

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BASIN SUMMARY

```
BASIN ID: EE-100        NAME: Existing EAST 100 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  28.00 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:   TYPE1A                     PERV           IMP
PRECIPITATION....:   4.00 inches   AREA..:   28.00 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min   CN....:   60.00          0.00
                                   TC....:   44.17 min     0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
PEAK RATE:    1.52 cfs  VOL:    1.70 Ac-ft  TIME:    570 min
```

New Detention Pond/ New Development only
Current City Design Standards

HYDROGRAPH SUMMARY

HYD NUM	PEAK RUNOFF RATE cfs	TIME OF PEAK min.	VOLUME OF HYDRO cf\AcFt	Contrib Area Acres
1	0.140	1360	4718 cf	0.00
2	0.665	1350	32099 cf	28.00
3	1.521	570	73919 cf	28.00
4	2.984	510	67342 cf	28.00
5	4.940	510	113323 cf	28.00
6	8.799	510	180365 cf	28.00
11	0.140	1480	19634 cf	28.00
12	0.665	1470	54351 cf	28.00
13	1.522	1460	117575 cf	28.00

MASCA

New Detention Pond/ New Development only
Current City Design Standards

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STAGE STORAGE TABLE

TRAPEZOIDAL BASIN ID No. NewEast
Description: New Development Detention Pond
Length: 160.00 ft. Width: 120.00 ft.
Side Slope 1: 3 Side Slope 3: 3
Side Slope 2: 3 Side Slope 4: 3
Infiltration Rate: 0.00 min/inch

STAGE	<----STORAGE---->		STAGE	<----STORAGE---->		STAGE	<----STORAGE---->		STAGE	<----STORAGE---->	
(ft)	---cf---	--Ac-Ft-	(ft)	---cf---	--Ac-Ft-	(ft)	---cf---	--Ac-Ft-	(ft)	---cf---	--Ac-Ft-
100.00	0.0000	0.0000	102.60	55809	1.2812	105.20	124241	2.8522	107.80	206560	4.7420
100.10	1928	0.0443	102.70	58200	1.3361	105.30	127142	2.9188	107.90	210021	4.8214
100.20	3874	0.0889	102.80	60609	1.3914	105.40	130064	2.9859	108.00	213504	4.9014
100.30	5836	0.1340	102.90	63037	1.4471	105.50	133006	3.0534	108.10	217010	4.9819
100.40	7815	0.1794	103.00	65484	1.5033	105.60	135970	3.1214	108.20	220538	5.0629
100.50	9811	0.2252	103.10	67950	1.5599	105.70	138954	3.1899	108.30	224089	5.1444
100.60	11825	0.2715	103.20	70435	1.6170	105.80	141959	3.2589	108.40	227663	5.2264
100.70	13856	0.3181	103.30	72939	1.6744	105.90	144985	3.3284	108.50	231259	5.3090
100.80	15904	0.3651	103.40	75462	1.7324	106.00	148032	3.3983	108.60	234879	5.3921
100.90	17969	0.4125	103.50	78004	1.7907	106.10	151100	3.4688	108.70	238522	5.4757
101.00	20052	0.4603	103.60	80566	1.8495	106.20	154190	3.5397	108.80	242187	5.5599
101.10	22152	0.5085	103.70	83147	1.9088	106.30	157300	3.6111	108.90	245876	5.6445
101.20	24270	0.5572	103.80	85748	1.9685	106.40	160432	3.6830	109.00	249588	5.7298
101.30	26406	0.6062	103.90	88368	2.0287	106.50	163585	3.7554	109.10	253323	5.8155
101.40	28559	0.6556	104.00	91008	2.0893	106.60	166760	3.8283	109.20	257082	5.9018
101.50	30730	0.7055	104.10	93667	2.1503	106.70	169957	3.9017	109.30	260864	5.9886
101.60	32920	0.7557	104.20	96347	2.2118	106.80	173175	3.9755	109.40	264669	6.0760
101.70	35127	0.8064	104.30	99046	2.2738	106.90	176415	4.0499	109.50	268498	6.1639
101.80	37352	0.8575	104.40	101765	2.3362	107.00	179676	4.1248	109.60	272351	6.2523
101.90	39595	0.9090	104.50	104503	2.3991	107.10	182959	4.2002	109.70	276228	6.3413
102.00	41856	0.9609	104.60	107262	2.4624	107.20	186265	4.2760	109.80	280128	6.4309
102.10	44136	1.0132	104.70	110041	2.5262	107.30	189592	4.3524	109.90	284052	6.5209
102.20	46433	1.0660	104.80	112841	2.5905	107.40	192941	4.4293	110.00	288000	6.6116
102.30	48750	1.1191	104.90	115660	2.6552	107.50	196312	4.5067	110.00	288000	6.6116
102.40	51084	1.1727	105.00	118500	2.7204	107.60	199706	4.5846			
102.50	53437	1.2268	105.10	121360	2.7860	107.70	203122	4.6630			

New Detention Pond/ New Development only
Current City Design Standards

STAGE DISCHARGE TABLE

MULTIPLE ORIFICE ID No. NewDev
Description: New Development Flow Control
Outlet Elev: 100.00
Elev: 100.00 ft Orifice Diameter: 1.7593 in.
Elev: 102.90 ft Orifice 2 Diameter: 4.1953 in.
Elev: 104.10 ft Orifice 3 Diameter: 4.8516 in.

STAGE (ft)	<--DISCHARGE---> ---cfs--	STAGE (ft)	<--DISCHARGE---> ---cfs--	STAGE (ft)	<--DISCHARGE---> ---cfs--	STAGE (ft)	<--DISCHARGE---> ---cfs--
100.00	0.0000	102.60	0.1354	105.20	1.5858	107.80	2.5205
100.10	0.0266	102.70	0.1380	105.30	1.6330	107.90	2.5492
100.20	0.0376	102.80	0.1405	105.40	1.6787	108.00	2.5776
100.30	0.0460	102.90	0.1430	105.50	1.7229	108.10	2.6057
100.40	0.0531	103.00	0.2965	105.60	1.7659	108.20	2.6335
100.50	0.0594	103.10	0.3615	105.70	1.8077	108.30	2.6609
100.60	0.0651	103.20	0.4119	105.80	1.8485	108.40	2.6881
100.70	0.0703	103.30	0.4547	105.90	1.8883	108.50	2.7150
100.80	0.0751	103.40	0.4926	106.00	1.9271	108.60	2.7416
100.90	0.0797	103.50	0.5271	106.10	1.9652	108.70	2.7680
101.00	0.0840	103.60	0.5590	106.20	2.0024	108.80	2.7941
101.10	0.0881	103.70	0.5888	106.30	2.0389	108.90	2.8199
101.20	0.0920	103.80	0.6168	106.40	2.0747	109.00	2.8455
101.30	0.0958	103.90	0.6435	106.50	2.1099	109.10	2.8709
101.40	0.0994	104.00	0.6689	106.60	2.1445	109.20	2.8961
101.50	0.1029	104.10	0.6933	106.70	2.1784	109.30	2.9210
101.60	0.1062	104.20	0.9187	106.80	2.2118	109.40	2.9457
101.70	0.1095	104.30	1.0250	106.90	2.2447	109.50	2.9702
101.80	0.1127	104.40	1.1110	107.00	2.2771	109.60	2.9945
101.90	0.1158	104.50	1.1863	107.10	2.3090	109.70	3.0186
102.00	0.1188	104.60	1.2546	107.20	2.3404	109.80	3.0425
102.10	0.1217	104.70	1.3177	107.30	2.3714	109.90	3.0663
102.20	0.1246	104.80	1.3768	107.40	2.4020	110.00	3.0898
102.30	0.1274	104.90	1.4327	107.50	2.4322		
102.40	0.1301	105.00	1.4859	107.60	2.4620		
102.50	0.1328	105.10	1.5369	107.70	2.4914		

MASCA

New Detention Pond/ New Development only
Current City Design Standards

LEVEL POOL TABLE SUMMARY

<--------DESCRIPTION--------->	MATCH (cfs)	INFLOW (cfs)	-STO- --id-	-DIS- --id-	<-PEAK-> <-STAGE>	STORAGE id	VOL (cf)
New Sys - 2to1/2-2yr	0.14	2.98	NewEast	NewDev	102.77	11	59807.63 cf
New Sys - 10to10yr	0.67	4.94	NewEast	NewDev	103.98	12	90573.72 cf
New Sys - 100to100yr	1.52	8.80	NewEast	NewDev	105.07	13	120526 ac-ft

THE TWO ITEMS THAT FOLLOW ARE RESULTS OF PRINT SCREEN COMMANDS ISSUED DURING THE COMPUTER RUN OF THE ABOVE CALCULATIONS, AND ARE INCLUDED FOR EASE OF UNDERSTANDING.

David Evans & Associates Inc - Bellevue

Level Pool Routing Instructions

Description	Pre Hyd	In Hyd	Stor ID	Disch ID	Out
New Sys - 2to1/2-2yr	1	4	NewEast	NewDev	11
New Sys - 10to10yr	2	5	NewEast	NewDev	12
New Sys - 100to100yr	3	6	NewEast	NewDev	13

David Evans & Associates Inc - Bellevue

Display Level Pool Results

Description	Match Peak	Inflow Peak	Storage ID	Disch ID	Peak Stage	Peak Volume	Peak Out
New Sys - 2to1/2-2yr	0.14	2.98	NewEast	NewDev	102.77	59808	0.14
New Sys - 10to10yr	0.67	4.94	NewEast	NewDev	103.98	90574	0.66
New Sys - 100to100yr	1.52	8.80	NewEast	NewDev	105.07	120526	1.52

FACTOR OF SAFETY OF 1.2 MIN REQUIRED.

MIN VOLUME = 120,500 CF X 1.2

= 144,600 CF

≈ 5100 CF/AC

New Detention Pond without Infiltration
Current City Design Standards

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BASIN SUMMARY

```
BASIN ID: E-025         NAME: Existing 25 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV           IMP
PRECIPITATION....:   3.50 inches   AREA..:    94.20 Acres    0.00 Acres
TIME INTERVAL....:    10.00 min    CN....:    67.50          0.00
                                   TC....:    56.65 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
TcReach - Channel L:1800.00 kc:17.00 s:0.0200
PEAK RATE:   7.43 cfs  VOL:   6.61 Ac-ft  TIME:    560 min

BASIN ID: E-100         NAME: Existing 100 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                    PERV           IMP
PRECIPITATION....:   4.00 inches   AREA..:    94.20 Acres    0.00 Acres
TIME INTERVAL....:    10.00 min    CN....:    67.50          0.00
                                   TC....:    56.65 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
TcReach - Channel L:1800.00 kc:17.00 s:0.0200
PEAK RATE:  11.74 cfs  VOL:   8.88 Ac-ft  TIME:    540 min
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                              MASCA
New Detention Pond without Infiltration
Current City Design Standards
==================================================================
                          BASIN SUMMARY


BASIN ID: D-002        NAME: Developed 2 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:   TYPE1A                  PERV          IMP
PRECIPITATION....:   2.20 inches   AREA..:   56.85 Acres  37.35 Acres
TIME INTERVAL....:    10.00 min    CN....:   77.20         98.00
                                   TC....:   30.60 min    23.78 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.1500 p2yr: 2.20 s:0.0200
TcReach - Shallow L: 200.00 ks:11.00 s:0.0200
impTcReach - Sheet   L: 200.00 ns:0.1500 p2yr: 2.20 s:0.0400
impTcReach - Channel L:1530.00 kc:21.00 s:0.0220
PEAK RATE:  19.93 cfs  VOL:   8.54 Ac-ft  TIME:    510 min

BASIN ID: D-010        NAME: Developed 10 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:   TYPE1A                  PERV          IMP
PRECIPITATION....:   3.00 inches   AREA..:   56.85 Acres  37.35 Acres
TIME INTERVAL....:    10.00 min    CN....:   77.20         98.00
                                   TC....:   30.60 min    23.78 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.1500 p2yr: 2.20 s:0.0200
TcReach - Shallow L: 200.00 ks:11.00 s:0.0200
impTcReach - Sheet   L: 200.00 ns:0.1500 p2yr: 2.20 s:0.0400
impTcReach - Channel L:1530.00 kc:21.00 s:0.0220
PEAK RATE:  32.40 cfs  VOL:  13.30 Ac-ft  TIME:    510 min

BASIN ID: D-025        NAME: Developed 25 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres    BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:   TYPE1A                  PERV          IMP
PRECIPITATION....:   3.50 inches   AREA..:   56.85 Acres  37.35 Acres
TIME INTERVAL....:    10.00 min    CN....:   77.20         98.00
                                   TC....:   30.60 min    23.78 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.1500 p2yr: 2.20 s:0.0200
TcReach - Shallow L: 200.00 ks:11.00 s:0.0200
impTcReach - Sheet   L: 200.00 ns:0.1500 p2yr: 2.20 s:0.0400
impTcReach - Channel L:1530.00 kc:21.00 s:0.0220
PEAK RATE:  40.80 cfs  VOL:  16.46 Ac-ft  TIME:    510 min
```

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                                MASCA
New Detention Pond without Infiltration
Current City Design Standards
===================================================================
                          BASIN SUMMARY

BASIN ID: D-100         NAME: Developed 100 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV           IMP
PRECIPITATION....:   4.00 inches    AREA..:    56.85 Acres   37.35 Acres
TIME INTERVAL....:     10.00 min    CN....:    77.20          98.00
                                    TC....:    30.60 min     23.78 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.1500 p2yr: 2.20 s:0.0200
TcReach - Shallow L: 200.00 ks:11.00 s:0.0200
impTcReach - Sheet   L: 200.00 ns:0.1500 p2yr: 2.20 s:0.0400
impTcReach - Channel L:1530.00 kc:21.00 s:0.0220
PEAK RATE:  49.55 cfs  VOL:  19.73 Ac-ft  TIME:    510 min

BASIN ID: E-002         NAME: Existing 2 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV           IMP
PRECIPITATION....:   2.20 inches    AREA..:    94.20 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:    67.50           0.00
                                    TC....:    56.65 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
TcReach - Channel L:1800.00 kc:17.00 s:0.0200
PEAK RATE:    1.67 cfs  VOL:   1.89 Ac-ft  TIME:   1060 min

BASIN ID: E-010         NAME: Existing 10 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV           IMP
PRECIPITATION....:   3.00 inches    AREA..:    94.20 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:    67.50           0.00
                                    TC....:    56.65 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
TcReach - Channel L:1800.00 kc:17.00 s:0.0200
PEAK RATE:    4.20 cfs  VOL:   4.56 Ac-ft  TIME:    580 min
```

New Detention Pond without Infiltration
Current City Design Standards

HYDROGRAPH SUMMARY

HYD NUM	PEAK RUNOFF RATE cfs	TIME OF PEAK min.	VOLUME OF HYDRO cf\AcFt	Contrib Area Acres
1	0.837	1060	41203 cf	0.00
2	1.674	1060	82407 cf	94.20
3	4.197	580	198657 cf	94.20
4	7.430	560	287804 cf	94.20
5	11.735	540	386739 cf	94.20
12	19.933	510	371914 cf	94.20
13	32.398	510	579317 cf	94.20
14	40.799	510	717056 cf	94.20
15	49.545	510	859261 cf	94.20
16	0.837	1480	121103 cf	94.20
17	4.196	1460	298174 cf	94.20
18	11.727	760	577084 cf	94.20

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STORAGE STRUCTURE LIST

TRAPEZOIDAL BASIN ID No. Exist
Description: Existing Detention Pond
Length: 100.00 ft. Width: 93.10 ft.
Side Slope 1: 3 Side Slope 3: 3
Side Slope 2: 3 Side Slope 4: 3
Infiltration Rate: 50.00 min/inch

TRAPEZOIDAL BASIN ID No. New
Description: New Detention Pond
Length: 160.00 ft. Width: 120.00 ft.
Side Slope 1: 3 Side Slope 3: 3
Side Slope 2: 3 Side Slope 4: 3
Infiltration Rate: 0.00 min/inch

New Detention Pond without Infiltration
Current City Design Standards

DISCHARGE STRUCTURE LIST

MULTIPLE ORIFICE ID No. Exist
Description: Existing Flow Control
Outlet Elev: 439.50
Elev: 439.50 ft Orifice Diameter: 11.0156 in.

MULTIPLE ORIFICE ID No. New
Description: New Flow Control
Outlet Elev: 439.50
Elev: 439.50 ft Orifice Diameter: 3.0586 in.
Elev: 450.50 ft Orifice 2 Diameter: 9.1172 in.
Elev: 452.70 ft Orifice 3 Diameter: 39.7500 in.

MASCA
New Detention Pond without Infiltration
Current City Design Standards

LEVEL POOL TABLE SUMMARY

<--------DESCRIPTION--------->	MATCH (cfs)	INFLOW (cfs)	-STO- --id-	-DIS- --id-	<-PEAK-> <-STAGE>	id	STORAGE VOL (cf)
New Sys - 6 Mo/2 Yr	0.84	19.93	New	New	450.38	16	323841 ac-ft
New Sys - 10/10	4.20	32.40	New	New	452.61	17	423160 ac-ft
New Sys - 100/100	11.74	49.55	New	New	452.75	18	430014 ac-ft

New Detention Pond without Infiltration
Current City Design Standards

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HISTORY OF HYDROGRAPH ACTIVITY

```
Date of Session: 2/28/96   2:41:26 pm
BASIN  E-002 "Existing 2 Year Storm" 94.200 2.20 10.00 56.65 TYPE1A 0.00
      0.20 0.000 94.200 67.50 0.000 0.00 SCS 24.00 484.00
      SHEET 300.00 0.1000 0.4000 2.20
      SHALLOW 200.00 0.1000 5.0000
      CHANNEL 600.00 0.0040 17.0000
      CHANNEL 1800.00 0.0200 17.0000
LSTEND

BASIN  E-010 "Existing 10 Year Storm" 94.200 3.00 10.00 56.65 TYPE1A 0.00
      0.20 0.000 94.200 67.50 0.000 0.00 SCS 24.00 484.00
      SHEET 300.00 0.1000 0.4000 2.20
      SHALLOW 200.00 0.1000 5.0000
      CHANNEL 600.00 0.0040 17.0000
      CHANNEL 1800.00 0.0200 17.0000
LSTEND

BASIN  E-025 "Existing 25 Year Storm" 94.200 3.50 10.00 56.65 TYPE1A 0.00
      0.20 0.000 94.200 67.50 0.000 0.00 SCS 24.00 484.00
      SHEET 300.00 0.1000 0.4000 2.20
      SHALLOW 200.00 0.1000 5.0000
      CHANNEL 600.00 0.0040 17.0000
      CHANNEL 1800.00 0.0200 17.0000
LSTEND

BASIN  E-100 "Existing 100 Year Storm" 94.200 4.00 10.00 56.65 TYPE1A 0.00
      0.20 0.000 94.200 67.50 0.000 0.00 SCS 24.00 484.00
      SHEET 300.00 0.1000 0.4000 2.20
      SHALLOW 200.00 0.1000 5.0000
      CHANNEL 600.00 0.0040 17.0000
      CHANNEL 1800.00 0.0200 17.0000
LSTEND

BASIN  D-002 "Developed 2 Year Storm" 94.200 2.20 10.00 30.60 TYPE1A 23.78
      0.20 0.000 56.850 77.20 37.350 98.00 SCS 24.00 484.00
      SHEET 300.00 0.0200 0.1500 2.20
      SHALLOW 200.00 0.0200 11.0000
      ISHEET 200.00 0.0400 0.1500 2.20
      ICHANNEL 1530.00 0.0220 21.0000
LSTEND

BASIN  D-010 "Developed 10 Year Storm" 94.200 3.00 10.00 30.60 TYPE1A 23.78
      0.20 0.000 56.850 77.20 37.350 98.00 SCS 24.00 484.00
      SHEET 300.00 0.0200 0.1500 2.20
      SHALLOW 200.00 0.0200 11.0000
      ISHEET 200.00 0.0400 0.1500 2.20
      ICHANNEL 1530.00 0.0220 21.0000
LSTEND

BASIN  D-025 "Developed 25 Year Storm" 94.200 3.50 10.00 30.60 TYPE1A 23.78
```

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HISTORY OF HYDROGRAPH ACTIVITY

```
      0.20 0.000 56.850 77.20 37.350 98.00 SCS 24.00 484.00
      SHEET 300.00 0.0200 0.1500 2.20
      SHALLOW 200.00 0.0200 11.0000
      ISHEET 200.00 0.0400 0.1500 2.20
      ICHANNEL 1530.00 0.0220 21.0000
LSTEND

BASIN  D-100 "Developed 100 Year Storm" 94.200 4.00 10.00 30.60 TYPE1A 23.78
      0.20 0.000 56.850 77.20 37.350 98.00 SCS 24.00 484.00
      SHEET 300.00 0.0200 0.1500 2.20
      SHALLOW 200.00 0.0200 11.0000
      ISHEET 200.00 0.0400 0.1500 2.20
      ICHANNEL 1530.00 0.0220 21.0000
LSTEND

ZERO   1 20

MOVE   E-002 to  1
                     1.6742 cfs    1.8918 ac-ft    17.67 hrs

MOVE   E-002 to  2
                     1.6742 cfs    1.8918 ac-ft    17.67 hrs

MOVE   E-010 to  3
                     4.1975 cfs    4.5605 ac-ft     9.67 hrs

MOVE   E-025 to  4
                     7.4302 cfs    6.6071 ac-ft     9.33 hrs

MOVE   E-100 to  5
                    11.7354 cfs    8.8783 ac-ft     9.00 hrs

MOVE   D-002 to 12
                    19.9325 cfs    8.5380 ac-ft     8.50 hrs

MOVE   D-010 to 13
                    32.3976 cfs   13.2993 ac-ft     8.50 hrs

MOVE   D-025 to 14
                    40.7986 cfs   16.4613 ac-ft     8.50 hrs

MOVE   D-100 to 15
                    49.5451 cfs   19.7259 ac-ft     8.50 hrs

DIVERT 50.00  1 20 PERCENT
              0.8371 cfs    0.9459 ac-ft    17.67 hrs
              0.8371 cfs    0.9459 ac-ft    17.67 hrs

ZERO   20 20
```

New Detention Pond without Infiltration
Current City Design Standards
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HISTORY OF HYDROGRAPH ACTIVITY

```
STOR2  New "New Detention Pond"   160.00  3.00  3.00   120.00  3.00  3.00  0.00   439.50 455.00  0.10

DISCH5 New "New Flow Control"     0.00  0.62   439.50   439.50 445.00       0.10
        11.02
LSTEND

ZERO   6 8

DESIGN
     1 "New Sys - 6 Mo/2 Yr" 1 12 New New 16
     2 "New Sys - 10/10" 3 13 New New 17
     3 "New Sys - 100/100" 5 15 New New 18
    ORIF New    3.06  11.00   9.12   2.20  39.75   0.00   0.00   0.00   0.00
LSTEND
Description          MatchQ   PeakQ Sto    Dis      PkStg    OutQ  hyd    Volume
New Sys - 100/100     11.74   49.55  New    New     452.75  11.73   18   430013.74 cf
```

MASCA
New Detention Pond with Infiltration
Current City Design Standards

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BASIN SUMMARY

```
BASIN ID: D-002        NAME: Developed 2 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV         IMP
PRECIPITATION....:   2.20 inches    AREA..:   56.85 Acres   37.35 Acres
TIME INTERVAL....:     10.00 min    CN....:   77.20         98.00
                                    TC....:   30.60 min     23.78 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.1500 p2yr: 2.20 s:0.0200
TcReach - Shallow L: 200.00 ks:11.00 s:0.0200
impTcReach - Sheet   L: 200.00 ns:0.1500 p2yr: 2.20 s:0.0400
impTcReach - Channel L:1530.00 kc:21.00 s:0.0220
PEAK RATE:  19.93 cfs  VOL:   8.54 Ac-ft  TIME:    510 min

BASIN ID: D-010        NAME: Developed 10 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV         IMP
PRECIPITATION....:   3.00 inches    AREA..:   56.85 Acres   37.35 Acres
TIME INTERVAL....:     10.00 min    CN....:   77.20         98.00
                                    TC....:   30.60 min     23.78 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.1500 p2yr: 2.20 s:0.0200
TcReach - Shallow L: 200.00 ks:11.00 s:0.0200
impTcReach - Sheet   L: 200.00 ns:0.1500 p2yr: 2.20 s:0.0400
impTcReach - Channel L:1530.00 kc:21.00 s:0.0220
PEAK RATE:  32.40 cfs  VOL:  13.30 Ac-ft  TIME:    510 min

BASIN ID: D-025        NAME: Developed 25 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                     PERV         IMP
PRECIPITATION....:   3.50 inches    AREA..:   56.85 Acres   37.35 Acres
TIME INTERVAL....:     10.00 min    CN....:   77.20         98.00
                                    TC....:   30.60 min     23.78 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.1500 p2yr: 2.20 s:0.0200
TcReach - Shallow L: 200.00 ks:11.00 s:0.0200
impTcReach - Sheet   L: 200.00 ns:0.1500 p2yr: 2.20 s:0.0400
impTcReach - Channel L:1530.00 kc:21.00 s:0.0220
PEAK RATE:  40.80 cfs  VOL:  16.46 Ac-ft  TIME:    510 min
```

New Detention Pond with Infiltration
Current City Design Standards

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BASIN SUMMARY

```
BASIN ID: D-100          NAME: Developed 100 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:   TYPE1A                      PERV           IMP
PRECIPITATION....:   4.00 inches     AREA..:   56.85 Acres   37.35 Acres
TIME INTERVAL....:    10.00 min      CN....:   77.20          98.00
                                     TC....:   30.60 min     23.78 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.1500 p2yr: 2.20 s:0.0200
TcReach - Shallow L: 200.00 ks:11.00 s:0.0200
impTcReach - Sheet   L: 200.00 ns:0.1500 p2yr: 2.20 s:0.0400
impTcReach - Channel L:1530.00 kc:21.00 s:0.0220
PEAK RATE:  49.55 cfs  VOL:  19.73 Ac-ft  TIME:    510 min

BASIN ID: E-002          NAME: Existing 2 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:   TYPE1A                      PERV           IMP
PRECIPITATION....:   2.20 inches     AREA..:   94.20 Acres    0.00 Acres
TIME INTERVAL....:    10.00 min      CN....:   67.50           0.00
                                     TC....:   56.65 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
TcReach - Channel L:1800.00 kc:17.00 s:0.0200
PEAK RATE:   1.67 cfs  VOL:   1.89 Ac-ft  TIME:   1060 min

BASIN ID: E-010          NAME: Existing 10 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres      BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:   TYPE1A                      PERV           IMP
PRECIPITATION....:   3.00 inches     AREA..:   94.20 Acres    0.00 Acres
TIME INTERVAL....:    10.00 min      CN....:   67.50           0.00
                                     TC....:   56.65 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
TcReach - Channel L:1800.00 kc:17.00 s:0.0200
PEAK RATE:   4.20 cfs  VOL:   4.56 Ac-ft  TIME:    580 min
```

MASCA

New Detention Pond with Infiltration
Current City Design Standards

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BASIN SUMMARY

```
BASIN ID: E-025          NAME: Existing 25 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV           IMP
PRECIPITATION....:   3.50 inches    AREA..:    94.20 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:    67.50          0.00
                                    TC....:    56.65 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
TcReach - Channel L:1800.00 kc:17.00 s:0.0200
PEAK RATE:   7.43 cfs  VOL:   6.61 Ac-ft  TIME:     560 min

BASIN ID: E-100          NAME: Existing 100 Year Storm
SCS METHODOLOGY
TOTAL AREA.......:  94.20 Acres     BASEFLOWS:    0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV           IMP
PRECIPITATION....:   4.00 inches    AREA..:    94.20 Acres    0.00 Acres
TIME INTERVAL....:     10.00 min    CN....:    67.50          0.00
                                    TC....:    56.65 min      0.00 min
ABSTRACTION COEFF:   0.20
TcReach - Sheet   L: 300.00 ns:0.4000 p2yr: 2.20 s:0.1000
TcReach - Shallow L: 200.00 ks:5.00 s:0.1000
TcReach - Channel L: 600.00 kc:17.00 s:0.0040
TcReach - Channel L:1800.00 kc:17.00 s:0.0200
PEAK RATE:  11.74 cfs  VOL:   8.88 Ac-ft  TIME:     540 min
```

New Detention Pond with Infiltration
Current City Design Standards

HYDROGRAPH SUMMARY

HYD NUM	PEAK RUNOFF RATE cfs	TIME OF PEAK min.	VOLUME OF HYDRO cf\AcFt	Contrib Area Acres
1	0.837	1060	41203 cf	0.00
2	1.674	1060	82407 cf	94.20
3	4.197	580	198657 cf	94.20
4	7.430	560	287804 cf	94.20
5	11.735	540	386739 cf	94.20
12	19.933	510	371914 cf	94.20
13	32.398	510	579317 cf	94.20
14	40.799	510	717056 cf	94.20
15	49.545	510	859261 cf	94.20
16	1.154	1470	167935 cf	94.20
17	4.195	1460	339350 cf	94.20
18	11.734	760	617816 cf	94.20

New Detention Pond with Infiltration
Current City Design Standards
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STORAGE STRUCTURE LIST

TRAPEZOIDAL BASIN ID No. Exist
Description: Existing Detention Pond
Length: 100.00 ft. Width: 93.10 ft.
Side Slope 1: 3 Side Slope 3: 3
Side Slope 2: 3 Side Slope 4: 3
Infiltration Rate: 50.00 min/inch

TRAPEZOIDAL BASIN ID No. New
Description: New Detention Pond
Length: 160.00 ft. Width: 120.00 ft.
Side Slope 1: 3 Side Slope 3: 3
Side Slope 2: 3 Side Slope 4: 3
Infiltration Rate: 50.00 min/inch

New Detention Pond with Infiltration
Current City Design Standards

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DISCHARGE STRUCTURE LIST

MULTIPLE ORIFICE ID No. Exist
Description: Existing Flow Control
Outlet Elev: 439.50
Elev: 439.50 ft Orifice Diameter: 11.0156 in.

MULTIPLE ORIFICE ID No. New
Description: New Flow Control
Outlet Elev: 439.50
Elev: 439.50 ft Orifice Diameter: 0.0117 in.
Elev: 449.90 ft Orifice 2 Diameter: 8.3438 in.
Elev: 452.30 ft Orifice 3 Diameter: 31.1250 in.

New Detention Pond with Infiltration
Current City Design Standards

LEVEL POOL TABLE SUMMARY

<--------DESCRIPTION--------->	MATCH (cfs)	INFLOW (cfs)	-STO- --id-	-DIS- --id-	<-PEAK-> <-STAGE>	id	STORAGE VOL (cf)
New Sys - 6 Mo/2 Yr	0.84	19.93	New	New	449.83	16	301223 ac-ft
New Sys - 10/10	4.20	32.40	New	New	452.20	17	404021 ac-ft
New Sys - 100/100	11.74	49.55	New	New	452.39	18	412717 ac-ft

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HISTORY OF HYDROGRAPH ACTIVITY

```
Date of Session: 2/28/96   2:41:26 pm
BASIN  E-002 "Existing 2 Year Storm" 94.200 2.20 10.00 56.65 TYPE1A 0.00
      0.20 0.000 94.200 67.50 0.000 0.00 SCS 24.00 484.00
      SHEET 300.00 0.1000 0.4000 2.20
      SHALLOW 200.00 0.1000 5.0000
      CHANNEL 600.00 0.0040 17.0000
      CHANNEL 1800.00 0.0200 17.0000
LSTEND

BASIN  E-010 "Existing 10 Year Storm" 94.200 3.00 10.00 56.65 TYPE1A 0.00
      0.20 0.000 94.200 67.50 0.000 0.00 SCS 24.00 484.00
      SHEET 300.00 0.1000 0.4000 2.20
      SHALLOW 200.00 0.1000 5.0000
      CHANNEL 600.00 0.0040 17.0000
      CHANNEL 1800.00 0.0200 17.0000
LSTEND

BASIN  E-025 "Existing 25 Year Storm" 94.200 3.50 10.00 56.65 TYPE1A 0.00
      0.20 0.000 94.200 67.50 0.000 0.00 SCS 24.00 484.00
      SHEET 300.00 0.1000 0.4000 2.20
      SHALLOW 200.00 0.1000 5.0000
      CHANNEL 600.00 0.0040 17.0000
      CHANNEL 1800.00 0.0200 17.0000
LSTEND

BASIN  E-100 "Existing 100 Year Storm" 94.200 4.00 10.00 56.65 TYPE1A 0.00
      0.20 0.000 94.200 67.50 0.000 0.00 SCS 24.00 484.00
      SHEET 300.00 0.1000 0.4000 2.20
      SHALLOW 200.00 0.1000 5.0000
      CHANNEL 600.00 0.0040 17.0000
      CHANNEL 1800.00 0.0200 17.0000
LSTEND

BASIN  D-002 "Developed 2 Year Storm" 94.200 2.20 10.00 30.60 TYPE1A 23.78
      0.20 0.000 56.850 77.20 37.350 98.00 SCS 24.00 484.00
      SHEET 300.00 0.0200 0.1500 2.20
      SHALLOW 200.00 0.0200 11.0000
      ISHEET 200.00 0.0400 0.1500 2.20
      ICHANNEL 1530.00 0.0220 21.0000
LSTEND

BASIN  D-010 "Developed 10 Year Storm" 94.200 3.00 10.00 30.60 TYPE1A 23.78
      0.20 0.000 56.850 77.20 37.350 98.00 SCS 24.00 484.00
      SHEET 300.00 0.0200 0.1500 2.20
      SHALLOW 200.00 0.0200 11.0000
      ISHEET 200.00 0.0400 0.1500 2.20
      ICHANNEL 1530.00 0.0220 21.0000
LSTEND

BASIN  D-025 "Developed 25 Year Storm" 94.200 3.50 10.00 30.60 TYPE1A 23.78
```

===

HISTORY OF HYDROGRAPH ACTIVITY

```
     0.20 0.000 56.850 77.20 37.350 98.00 SCS 24.00 484.00
     SHEET 300.00 0.0200 0.1500 2.20
     SHALLOW 200.00 0.0200 11.0000
     ISHEET 200.00 0.0400 0.1500 2.20
     ICHANNEL 1530.00 0.0220 21.0000
LSTEND

BASIN D-100 "Developed 100 Year Storm" 94.200 4.00 10.00 30.60 TYPE1A 23.78
     0.20 0.000 56.850 77.20 37.350 98.00 SCS 24.00 484.00
     SHEET 300.00 0.0200 0.1500 2.20
     SHALLOW 200.00 0.0200 11.0000
     ISHEET 200.00 0.0400 0.1500 2.20
     ICHANNEL 1530.00 0.0220 21.0000
LSTEND

ZERO  1 20

MOVE  E-002 to  1
                   1.6742 cfs   1.8918 ac-ft   17.67 hrs

MOVE  E-002 to  2
                   1.6742 cfs   1.8918 ac-ft   17.67 hrs

MOVE  E-010 to  3
                   4.1975 cfs   4.5605 ac-ft    9.67 hrs

MOVE  E-025 to  4
                   7.4302 cfs   6.6071 ac-ft    9.33 hrs

MOVE  E-100 to  5
                  11.7354 cfs   8.8783 ac-ft    9.00 hrs

MOVE  D-002 to 12
                  19.9325 cfs   8.5380 ac-ft    8.50 hrs

MOVE  D-010 to 13
                  32.3976 cfs  13.2993 ac-ft    8.50 hrs

MOVE  D-025 to 14
                  40.7986 cfs  16.4613 ac-ft    8.50 hrs

MOVE  D-100 to 15
                  49.5451 cfs  19.7259 ac-ft    8.50 hrs

DIVERT 50.00 1 20 PERCENT
             0.8371 cfs   0.9459 ac-ft   17.67 hrs
             0.8371 cfs   0.9459 ac-ft   17.67 hrs

ZERO  20 20
```

New Detention Pond with Infiltration
Current City Design Standards
==

HISTORY OF HYDROGRAPH ACTIVITY

STOR2 New "New Detention Pond" 160.00 3.00 3.00 120.00 3.00 3.00 50.00 439.50 445.00 0.10

DISCH5 New "New Flow Control" 0.00 0.62 439.50 439.50 445.00 0.10
11.02

LSTEND

ZERO 6 8

DESIGN
1 "New Sys - 6 Mo/2 Yr" 1 12 New New 16
2 "New Sys - 10/10" 3 13 New New 17
3 "New Sys - 100/100" 5 15 New New 18
ORIF New 0.01 10.40 8.34 2.40 31.13 0.00 0.00 0.00 0.00

LSTEND

Description	MatchQ	PeakQ	Sto	Dis	PkStg	OutQ	hyd	Volume
New Sys - 100/100	11.74	49.55	New	New	452.39	11.73	18	412716.95 cf

Date of Session: 3/4/96 5:1:57 pm

Appendix B
Field Reconnaissance Summary
(February 19, 1996)

1.1 Normal Conditions Flow Path

The MASCA on-site infiltration pond is in the northwest corner of the property. The pond water level is below the invert of the 18" outlet riser pipe. The pond control structure is a 60" diameter manhole with a 24" riser pipe/orifice with a 6" shear gate, orifice sizes are unknown. No water is flowing in or out of the structure at this time. The 24" discharge pipe runs in a northerly direction for approximately 175', daylighting at a semi-defined channel near the north property line.

The pond outlet channel is on the east side of a 60' wide swath of grassy cleared area that serves as a sewer easement and access road. Discharge flows along the east side of the access road through low vegetation and forest duff for approximately 40', where there is evidence of periods of standing water. The water sheet flows to the west across the grass access road from approximately 70' to 115' north of the discharge point. There is standing water in the access road and the soil is saturated and muddy.

A shallow swale, about 1' wide by 6" deep collects the water on the west side of the access road. The swale directs flow north for about 45' gradually increasing in size to about 2' wide by 1' deep at which point it discharges to a pool about 15' to 20' in diameter. The primary water source for the pool is a 12" concrete discharge pipe from Bradley Lake. The pipe is half submerged and discharging water.

At 320' north of the lake discharge the creek channel is about 8' wide with 2' flow depth increasing to about 10' in width with 2' flow depth. The channel continues north with increasing velocity, as the channel narrows and terrain steepens. The channel reduces to 2' in width with a 2' flow depth. The banks of the creek are densely vegetated, and in places the creek channel itself contains trees, some fallen, primarily alders ranging in size from 8" to 36" in diameter. To the east of the creek is a housing development and to the west is undeveloped. The west bank of the channel varies from 10' to 20' high with a 2' to 3' high berm at the top portion, terrain to the west is gently sloping towards the creek. The east bank varies from 6' to 12' in height.

At 840' north of lake discharge the creek channels slope flattens, the velocity has decreased and the channel itself is between 6' to 8' in width with about a 2' flow depth. The banks are still heavily vegetated and the creek ravine is about 10' deep on both sides.

Between 840' to 970' the creeks velocity increases, the channel width is 2' to 3' with a 2' flow depth, there are several vertical drops, or waterfalls in the channel ranging from 1' to 3' in elevation change. The ravine is still heavily vegetated with alders, with some trees in the channel itself.

At 970' to 990' the channel slope flattens and the velocity slows, the berm to the west has dissipated and given way to flat to gentle sloping open space. The channel width is about 2.5' wide and 2' deep where it opens to a pool area at 1,000' downstream that is about 8' to 10' in diameter. The creek is obstructed by an abandoned fill 40' wide and about 10' in height. There appears to be no culvert, the water flows through the embankment via voids created by large logs and debris at the lower portions of the embankment.

At about 1,050' downstream the flow resumes north of the embankment. Here is a pool about 10' wide by 14' long and 2' to 3' deep. The channel is still in a ravine that varies from 4' to 8' in depth, the ravine is heavily vegetated, mostly alders and blackberries. To the west the ravine banks to a large grassy open space where the ground is saturated and there are areas of standing water. To the east is densely vegetated. The actual channel width is about 6' to 8' wide and 2' to 3' deep for about 450' feet as it flows north-northeast.

At about 1,450' downstream the creek crosses under a driveway that extends from the end of 7th Street S.E. through about 30' of 18" culvert of unknown type. Both the upstream end and the downstream end of the culvert are submerged. The upstream pool is about 6' to 8' in diameter and 2' to 4' in depth, above the pipe inlet is small area of turbulence. At the outlet end is a 10' diameter pool that is about 2' to 3' deep. Both upstream and downstream pools are surrounded by heavy vegetation with some alders growing in the channel.

The creek continues northerly paralleling 7th Street S.E., offset to the east of the 7th Street varies from about 50' to 200'. The area between the road and the creek has been cleared, and is fairly flat. To the east is also fairly flat. The vegetation around the creek is dense, primarily smaller alders, and becomes sparser to the west between the creek and 7th Street S.E. where it turns to grasses, shrubs, and scotch broom. To the east of the creek is denser vegetation.. The areas adjacent to the creek are very saturated, with areas of standing water. The typical creek channel varies from 6' to 12' in width and between 1' to 2' in flow depth. At 186' from the driveway a 24" culvert crosses under fill material for about 35'. Both ends of the culvert are completely submerged. There are large pools, about 10' in diameter at both ends. At the north end of the of the pool, about 235' from the driveway, is the inlet end of another 24" corrugated metal culvert with a submerged inlet. This culvert is about 60' long and crosses under another fill area. The outlet opens to a 10' to 12' wide by about 3' deep pool and is also completely. This series of inlets and outlets is cluttered with alders ranging from 6" to 28" in diameter. The ground is completely saturated and there is standing water in areas. It appears that the area between here and 7th Street was flooded during last weeks rains. The creek continues across this flatter area in a north-northeasterly direction towards the Wildwood development. The channel varies between 6' to 12' wide and between 1' to 2' in depth. About 100' to 120' south of the development a 2' wide by 6" deep channel joins the creek from the east. 40' west of the development there is a pool about 12' in diameter and 3' in depth, there is an inlet to a 18" concrete culvert that is completely submerged. This pool sits in a depression that is about 3' to 4' deep at the inlet side. There is no evidence that the water level was above the top of the depression during recent rainfall.

The 18" culvert extends to the east for 35' where it discharges to an easement that runs from the western boundary of the development and Parkwood Boulevard at the back of several lots. Houses border the creek on both sides. The lots to the south are fenced with grass or landscaped areas that meet the banks of the creek. To the north the homeowners have constructed rockeries or shoring the that are between 2' to 3' in height at the edge of the creek channel. The rockeries and shoring appear to be in sound condition. Several property owners have constructed foot bridges across the channel. The channel itself is between 2' to 4' in width and 6" to 12" in depth. Some portions of the channel are grassed, and in other areas the property owners have lined the channel with larger aggregates and rocks. The velocity of the water is fairly high in areas where the creek channel is constricted by rockeries and shoring.

The creek crosses northeasterly under Parkwood Boulevard through 129' of 24" concrete culvert pipe that has between 2' to 3.5' of cover. The inlet end of the culvert is armored with rip-rap and in good condition. The flow depth is about 6" to 8". A property owner commented that the flow depth was about 20" during a recent storm. Two catchbasins in Parkwood Blvd. sit directly above the culvert and discharge directly into it, a third, located at the intersection of Parkwood and Olympic Blvd., to the east, is connected to the culvert via a lateral pipe. The outlet end of the culvert is at the southwestern border of an open space area. The creek channel begins here with a flow depth between 6" to 8" and is about 3' wide. The channel widens to 4' to 6' and the velocity is slower. The flow depth maintains 6" to 8". The creek becomes wider 6' to 12' and flow depth decreases to almost sheet flow as the creek turns northerly about the middle of the open area. The open area is vegetated with mostly grasses and shrubs, the ground is saturated with large areas of standing water. The area is cluttered with debris that has been washed downstream and in areas there are large deposits of sediment. A property owner commented that this area is of growing concern to the homeowners. There is constant flooding of the area during the winter months; and it seems to be increasing year to year.

To the north of the open space the channel again becomes defined as it enters an easement at the backs of lots. The channel is between 2' to 4' wide and about 6" to 12" in depth, velocities increase as the terrain becomes steeper to the north. The homeowners have built or landscaped to the banks of the creek. Several homeowners have built timber retaining structures or rockeries, and lined the creek with rip-rap.

The creek again crosses under Parkwood Boulevard via a 24" concrete culvert. The 24" concrete culvert about 55' long that crosses from south to north. Stormdrain grates on both the north and the south side of the Street sit directly above the culvert and empty into the creek. Both the inlet and the outlet end of the culvert have rock headwalls constructed around them, the headwalls appear to be in sound condition. The flow depth at both the upstream and downstream ends of the culvert is about 20".

The creek flows through an easement between lots northerly towards 23rd Avenue S.E. The velocity has increased with the grade. The channel is between 2' to 3' wide flowing at 6" to 8" in depth with several small bends.

The creek crosses under 23rd Avenue S.E. through about 51' of 18" concrete culvert. The inlet at the inlet end (south) has about 2.5' to 3' of cover and is armored with rip-rap. A 3' wide drainage ditch that runs from east to west beginning at the intersection of 23rd Avenue S.E. and Wildwood Park drive also enters the culvert. The flow depth at inlet is about 9", inlet is in good condition. The outlet end of the culvert (north side of 23rd Avenue S.E.) is about 18" above the elevation of the channel, and there is evidence of erosion. The culvert has about 4' to 4.5' of cover at daylight.

The creek enters Wildwood Park and continues downhill with increasing velocities. The channel is between 2' to 5' wide and 6" to 8" in depth at the most, has several small jogs and is lined with aggregates.

85' north of the 23rd Avenue S.E. crossing the creek enters a 30" by 42" corrugated metal culvert pipe, where it crosses under a west to east access roadway in the park. The culvert is 32' long and has about 18" of cover, both ends are in good condition. Flow depth in the culvert is about 2". The outlet end of the culvert is about 2' above the elevation of the creek channel and there is evidence of erosion at the beginning of the creek channel.

The creek channel steepens as it continues north along the main access road of the park. Channel widths vary from between 2' to 4' with depths of 6" in the wider portions to depths of 18" in narrower stretches. There is evidence of channel erosion in the narrower portions of the channel. The creek has cut itself a ravine with densely vegetated banks. Some trees have fallen or become disrooted littering the ravine, causing natural obstructions within the creek channel at several locations. There are at least two small springs and several sources of groundwater seepage along this portion of the creek channel.

Approximately 450' downstream of the first access road another park access road crosses the creek from west to east. About 75' upstream the ravine has daylighted and the creek channels slope has decreased. The creek is approximately 12' to 14' wide with flow depths between 6" to 12". The roadway crossing is about 20' wide constructed of fill with a concrete/rock masonry retaining/headwall structure bordering the south side of the roadway. There is a large pool, about 20' long by 25' wide and 3' in depth. The flow is diverted to an 18" culvert which flows to the west. Flow depth at the culvert is about 12". The culvert has a rebar trash rack over it, which appears to be reducing its inlet capacity. During highflow conditions additional flow is allowed to pass under the access road through a 10" concrete bypass culvert and continue downstream to the north through the park. The 10" bypass culvert has about 2' of cover upstream and 4' of cover downstream. The water surface upstream is currently about 2' below the invert of the culvert. Downstream the culvert daylights about 6" above the now dry creek channel. The upstream pool is heavily silted and there are large amounts of sediment that have gathered. Logs and other debris littering the banks upstream and downstream indicate that the access road had been overtopped during recent storm events. (NOTE: See Overflow Diversion Flow Path).

The 18" culvert flows to the west past the water tanks, currently under construction, through several storm drain manholes, to its exit from the park on 9th Street S.E. Flow enters a structure on the east side of the roadway and crosses the road to the west, where it enters another structure and is directed to the north along the west side of 9th Street S.E. through a closed conveyance system.

A drainage ditch/creek from the south appears here but flows separately to the northwest across several properties and at least one manmade pond until it crosses 15th Avenue S.E. further downstream.

At the intersection of 9th Street S.E. and 15th Avenue S.E. the conveyance system turns west and runs along the south side of 15th Avenue.

At 7th Street S.E. the flow enters a structure which also collects water from a separate channel on the south side of 15th Avenue that is diverted to the north side of the roadway into a deep ravine that runs south to north and inlets into a storm drain junction structure at the bottom of the hill.

Undiverted runoff continues through a conveyance system downhill in 7th Street S.E. over the hill to the previously mentioned junction structure at the bottom of the hill.

From the junction structure flows are directed to the west and cross under state route 161 via culvert.

1.2 Overflow Diversion Flow Path

A 10" highflow diversion pipe daylights about 6" above the dry creek channel on the north side of the second east to west access road in the park. This area appears to have received a lot of flow during past storms, and there is evidence of erosion. Another 10" pipe from unknown origin enters the channel here, there is no flow coming from either of the pipes. There is a large open space about 30' wide by 30' long here that is currently dry. The creek channel begins at the end of this open area and is about 2' wide and 1' deep and flows to the north in a shallow depression that is densely vegetated, the channel is dry except for minimal flows created from groundwater seepage. 45' downstream of the road crossing a 12" culvert from the east discharges a fair amount of water to the channel. 65' downstream another 12" culvert from the east discharges to the creek channel also contributing a significant amount of water. The creek channel is still about 2' wide and 1' deep there at least 2 small waterfalls. The channel becomes rockier with mosses and dense vegetation bordering it.

At 85' downstream of the second access road crossing the creek passes through 34' of 24" corrugated metal culvert pipe. The culvert has between 1' to 2' of cover at both ends. The invert of the downstream end sits about 18" above the creek channel. Flow depth through the culvert is about 1" to 2". The creek channel becomes rockier as it enters a forested ravine and descends 20' to 25' over 50' to 60' of distance.

The creek daylights the ravine and winds it way in a westerly direction for about 150'. A sand play area sits to the north and directly adjacent to the creek, separated by a 1' to 2' high vertical log retaining wall. The southern bank of the creek rises to the south fairly steeply and is densely vegetated. The creek channel through this area begins at 2.5' wide with a 6" flow depth and increases to about 6' wide with a 4" flow depth as continues past the play area. The channel is lined with granules and small rocks. Several concrete footbridge structures span the creek and have or are currently washed out on at least one side. The timber retaining wall that borders the play area shows evidence of erosion at its base.

Just to the west of the play area the creek crosses under a man-made footbridge and enters a rock masonry channel that is about 3' wide and 1' deep, flow depth here is about 4". The channel directs the creek southerly and over a rock masonry waterfall that is about 8' high. There is considerable debris at the base of the waterfall, mostly small logs. The creek descends 20' to 30' over 40' to 50' of distance, through a channel that is about 6' in width the channel is covered primarily with larger rocks and tree debris.

The creek is in the bottom of a 30' to 40' deep ravine that has a gentle swale-like base that descends gently for about 200' to the north property line of the park. The ravine banks are densely vegetated. The creek channel is between 6' to 12' wide with a 4" flow depth, and is lined with small to medium rocks, debris from fallen trees litter the creek occasionally. In the lower flatter portions of the ravine the channel has considerable amounts of sand that are filling the voids of the larger rocks. These sand deposits appear to have been carried downstream from the playground area. The creek flattens out and exits the park property under a chainlink fence 320' north of the waterfall.

The creek enters the property north of the park. The channel area is heavy congested with sandy sediment. The creek meanders through a series of bends with one small vertical drop 20' from the fence. The creek channel is 2' wide and 1' deep and relatively flat, its base is mostly sand with some grasses growing in areas. 45' from the fence there is a concrete weir structure that serves as an inlet to a private pond. Water is backed up behind the entire length of the structure and there are large deposits of sand upstream of the structure. The weir itself is 2.5' wide by 6" deep. There is a large deposit of sand at the downstream side of the weir. The weir discharges to a series of three manmade ponds that are constructed of rock masonry, ponds are connected by a series of waterfalls or vertical drops. The property owner commented on the issue of the sand deposits within the ponds, stating that the sand has only been a problem since the construction of the play area upstream in the park. They have discussed this issue with the City Parks Department. The water exits the last pond 60' from the weir structure, and descends about 12' vertically to a small densely vegetated ravine. 20' from the exit of the pond there is a 10' wide by 10' high land mass constructed of larger rocks and boulders with fill dirt above them. The creek is obstructed by this mass but is exiting through voids at the base at a good rate.

20' north of the creeks' exit from the land mass, it enters 32' of 24" concrete culvert that crosses under a property owners driveway. The culvert is about 10' below the roadway surface with rock headwalls on both the upstream and downstream ends. Flow depth through the culvert is 3".

The creek exits the driveway culvert to a 2' wide by 6" depth channel that descends a ravine for 80' to 90' of elevation over about 240'. The 30' to 40' deep ravine has steep banks that are heavily vegetated.

The creek daylights the ravine and continues in a northerly direction via a channel that is between 2' to 3' wide with a flow depth of about 6" for approximately 150', the channel base is primarily gravel and the banks are densely vegetated. Terrain is flatter and slopes gently to the north.

The creek enters a concrete diversion structure that directs some of the flow to a large pond through a 4" pipe. The creek continues northerly for 85' adjacent to and on the eastern side of the pond in a man-made concrete channel. The channel is 2' wide and the flow depth is at 4". The channel is joined by discharge from the pond at another concrete diversion structure and is then directed via the structure over a vertical jump of 2' to 3' where it enters a storm drain inlet structure. From this point flow is directed through an underground conveyance system towards 12th Avenue S.E.

Supplemental Environmental Impact Statement

Environmental Health -- Emergency Response Technical Appendix

MASCA Puyallup Plant
Building D Expansion
(*Puyallup Science Park*)

Prepared for:

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July 1, 1996

List of Acronyms

Acronym	Definition
AWN	Acid Waste Neutralization
City	The City of Puyallup
DOT	Department of Transportation
ECS	Emergency Control Station
EIS	Environmental Impact Statement
ERT	Emergency Response Team
ESO	Equipment Sign-Off Procedure
HPM	Hazardous Production Material, a chemical used in the manufacture of semiconductors with a NFPA hazard ranking of 3 or 4 in any category.
HMIS	Hazardous Material Inventory Statement
IC	Incident Commander
ICS	Incident Command System
IDLH	Immediately Dangerous to Life and Health
IPA	Isopropyl Alcohol
MASCA	Matsushita Semiconductor Corporation of America
MSDS	Material Safety Data Sheets
NFPA	National Fire Protection Association
OHH	Other Health Hazards
PEL	Permissible Exposure Limit
PFD	Puyallup Fire Department
PPE	Personal Protective Equipment
RFO	Reduced Flow Orifice
SCBA	Self Contained Breathing Apparatus
SEIS	Supplemental Environmental Impact Statement
SEMI	Semiconductor Equipment and Materials International
SIC	Single Incident Command
TIPS	Tactical Incident Plan Sheet
UBC	Uniform Building Code
UFC	Uniform Fire Code
UICS	Unified Incident Command System
UMC	Uniform Mechanical Code
VOC	Volatile Organic Carbon
WAC	Washington State Administrative Code

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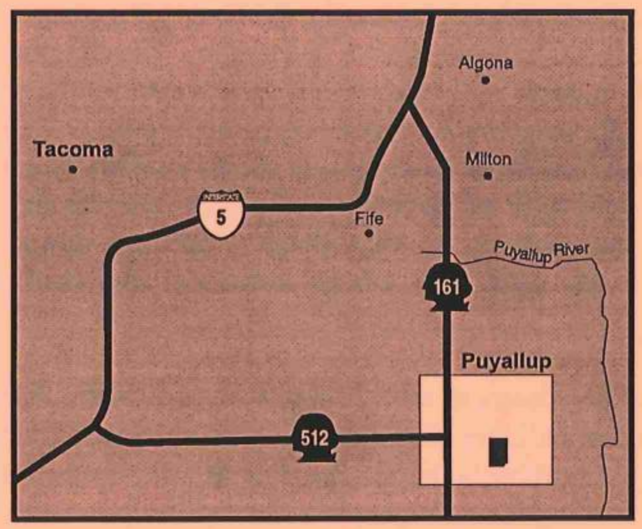
1. INTRODUCTION

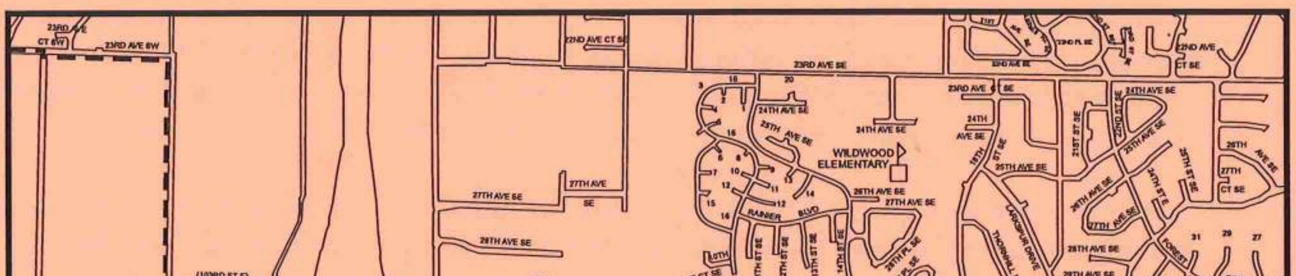
The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitent zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.

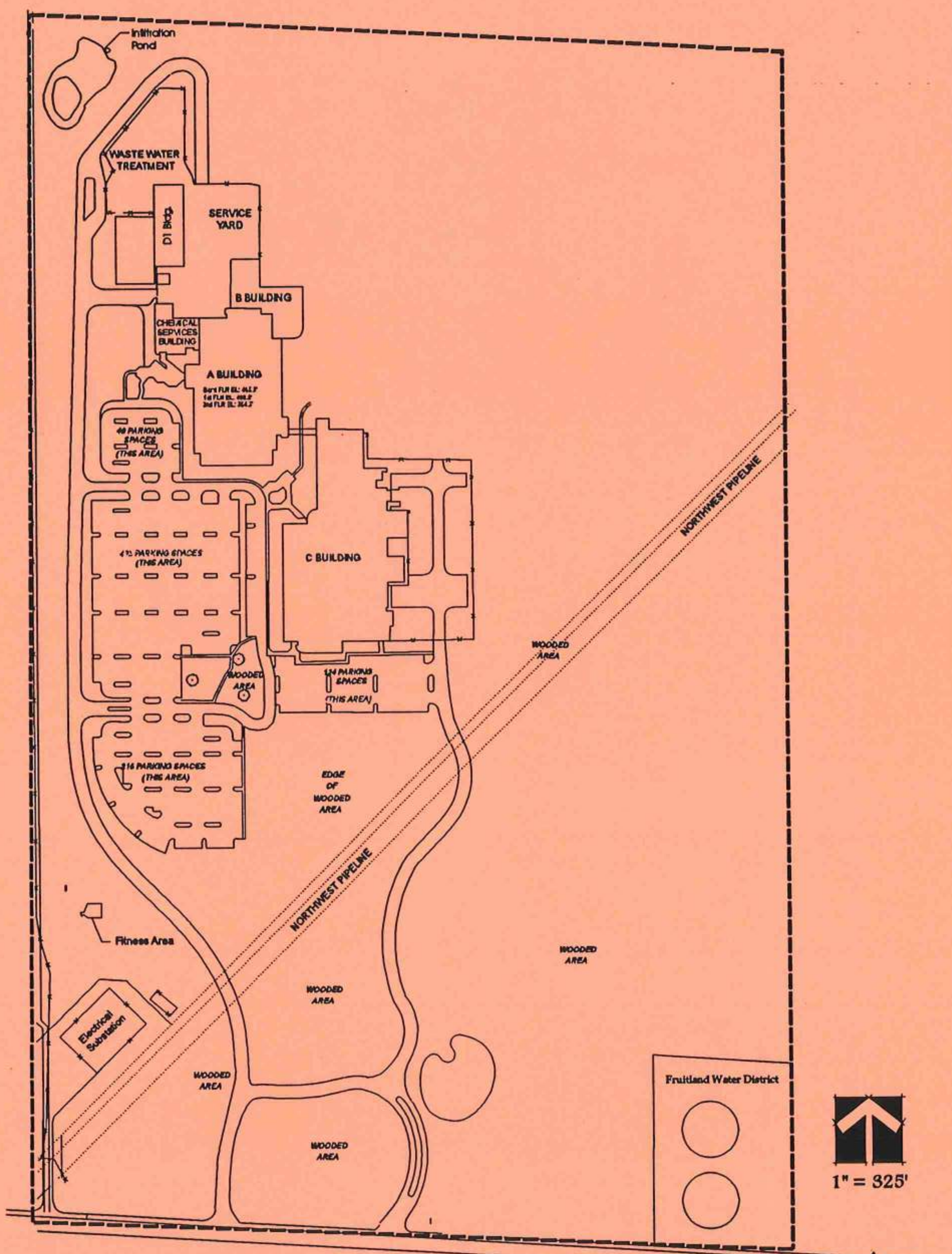




Source: *City of Puyallup*

Figure 1:
Vicinity Map
ENVIRONMENTAL HEALTH - EMERGENCY RESPONSE CAPABILITIES

DAVID EVANS AND ASSOCIATES, INC.



DAVID EVANS AND ASSOCIATES, INC.

Figure 2:
Existing Site Plan

ENVIRONMENTAL HEALTH EMERGENCY RESPONSE CAPABILITIES

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA

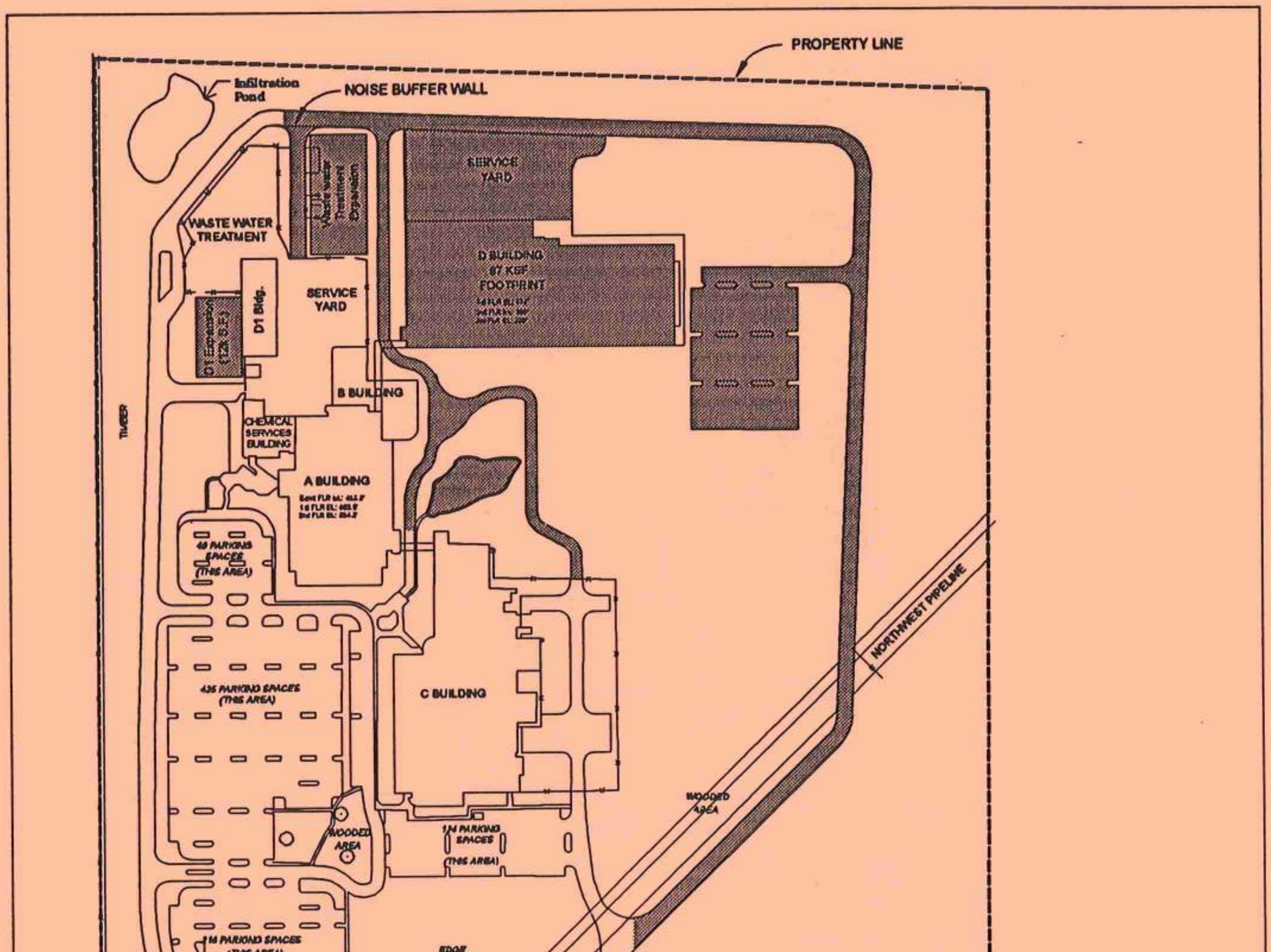


Figure 3:
Proposed Expansion Site Plan
ENVIRONMENTAL HEALTH-EMERGENCY RESPONSE CAPABILITIES

DAVID EVANS AND ASSOCIATES, INC.

1.1 ANALYSIS FRAMEWORK

In the production of semiconductor chips, significant amounts of hazardous materials, including gases and liquids, are used. When proper engineering and administrative controls are utilized in the production process, the manufacturing of semiconductor chips can be conducted with minimal risks to workers and the community. This analysis provides a general review of the potential risks to the community and work force as posed by use and storage of hazardous materials (chemicals) at the MASCA plant in Puyallup, Washington, and proposed measures to mitigate these risks associated with MASCA's planned building expansion.

1.1.1 Use and Storage of Hazardous Materials

Hazardous materials used and stored at MASCA have been broken down into hazard classes (per the 1994 Uniform Fire and Building Codes) with examples of chemicals that fall into each of these classes. The examples in Tables 1 and 2 represent greater volume or more toxic hazardous materials used at the present MASCA facility. These tables relate hazards inherent with improper use and storage of chemicals used at MASCA. It should be noted that the likelihood of an uncontrolled release affecting the neighboring community is very small due to the present distances separating the plant from the community in combination with handling practices and container sizes presently utilized at MASCA.

Table 1
Examples of Physical Hazards Used at MASCA

Hazard Class	Examples Used at MASCA
Flammable:	
Liquids	Isopropyl Alcohol (IPA), Acetone, EBR Solvent
Gases	Hydrogen
Oxidizer:	
Liquids	Nitric Acid, Hydrogen Peroxide
Gases	Chlorine, Oxygen, Nitrogen Triflouride, Nitrous Oxide
Pyrophoric	Silane, Phosphine and Diborane Gases
Water Reactive	Sulfuric Acid

Note: Some materials have more than one hazard class. For examples, sulfuric acid is a toxic, water reactive and corrosive material while chlorine gas is a corrosive and oxidizer gas. The above list is just an example of hazardous materials used at MASCA. The purpose of the table is to explain the different hazard classes.

Table 2
Examples of Health Hazards Used at MASCA

Hazard Class	Examples Used at MASCA
Corrosive:	
Liquids	Sulfuric, Nitric, Hydrofluoric, Hydrochloric and Phosphoric Acids Ammonium Hydroxide, Sodium Hydroxide, Hydrogen Peroxide
Gases	Chlorine, Boron Trichloride, Boron Triflouride, Ammonia, Tungsten Hexaflouride
Highly Toxic	Arsine, Phosphine and Diborane Gases
Irritant	MF-321 Developer, Photoresists
Other Health Hazard (OHH)	Freon gases, Arsenic (solid), Xylene, Photoresists, MF-321 Developer
Toxic:	
Liquids	Sulfuric and Hydrofluoric Acids Ammonium Hydroxide
Gases	Tungsten Hexaflouride, Chlorine

Note: Some materials have more than one hazard class. For examples, sulfuric acid is a toxic, water reactive and corrosive material while chlorine gas is a corrosive and oxidizer gas.

Tables 3 and 4 represent the hazard classes used at MASCA and adverse impacts which uncontrolled releases could have on the Work Force and surrounding community.

Table 3
Physical Hazards to Work Force/Community

Hazard Class	Adverse Impacts on Work Force/Community: Uncontrolled Release
Flammable	Burns to those in close proximity. If toxic materials are involved, risk of airborne toxic hazards.
Oxidizer	Contribute to intensity of fire. Many are highly reactive. If toxic materials are involved, risk of airborne toxic hazards.
Pyrophoric	Ignite spontaneously upon contact with air posing significant fire risk. If toxic materials are involved, risk of airborne toxic hazards.
Water Reactive	If toxic materials are involved, risk of airborne toxic hazards.

Table 4
Health Hazards to Work Force/Community

Hazard Class	Adverse Impacts on Work Force/Community: Uncontrolled Release
Corrosive	Inhalation of vapors can cause burns to the respiratory system; skin contact can cause burns. Effects can be long lasting and destructive of tissue.
Highly Toxic	Inhalation of even small amounts can cause serious injury in a short period of time.
Irritant	Inhalation of vapors can cause irritation to the respiratory system; skin contact can cause redness and itching. Effects are reversible.
Other Health Hazard (OHH)	OHH is a "catchall" category covering materials effecting target organs of the body including the central nervous system, reproductive system, kidney, liver, etc.
Toxic	Inhalation or contact can cause serious injury. Not as hazardous to human health as materials rated as highly toxic.

1.1.2 Hazardous Materials Emergency Response

This technical appendix also examines the emergency response capabilities of both MASCA and the Puyallup Fire Department (PFD).

1.2 HAZARDOUS MATERIALS EMERGENCY RESPONSE

Response to hazardous materials emergencies requires creating order out of scenarios often in chaos. Common terminology, knowledge, well-rehearsed procedures and familiarity with co-workers' capabilities all enhance this process. Applicable regulations clearly define the goal of "responder competency" as the key element in any hazardous materials guide, plan or training program. Training, equipment and organizational support must provide the tools necessary to mitigate any likely incident and allow responders to correctly analyze incidents they are not competent to mitigate. Responders to the MASCA facility, whether they are MASCA or PFD employees share this overriding requirement for competency.

1.2.1 Hazardous Materials Responders

Hazardous materials responders are typically considered to be at one of the following levels of competency: Awareness, Operational, Technician, Incident Commander (IC) or Specialist.

> **Awareness level responders** are expected to recognize general hazardous materials hazards and know to leave the area and know who to call for help if an uncontrolled incident occurs. They "see the puddle and hit the evacuate button."
>
> **Operational level responders** are expected to recognize general hazards from hazardous materials, make general evaluations as to the level of severity, call for assistance and take appropriate defensive action when they are not personally at risk. They "see the puddle, call for help, walk away from the incident down the hall to close the valve, then leave the area." Operational level employees can assist hazardous materials teams during a hazardous materials response if they are working within the scope of their training.
>
> **Technician level responders** are expected to control and contain hazardous materials incidents. They "secure the area, stand in the puddle, fix the leak and prepare the area for reentry by unprotected personnel." They are expected to be competent to deal with the hazards they encounter. Skills levels will therefore differ considerably between Technicians from different teams. A facility team need only be trained to handle the incidents at their facility to be called Technicians. A municipal team needs to be trained to handle any likely incident that could occur in their response area to be called Technicians.

Incident Commanders are expected to establish and maintain a system of management and control at the scene of a hazardous materials incident. They are required to be trained to at least the Operational level and have additional training at the Incident Commander level.

Specialists can support a hazardous materials response by providing special knowledge or skills to the team. They can accompany technicians into areas normally closed to all but technicians if they are properly prepared, trained and their duties are limited to their area of expertise. Examples of specialist employees include heavy equipment operators, chemists, air monitoring experts, sampling experts, process equipment operators and building systems engineers.

1.2.2 Seven-Step Protocol for Structuring a Hazardous Materials Response

A recommended method to assist hazardous materials teams in structuring a hazardous materials response is the seven (7)-step protocol familiar to a majority of the Puget Sound area industrial and fire department hazardous materials teams. By using this system, both the PFD and MASCA would be familiar with a framework for responding to the facility reducing confusion and enhancing response efforts.

The 7-steps are as follows:

1. Management and control of the scene;
2. Identification of the hazard;
3. Analysis of the hazard;
4. Selection of personal protective measures;
5. Control and containment;
6. Decontamination; and
7. Termination.

The PFD uses a similar method for analyzing its hazardous materials response capabilities.

Management And Control Of The Scene Includes:

A. Designation of an Incident Commander (IC). The first IC is typically the first trained responder on-scene. This initial IC may be relieved by someone with more training, experience, and knowledge about the incident. IC must delegate responsibility in a manner that leaves them available to look at "the big picture."

Two (2) types of Incident Command Systems (ICS) are typically implemented at hazardous materials responses, Single or Unified.

1. ***Single Incident Command*** involves one organization. The one organization provides its own Incident Commander and works as an independent team. The MASCA Incident Command System is shown on Figure 4.

2. *Unified Incident Command* (UIC)involves more than one organization. Two or more organizations can each designate an IC who positions thenself at the one Command Post. In theory, decisions are made by consensus and line staff are aware only that decisions are made at the command post by an IC, regardless of the number of people who fill that role. UIC systems work well when the parties are familiar with each other and have practiced this method of providing a command structure. The UIC system used by the PFD at MASCA is shown on Figure 4.

When on-scene at MASCA, the PFD has incident command responsibility and authority. It is the PFD's goal to work closely with the MASCA Emergency Response Team (ERT) to mitigate incidents.

B. Establishment of a command post.

C. Coordination of evacuation and medical treatment of any affected individuals.

D. Assign team positions. Ensure that the roles of those positions are being fulfilled. The number of people required to mitigate an incident will depend upon the severity of the incident and resources available. Team positions can include:

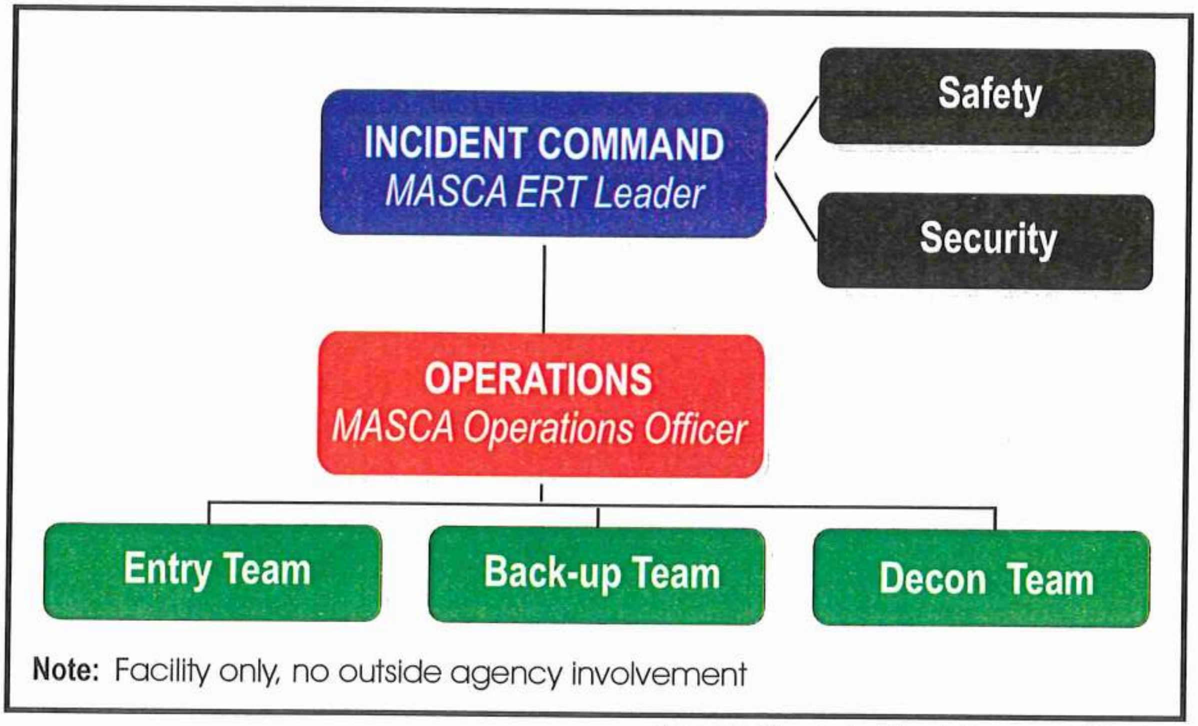
Safety -- overall safety at the scene;
Operations -- tactical decisions and operations;
Security -- evacuation, crowd control and controlling access;
Entry Team -- controlling and containing the incident;
Medical -- assisting victims and monitoring team members for exposure;
Staging -- stage and prepare support equipment and personnel; and
Public Information Officer -- provides news media support.

E. Establishment of site control zones (hot, warm, cold).

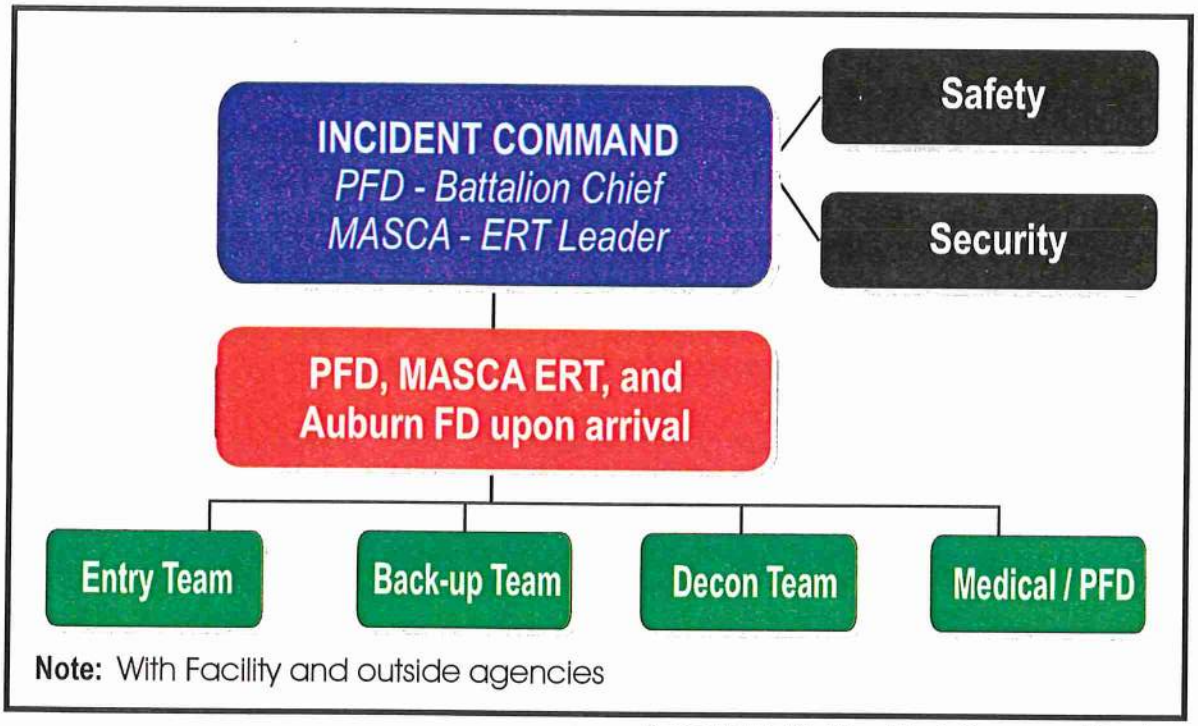
Hot -- area of contamination;
Warm -- where decontamination of personnel and equipment takes place; and
Cold -- support area (command post, staging, etc.).

F. Establishment of communication protocols (voice, phone, radio, record-keeping).

G. Notification of other organizations (PFD, MASCA, Law Enforcement and government agencies).



Generic Single Incident Command System



Generic Unified Incident Command System

Source: *Cadre, Inc.*

Figure 4:
Incident Command - Single and Unified
ENVIRONMENTAL HEALTH - EMERGENCY RESPONSE CAPABILITIES

Identification of the hazard includes:

A. Recognizing storage, process, and transportation equipment involved.

B. Collecting data from monitoring devices.

C. Site specific knowledge.

D. Interviews with knowledgeable staff.

E. Using Material Safety Data Sheets (MSDS).

F. Marking systems including National Fire Protection Association (NFPA) 704, Hazardous Material Inventory Statement (HMIS), Department of Transportation (DOT).

G. Using DOT Emergency Response Guidebook.

H. Detecting odors, colors, or other subjective clues.

Hazard analysis includes:

A. Evaluating the chemical and physical properties of the material(s) involved:

Vapor Pressure -- how fast it enters the air;
Vapor Density -- where it will go when it gets into the air, up or down;
Specific Gravity -- will it sink or float in water;
Flash Point -- at what temperature will it give off vapors that can ignite;
Flammability -- lower and upper explosive limit;
Reactivity -- how stable is the material, can it react with other materials;
Corrosively -- pH, acid or base; and
Immediately Dangerous to Life and Health, Threshold Value Limit, Personal Exposure Limit -- airborne toxicity of the material.

B. Using reference sources:

MSDS;
Chemical reference library (books and computer databases); and
Subject area experts.

C. Using air monitoring equipment:

Fixed systems (installed monitoring equipment at a facility); and
Portable (initially limited to perimeter monitoring).

Selection of personal protective equipment (PPE) includes:

Determination of the type of protection required for responders:

- Physical hazards (fire, heat, abrasion, cold, etc.);
- Corrosive hazards (will the protective gear withstand the material); and
- Routes of exposure (airborne vapor hazard or splash hazard).

There are four (4) recognized classes of hazardous materials protective clothing--Levels A, B, C and D. Each has benefits and drawbacks. Although Level A provides the highest degree of chemical protection, it is also the most cumbersome, restrictive and expensive. The decrease in freedom of movement associated with Level A may actually make it more hazardous to wear than other levels of protection. Selection of the level of protection should take not only the chemical hazards but also the physical hazards into account as well. Chemical protective clothing is not generally designed to protect the wearer against fire hazards. Instead, being caught in a fire with chemical protective clothing on would be similar to wrapping your arm in plastic wrap and putting it into a fireplace.

Control And Containment Includes:

A. Taking steps to control a release and contain it, requiring:
Familiarization with facility systems;
Familiarization with the product and it's associated characteristics; and
Familiarization with specialized equipment and procedures.

B. Maintaining an inventory of specialized equipment.

Decontamination Includes:

A. Selecting an effective method for minimizing the spread of contaminants.
B. Defining decontamination protocols:
Disposable decontamination;
Dilution;
Absorption;
Wash and rinse methods; and
Neutralization of selected products in a safe manner.
C. Disposing of contaminated equipment and decontamination solutions.

Figure 5 is an example of what a decontamination line might look like.

Termination Includes:

A. **Releasing affected areas for their intended purpose.**

B. **Ending the response phase of the incident.**

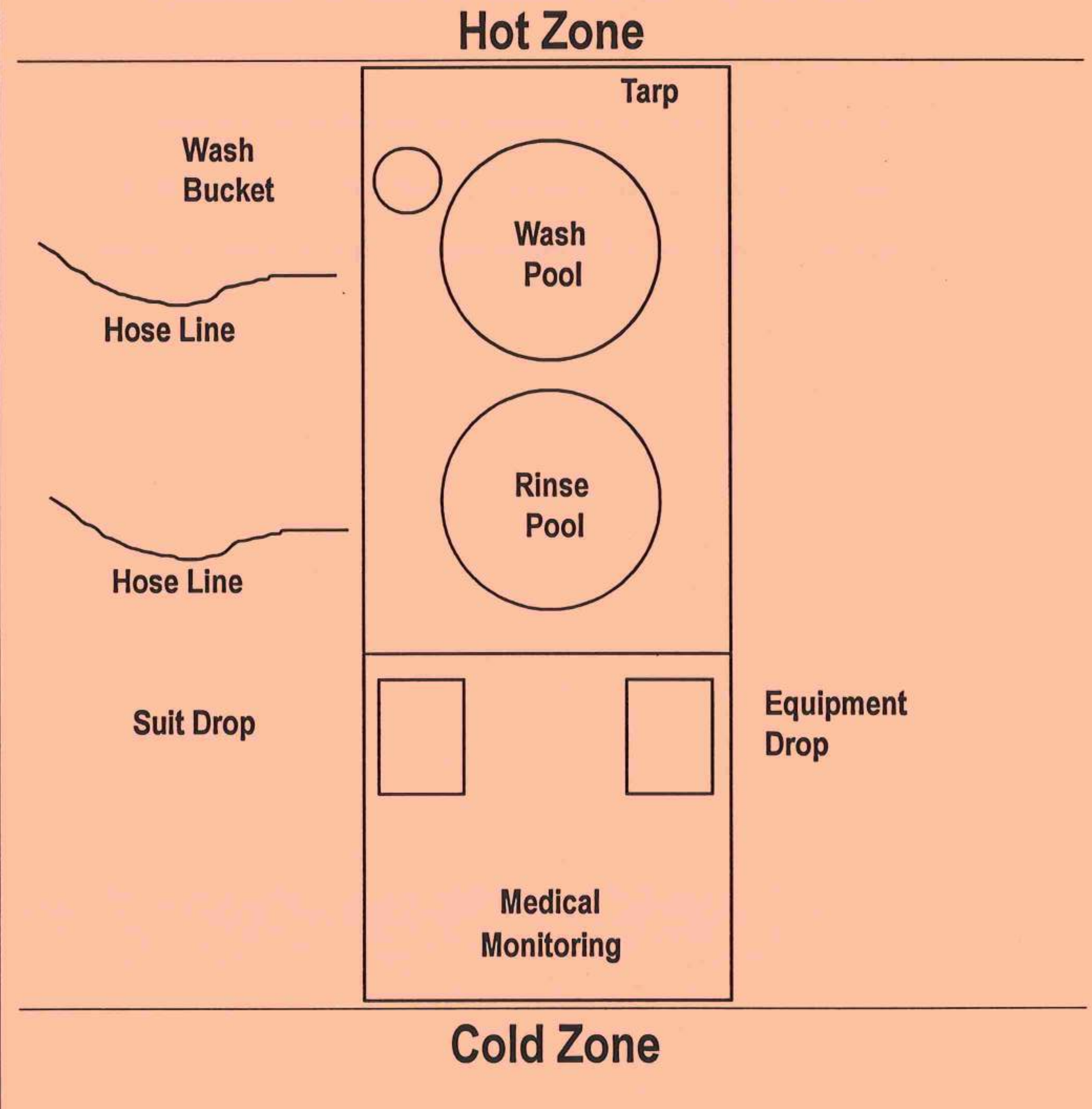
C. **Completing an inventory of consumed equipment and replenishing it.**

D. **Debriefing appropriate personnel.**

E. **Reporting on the nature of the incident and methods used to mitigate it.**

F. **Reporting on steps that can be taken to prevent a reoccurrence of the incident.**

G. **Reporting on action items that can be taken to improve future responses.**



Source: *Cadre, Inc.*

Figure 5:
Generic Decontamination Line

2.0 METHODS

2.1 LITERATURE REVIEW

The majority of the information presented in this technical appendix is a result of reviewing existing literature. This literature review included all the documents mentioned in Section 6, References. The use of existing documents has been very liberal and much of the information presented in this technical appendix is drawn from those documents, even when direct references are not cited.

- MASCA HMIS
- Maps showing layouts of present and future buildings and proximity to the community
- MASCA New Equipment Start Up Permit
- MASCA preventative maintenance schedules (scrubber and burn box)
- Emergency Response Team (ERT) incident report 10/31/95
- Annual inspection by Winslow Partnership 2/8/96
- ERT training schedule 1996

Puyallup Fire Department
Training records for 1993 through 1995
Incident responses to MASCA
Inter local response agreements for hazardous materials response
Run response cards from the dispatch center
Inspection reports from Winslow Partnership
Hazardous materials instructor endorsements and training
Operating Guidelines: Hazardous Materials, IC, and Medical
Annual training requirements
Hazardous materials equipment inventories
Station locations
Listing of fire department technicians
City of Puyallup ordinance naming PFD as IC

MASCA
Training records 1993 through 1995
Incident responses
Hazardous materials equipment inventories
ERT Manual
Training records
PFD inspection records
ERT member listing
Equipment inventory
Training requirements

Training records were received from both MASCA and the PFD for the years of 1993 through 1995. Training records examined were those of MASCA ERT members and those identified by the PFD as PFD hazardous materials team members trained to the Technician level.

2.2 DATA COLLECTION

Information included in this report was gathered by meetings and discussions with MASCA personnel on March 12 and 13, 1996, including: the Safety and Health Manager and Technician, the Facilities Manager, the Environmental Engineer, the engineer responsible for the gas detection system and several other employees who handle chemicals or are members of the plant ERT in addition to other job responsibilities.

Supplementing the meetings and discussions were walk-arounds of all areas where chemicals are used or stored including: the fabrication area, the gas rooms and storage area, bulk chemical dispensing rooms and storage areas, and the facilities support areas. Review of the above literature provided by MASCA personnel provided additional information.

Evaluation staff randomly selected a group of emergency response team members (12 MASCA and 7 Fire Department) who submitted to a written test, 6 practical knowledge skill stations and 2 drill scenarios. These tests were on standard operating procedures, terminology, and applied industry standards. These tests were evaluated using common practice from comparable teams as standards. Practical evaluations included an appropriate range and difficulty level of questions and hands-on skill challenges. Originals of these evaluations are in the CADRE project file.

The results of the written test were compiled into a spreadsheet using categories including:

- incident command;
- recognition and identification;
- chemistry / chemical characteristics;
- personal protective equipment; and
- emergency medical knowledge.

Results were summarized and evaluated using best professional judgment to determine areas where knowledge was adequate or required improvement.

Individuals, training categories and hours attended were compiled to determine the number of team member training hours in the training categories identified and used by MASCA and the PFD respectively.

3.0 RESULTS AND IMPACT ANALYSIS

3.1 MASCA HISTORY OF HAZARDOUS MATERIALS SPILLS AND RESPONSES

Despite existing high levels of engineering controls, hazardous materials incidents have and will continue to occur at the MASCA facility. Such incidents are difficult if not impossible to completely prevent due to human error factors, the complexity of systems at MASCA, changing conditions and the unexpected (accidents do happen). Hazardous materials incidents reviewed were primarily localized to the area of the facility where they occurred and mitigated by MASCA employees in a timely manner. The most severe hazardous materials incident reviewed occurred on October 31, 1995. Reports conflict on the severity of a toxic cloud formed when an uncontrolled nitric acid reaction occurred on that date. The incident was mitigated by MASCA and PFD responders.

Typical for facilities similar to MASCA, they have a history of small chemical spills and releases. The vast majority of these incidents appear to have been small, confined to the immediate area and quickly mitigated by the in-house MASCA ERT.

In 1994, MASCA reported 27 incidents that required activation of the team:

- 14 minor (small spills confined to the immediate area);
- 12 false alarms;
- 0 off-site releases; and
- 1 chemical exposure.

In 1994, the PFD reported 73 responses to the MASCA facility:

- 37 fire auto & sprinkler alarms;
- 17 hazardous materials auto alarms;
- 13 toxic gas/hydrogen alarms;
- 4 aid (medical) calls unrelated to hazardous materials incidents; and
- 2 service calls (backed up drains, etc.).

In 1995, MASCA reported 43 incidents that required activation of the team:

- 17 minor (small spills confined to immediate area):
- 25 false alarms;
- 1 off site releases; and
- 0 chemical exposure.

In 1995, the PFD reported 55 responses to the MASCA facility:

- 8 fire auto & sprinkler alarms;
- 17 hazardous materials auto alarms;
- 19 toxic gas/hydrogen alarms;
- 11 aid (medical) calls unrelated to hazardous materials incidents; and
- 0 service calls (backed up drains, etc.).

Differences in the number of responses reported by MASCA and the PFD for 1994 and 1995 are primarily caused by the use of reporting criteria that differ between each organization and between years. MASCA reported incidents where the ERT was activated for hazardous material emergencies, not fire auto and sprinkler alarms, aid calls, or service calls in 1994. In 1995, MASCA added fire auto and sprinkler alarms to their reporting criteria. With that criteria understood, MASCA reported three (3) fewer hazardous material incidents in 1994 (27 - MASCA, 30 - PFD) and one (1) less in 1995 (43 - MASCA, 44 - PFD) than the PFD records indicate. These differences were apparently caused by incidents where MASCA had ERT members respond to an incident but the incident was not recorded as a response. The use of common reporting criteria between both agencies would help to eliminate future discrepancies.

3.2 HAZARDOUS MATERIALS USE AND STORAGE

3.2.1 Toxic Gas Detection

The majority of toxic gas detection within the existing fabrication area is performed by chemical tape technology by the brand name of MDA. MDA System 8 and 16 machines constantly "sniff" the fabrication area and ventilation ducting associated with equipment and gas cabinets for leakage of small amounts of hazardous gases. These MDA machines are old by industry standards (greater than 8-10 years) and require ongoing maintenance to operate efficiently and correctly. Maintenance of the system is not being documented adequately but is occurring. Maintenance of the system was not being performed correctly and the functionality of the system had been in doubt for a period of months.

The monitoring points in ductwork are not optimally located in order to detect a leak of a hazardous gas, and do not follow best industry practices.

The present emergency control station (ECS) located in the security room is incapable of determining which detection point is in alarm and what level of gas is present. This alarm system has difficulty processing multiple simultaneous alarms.

An inconsistently operating gas detection system, such as that observed at MASCA, within a semiconductor fabrication area offers the potential of a leak of a hazardous gas to go undetected until employees have suffered exposures. While controls exist to limit or minimize the effects of a catastrophic release (i.e., excess flow control, reduce flow orifices) from an entire cylinder, a poorly functioning gas detection system is a significant deficiency within a fabrication area as this is a primary early warning system similar to that of smoke detectors for the presence of fire.

3.2.2 Volatile Organic Compound (VOC/Solvent) Abatement

In the present plant, VOCs (solvents) are being released directly into the environment without any treatment. Small amounts of VOC odors could be detected by smell while touring the outside support facilities. Due to the anticipated increase of solvent usage in the expanded facility and proximity to a school and residences, the abatement of VOC emissions is imperative so employees and the community are not subjected to what at best would be nuisance odors and at worst chronic, low level exposures to a variety of solvents (See discussion of VOC emissions under Human Health Risk Analysis Technical Appendix). Current semiconductor factories, constructed within the last year, or that are currently under construction in the Pacific Northwest, all abate VOC emissions.

3.2.3 New Equipment Sign-Off Procedures

Presently, the MASCA Safety and Health Department is administering a procedure for installing new fabrication equipment that contains two parts: a new equipment start up permit data sheet and the new equipment start up permit. Both of these are each one (1) page long and contain numerous line items and places for initials of responsible parties overseeing portions of the equipment installation. The responsible signing party is not required to have knowledge of the proper installation. Additionally, the Safety and Health Department has ultimate sign-off responsibility for areas in which it does not exercise functional management authority. Best industry practices currently reflect utilization of a detailed, multi-disciplinary equipment sign-off procedure.

The lack of a detailed equipment sign-off procedure encompassing all applicable departments increases the probability that equipment processing hazardous materials will not be installed safely and therefore increases the risk of employee exposure or an uncontrolled release into the community. A systematic approach, including detailed documentation and established roles and responsibilities is imperative during any semiconductor expansion involving literally dozens of pieces of equipment using hazardous materials in a complex mechanical scheme. A formal tracking system for completion of equipment sign-off should be internal to MASCA. This system should be interactive with the City permit system for equipment installation.

3.2.4 Ventilation System

In a semiconductor fabrication area, local ventilation is the primary means of preventing employee exposure to chemicals and emissions to the environment of vapors or gases of hazardous materials. The MASCA ventilation system is very complex and requires consistent documented monitoring data indicating a minimum amount of ventilation capacity at workstations and within ducting designed to remove hazardous materials. Article 51 of the UFC requires that "devices and systems shall be maintained in operable condition." Chapter 5 of the Unified Mechanical Code (UMC) requires that minimum velocities be maintained in productconveying duct system. No program to systematically perform checks on the ventilation system exists. Additionally, dampers controlling the amount of airflow in ducts are not secured adequately in many locations to prevent inadvertent closure.

In the present fabrication area, there are significant on-going modifications to the ventilation system to accommodate new installations of equipment using hazardous materials. The lack of a documented program tracking exhaust levels and requirements for a specific piece of equipment greatly increases the likelihood that inadequate ventilation will cause the release of vapors or gases into the fabrication environment causing either acute or chronic exposures to workers. If volume dampers are not set and locked in the correct position to ensure adequate ventilation it is possible to decrease the exhaust flow therefore causing an exposure.

3.2.5 Double/Secondary Containment:

Gases -- Presently, some corrosive gases and hydrogen are not doubly contained when transported in stainless steel, welded lines. While this complies with the minimal standards as set forth in the Uniform Fire Code (UFC), this is not in conformance with the guidelines as set forth in the Semiconductor Equipment Material International (SEMI) Standard F6-92. The SEMI Standards and safety guidelines are consensus documents that represent performance based environmental, health, and safety considerations regarding facilities and equipment in the semiconductor industry.

Double containment of corrosive gases such as chlorine and boron trichloride and a flammable gas such as hydrogen provides additional mechanical protection to protect the stainless steel line from accidental breakage leading to a release of hazardous materials. Additionally, stainless steel can be attacked by corrosive gases causing failures in the piping. It should be noted that piping runs can be several hundred feet and go through areas where a high degree of mechanical activity occurs. This increases the likelihood of a mechanical failure.

Bulk Liquid Chemicals -- Bulk liquid chemicals, such as sulfuric acid and sodium hydroxide used in the facilities Acid Waste Neutralization (AWN) area, have mechanical fittings that are not within the secondary containment providing for the rupture of a tank. Additionally, the bermed area providing secondary containment for these tanks did not appear adequate to contain the contents of the entire tank.

If a leak were to occur while off-loading or un-loading production or waste chemicals and were not secondarily contained, a release into the environment would occur. Such a release would trigger an emergency response by the ERT with accompanying risks. By secondarily containing all mechanical connections, such leaks would be controlled in a confined environment. Bermed areas need to be sized to collect a failure from the largest tank to prevent the chemical from flowing into the environment.

3.2.6 Seismic Restraints

Restraints to prevent equipment or tanks from falling over in case of an earthquake, with the exception of gas cabinets, are not systematically applied. Where restraints are used, it is questionable if they comply with structural requirements for seismic restraints as required by the Uniform Building Code (UBC) and SEMI S2-93.

If a significant earthquake were to occur and equipment or tanks were not secured appropriately, chemical lines connected to the equipment would likely rupture releasing pressurized hazardous materials to the fabrication or outside environment. Additionally, reservoirs of liquid chemicals in workstations would be likely to spill as well.

3.2.7 Exit Signage in the Fabrication Area

Exit signage was either missing or difficult to see in many of the bay and service chases of the fabrication area. This presents a potential risk to employees required to exit in times of emergency if pre-knowledge of the exit path is not apparent.

3.2.8 Chemical Handling

Facilities personnel were observed handling containers of hazardous materials alone. It is an established industry practice that workers use the "buddy" system when handling hazardous materials in case of a spill or release of a hazardous material. While not observed, a maintenance employee stated that for cylinder changes of hazardous gases, the "buddy" system is strictly adhered to.

If a spill or release of a hazardous material were to occur and the employee were unable to respond due to an exposure, the spill or release would potentially continue unabated leading to the increased probability of further injury to the employee and release of the material to the environment.

3.2.9 Hazardous Gas Storage/Use

The present hazardous gas storage and use practices generally comply with current codes, standards and best management practices. The only exception to this is the indoor use of Silane gas. Typically, Silane gas is used and stored in a specially designed outdoor installation. Both UFC Standard 80-1 and NFPA 318 require outdoor storage of silane.

If a buildup of Silane gas were to occur indoors, an explosion could occur with significant impact to life and property.

3.2.10 Safety and Health Department Staffing Roles and Responsibilities

The present MASCA Safety and Health Department is comprised of two (2) employees: a Safety and Health Manager and a Technician. The focus of each of these employees' jobs appears to be responsibilities for numerous tasks ranging from the installation of new equipment to training and leading the emergency response team to responding to numerous day-to-day demands.

The level of professional training and experience of these individuals is not comparable to that of safety staffs at similarly sized semiconductor facilities. Due to a lack of safety "ownership" in other departments (i.e., equipment maintenance, fabrication production), these two (2) individuals appear to be responding and reacting rather than providing technical consulting and expertise, as would be optimal under best industry standards.

An inadequately staffed, trained or assigned safety and health department within a semiconductor facility definitely increases risks to both employees and the community as related to hazardous materials. Prevention of incidents is paramount to protection of workers and the community and assigning such responsibilities to a two- (2) person department is not adequate.

3.3 EMERGENCY RESPONSE TEAM CAPABILITIES

3.3.1 MASCA

Training Records

According to the MASCA ERT guidelines, ERT members are required to attend a minimum of 52 hours of annual training in 14 separate categories.

Training records supplied by MASCA for the years 1993, 1994, 1995 showed that there are 13 categories of training. Of the 14 categories, five (5) areas were not trained on in the three (3) year review period. The average training received by MASCA ERT members per year for three (3) years was 16.2 hours per year. Of those, 11.6 hours can be categorized and 4.6 hours were identified as "other" training. Training records indicate that the majority of MASCA team members attended the same classes and received the same instruction.

With an average of 16.2 hours of Hazardous Materials training per year, each team member is 35.8 hours short of their own 52 hour guideline.

Table 5
MASCA ERT Training Hours

CATEGORY	Total ERT Training Hours by Year '93	'94	'95	Total ERT Training Hours by Member '93	'94	'95
ERT Plan	2	2	52	0.1	0.1	2.0
Evacuation Plan	4	2	0	0.2	0.1	0.0
Toxic	32	42	32	1.3	1.6	1.2
Chemical Spills	106	22	182	4.6	0.9	7.0
EMS	64	52	2	2.7	2.0	0.1
Building System	82	38	74	3.5	1.5	2.8
ICS	42	0	0	1.8	0.0	0.0
Communications	0	0	0	0.0	0.0	0.0
Bomb Threat	0	0	0	0.0	0.0	0.0
Flame/Fire Fighting	0	0	0	0.0	0.0	0.0
News Media	0	0	0	0.0	0.0	0.0
Environment	0	0	0	0.0	0.0	0.0
Exam	0	32	0	0.0	1.2	0.0
Other Training	66	82	202	2.9	3.1	7.8
Total Hours of ERT Training	**398**	**272**	**546**	**17.3**	**10.4**	**21**

3 year average training hours = 16.2/year

Written Test Results

MASCA team members require improvement in:

- Chemistry (chemical properties and how they relate to incident response);
- Recognition and identification (labels & placards, DOT and NFPA 704 standards);
- Hazard analysis; and
- Incident command (as it relates to combined operations, Unified), to a lesser extent.

MASCA strengths were in:

- Personal protective equipment; and
- Emergency medical knowledge.

Practical Evaluations Results

Station 1--Incident Command

Using 2 scenarios the member was to determine the number of personnel to handle the incident, diagram a chart of command and determine if it was a single or unified command.

Results:

- Satisfactory understanding of personnel required;
- Unsatisfactory understanding of type of command;

- Unsatisfactory understanding of terminology; and
- Unsatisfactory understanding of ICS positions.

Station 2--Selection of PPE
Using the same scenario as the ICS station, recommend a level of protection for entry, backup and decontamination, and justify the decision.

Results:
- Satisfactory understanding of levels of protection; and
- Generally selected appropriate level of protection.

Station 3--Level A
Answer questions on the construction, use and reasons for using a Level "A" suit. Don the suit correctly.

Results:
- Unsatisfactory understanding of benefits, drawbacks, features of A suits; and
- Satisfactory donning of suit.

Station 4--Physical Properties
Using a chemical found at MASCA and an MSDS, determine its hazards, chemical characteristics and provide information on where it is located on-site.

Results:
- Satisfactory understanding of chemical location at MASCA; and
- Unsatisfactory understanding of chemical properties.

Station 5--Self-Containing Breathing Apparatus (SCBA)
Given an SCBA from the facility, answer questions on features and components of the unit, perform normal checks and don the unit.

Results:
- Satisfactory understanding of SCBA, uses and features; and
- Unsatisfactory donning of unit.

Station 6--Tube Determination
Given a colorimetric tube with a coloration on it, determine the concentration shown, describe features, uses and field checks of the unit.

Results:
- Unsatisfactory understanding of equipment;
- Unsatisfactory understanding of when to use it, how they work; and
- Unsatisfactory understanding of how to interpret information.

Results of Drill Scenarios

The MASCA ERT exhibited the capability to establish Incident Command, identify the product, complete a hazard analysis, select and don protective equipment, contain the incident, perform decontamination and terminate the incident.

Problems encountered:

- Ability to rapidly move needed equipment to a remote incident location;
- A slow down in effective response when abnormal situations are encountered;
- A weak IC structure when abnormal situations are encountered;
- Weak hazard analysis when abnormal situations are encountered;
- Over dependency on facility controls and fixed monitoring devices; and
- Basic skills could be further refined (suits, boots, SCBA).

Assets:

- Good equipment with some minor exceptions;
- Familiarity with the facility, controls, chemical property reference manuals; and
- Good in-house Incident Command structure for typical incidents.

3.3.2. Puyallup Fire Department

Training Records

According to the PFD, there are currently no minimum training hours required for hazardous materials response.

Training records supplied by the fire department covering outside training for the period of 1983 to 1995 listed 46 PFD staff with an average total amount of hazardous material training of 35 hours each. Six (6) staff had no (0) hours, two (2) had 248 and 258 hours each. No records indicating instructor qualifications, accountability methods, agendas, or student performance were available for review.

Training records supplied by the fire department covering in-house training for the years 1993, 1994, and 1995, showed that there are 42 training areas specific to hazardous materials (see Table 6). Of those 42 areas, 27 were not trained on in the three year period evaluated. Training records indicate the average PFD hazardous materials team members received 13.5 hours of hazardous materials in-house training per year. Of those, 8.2 hours can be categorized and 5.3 hours were identified as "other" hazardous materials training. Training records show that training areas were not covered or were inconsistent in its application to the team. Of the 17 team members, frequently only three (3) or four (4) members had training in a given area. Training records for the Command Staff indicate an average of 8.2 hours per year of hazardous materials training per chief, with 3.8 categorized and 4.4 classified as "other" training. Again, training was inconsistent in its application to the staff.

Training categories listed in the PFD's records closely follow the requirements outlined in the NFPA 472 standard.

Table 6
Summary of PFD Training Records ('93, '94, '95)

CATEGORY	1993	1994	1995	3 year Avg./ member (hr.)
Awareness Level				
1=Awareness	33.5	48.0	14.7	1.9
2=Safety	0.0	0.0	0.0	0.0
3=Planning	0.0	0.0	1.5	0.0
4=ICS	0.0	0.0	4.0	0.0
5=Recognition	26.5	13.5	5.0	0.9
6=Identification	0.0	9.0	6.0	0.2
7=Hazard/Risk	0.0	6.0	0.3	3.3
Operations Level				
10=Operational	0.0	119.0	10.0	2.5
11=Safety	0.0	0.0	0.0	0.0
12=Planning	0.0	0.0	10.0	0.2
13=ICS	20.0	7.0	2.0	0.6
14=Identify label	0.0	0.0	0.0	0.0
15=Classify	0.0	0.0	0.0	0.0
16=Chemistry	0.0	0.0	0.0	0.0
17=Protective equip.	4.0	6.5	0.0	0.2
18=Control	34.0	0.0	0.0	0.7
19=Termination	0.0	6.0	0.1	4.3
Technician Level				
20=Technician	0.0	0.0	0.0	0.0
21=Goals	0.0	0.0	5.0	0.1
22=Safety	0.0	0.0	0.0	0.0
23=Planning	0.0	0.0	0.0	0.0
24=ICS	0.0	0.0	0.0	0.0
25=Recognition	0.0	0.0	0.0	0.0
26=Classify	0.0	0.0	0.0	0.0
27=Chemistry/toxic	0.0	0.0	0.0	0.0
28=Hazard/Risk	15.5	0.0	8.8	0.5
29=Protective equip.	0.0	0.0	0.0	0.0
30=Control	0.0	0.0	5.0	0.1
31=Decontamination	0.0	0.0	0.0	0.0
32=Termination	0.0	0.0	0.0	.67
Specialist Level				
40=Specialists	0.0	0.0	0.0	0.0
41=Goals	0.0	0.0	0.0	0.0
42=Safety	0.0	0.0	0.0	0.0
43=Planning	0.0	0.0	0.0	0.0
44=ICS	0.0	0.0	0.0	0.0
45=Classify	0.0	0.0	0.0	0.0
46=Chemistry/toxic	0.0	0.0	0.0	0.0
47=Hazard/Risk	0.0	0.0	0.0	0.0
48=Protective Equip.	0.0	0.0	0.0	0.0
49=Control	0.0	0.0	0.0	0.0
50=Decontamination	0.0	0.0	0.0	0.0
51=Termination	0.0	0.0	0.0	0.0
Other training	47.0	115.0	107.0	5.3
Total team training	180.5	319.0	191.0	
Yearly avg./member	10.6	18.7	11.2	

3 year average training hours = 13.5/year

Written Test Results

Overall the PFD did a very good job on the written test, weakness areas include:

- Chemistry (chemical properties and how they relate to incident response);
- Recognition and identification (labels & placards, DOT and NFPA 704 standards);
- Hazard analysis; and
- To a lesser extent, incident command as it relates to organizing the incident.

PFD's strengths were in:

- Personal protective equipment; and
- Emergency medical knowledge.

Practical Evaluations Results

Station 1--Incident Command

Using 2 scenarios the member was to determine the number of personnel to handle the incident, diagram a chart of command and determine if it was a single or unified command.

Results:

- Unsatisfactory understanding of personnel required; and
- Unsatisfactory understanding of type of command.

Station 2--Selection of PPE

Using the same scenario as the ICS station, recommend a level of protection for entry, backup and decontamination, and justify the decision.

Results:

- Satisfactory understanding of levels of protection; and
- Uninformed selection of PPE.

Station 3--Level A

Answer questions on the construction, use and reasons for using a Level "A" suit.

Results:

- Satisfactory understanding of benefits, drawbacks, features of A suits.

Station 4--Physical Properties

Using a chemical found at MASCA and a MSDS, determine it's hazards, chemical characteristics and provide information on where it is located on site.

Results:

- Marginal understanding of chemical location at MASCA; and
- Unsatisfactory understanding of chemical properties.

Station 5--Level B Suit

Answer questions on the construction, use and reasons for using a Level "B" suit. Don the suit.

Results:

- Unsatisfactory consistency in wearing of suit; and
- Satisfactory understanding of limitations, features of suit.

Station 6--Chlorine "A" Kit

Given a Chlorine "A" Kit, describe the features of the kit, types of patches, other uses and place dome cover assembly onto a training cylinder.

Results:

- Unsatisfactory familiarity with kit; and
- Unsatisfactory knowledge of the equipment and uses.

Results of Drill Scenarios

During the drills, PFD personnel exhibited that they were able to establish a command, identify the product, select and don protective equipment, contain the incident, perform decontamination and terminate the incident.

Problems encountered:

- ICS not strong or formalized;
- Weak hazard analysis of incident;
- Slow hazard assessment;
- Actions were very hesitant resulting in delayed rescue times;
- Unfamiliar in using existing resources to cope with hazardous materials;
- Zones not set or identified to all response personnel; and
- Ineffective use of manpower.

Assets:

- Application of decontamination;
- Selection of personal protective equipment;
- Knowledge of DOT guide book; and
- Knowledge of ICS terminology.

3.3.3 Summary of Response Capabilities

With the expansion of the MASCA facility, the PFD has recognized a need to develop a hazardous material team to ensure quick response. The PFD acknowledges its personnel are not currently trained or equipped to handle hazardous material incidents. The PFD's goal is to provide the necessary training and obtain the necessary equipment before MASCA's Building D commences chemical use.

Both the PFD and MASCA have written policy and guidelines covering response to hazardous materials incidents. The PFD's guidelines are generic, owing to their responsibility to respond to a wide variety of incidents throughout the community. MASCA has guidelines specific to their facility.

Training records reviewed for hazardous materials responders from MASCA indicate that they do not maintain levels of training suggested by their own operating guidelines. The PFD does not have minimum training requirements. However, a comparison of PFD training hours to industry standards shown that none of the responders are trained to a "technician" level; a few are trained to an "operational" level; and the remainder are trained to an "awareness" level. (See Section 1.2.1 for a discussion of training levels.) Records of both organizations do not adequately address instructor qualifications, agendas of instruction, student accountability and references used. Although hazardous materials emergency response is a hands-on activity, a majority of the training was conducted in a classroom setting.

With the exception of radios and 1-hour rated SCBA, MASCA owns and maintains an adequate inventory of equipment for response to an uncontrolled hazardous materials incident at their facility. A list of recommended additions and modifications to the MASCA inventory is provided in this report.

The PFD does not have an adequate inventory of equipment for safe response to an uncontrolled hazardous materials incident at MASCA. The PFD has prepared a list of hazardous materials emergency response equipment needed for a safe response, detailed in a memo from John Davis (PFD) to Chief Frank (PFD), dated January 2, 1996. The proposed total cost of this equipment is $322,867.

The PFD can have access to this equipment for responses to MASCA through two (2) identified methods: (1) by establishing a mutual aid agreement with surrounding municipalities; (2) establish an independent in-house PFD inventory.

Establishing mutual aid agreements to insure availability of equipment will decrease overall costs by spreading them out among several municipalities. This procedure is used by a number of Fire Departments including the Eastside Hazardous material team made up of municipalities including: Bellevue, Redmond, Kirkland, Woodinville and Bothell, Washington. Pooling of resources in this manner can provide for equipment not affordable to municipalities who elect to operate independently. Close cooperation among all parties is required to maintain shared equipment and ensure availability at all times to all participants. Response times for the PFD could be increased if the equipment is staged or in use (for response or training) outside of the City of Puyallup.

Establishing an in-house inventory of hazardous materials response equipment will provide the PFD with immediate access to that equipment. They will be responsible for all maintenance and upgrade costs and be in control of when the equipment is being used for training.

It is possible the cost of the equipment could be reduced by the purchase of a large box type truck instead of a hazardous materials vehicle. The truck could be properly outfitted with shelving, a generator, lighting, awnings, and other necessary equipment if the PFD has time to manage the project. The City of Vancouver B.C. used this approach when outfitting their team. They could be contacted for more information.

Hazardous materials skill levels were evaluated using written and hands-on evaluations of randomly selected hazardous materials responders from both MASCA and the PFD. Levels of performance were compared by an experienced evaluation team to other industrial and fire department responders and applicable regulations/standards. MASCA responders appear to be personally and professionally motivated to respond to hazardous materials incidents at their facility in an appropriate manner. They have site specific knowledge unlikely to be provided through any other source and will remain a key operational component of any response to the facility. Evaluations showed several areas where current skill levels are inadequate including Incident Command, basic response terminology, chemistry and lack of a standardized protocol for hazard analysis.

The PFD maintained they are capable of responding to hazardous materials emergencies at an Awareness level. Evaluations confirmed that the PFD personnel tested are trained to a level between Awareness and Operational. The PFD maintained they are capable of acting as an IC at the scene of a hazardous materials incident; evaluations and document review support this statement.

PFD responders will require extensive hazardous materials emergency response training to establish a hazardous materials team at the Technician level. Typically, fire department personnel require a minimum of 120 initial hours of training to reach the Technician level and a minimum of 40 hours of annual training to stay competent at that level. The cost of this training is in addition to the equipment costs discussed previously.

Response to hazardous materials incidents at the MASCA facility is enhanced when the resources and capabilities of MASCA and the PFD are combined. MASCA has site-specific knowledge and skills unlikely to ever be duplicated in the PFD. MASCA responders will typically be in a position to respond first and take corrective actions immediately, minimizing the potential severity of an incident. PFD responders can provide equipment, manpower and resources beyond the capabilities of MASCA to enhance the MASCA response efforts and insure protection of the community. PFD responders should also be prepared to perform control and containment measures on selected in-plant systems should MASCA responders not be available. Both parties and the citizens of Puyallup will benefit from joint training, evaluations and responses. Specific steps to mitigate deficiencies are listed under mitigation measures.

4.0 SUMMARY OF MITIGATION MEASURES

4.1 USE AND STORAGE OF HAZARDOUS MATERIALS

Toxic gas monitoring systems shall be installed and maintained in accordance with UFC 5101.01 "...required devices and systems shall be maintained in operable condition." UFC 5103.5.3 requires toxic gas monitoring in a semiconductor fabrication area.

For hazardous gas monitoring, computer based toxic gas management systems, programmable logic controllers or equivalent technology shall be used in both the existing fabrications and in the fabrications under construction. These systems provide detailed information at the constantly attended location about the location and severity of a leak.

Preventative maintenance on the gas detection systems shall be performed and documented per manufacturer's requirements.

Sensors installed in exhaust ducts shall be located 3 to 10 duct diameters downstream of anticipated leak area.

End of line testing of all detection points shall be performed on an annual basis or other time frame as negotiated with the PFD to ensure system functionality.

An approved VOC abatement system shall be installed as part of the expansion.

The equipment sign off procedure (ESO) shall be redesigned, in a more detailed and systematic manner, to incorporate SEMI S2-93, UFC, Uniform Building Code (UBC), Uniform Mechanical Code (UMC), National Electric Code (NEC) and NFPA 318 requirements. ESO procedures developed by other semiconductor companies would facilitate this process.

Equipment suppliers shall perform reviews of new equipment in accordance with the SEMI S2-93 and S7-94 standards. The PFD shall not approve operation of equipment with deficiencies that could jeopardize community safety.

Safety responsibilities shall be assigned to functional groups (production, equipment and facilities), so that these groups assume a far greater role in overseeing and managing safety for their employees and areas.

All equipment shall be installed and maintained in accordance with UFC 5101.01 "...required devices and systems shall be maintained in operable condition."

The ventilation system shall be installed using the requirements contained in Chapters 5 and 6 of the UMC and Section 10 of SEMI S2-93.

A written procedure shall be prepared and implemented that ensures on-going exhaust ventilation system functionality whenever modifications are made. Capacity testing shall be done on a semi-annual basis. The results of the testing shall be recorded and results shall be posted on stickers located on tested equipment and supporting ductwork.

Secondary containment for hazardous gases shall be provided as specified in SEMI Standard F6-96.

All mechanical connections in piping systems for liquid hazardous production materials shall be in secondary containment.

Bermed areas for liquid chemicals shall be sized large enough to contain a spill of the largest container plus 20 minutes of sprinkler water.

UBC Chapter 16, NFPA 318 and SEMI Standard S2-93, Section 17, shall be used as guidelines for securing tanks and equipment in order to reduce the risk of hazardous materials releases due to an earthquake.

Exit signs in the fabrication area shall be displayed and illuminated as required by Section 1013 of the UBC.

The "buddy" system shall be used for HPM liquids handling..

Silane gas shall be dispensed and stored outside in compliance with UFC Standard 80-1 and NFPA 318, Chapter 6.

The MASCA Safety and Health Department shall include a Certified Safety Professional or Certified Industrial Hygienist with a minimum of five years experience in the semiconductor industry

Day-to-day safety responsibilities shall be distributed so that the functional groups (production, equipment and facilities) assume a far greater role in overseeing and managing safety for their employees and areas.

4.2 EMERGENCY RESPONSE TEAM

MASCA

Currently MASCA maintains 12 ERT personnel on site during full production and allows for reduced ERT personnel during reduced production periods. MASCA shall maintain a minimum of 12 Technician level trained ERT members on site at all times. In addition, MASCA shall maintain a minimum of 8 ERT support personnel trained to the Operations level who are competent to assist MASCA Technicians with procedures including site control, crowd control, decontamination, and related actions.

MASCA shall confirm reporting criteria for what is a "hazardous materials response" at the plant with the PFD to ensure common reporting terminology is used by both organizations.

MASCA shall maintain and continue to progress in the areas of hazardous materials inventory minimization, substitution with less hazardous materials, and implementation of hazardous materials engineering controls.

ERT guide, protocols and checklists shall be reviewed and updated to establish "user friendly" response documentation. Copies shall be provided to the PFD for review.

Standard protocols for hazardous material response shall be established, using a system like the 7-step method.

Facility specific hazardous material team training shall be conducted that focus on the areas of Incident Command, chemistry, hazard analysis and basic response terminology. PFD personnel shall be invited to participate in all portions of this training.

MASCA shall supply the PFD with 4 radios that can communicate with MASCA's radio system. In addition, the MASCA ERT shall have 15 radios dedicated for ERT use. This number allows 12 members of the ERT to be issued a radio, with three spares as backup.

ERT members shall be provided annual training as required by MASCA procedures. The training plan shall be reviewed and approved by the PFD.

Training shall be revised to reflect the terminology and standards used in emergency response by other agencies. The Washington Administrative Code (WAC) 296-62-300 and NFPA 472 shall be used to give specific guidance. Areas to focus on include levels of protection and Incident Command.

An ERT Leader shall be on-site at all times.

The ICS shall be initiated at all incidents, regardless of size. IC position vests shall be obtained and utilized.

Detailed lesson plans shall be created using adult instructional methodology to establish consistent training where anyone qualified can teach a repeatable, accountable lesson plan.

All new purchases of hazardous material dedicated SCBAs shall have one-hour bottles. An adequate number of SCBAs shall be staged and maintained in a central location for emergency use only.

"Threat levels" shall be established for hazardous material responses at the facility. These threat levels shall be used as the basis of a plan for notifying and responding with the PFD. The plan shall be approved by the PFD.

A member accountability system (passport system) shall be implemented that is compatible with the PFD and with the Pierce County standard.

ERT records shall be improved to include rosters, agendas as taught, qualifications of instructors, accountability procedures, copies of handouts, copies of certificates or documentation of completion. A thorough database of hazardous material training records-shall be developed that includes training completed, by competency skill.

Puyallup Fire Department

The PFD shall provide a total of 21 "NFPA 472 Technician" trained responders within the PFD, which will include seven (7) per work shift. As with equipment, the City of Puyallup has an option to provide these 21 Technicians through a mutual aid agreement with surrounding municipalities, all in-house, or a combination of both methods. Providing all 21 "NFPA 472 Technicians" in-house will provide the PFD with the highest level of trained responders, immediately available to the City of Puyallup. Using mutual aid agreements will decrease the cost to the City of Puyallup but depending upon personnel management strategies may increase response times for the team by relying on responders outside the City of Puyallup.

Hazardous materials Technician training shall focus on hands-on activities, be taught by qualified instructors, and hold students thoroughly accountable. MASCA personnel shall be invited to participate in all or selected portions of this training.

Extensive training, drills and building familiarization visits shall be conducted with MASCA personnel.

PFD and MASCA shall work together to preplan responses to include, sharing, and staging equipment, Incident Command location, procedures and Command staff.

The PFD Hazardous material Team shall be equipped as proposed by the PFD hazardous material Captain to the PFD Chief in a memo dated January 2, 1996.

The PFD Fire Prevention Division shall assign line personnel to participate in inspections of the MASCA facility. Inspections involving firefighters would allow them to become more familiar with the facility, it's features, and layout and increase their knowledge of a H-6 occupancy.

All fire department hazardous material training records shall be reviewed to determine if categories can be reduced.

Hazardous material training records shall be improved to include rosters, agendas as taught, qualifications of instructors, accountability procedures, copies of handouts, copies of certificates or documentation of completion. A thorough database of hazardous material training records shall be developed that includes training completed, by competency skill.

PFD shall provide MASCA with Tactical Incident Plan Sheet for use by fire personnel when they arrive at the facility.

PFD hazardous material response protocols and checklists shall be established in order to review and update "user friendly" response documentation including: decontamination procedures, unified command protocols, handling of contaminated patients, and interfacing with the hospital. MASCA shall be provided copies for review.

Threat levels shall be established for hazardous material responses at the MASCA facility. These threat levels shall be used as the basis of a plan for responding.

The PFD shall confirm reporting criteria for what is a "hazardous material response" at MASCA with MASCA to ensure common reporting terminology is used by both organizations.

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5.0 REFERENCES

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Supplemental Environmental Impact Statement

Environmental Health -- Odor Technical Appendix

MASCA Puyallup Plant
Building D Expansion
(*Puyallup Science Park*)

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June 17, 1996

ACRONYMS

Acronym	Definition
City	The City of Puyallup
EIS	Environmental Impact Statement
EPA	Envrionmental Protection Agency
HAPS	Hazardous Air Pollutants
ISCST3	Industrial Source Complex Term Model version 3
NPDES	National Pollutant Discharge Elimination System
MASCA	Matsushita Semiconductor Corporation of America
POTW	City of Puyallup's Publically Owned Treatment Works
PSAPCA	Puget Sound Air Pollution Control Authority
SEIS	Supplemental Environmental Impact Statement
TACS	Toxic Air Contaminants

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1.0 INTRODUCTION

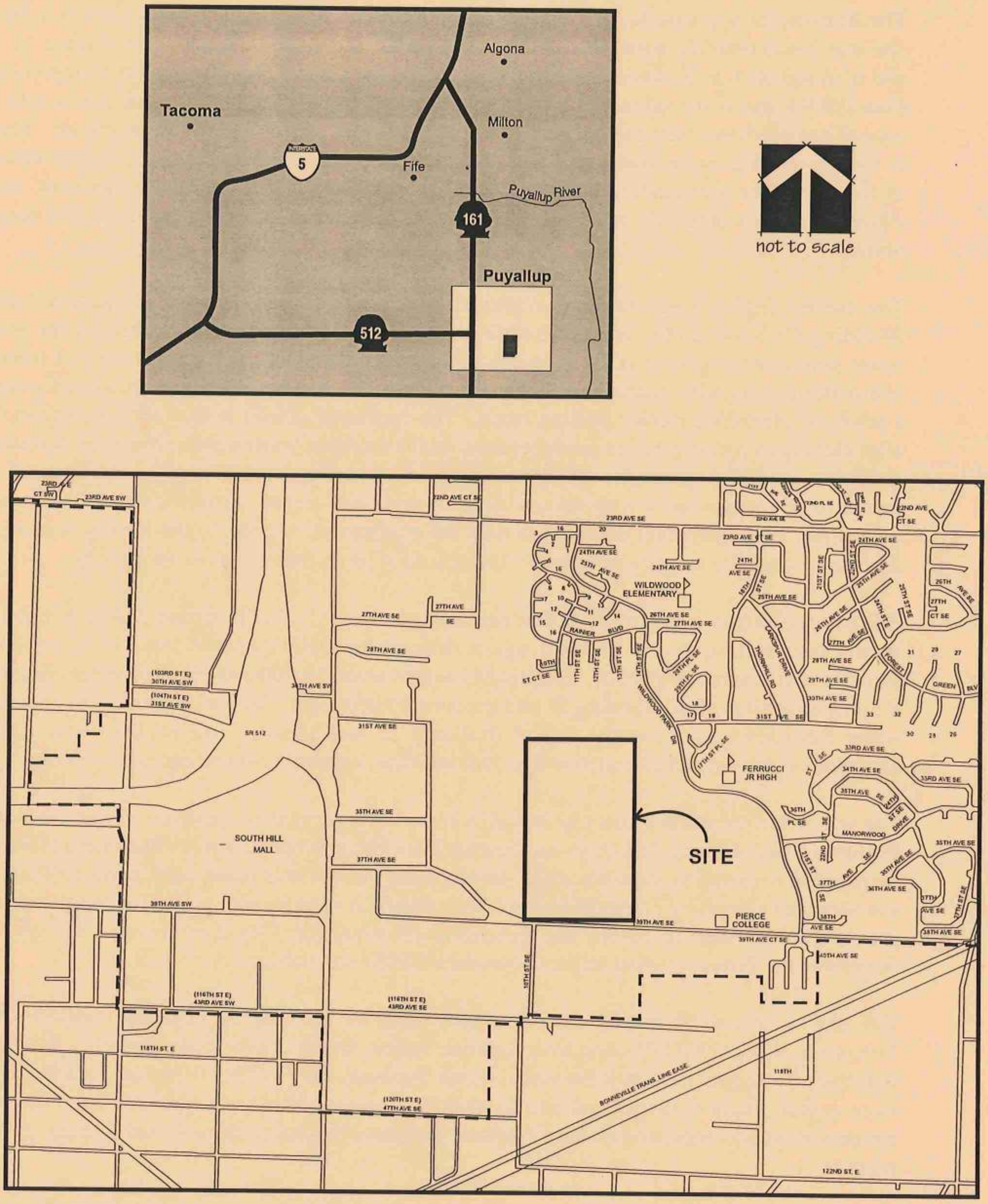
The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitent zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.

The site is served by gravity sewers, which drain to the City of Puyallup Publicly Owned Treatment Works (POTW), and by a tightline system which drains to the Puyallup River. The tightline discharges treated wastewater which bypasses the POTW. Periodic backwash water from carbon filters is discharged into an existing on-site infiltration pond. All three discharges are permitted and regulated under a National Pollutant Discharge Elimination System (NPDES) permit.



Source: *City of Puyallup*

Figure 1:
Vicinity Map
ENVIRONMENTAL HEALTH - ODOR

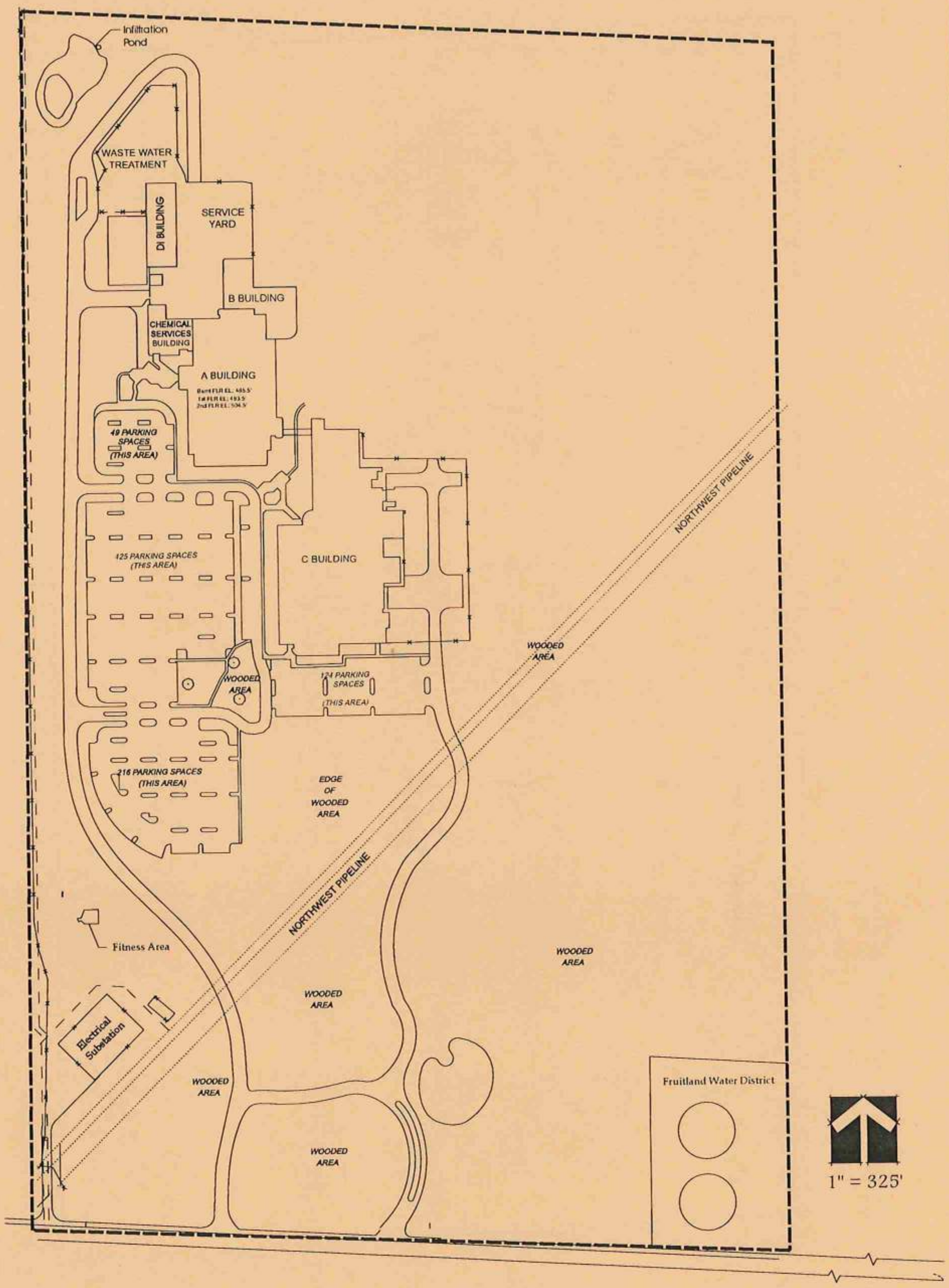


Figure 2:
Existing Site Plan
ENVIRONMENTAL HEALTH ODOR

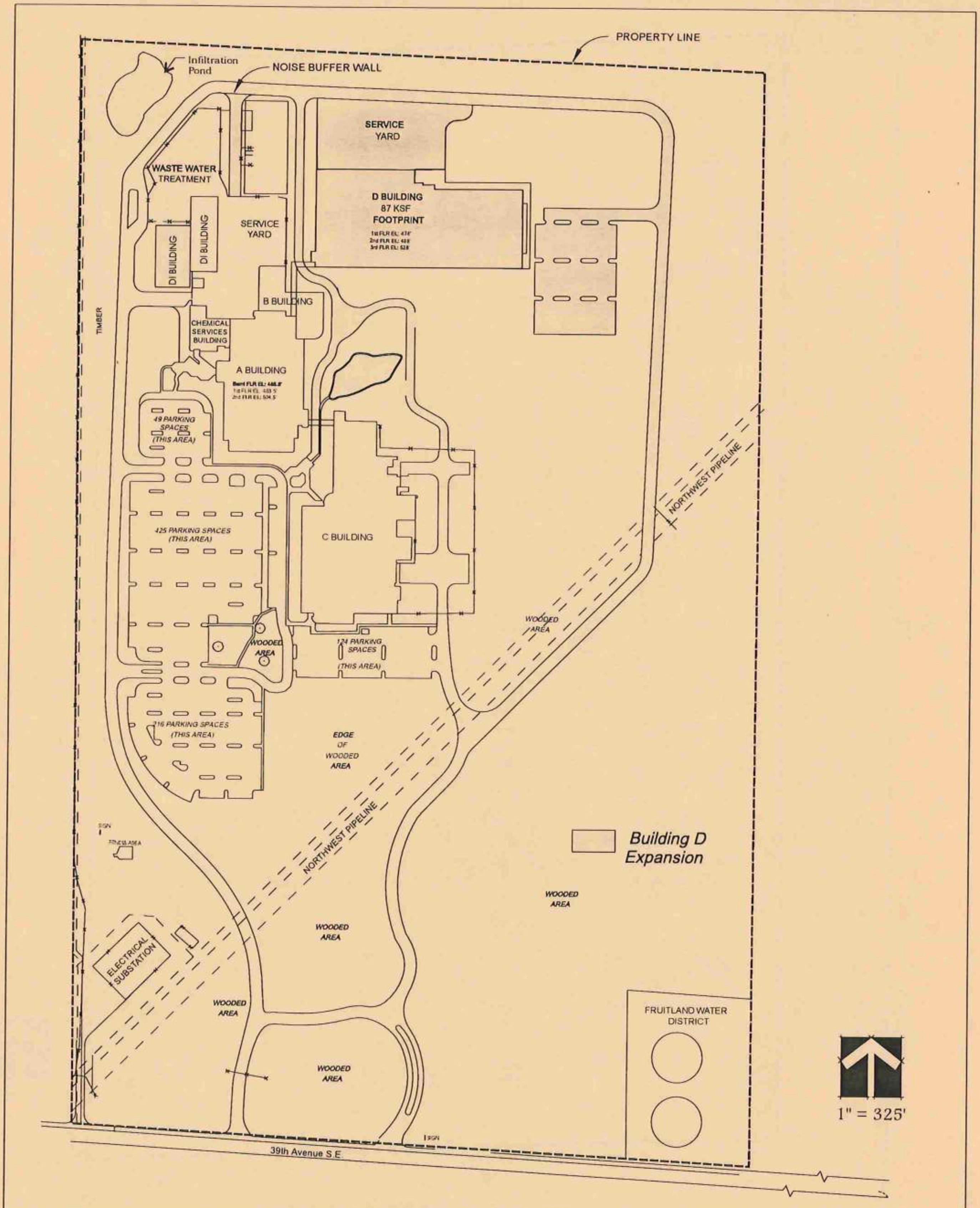


Figure 3:
Proposed Expansion Site Plan
ENVIRONMENTAL HEALTH-ODOR

1.1 ANALYSIS FRAMEWORK

The City of Puyallup's Determination of Significance states, "changes in the physical layout and operations of the 1995 project may result in potential odors at the property perimeter and off-site beyond those analyzed in the 1981 EIS." This report analyzes the effect of increased plant emissions on the odor aspect of air quality. Odor impacts from this type of operation are almost entirely due to emissions of various hydrocarbon compounds used as solvents in the manufacturing processes.

In order to understand the mechanisms which cause odor impacts it is important to examine the existing environmental conditions in the vicinity of the project. Included in the evaluation of the existing environmental conditions are the local meteorology, the specific topography of the site and, when available, information on the current air quality levels.

1.2 REGIONAL CLIMATOLOGY AND METEOROLOGY

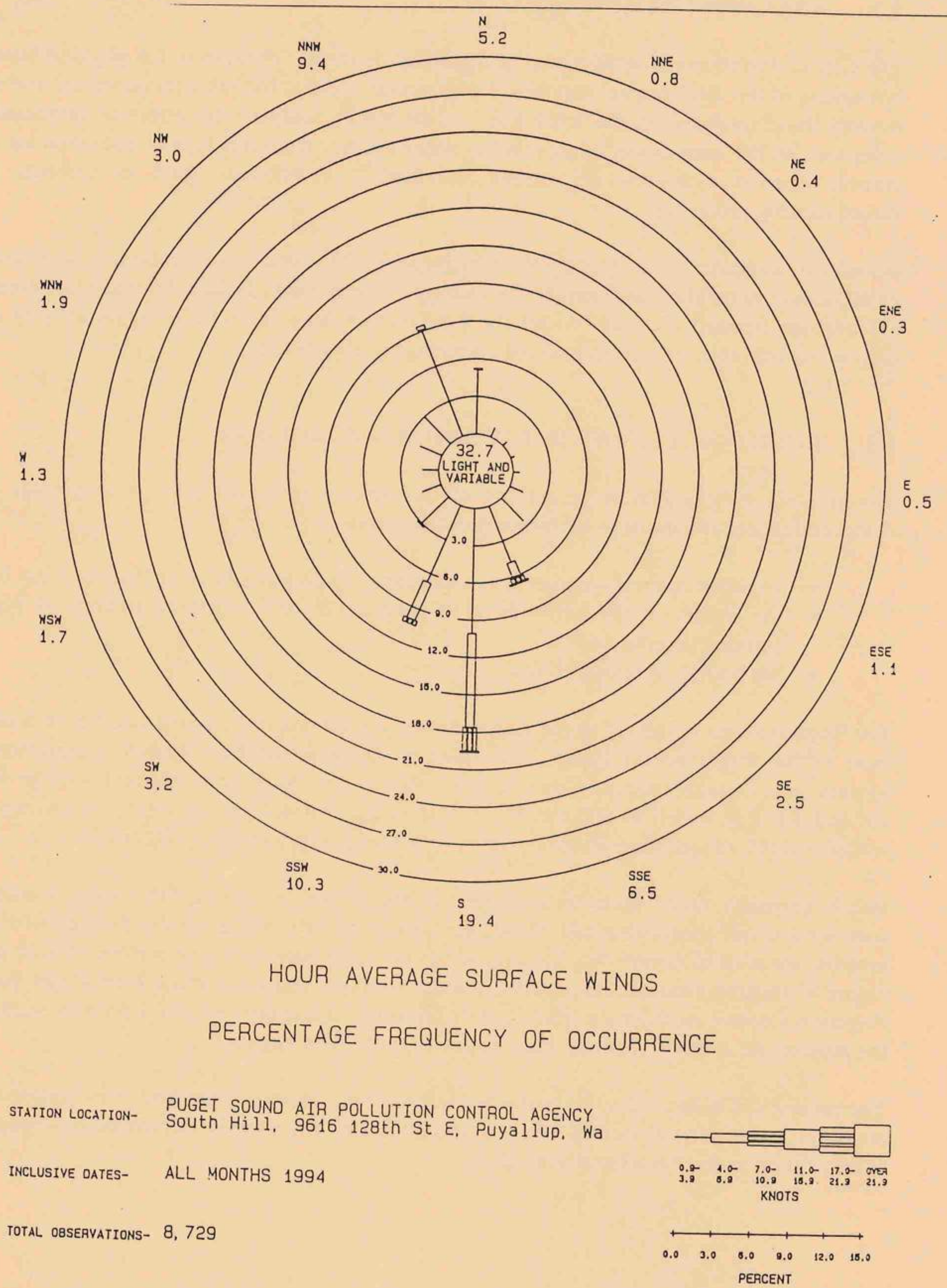
The primary meteorological conditions of the local area which play an important role in determining concentrations of odiforous pollutants are:

- the direction and speed of winds affecting the project site on an hour-by-hour basis;
- the ability of the atmosphere to enhance or retard vertical mixing of pollutants (mixing height); and
- the hourly air temperatures.

The Puyallup area is subject to the same climatic conditions that control weather in Seattle and most of the Puget Sound Basin. This area is characterized by moderate temperatures, wet winters, and frequent onshore flows of moist marine air. Average temperatures range from the 30° and 40° F in winter to 60° and 70° F in summer. Annual precipitation, concentrated in the winter months, ranges from 45 to 65 inches with a long term average of 50 inches.

Winds generally range south to southwest in the winter, or during other rainy periods, with southwest winds predominating. Winds during fair periods, and generally throughout the warm months, are west to northwest. Easterly winds occur frequently during periods of high pressure. Figure 4 illustrates the annual patterns of wind direction and wind speed from Puget Sound Air Pollution Control Authority's (PSAPCA) monitoring site approximately 1.5 miles southwest of the project site at 9616-128th St. East, Pierce County, Washington.

The project site is located in fairly flat or gently sloping terrain. Therefore, it is assumed that the air flows in the general vicinity of the project site are only slightly influenced by topographical features such as the Puyallup River valley.



Source: *Environalysis*

Figure 4:
Windrose Chart
ENVIRONMENTAL HEALTH - ODOR

Temperature inversions are common throughout the Puget Sound area in fall and winter. In most cases these pollutant-trapping inversions have an upper "lid" at an altitude between 1,000 to 6,000 feet. The air inversions trap pollution and concentrate the pollution. The project lies between 450 and 520 feet elevation and thus lies within the areas subject to inversions.

1.3 LOCAL AMBIENT AIR QUALITY-ODOR

Local odor impacts to air quality in the vicinity of the project are primarily from a variety of sources typical of rural and suburban land uses including: wood stoves and fireplaces, vehicle traffic including diesel buses and trucks, and livestock and farm operations.

The degree to which any particular source causes an objectionable odor varies greatly from person to person. Research which attempts to determine the level that a compound is detectable recognizes the wide range in individuals sensitivity to odors by making use of groups of people ("odor panels") sniffing precise concentrations of that substance. The odor panel's reactions are categorized in several ways:

- absolute odor threshold--is the concentration at which half of the panel can detect the odor.
- odor recognition threshold (50%)--the concentration at which half of the panel can identify the odor.
- odor recognition threshold (100%)--the concentration at which all of the panel can identify the odor.

Odor detection clearly occurs at far lower concentrations than odor recognition and is more representative of the levels at which public concerns about odor impacts will start to occur.

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2.0 METHODS

Information on existing and future emissions was provided by MASCA and the PSAPCA. PSAPCA requires industrial sources of air pollutants to file an annual report on their emissions of several categories of pollutants including criteria pollutants. Criteria pollutants are those first regulated by the Environmental Protection Agency (EPA) starting in 1963 and include carbon monoxide, nitrogen oxide, sulfur dioxide, particulate matter, lead, and ozone. Of interest in an odor study are the hydrocarbons which interact with sunlight and oxides of nitrogen to form ozone. PSAPCA also requires calculation of the emission quantities of a number of toxic air contaminants, some of which are regulated by both the State and Federal governments. Odor causing compounds are not regulated on the basis of their odor, they are regulated on the basis of being hazardous air pollutants (HAPS) by EPA (as defined in the Clean Air Act 112(b)) or toxic air contaminants (TACS) as defined by PSAPCA (40 CFR Part 372(d)).

The process used to determine if detectable levels of odor-causing compounds occur at or beyond the MASCA property line involves entering information from several sources into computer models. These include:

- Industrial Source Complex Short Term Model (ISCST3), version 3;
- Building Profile Input Program;
- PCRAMMET; and
- TSCREEN.

The dispersion and resulting concentrations of the facility's emissions during normal operating conditions was determined using EPA's recommended dispersion model for industrial emission sources: ISCST3. The ISCST3 model is a refined model which requires a detailed analysis of the effective building widths for each 10° of wind direction, this information was generated using EPA's Building Profile Input Program. Annual meteorological data from Sea-Tac Airport was used in the model and was processed for ISCST3 using PCRAMMET. Although PSAPCA operates a meteorological station in conjunction with its particulate matter sampler 1.5 miles southwest of the project site, its meteorological data is compiled and stored in a format that is not compatible with the ISCST3 model. For this reason the ISCST3 model was operated with data from Sea-Tac Airport. The data year selected (1991) was one during which Tacoma, the closest site where PSAPCA calculates the Pollutant Standard Index, recorded the highest pollutant concentrations over a five year period (1989-1995).

The step-by-step methodology used to determine the odor impact from the existing level of operations at MASCA consisted of:

1. Obtain data on all the emissions from all of the facility's sources (solvent vents, boiler stacks and the acid scrubber stacks).
2. Compare the list of emitted compounds to published data on odor thresholds.
3. Calculate the emission rate (in grams per second) for all compounds with published odor thresholds.

4. Model the pollutant concentrations (for each pollutant) at the MASCA property line using EPA's ISCST3 dispersion model. As shown on Figure 5, additional receptors are set up at the following neighboring schools: Pierce College, Ferruci Junior High School, and Wildwood Elementary School.
5. Set-up the ISCST3 model with a receptor grid extending 1,000 meters beyond the property line. The 1,000-m receptor grid extended beyond the property boundary was done to ensure that the entire area zoned as Light Industrial by the City was included in the analysis.

The required inputs for each of the models include:

- Building dimensions for Buildings A, B, C and D (as shown on Figure 6);
- Solvent vent and acid scrubber stack heights, diameters, exhaust gas volumes, temperatures and exit velocity of the exhaust gases;
- Site topography; and
- Meteorological data (wind speed, direction, air temperature, and mixing height) on a hour-by-hour basis for an entire year (1991).

Table 1 is a summary of the stack configurations for Building C. Only four (4) of the five (5) acid scrubber stacks operate at a time. The proposed stack configuration for Building D is shown in Table 2. All five (5) acid scrubber stacks would operate at all times.

Table 1
Stack Configurations -- Building C

	Acid Scrubber Stacks	Solvent Vent Stack
Stack height	12.2 meters	12.2 meters
Base elevation	0.00 *(assumed)*	0.00 *(assumed)*
Temperature of exiting gas	287^{o} Kelvin	295^{o} Kelvin
Velocity of exiting gas	10.1 meters/second	12.5 meters/second
Diameter of stack	1.42 meters	1.02 meters

Table 2
Stack Configurations -- Building D

	Acid Scrubber Stacks	Solvent Vent Stack
Stack height	19.8 meters	19.8 meters
Base elevation	-1.4 meters	-1.4 meters
Temperature of exiting gas	290^{o} Kelvin	294^{o} Kelvin
Velocity of exiting gas	8.1 meters/second	7.1 meters/second
Diameter of stack	0.946 meters	0.914 meters

MASCA is required by the PSAPCA to register its sources of pollutant emissions and pollution control equipment. This registration includes a calculation of emissions which is updated annually. Table 3 summarizes the most recent emission data from MASCA for those compounds with distinctive odor characteristics.

Table 3
Existing Annual Emission Inventory of Odor Causing Compounds

Compound	1996 Emissions in lbs [1]	Characteristic Odor [2]	Hedonic Tone [3]
Isopropyl alcohol	75,537	sharp, musty	Unpleasant
Acetone	35,006	sweet, fruity	Pleasant to Neutral
Ammonia	54,755	sharp, pungent	Unpleasant
Phosphine [4]	42	garlic or fishy odor	N/A
Hydrofluoric Acid [4]	1,311	strong, irritating [5]	N/A
Ethylene glycol ether	10,237	sweet	Pleasant
Propylene glycol ether	11,990	sweet	Pleasant

Notes:
1 Source: Amtest stack test March, 1996
2 Source: Hellman, T & Francis Small, 1974.
3 Hedonic tone is a judgment of the pleasure or displeasure a person would experience by smelling the compound in question.
4 Source: EPA, March 1992.
5 Source: Center for Disease Control.

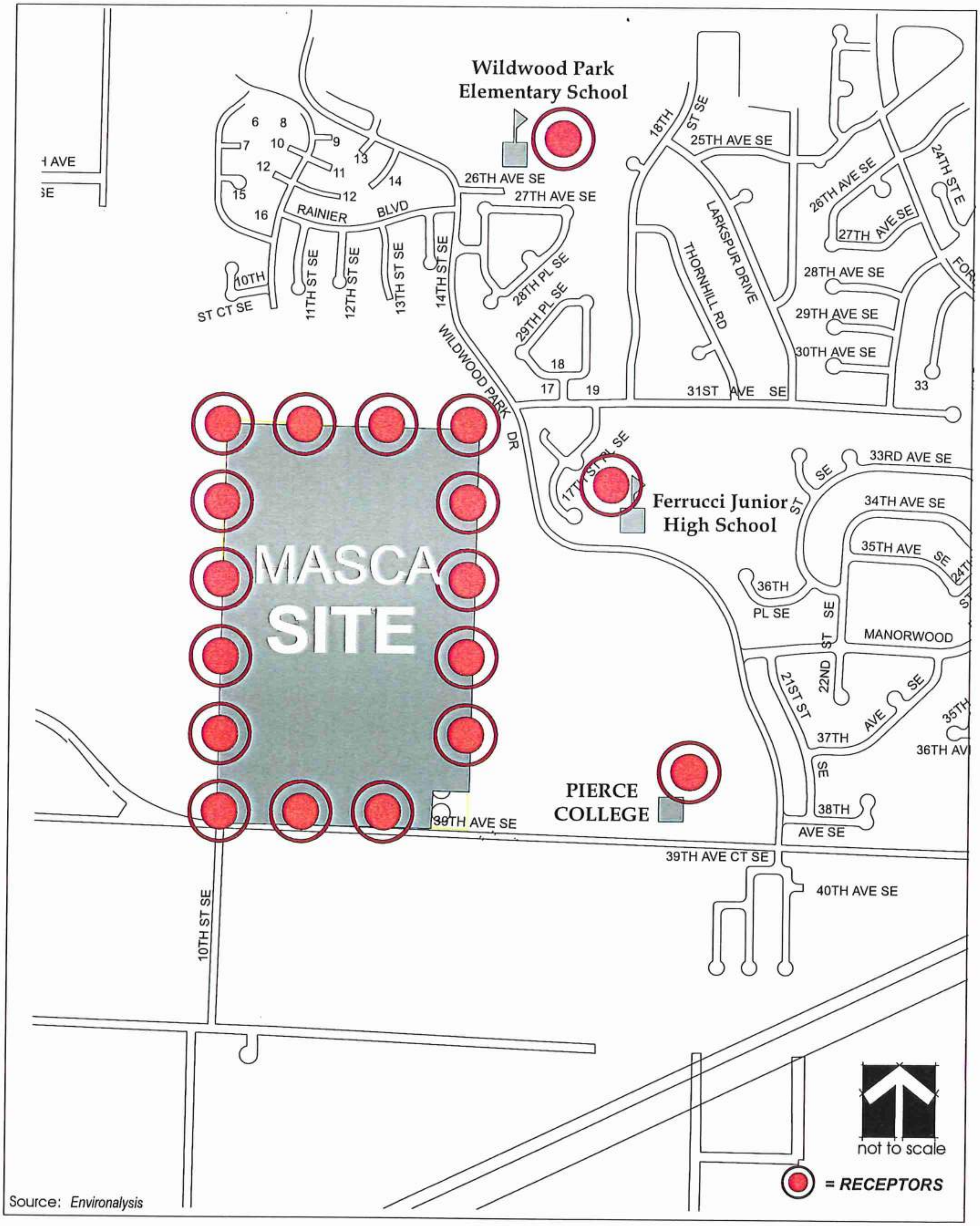

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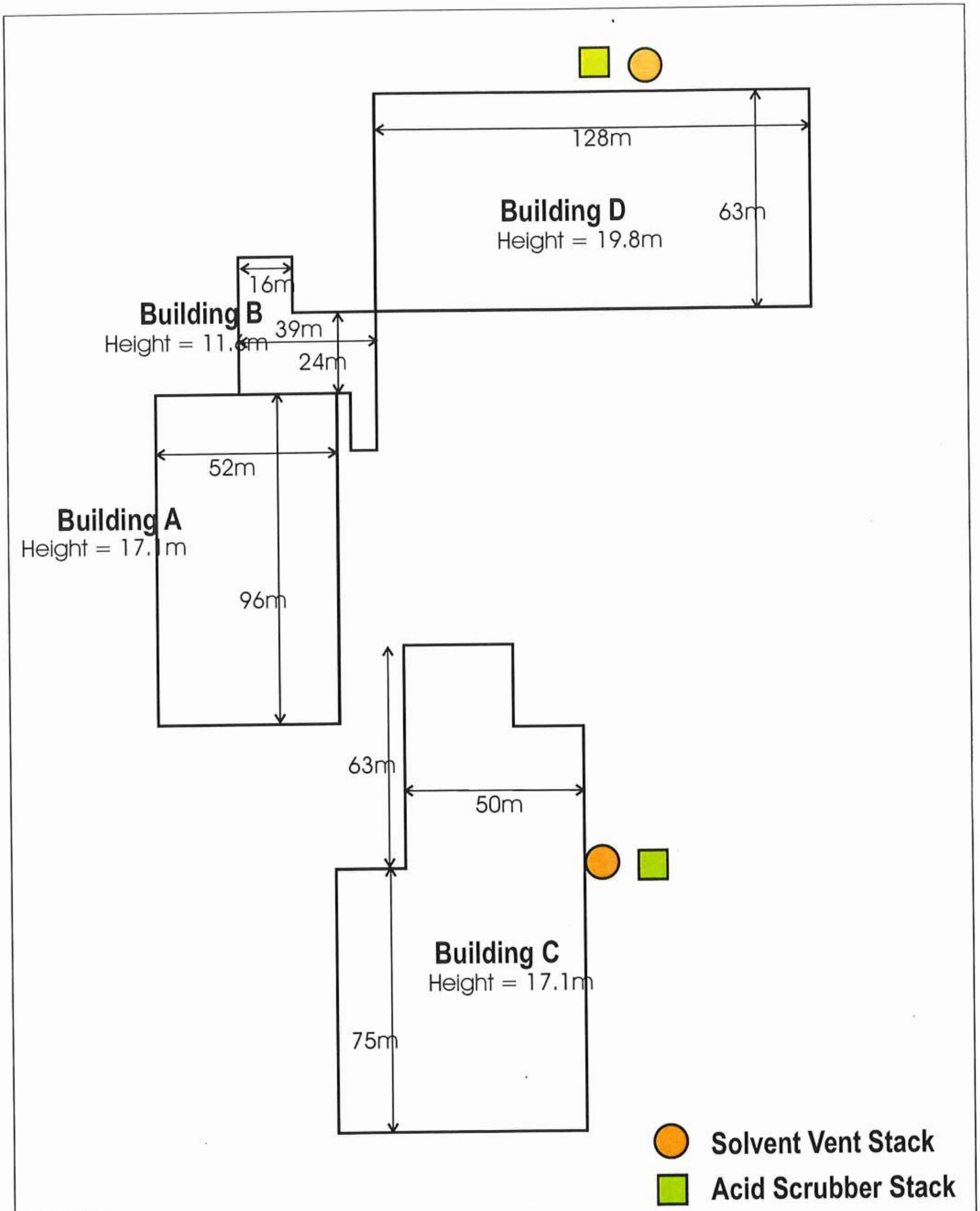
Figure 5:
Odor Receptors
ENVIRONMENTAL HEALTH - ODOR



Note: *Environalysis*

Figure 6
Building Dimensions Used in Odor Modeling
ENVIRONMENTAL HEALTH - ODOR

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3.0 AFFECTED ENVIRONMENT

The documentation provided by MASCA to PSAPCA for previous years includes some chemicals with published odor thresholds which no longer used at MASCA for wafer production including: carbon tetrachloride, xylenes, trichlorotrifluoroethane, and benzene. These compounds were eliminated from the production process in 1994. The elimination of these compounds has helped to significantly reduce odor impacts. In March, 1996, the acid scrubber and solvent vent stacks were sampled for a wide range of compounds (Amtest, 1996).

Figure 5 shows the receptor locations used in the ISCST3 modeling. Table 4 summarizes the results of the dispersion modeling and compares modeled concentrations to recognized odor thresholds. The concentrations shown in Table 4 are the maximum level occurring at any given hour at any point along the MASCA property lines.

Table 4
Maximum Annual Existing Concentrations of Odor Causing Compounds

Compound	Modeled Concentrations-1996[1] (micrograms/cubic meter)	Odor Threshold[2] (micrograms/cubic meter)	Modeled/Threshold [3]
	Normal Operation		
Acetone	551.0	47,412.2	1.2%
Ammonia	772.9	3,700.0	20.9%
Isopropyl alcohol	1,191.7	8,000.0	1.5%
Phosphine	0.66	14 to 280	4.7%
Hydrofluoric Acid	18.5	30 [4]	61.7%
		33.0-133.0	56 to 13.9%
		<832.0	2.2%
Ethylene glycol	160.7	24,000[5]	0.67%
Propylene glycol	189.1	24,000[5]	0.79%

Notes:
1 The maximum modeled concentration of an hour's duration occurring at any given hour in a year.
2 Published literature provides a wide range of odor thresholds. Where the research has been critiqued only the thresholds found acceptable are listed here.
3 This is the modeled concentrations divided by the lowest published threshold.
4 This threshold is based upon limited data.
5 Source: EPA, 1992

Under current normal operating conditions, no compound exceeds published odor thresholds at any of the model's receptors. The point of maximum concentration for all compounds is on the east property line and occurs under meteorological conditions with light winds 3 miles per hour blowing from the west. An examination of the windrose chart (Figure 4) shows that winds from the west occur in Puyallup approximately 1.7% of the time or approximately 148 hours a year. The City of Puyallup has no records of complaints regarding the existing MASCA facility causing objectionable odors.

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4.0 PROJECT IMPACTS

MASCA proposes to increase wafer production from 18,000 wafer-outs per month to 40,000 wafer-outs per month by the addition of a 300,000 s.f. fabrication building and associated structures. The projected emission inventory and resulting concentrations are shown in Table 5.

Table 5
Projected Annual Emissions and Concentrations of Odor Causing Compounds by 1997

Compound	Emissions (lbs)	Modeled Concentrations (units)	Modeled/Threshold
Acetone	89,264	551.0	1.2%
Ammonia	139,625	772.9	20.9%
Isopropyl alcohol	192,620	1,191.5	1.5%
Phosphine	106	0.65	4.7%
Hydrofluoric Acid	3,343	18.5	61.7%
Ethylene glycol	26,103	160.7	0.67%
Propylene glycol	30,576	189.1	0.79%

After Building D is in operation, the maximum concentrations averaged over a one- (1) hour period would be no higher than currently exists with only Building C in operation. The highest single concentration occurring at a receptor which is affected only by the stacks of Building C. The second highest concentration occurs at a receptor affected by both buildings. The point of maximum concentration is on the east property line and occurs under meteorological conditions with light winds of three (3) miles per hour blowing from the west-southwest. An examination of the windrose chart (Figure 4) shows that winds from this direction occur at Puyallup approximately 1.7% of the time or approximately 148 hours a year. Therefore it has been determined that there will be no significant adverse odor impacts as a result of the proposed expansion.

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Supplemental Environmental Impact Statement

Environmental Health -- Noise Technical Appendix

MASCA Puyallup Plant Building D Expansion

(*Puyallup Science Park*)

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June 17, 1996

List of Acronyms

Acronym	Definition
City	City of Puyallup
dB	Decibels
dBA	A-Weighted Decibels
DOE	Washington Department of Ecology
EDNA	Environmental Designation for Noise Abatement
EIS	Environmental Impact Statement
ENM	Environmental Noise Model
EPA	U.S. Environmental Protection Agency
Leq	Equivalent Sound Level
MASCA	Matsushita Semiconductor Corporation of America
NPDES	National Pollutant Discharge Elimination System
PMC	City of Puyallup Municipal Code
POTW	City of Puyallup's Publically Owned Treatment Works
SEIS	Supplemental Enviornmental Impact Statement

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1.0 INTRODUCTION

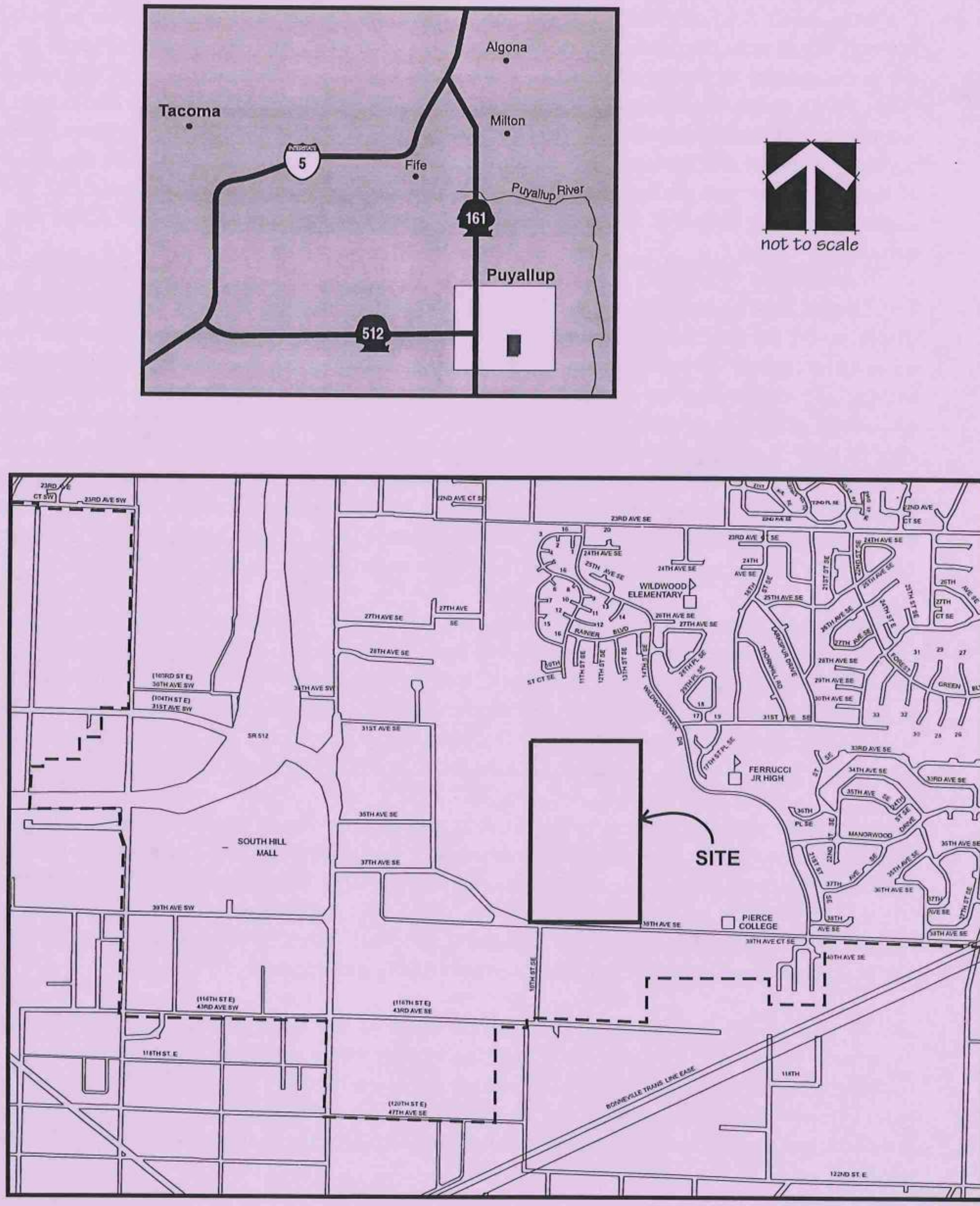
The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitent zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.

The site is served by gravity sewers, which drain to the City of Puyallup Publicly Owned Treatment Works (POTW), and by a tightline system which drains to the Puyallup River. The tightline discharges treated wastewater which bypasses the POTW. Periodic backwash water from carbon filters is discharged into an existing on-site infiltration pond. All three discharges are permitted and regulated under a National Pollutant Discharge Elimination System (NPDES) permit.



Source: *City of Puyallup*

Figure 1:
Vicinity Map
ENVIRONMENTAL HEALTH - NOISE

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA

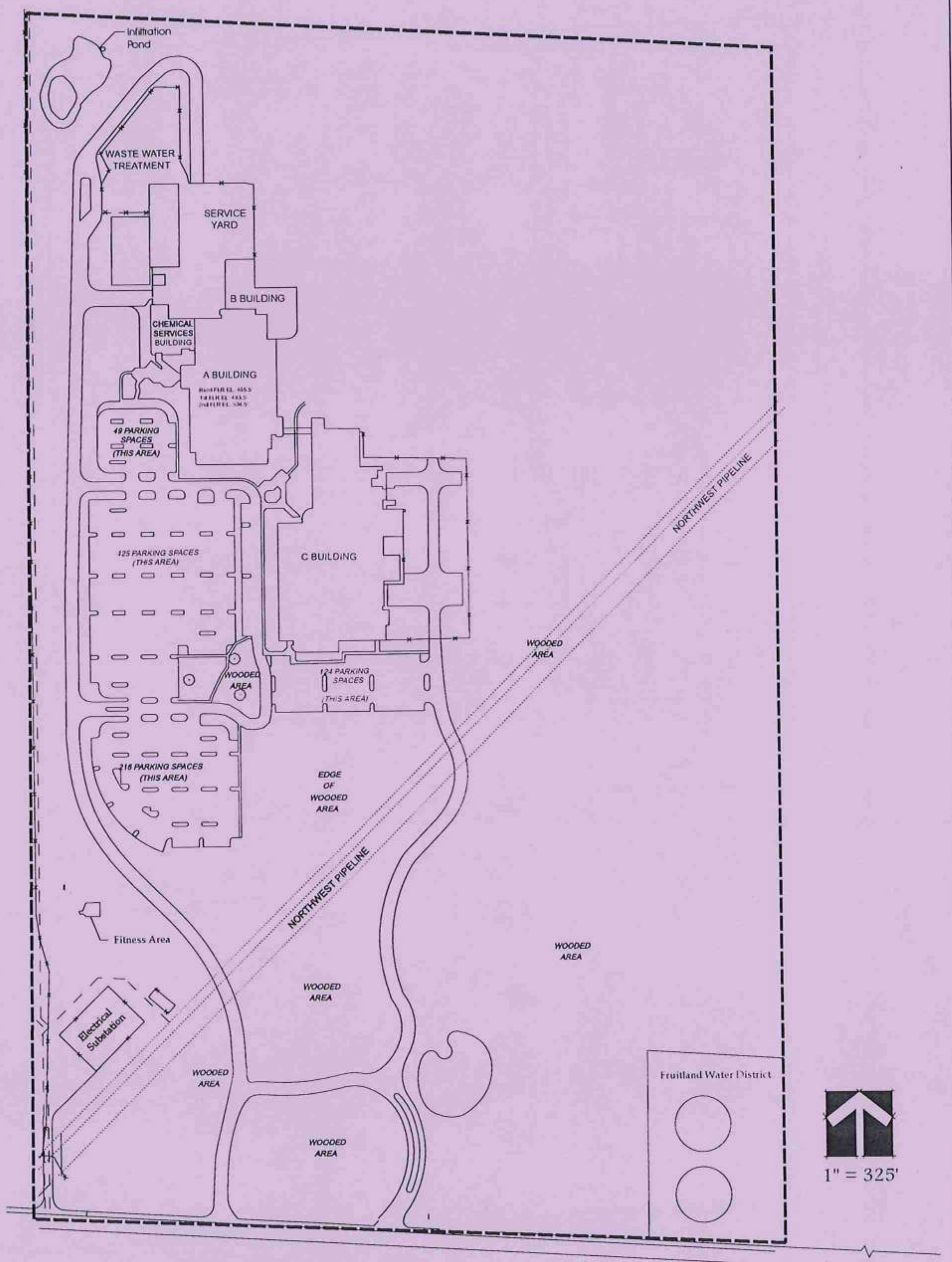


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Figure 2:
Existing Site Plan
ENVIRONMENTAL HEALTH-NOISE

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA

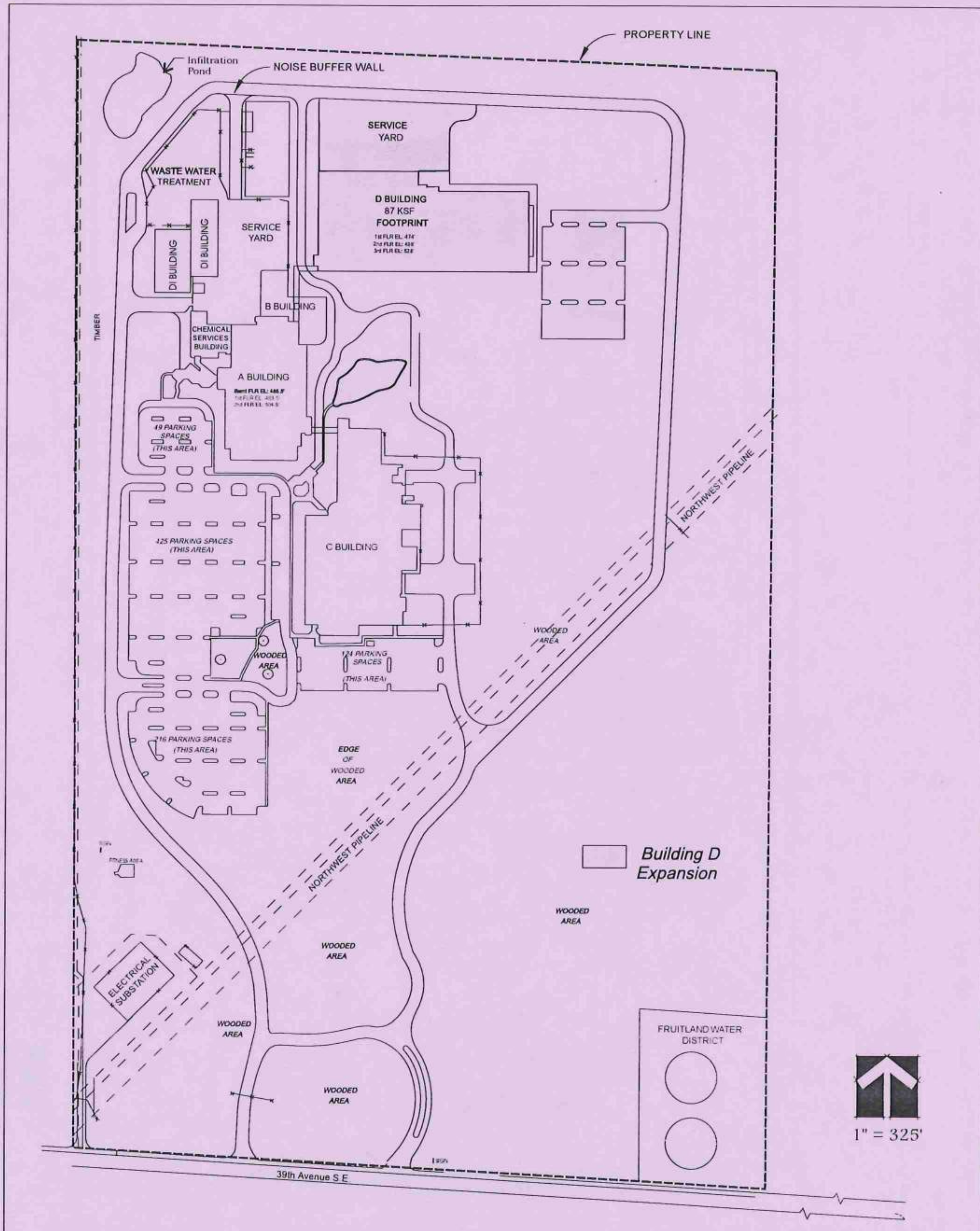

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Figure 3:
Proposed Expansion Site Plan
ENVIRONMENTAL HEALTH-NOISE

The City of Puyallup's Determination of Significance for the proposed MASCA Semiconductor Corporation of America (MASCA) Building D expansion states, "changes in the physical layout and operations of the proposed expansion may result in potential noise impacts at the property perimeter and off-site beyond those analyzed in the 1981 EIS." An assessment of the potential noise levels at all affected property perimeters and any resultant mitigation measures was conducted in order to address this issue. This technical appendix analyze the impact that the additional plant equipment will have upon noise levels at and beyond the property boundary.

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2.0 METHODS

Noise is defined as excessive or undesired sound. Human sensitivity to sound depends on its intensity, frequency, composition, and duration. Noise intensity is measured on a scale whose units are termed decibels (dB). In order to represent the wide range of sounds audible to the human ear this scale is logarithmic. With this scale an increase of 10 dB is perceived as a doubling of apparent loudness and an increase of 5 dB is noticeable under typical listening conditions. Sound levels from a number of sources combine non-linearly, e.g., doubling the number of noise producing machines such as cooling towers or fans will increase sound levels by 3 dB.

The greater sensitivity of the human ear to certain frequencies is approximated by skewing (or weighing) the decibel scale towards those frequencies. The weighted decibel scale which best approximates the response of the human ear is known as the A-weighted decibel scale (dBA).

One useful indicator of environmental noise which correlates well with the effects of noise of people is the equivalent sound level (Leq). The Leq is the dBA level of a constant sound having the same sound energy as all the fluctuating levels which are measured over a given period of time. The magnitude of typical noises are shown in Table 1.

Table 1
Weighted Sound Levels and Human Response

Sound Source	dBA	Human Response
Aircraft carrier operation	140	
Jet takeoff (200 feet away)	120	Painfully loud
Riveting Machine	110	Maximum vocal effort
Shout (0.5 feet away)	100	
Heavy truck (50 feet away)	90	
Busy Street	80	Hearing damage with continuous exposure
Freeway traffic (50 feet away)	70	Telephone use difficult
Air conditioning unit (20 feet away)	60	
Light auto traffic	50	Quiet
Bedroom, Library	40	
Soft whisper	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Threshold of hearing

Source: U.S. Council on Environmental Quality (1970)

Noise levels are affected by distance and physical buffers. Noise levels decrease as the distance from the source increases. As the distance from a noise source doubles, the noise levels will

Noise levels are affected by distance and physical buffers. Noise levels decrease as the distance from the source increases. As the distance from a noise source doubles, the noise levels will decrease by 6 dBA over hard smooth surfaces and decrease by even more over soft ground such as grasslands or vegetation. Dense trees can reduce noise levels if their trunks and branches completely block the view between source and receptor. A dense and deep buffer of evergreen vegetation can reduce noise by up to 2 dBA for every 100-foot wide forested buffer.

2.1 NOISE REGULATIONS

The Washington State Department of Ecology (DOE) has developed maximum permissible noise levels termed Environmental Designation for Noise Abatement (EDNA) which vary depending upon the land uses of the noise source and the receiving property. EDNA has three categories for receivers: the "A" category covers residential uses, the "B" category covers commercial uses, and the "C" category are industrial uses. Table 2 shows the maximum permissible sound levels for each EDNA category.

Table 2
Maximum Permissible Sound Levels in dBA (EDNA)

Land Use of Source:	Land Use of Receiving Property			
	Residential (A)[1]		Commercial (B)	Industrial (C)
	Day	Night		
Residential (A)	55	45	57	60
Commercial (B)	57	47	60	65
Industrial (C)	60	50	65	70

Note: [1]Between the hours of 10 pm and 7 am on weekdays and 10 pm and 9 am during weekends, the maximum limits for residential receivers is to be reduced by 10 dBA. For noises of short duration these limits can be exceeded by a maximum of 5 dBA for 15 minutes/hour, 10 dBA for 5 minutes/hour, or 15 dBA for 1.5 minutes/hour.

The City has adopted DOE regulations (Chapter 70.107 RCW, Chapters 173-58,173-60 & 173-62 WAC) as its basis for noise control, and has added Section 6.16. "Noise Control" to its Municipal Code (PMC)to address issues unique to the City. Section 6.16.060 PMC exempts certain industrial noise sources which have been in operation over the three (3) previous years. However, due to the replacement of the cooling towers in Building B, the expansion of the wastewater treatment facility, and other changes to the existing facility that may generate additional noise, the provision is not applicable.

Motor vehicle traffic traveling on public roads is exempt from noise regulation, but Pierce County and DOE have motor vehicle performance standards setting forth the maximum noise level from individual vehicles (and not applicable to general traffic noise) measured under specific testing criteria. The City prohibits the operation of vehicles with faulty mufflers or driving in such a manner as to cause screeching or squealing tires.

It is assumed for the purposes of this study that the zoning currently in place in the properties adjoining the MASCA property will be applicable in 1997, when Building D is in operation. The EDNA which will apply at the boundaries of the MASCA expansion project varies according to the zoning classification of these adjacent properties, as shown on Figure 4. Table 3 summarizes the EDNA permissible sound levels for these zoning classifications.

Table 3
Zoning and EDNA of Adjacent Properties

Boundary to the:	Zoning Category	EDNA	
		Day (dBA)	Night (dBA)
North	"ML" Light Manufacturing	70	70
West	"RM-20" High Density Residential	60	50
Southwest	"CL" Limited Commercial	65	65
South	"ML" Light Manufacturing	65	65
East	"ML" Light Manufacturing	65	65

2.2 NOISE MODELS

A Larson-Davis model 812 integrating Type 1 sound level meter was used to measure existing noise levels. Efforts were made to obtain readings on noise produced *solely* by the existing facility. The measurements were taken during the mid-morning to early afternoon period when background traffic noises were low.

The sound level meter was paused to avoid the measurement of aircraft noise, which is a significant portion of the background noise due to the project's proximity to McCord Air Force Base. Measurements were made under as dry and windless conditions as possible. The calibration of the meter was checked before and after each reading.

RESIDENTIAL CATEGORIES

RS-04	URBAN DENSITY SINGLE-FAMILY RESIDENTIAL (4,000 square feet minimum lots)
RS-06	URBAN DENSITY SINGLE-FAMILY RESIDENTIAL (6,000 square feet minimum lots)
RS-08	MEDIUM URBAN DENSITY SINGLE-FAMILY RESIDENTIAL (8,000 square feet minimum lots)
RS-10	LOW URBAN DENSITY SINGLE-FAMILY RESIDENTIAL (10,000 square feet minimum lots)
RS-35	VERY LOW DENSITY SINGLE-FAMILY RESIDENTIAL (35,000 square feet minimum lots)
RM-10	MEDIUM DENSITY MULTIPLE-FAMILY RESIDENTIAL (10 units/acre maximum)
RM-20	HIGH DENSITY MULTIPLE-FAMILY RESIDENTIAL (20 units/acre maximum)
PRD	PLANNED RESIDENTIAL DEVELOPMENT
PCD	PLANNED COMMUNITY DEVELOPMENT

COMMERCIAL CATEGORIES

CG	GENERAL COMMERCIAL (Retail & other commercial uses which rely upon the auto as their principal source of access)
CL	LIMITED COMMERCIAL (Professional office & limited retail uses in a well-designed & landscaped setting)
CBD	CENTRAL BUSINESS DISTRICT (commercial services that preserve & enhance pedestrian scale and the downtown character)

MANUFACTURING CATEGORIES

MP	BUSINESS PARK (intended to provide for modern industrial, research & business park uses)
ML	LIMITED MANUFACTURING (intended to primarily provide light industrial uses as well as limited retail uses that are complementary to neighboring commercial & residential districts)

OTHER CATEGORIES

MEDICAL OVERLAY	MEDICAL FACILITIES OVERLAY
FAIR	FAIRGROUND ZONE
OP	PROFESSIONAL OFFICE ZONE

DOWNTOWN OVERLAY CATEGORIES

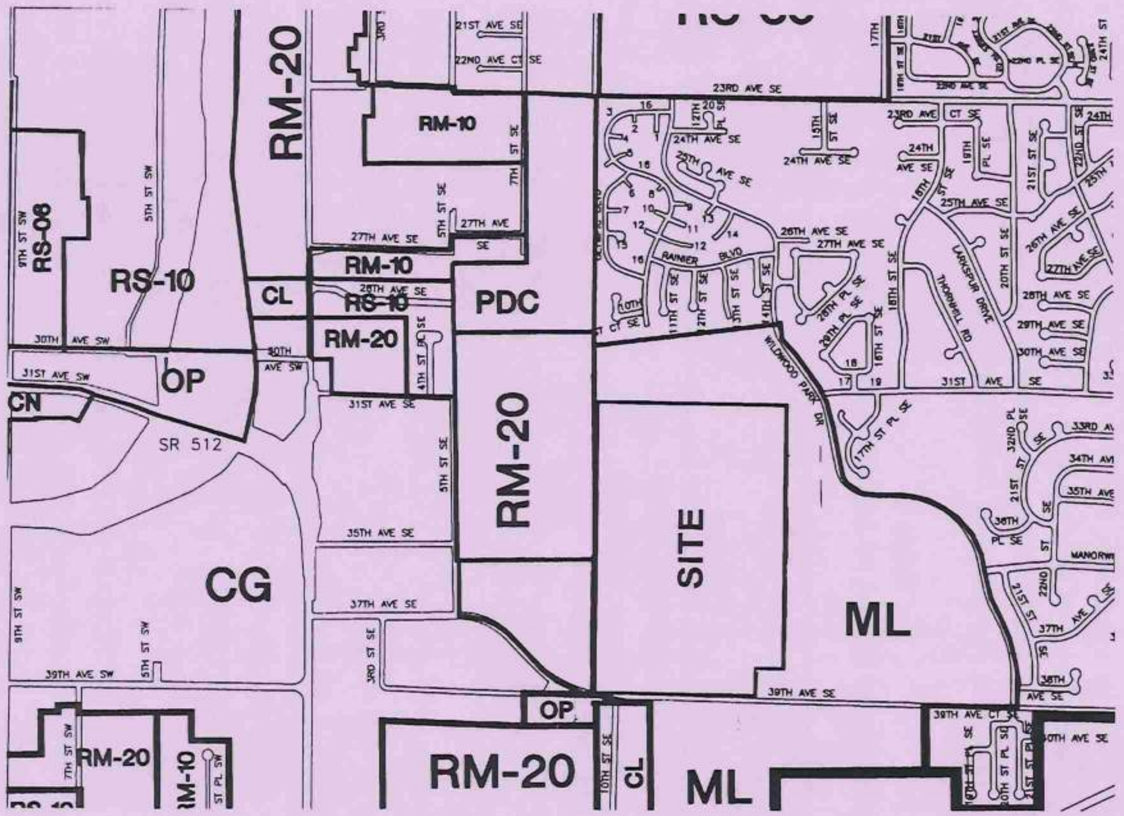
(The intent of the Downtown Overlay Categories is to reinforce the complimentary mix of uses & character in those zones which surround the overall downtown area)

CG-DTN	GENERAL COMMERCIAL DOWNTOWN OVERLAY
CL-DTN	LIMITED COMMERCIAL DOWNTOWN OVERLAY
ML-DTN	LIMITED MANUFACTURING DOWNTOWN OVERLAY
RM-20-DTN	HIGH DENSITY MULTIPLE FAMILY RESIDENTIAL DOWNTOWN OVERLAY

FAIR PARKING OVERLAY CATEGORIES

(The intent of the Fair Parking Overlay Category is to allow certain events which can only be staged in large open areas while ensuring minimal disruption to existing residential & commercial uses.)

RS-08-FPO	SINGLE FAMILY RESIDENTIAL FAIR PARKING OVERLAY
RM-20-FPO	MULTIPLE FAMILY RESIDENTIAL FAIR PARKING OVERLAY



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MASCA

DAVID EVANS AND ASSOCIATES, INC.

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Figure 4:
Zoning Map
ENVIRONMENTAL HEALTH-NOISE

3.0 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

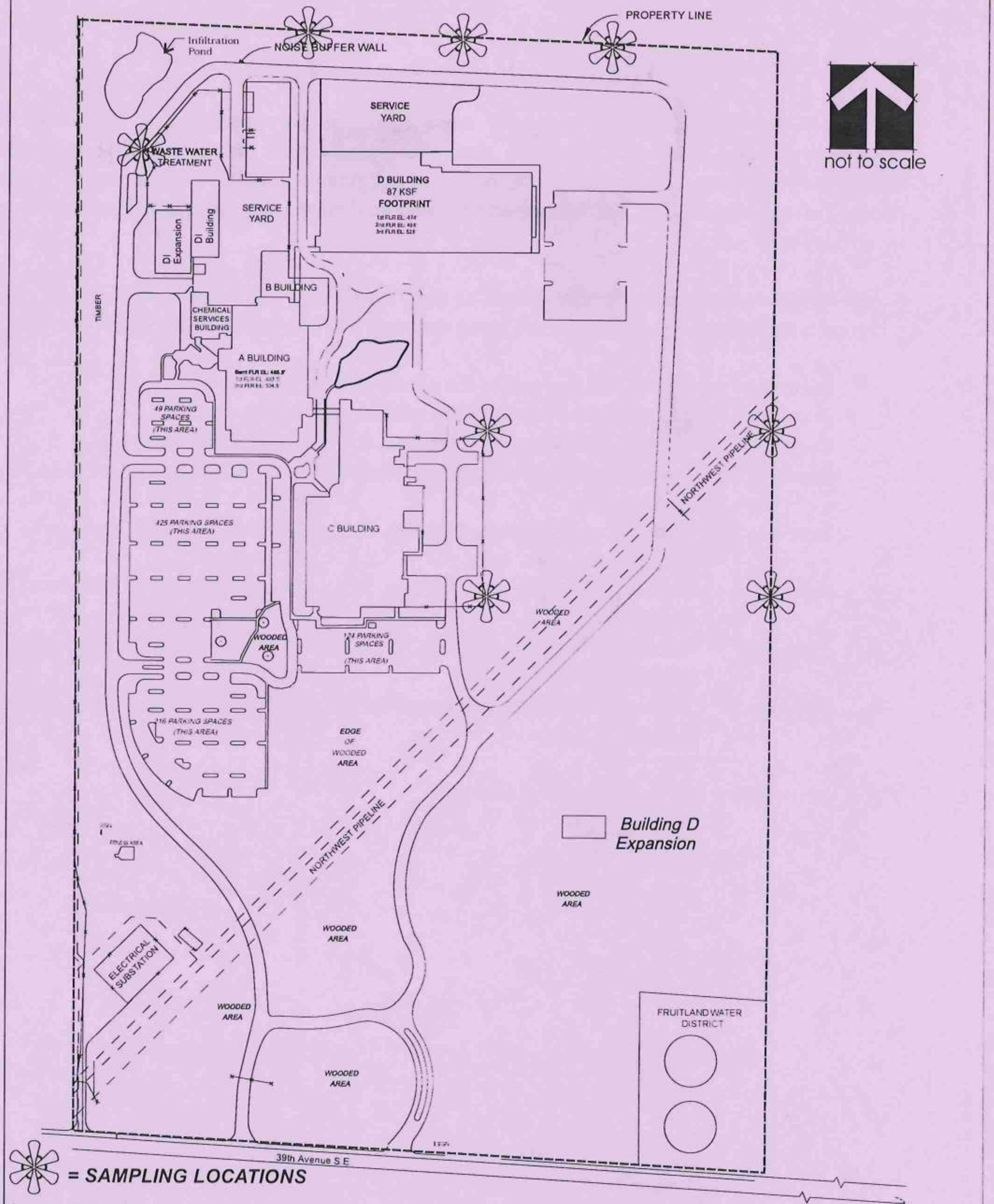
3.1 EXISTING NOISE LEVELS

Current MASCA operations affects local noise levels by the operation of noise-emitting equipment and the number of employee passenger vehicles and supply trucks entering and exiting the project site. The predominant sources of equipment noise are the acid scrubber fans, pumps, solvent exhaust fans, condensers, and the fans and pumps associated with the wastewater treatment plant.

Sound levels were measured at 8 locations, as described below and located on Figure 5. The receivers with the highest noise levels are along the north ML and west RM 20 property lines.

Receiver 1	Located 50 feet east of the existing acid scrubbers.
Receiver 2	Located 50 feet north of the existing acid scrubbers.
Receiver 3	Located on the east property line, due east of the acid scrubbers.
Receiver 4	Located where the Northwest Natural Gas pipeline crosses the MASCA property line.
Receiver 5	Located at the north property line, approximately 500 feet north of Building B.
Receiver 6	Located at the north property line, approximately 900 feet north of Building C.
Receiver 7	Located at the north property line, approximately 1,000 feet northeast of Building C.
Receiver 8	Located on the west property line due west of the storm water detention pond.

Table 4 contains the results of the sound meter test.



Source: *Environalysis*

Figure 5:
Noise Receptors
ENVIRONMENTAL HEALTH - NOISE

Table 4
Measured Noise Levels 1995 (in dBA)

Intersection	Minimum (dBA)	Maximum (dBA)	Leq (dBA)
Receiver 1	71.8	73.1	72.5
Receiver 2	78.9	81.1	79.3
Receiver 3	41.9	50.2	45.2
Receiver 4	44.1	49.6	45.5
Receiver 5	45.0	48.0	45.7
Receiver 6	41.2	45.5	42.5
Receiver 7	40.6	50.7	41.9
Receiver 8	48.7	57.7	51.0

3.2 IMPACTS OF PROJECT GENERATED NOISE

Predictions of sound levels for the year 1997 with the project, were calculated from information on the mechanical equipment to be installed for the Building D project. The noise data for this equipment is summarized in Table 5.

Table 5
Building D Noise Sources Sound Pressure Levels in dBA 50 feet from Source

Equipment	dBA at 50 feet at Full Speed
Process Water Cooling Towers -- 2 units @ with 4 fan motors	54 each, with noise attenuation option
Sputter Chilled Water Cooling Tower -- 1 unit with 2 fan motors	52 each, with noise attenuation option
Secondary Chilled Water Towers -- 2 units @ with 4 fan motors	54 each, with noise attenuation option
Acid Scrubbers (5) each with a 125 hp fan	50 each
Solvent Exhaust Fans (2)	50 each
Diesel generators (3) -- Exempt from City of Puyallup Noise Ordinance	
Replacement cooling towers (6) at Building B	69 each
Old cooling towers (3) at Building B	62 each

Sources: Lockwood Grenne.

A number of methods, both manual and computerized, exist to estimate noise levels at various distances from new planned noise sources. One (1) of the more comprehensive methods involves the use of the Environmental Noise Model (ENM). The ENM requires data on individual building dimensions and height, the frequency distribution of the noise sources, the topography of the site and meteorological data as it affects noise propagation. This model was used by Colin Gordon & Associates in their recent noise work for MASCA (1996). Instead of duplicating this modeling effort, the assumptions and results of the ENM work were reviewed and compared to manual calculations. Three of the sampling locations and calculation points used in this analysis are identical to those used in the Gordon and Associates work. Table 6 compares the two (2) sets of analyses and demonstrates a close agreement in results.

Table 6
1997 Noise Levels (in dBA)

Intersection	Modeled Leq	Calculated Leq
Receiver 5	44	44
Receiver 6	46	48
Receiver 8	37	38

Sources: Colin Gordon Associates, February 1996

Notes: Both columns represent project impacts of Building D and do not include existing background or new cooling towers at Building B.

In addition to the new equipment associated with Building D, this project will also replace the three (3) existing cooling towers adjacent to Building B with six (6) new ones. The new cooling towers will be approximately 10 dBA louder than those in place now. Table 7 presents the calculated maximum Leq noise levels for the receptors where on-site measurements were taken.

Table 7
Calculated Noise Levels 1997 (in dBA)

Intersection	1997 Existing[1]	1997 Building D Only	Building B New Cooling Towers	Total Impacts Background
Receiver 1[2]	73	73	80	na
Receiver 2[2]	79	79	80	na
Receiver 3	45	8	49	50
Receiver 4	46	21	50	51
Receiver 5	46	44	30	48
Receiver 6	43	47	47	51
Receiver 7	42	42	46	48
Receiver 8	48[3]	38	40	48

Notes: [1]The sound level in 1997 before Building D is in operation is assumed to be the same as was measured in 1995.
[2] These receivers are located within the MASCA property lines.
[3]Traffic noise from 39th Avenue and the South Hill Mall area was clearly audible and contributes 3 to 6 dBA at this location. To be conservative, 3 dBA was deducted from the measurement to yield the net noise levels coming from the MASCA facility.

As can be seen from Table 7, the proposed MASCA expansion does not cause any receivers to exceed the EDNA levels for any zoning categories, including the nighttime levels.

An acoustic wall is included in the proposed Building D expansion. Due to uncertainty as to the location and size of this wall, the probable noise reductions are not reflected in Table 7.

However, depending upon wall height and location relative to the noise source, a wall can reduce noise impacts by five (5) to 15 dBA.

Sound radiates out from a source in the shape of a sphere and its intensity diminishes by the inverse square of the distance between source and receiver (i.e. as the distance from the source doubles the intensity is one-fourth of that at the source). A barrier wall increases the effective distance between source and receiver thus reducing the received noise levels.

3.3 IMPACTS ASSOCIATED WITH CONSTRUCTION

During the construction phase the use of heavy machinery will cause noise levels to increase. Specific noise levels will vary with the type of activity and equipment used. For construction of the MASCA expansion project, the use of bulldozers to clear and grade the site will be the noisiest tasks. It is expected that the use of heavy equipment could produce noise levels ranging from 75 to 95 dBA at a distance of 50 feet. Table 8 summarizes the noise levels from typical construction equipment.

Table 8
Construction Equipment Noise Levels

Equipment	Typical Sound Level (dBA) (measured at a distance of 50 feet)
Paver	89
Dump truck	88
Jackhammer	88
Scraper	88
Bulldozer	87
Concrete mixer	85
Air compressors	81

Source: Alfredson & May, 1978.

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4.0 SUMMARY

Construction work should be avoided between the nighttime hours of 10 PM and 7 AM as per City of Puyallup and DOE regulations.

The proposed Building D expansion will have no significant noise impacts during full plant operations. No receivers were projected to exceed EDNA levels applicable for current land use zoning categories of the adjacent properties, thus no mitigation of noise impacts is required.

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5.0 REFERENCES

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Supplemental Environmental Impact Statement

Utilities -- Sanitary Sewer Technical Appendix

MASCA Puyallup Plant
Building D Expansion
(*Puyallup Science Park*)

Prepared for:

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August 28, 1996

LIST OF ACRONYMS

Acronym	Definition
AW	Acid Wastewater
BOD5	5-Day Biochemical Oxygen Demand
Ca	Calcium
CaCl	Calcium Chloride
City	The City of Puyallup
Cl	Chlorine
COD	Chemical Oxygen Demand
DI	Deionization
DIMBR	Deionization Mixed Bed Regenerant
DOE	Washington Department of Ecology
DS	Determination of Significance
Fl	Fluoride
F/P/A	fluorides, phosphates and ammonia
H_2O_2	Hydrogen Peroxide
H_2SO_4	Sulfuric Acid
HaOH	Sodium Hydroxide
Hg	Mercury
HNO_3	Nitric Acid
MASCA	Matsushita Semiconductor Corporation of America
MGD	million gallons per day
Na	Sodium
NH_3-N	Ammonia-nitrogen
NO_3-N	Nitrate-nitrogen
NPDES	National Pollutant Discharge Elimination System
pH	acid/alkaline balance
PO_4-P	Phosphate-phosphorus
POTW	City of Puyallup Publicly Owned Treatment Works
RO	Reverse Osmosis Process
S/O	Solvent Organic
TDS	Total Dissolved Solids
TI/RE	Toxicity Identification/Reduction Evaluation
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRCl	Total Residual Chlorine
TSS	Total Suspended Solids
TTO	Total Toxic Organics
WET	Whole Effluent Toxicity
WLA	Waste Load Allocation
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

This technical appendix addresses the potential impact of increased process and domestic wastewater flows on the surrounding environment caused by construction of Building D at the Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant.

MASCA has three National Pollutant Discharge Elimination System (NPDES) permitted discharge locations for storm, domestic, and industrial wastewater streams.

- **Outfall #001** is for process wastewater discharge, which is treated on-site then drains through a five-mile long tightline conveyance pipe to the Puyallup River. It discharges in a combined outfall with treated effluent from the City of Puyallup's Publicly Owned Treatment Works (POTW). The outfall and tightline are owned by the City.

- **Outfall #002** is a combined process wastewater and sanitary sewer discharge with on-site pre-treatment for the process wastewater. This discharge flows through the Public Sanitary Sewer System to the POTW where it is treated prior to discharge into the Puyallup River.

- **Outfall #003** is a stormwater infiltration pond which receives stormwater and process wastewater from a periodic backflush of the on-site water treatment facility. This process water is discharged into the on-site stormwater infiltration pond, which discharges to ground and surface waters.

MASCA has already constructed a portion of the expansion to their on-site wastewater treatment plant. The on-site improvements are designed to accommodate the proposed site expansion. The Washington Department of Ecology (DOE) has approved the final engineering report, along with plans and specifications for the wastewater treatment plan expansion. The City building official has issued building permits for tank construction and plumbing for processing pumps.

There is a potential for impact to the surrounding environment if treatment systems at the MASCA facility fail to remove regulated pollutants. The on-going upgrade to the on-site treatment plant capacity should continue to ensure that the proposed flows from the expanded facility meet the discharge regulation requirements.

There is a potential for impact to the surrounding environment because increased flow rates could overload the existing system and decrease the amount of time MASCA would have to respond to and correct problems at the plant. A new upset tank belonging to MASCA will need to be constructed at the downstream end of the tightline to ensure adequate response time is provided to handle problems on-site and in the tightline. A second tightline down to the POTW will be constructed as part of this project so that the existing tightline can be taken off-line periodically for maintenance.

The increase in process water flow rates and associated concentrations of pollutants discharging through outfalls #001 and #002, may place the POTW outside of the allowable discharge for toxic organic compounds. MASCA needs to complete on-going toxic identification evaluation, and remove the problem toxic from the wastewater. In addition, MASCA will be required to revise the process water treatment systems and the NPDES permits so that all process water discharge from the site is through Outfall #001.

The increase in flow rates for Outfall #001 may also increase the impact on the POTW, due to the methods by which problem flows in the tightline outfall are now handled. Wastewater from the upset tank will be batch treated or re-processed. This re-processed water may then be discharged into the Puyallup River. The practice of treating upset tank flows at the POTW will be discontinued.

An increase in project flows discharged into the detention pond may cause the pond to overload and result in a spill of process wastewater into the surrounding surface waters via the overflow of the infiltration pond. MASCA will pretreat Outfall #003 flows as necessary and discharge these flows through Outfall #001.

The increase in pollutant concentrations and flow rates due to the proposed Building D expansion combined with past problems with the treatment facility and tightline, required MASCA to give the City an increased level of awareness and control over flows through the tightline. MASCA will prepare a written set of procedures for shutting down the process water discharge in the tightline. The City will be give the procedure and authorization to initiate shutdown during upset conditions.

The City will hire a neutral third party to test MASCA's discharges to ensure compliance with the NPDES permit. Funds to pay for the testing, evaluation, and documentation will be provided by MASCA. Copies of the results and necessary documentation will be submitted to both DOE and the City.

The Concomitant Agreement between MASCA and the City will need to be revised prior to the operation of Building D to address operational changes of the wastewater treatment plant and the tightline.

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1.0 INTRODUCTION

The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitant zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

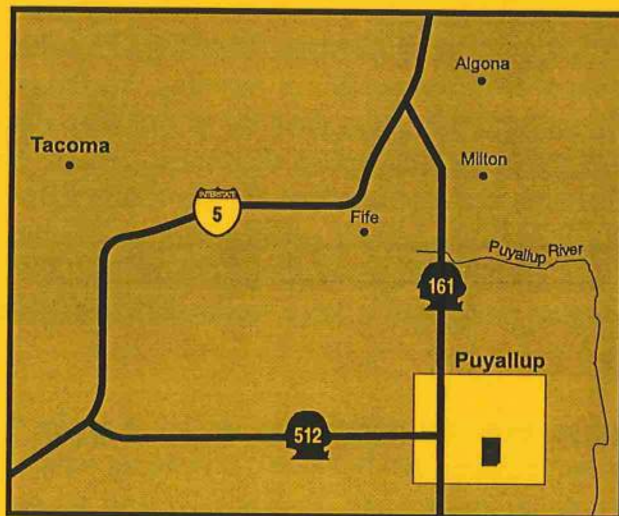
Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

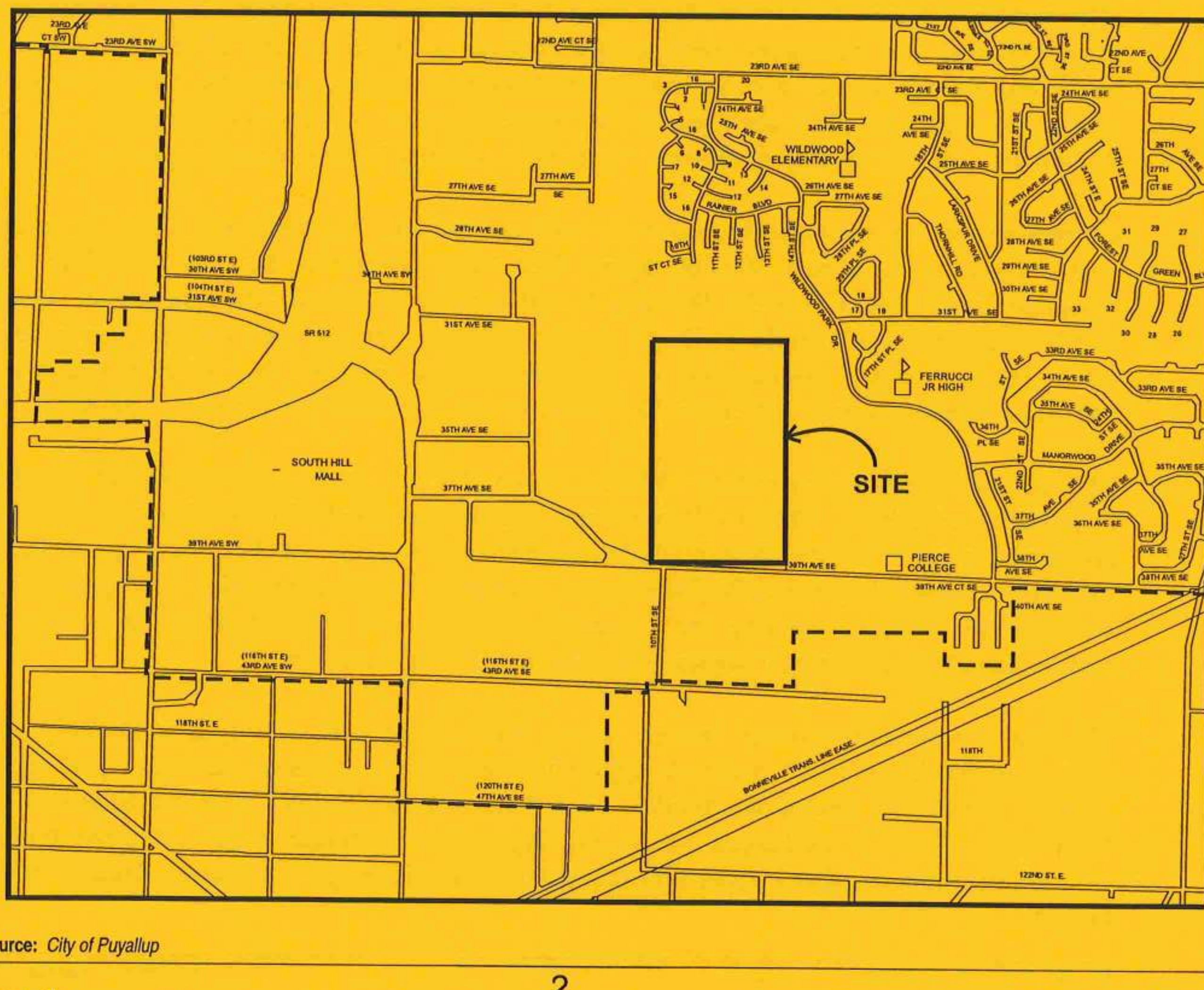
The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.

The site is served by gravity sewers, which drain to the City of Puyallup Publicly Owned Treatment Works (POTW), and by a tightline system which drains to the Puyallup River. The tightline discharges treated wastewater which bypasses the POTW. Periodic backwash water from carbon filters is discharged into an existing on-site infiltration pond. All three discharges are permitted and regulated under a National Pollutant Discharge Elimination System (NPDES) permit.

Plant Building D Expansion
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA





Source: *City of Puyallup*

Figure 1:
Vicinity Map
UTILITIES - SANITARY SEWER

DAVID EVANS AND ASSOCIATES, INC.

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA

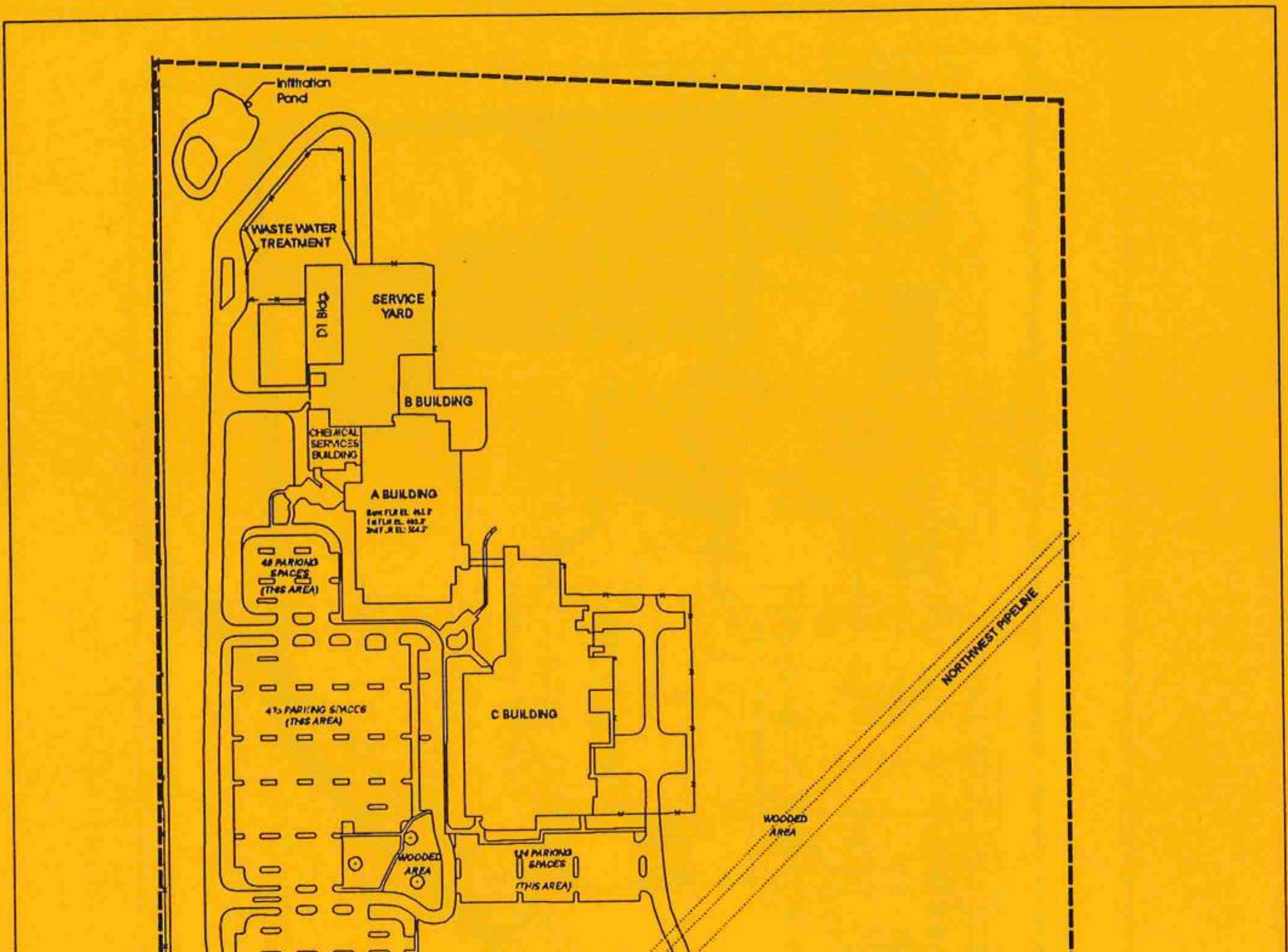


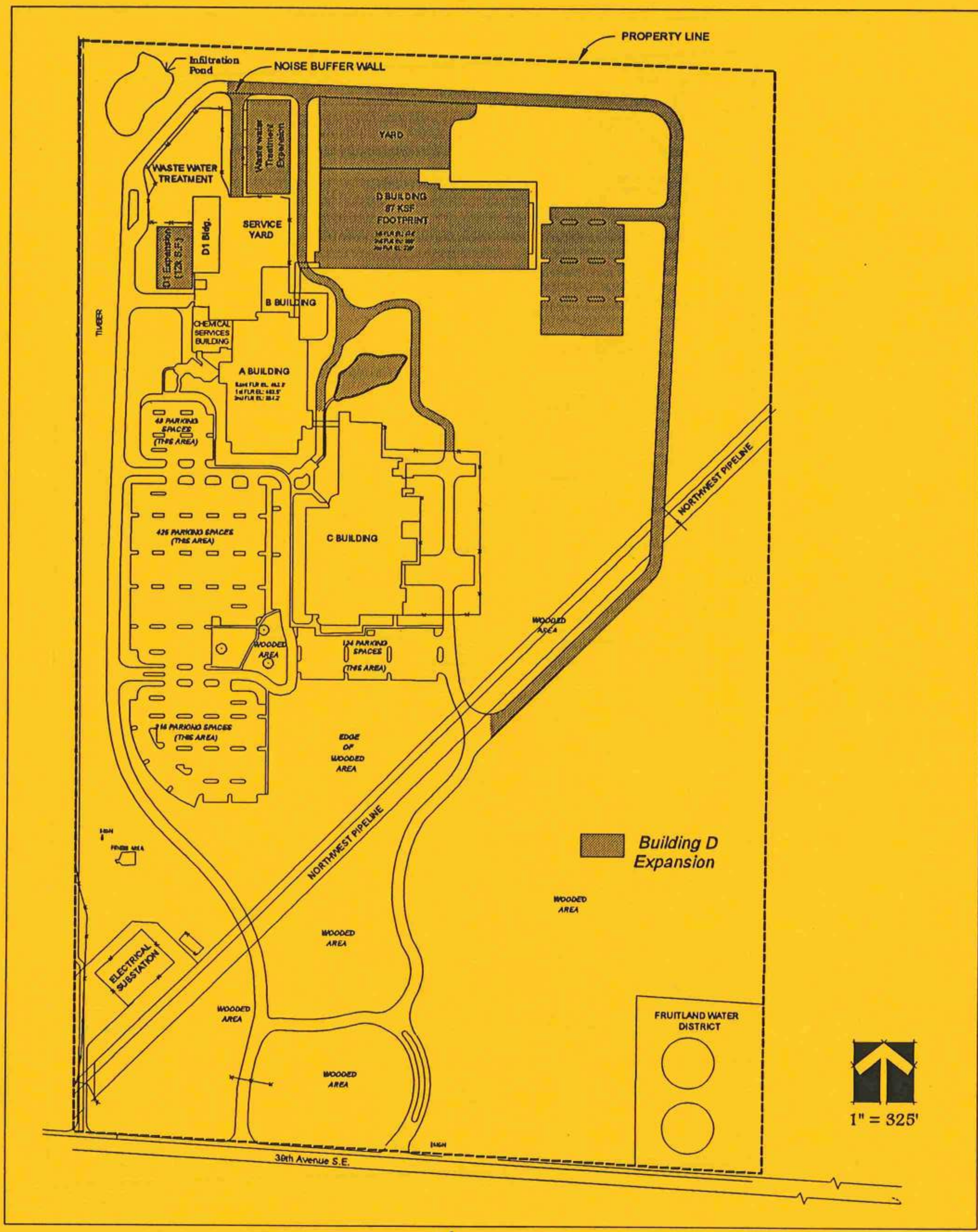
Figure 2:
Existing Site Plan
UTILITIES - SANITARY SEWER

DAVID EVANS AND ASSOCIATES, INC.

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA



DAVID EVANS AND ASSOCIATES, INC.

Figure 3:
Proposed Expansion Site Plan
UTILITIES - SANITARY SEWER

The 1981 EIS projected various sanitary sewer facility improvements to be constructed over the course of the subsequent decade. These included potential upgrades to the POTW, on-site water re-use, or pretreatment on-site and discharge directly into the Puyallup River. The City, DOE, and Fairchild agreed that more than 90 percent of the plant's wastewater would be treated on-site and conveyed via a tightline to the Puyallup River. The remaining wastewater would be discharged to the City's POTW.

The City of Puyallup issued a Determination of Significance (DS) on December 2, 1995. The DS identified that the proposed expansion may have a significant effect on the existing sanitary sewer system. As a result, the scope for this analysis was identified as the following:

> *"The specifics of the existing sanitary sewer system and industrial waste stream for the plant (e.g. on-site treatment, quality and quantity of process water, tightline conveyance to river, new outfalls, use of clarifier at treatment plant) was established after the 1980 EIS; that document's coverage of this issue was conceptual in nature. The 1995 project is expected to result in an additional quantity of sewage beyond that cited in the 1980 EIS, as well as potential major changes in the quality of effluent (e.g. potential solvents and other materials within the wastestream). Assessment of quantity/quality of expected effluent of this the existing/proposed treatment and conveyance. system, including any resultant mitigation measures, shall be included in the SEIS."*

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2.0 METHODS

2.1 LITERATURE REVIEW

The literature review included all the documents mentioned in Section 6. References. The use of existing documents has been very liberal and much of the information presented in this technical appendix is drawn from those documents, even when direct references are not cited.

2.2 DATA COLLECTION

Site maps and chemical data related to the applicable NPDES outfalls from the facility and copies of the NPDES permits were reviewed, as well as monthly records of operation of the POTW and reports of three bioassay tests conducted in February, May, and September of 1995, on the City of Puyallup treatment plant effluent. Phone conversations with John Wilson of Gray & Osborne, and Randy Marshall of the Washington Department of Ecology (DOE) and others were also data sources.

A current source of data that identified all the potential regulated pollutants in the process water discharges from MASCA did not exist. The City asked David Evans and Associates, Inc. (DEA) to perform additional sampling to alleviate this data gap. DEA collected and analyzed samples of process water flows and infiltration pond sediments based on the standard U.S. Environmental Protection Agency (EPA) protocols for sampling and testing for the 129 Priority Pollutants identified in 40 CFR part 423, Appendix A. The samples were taken between March 5 and March 7, 1996. A complete discussion of the pollutants studied, the sampling and testing regime followed, and the individual test results, are contained in Water, Wastewater, and Sediment Sampling Analysis Technical Appendix (DEA, 1996). Data were also used for a Human Health Risk Assessment, which is included in this SEIS.

The 129 priority pollutants are not the only potential pollutants that could discharge from MASCA. There are thousands of natural and manmade compounds that could discharge from any project. The costs of screening for all of these potential constituents is extremely prohibitive. This is why the EPA has identified the list of priority pollutants. By testing water discharges for constituents on that list, it is possible to detect the pollutants that have the worst impact on the environment. Sediment sampling of the detention pond is a good way to identify periodic pollution problems that may happen once in a while, but do not happen during the actual sampling test. This type of test is not available for the other discharge locations. In addition, Whole Effluent Toxicity (WET) testing analyzes the effect of effluent on the environment. WET testing provides a safety net for those compounds not found on the priority pollutant list.

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3.0 DESCRIPTION OF EXISTING CONDITION

3.1 INITIAL SITE CONSTRUCTION

The 1981 EIS spoke in very general terms about both flow rates and treatment of the flows to be generated by the wafer production facility that exists today on the MASCA site.

When this facility initially started to produce wafers, the process method tied wastewater flow rates to wafer production. Any changes in the processes of fabrication and assembly would therefore have an unquantifiable effect on the wastewater flow rate. This is pointed out with respect to the change in the wafer etching process from plasma to acid etching which took place several years ago. This change increased the concentration of ammonia in the wastewater. The existing wastewater treatment plant operations were not capable of dealing with this additional ammonia and the discharge flow concentrations began to exceed the allowable release levels.

In order to bring the ammonia releases back into the allowable ranges, changes in the ammonia removal process were instituted. They involved fine tuning the existing system and replacing the ammonia removal system with a newer and larger system. This had the desired effect, but increased the operational costs of ammonia treatment.

3.2 HISTORY AND EVOLUTION OF SANITARY SEWER SYSTEM

In May, 1981, the City of Puyallup and then-predecessors of MASCA, (Fairchild) entered into the City of Puyallup - Fairchild Concomitant Agreement. This agreement noted that both the existing City of Puyallup treatment plant and conveyance systems were not designed to take the kind of wastewater flows that the site would discharge. To mitigate this, the agreement included the following:

- Fairchild would build an on-site wastewater treatment system.
- The City of Puyallup would construct a sewer discharge tightline capable of a 1.6 million gallons per day (MGD) flow rate, for the Fairchild flows.
- The City of Puyallup would provide all monitoring equipment along with operation of the clarifier tank, as necessary, to discharge flows to the Puyallup River.

As a treatment method for tightline flows that are diverted into the clarifier, operators at the POTW drain overflows from the clarifier tank by bleeding the volume into the POTW treatment system. MASCA is charged for this on a basis of a meter between the clarifier tank and the POTW treatment system. This method of treatment has come into practice over time and has resulted in some problems. This treatment method was not made available to MASCA in any written documentation that was able to be reviewed.

3.3 EXISTING ON-SITE SEWER SYSTEM

The system within the production buildings generates five (5) separate wastewater streams flowing from separate types of process water usage points. The five wastewater streams are summarized below:

The largest stream of flow is an acidic stream produced from the spent process acid rinse system. These acid wastes are piped to MASCA's on-site wastewater treatment facility together with other acid wastes from the site with the exception of fluorides, phosphates, and ammonia (F/P/A). The reported primary constituents of the acid wastewater include: Sulfuric Acid (H_2SO_4), Sodium hydroxide (NaOH), Nitric Acid (HNO_3), and Acetone (CH_3COCH_3). This line is drained from the process water pickup point to the on-site wastewater treatment facility. This wastewater stream leaves the site after treatment via the tightline and discharges through Outfall #001 into the Puyallup River.

The second wastewater stream consists of F/P/A from process wastewater drains and discharge from specially identified sinks/process tools. It also consists of blow down from acid and fluoride fume scrubbers and cleaning solution from the Reverse Osmosis membranes (RO) and de-ionization (DI) mix bed regeneration wastewater. The RO flush wastewater is generated once every five (5) days. Each cycle generates a continuous wastewater stream of approximately 160 gallons per minute for eight hours. A de-ionizing system mixed regenerate is generated periodically on five (5)- to 10-day cycle. The wastewater first is treated by removing F/P/A and then combined with an acidic waste stream for neutralization. This wastewater stream discharges via the tightline through Outfall #001 into the Puyallup River. A part of the existing treatment process produces solid and concentrated liquid wastes from the F/P/A wastewater stream as well as solids collected in the sumps of other wastewater streams. These constituents in their concentrated form are disposed of via off-site facilities.

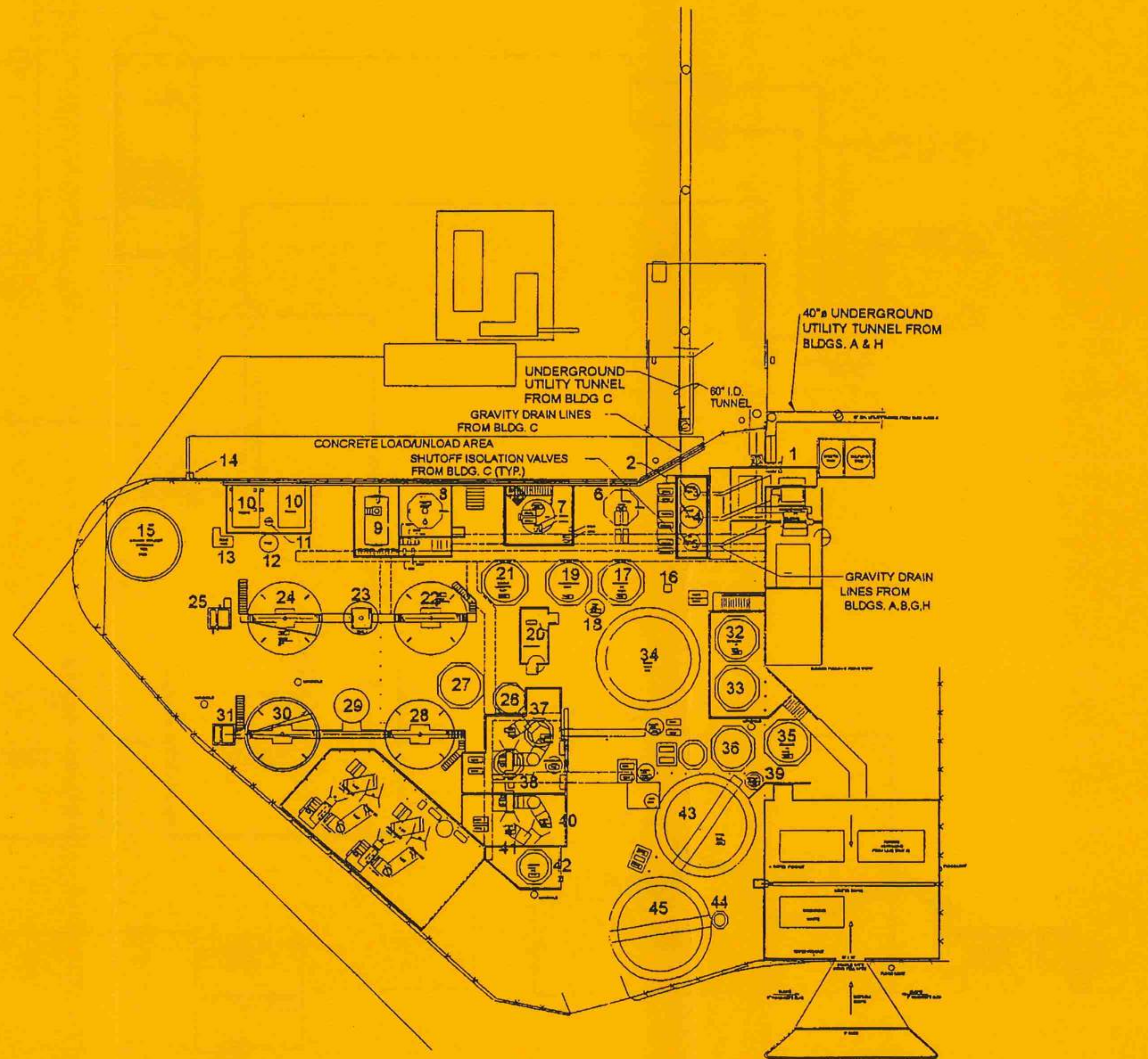
The third stream is a solvent organic waste stream composed of rinse waters contaminated with less than one (1) percent organic solvents from the manufacturing process. This stream is drained separately down to the on-site wastewater treatment plant, is treated by active carbon and pH neutralization, then discharged as Outfall #002 into the POTW for additional treatment.

The fourth wastewater stream collected separately on-site is the sand, carbon and de-ionized filters backwash waters from the water purification system. The backwash rinses solids from the filters. The backwash does not contain any chemicals, only solids that were filtered from the water to make it pure. This water is drained in separate lines and discharged into the infiltration/detention pond (Outfall #003).

A fifth stream consists of the domestic wastewater from standard toilet facilities, a laundry room, and other on-site areas. These wastewater streams flow to the sanitary collection lines on-site. The stream joins the process discharge from the organic solvent

LEGEND

(1) TUNNEL DRAIN VALVE TO STORM SEWER
(2) CATCH BASIN
(3) ORGANIC WASTE SUMP, T-601
(4) ACID WASTE SUMP, T-101
(5) FLOURIDE/PHOSPHATE WASTE SUMP: 1,900 GAL., T-401A
(6) CALCUIM CHLORIDE STORAGE-BULK: 10,500 GAL. T-901
(7) LIME HOPPER/SLURRY MIX SYSTEM-BULK: 600 GAL. OPERATING CAP. 750 GAL MAX CAP. T-801
(8) SODIUM HYDROXIDE STORAGE-BULK:7,000 GAL. T-201
(9) SULFURIC ACID STORAGE-BULK:6,000 GAL. T-301
(10) ACTIVATED CARBON BINS: 60 S.F. / 10,000 C.F. (SOLR)
(11) ORGANIC pH CONTROL TANK: 250 GAL. T-605
(12) ORGANIC pH EQUILIZATION TANK: 1,600 GAL. T-605
(13) ORGANIC EFFLUENT WEIR
(14) CATCH BASIN
(15) FUTURE ORGANIC EFFLUENT DIVERSION TANK
(16) CATCH BASIN
(17) PRIMARY LIME REACTION TANK 16,000 GAL. TRAIN #1 T-402
(18) FLOCULATION TANK: 650 GAL. T-407
(19) SECONDARY LIME REACTION TANK: 5,600 GAL. OPERATING CAP. 7,000 GAL. MAX. CAP. T-403A
(20) MCC BUILDING
(21) ROUGH pH CONTROL TANK: 5,600 GAL. OPERATION CAP. 7,000 GAL. MAX. CAP. T-103A
(22) INFLUENT EQUILIZATION TANK: 27,000 GAL. T-105
(23) POLISH pH CONTROL TANK: 2,300 GAL. T-107A
(24) EFFLUENT EQUILIZATION TANK: 27,000 GAL. T-109
(25) ACID EFFLUENT WEIR
(26) BACKUP ROUGH pH CONTROL TANK T-2203
(27) FUTURE ROUGH pH TANK TRAIN #2
(28) FURTURE EFFLUENT EQUALIZATION TANK TRAIN #2 T-2105
(29) FUTURE POLISH pH CONTROL TANK TRAIN #2 T-2107
(30) FUTURE EFFLUENT EQUALIZATION TANK TRAIN #2 T-2109
(31) FUTURE ACID EFFLUENT WEIR TRAIN #2
(32) LIME REACTION TANK TRAIN #2 T-1001
(33) FUTURE LIME REACTION TANK TRAIN #3 T-2001
(34) PRIMARY CLARIFIER 64,000 GAL. TRIAN #1 T-408
(35) LIME REACTION TANK TRAIN #2 T-1002
(36) FUTURE LIME REACTION TANK TRAIN #3 T-2002
(37) ARRP'S STRIPPER TOWER: 50 S.F. AREA/ 425 C.F. PACKING T-703
(38) ARRP'S ABSORBER TOWER 50 S.F. AREA/ 425 C.F. PACKING T-704
(39) FLOCULATION TANK TRAIN #2 T-1003
(40) FUTURE ARRP'S STRIPPER #2 T-706
(41) FUTURE ARRP'S ABSORBER #2 T-707
(42) AMMONUIM SULFATE TANK: 7,000 GAL. T-713
(43) CLARIFIER TRAIN #2 T-1004
(44) FUTURE FLOCULATION TANK TRAIN #3 T-2003
(45) FUTURE CLARIFIER TANK TRAIN #3 T-2004



NOTE: Outfalls to Tightline

Source: Matsushita Semiconductor Corporation of America

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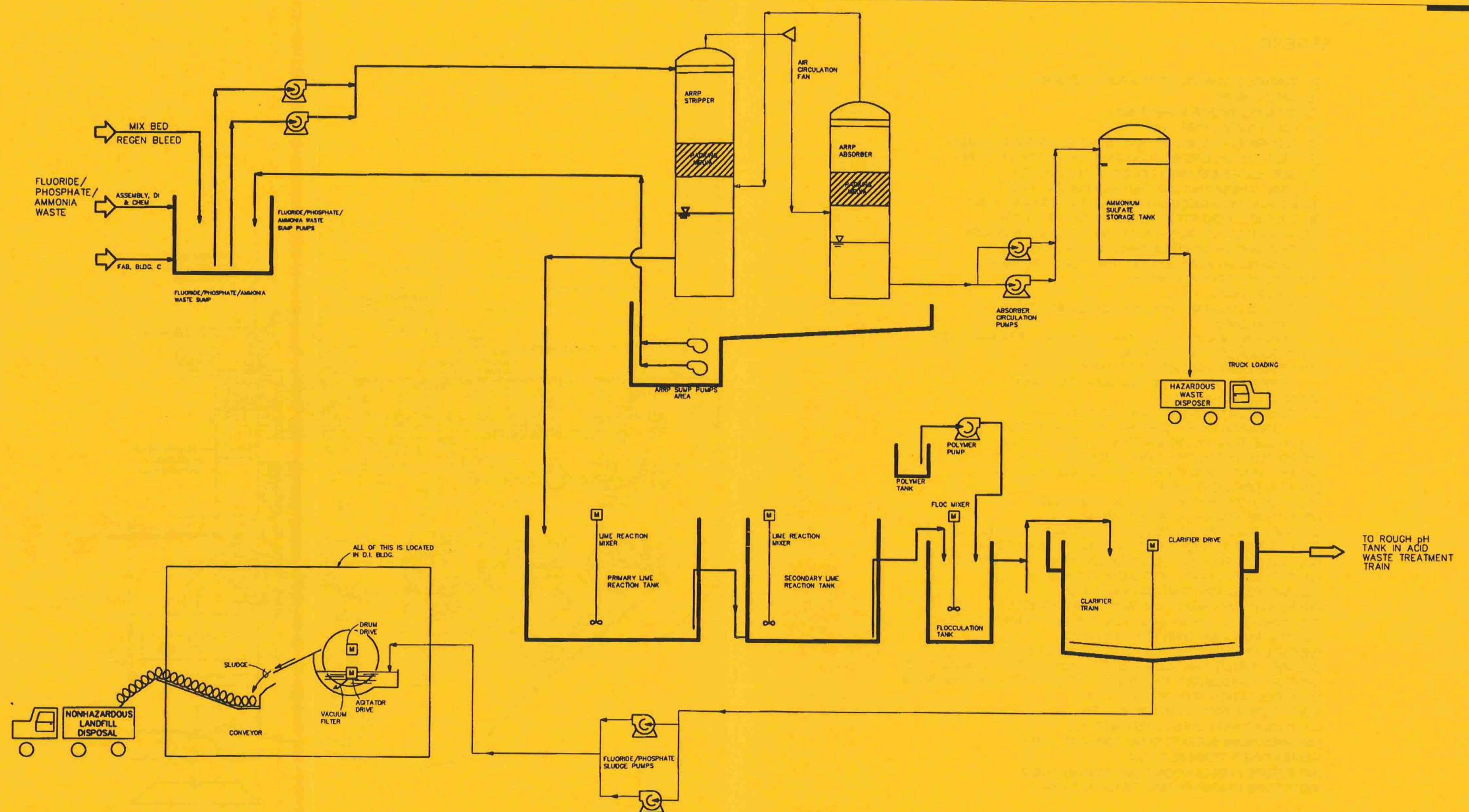
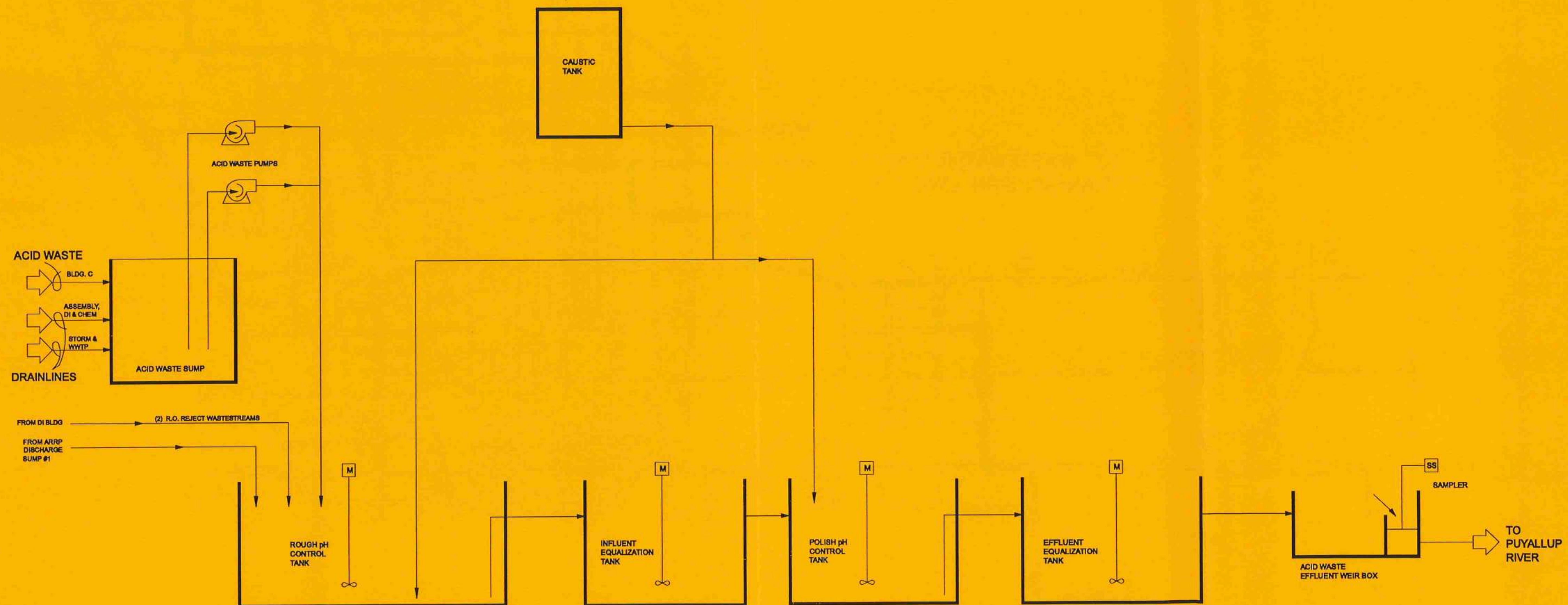
Figure 4:
MASCA Wastewater Treatment Plant (WWTP) Location Map
UTILITIES-SANITARY SEWER



Source: Matsushita Semiconductor Corporation of America

NOTE: Outfalls to Tightline

Figure 5:
Floride/Phosphates/Ammonia Wastewater Treatment Systems
UTILITIES-SANITARY SEWER



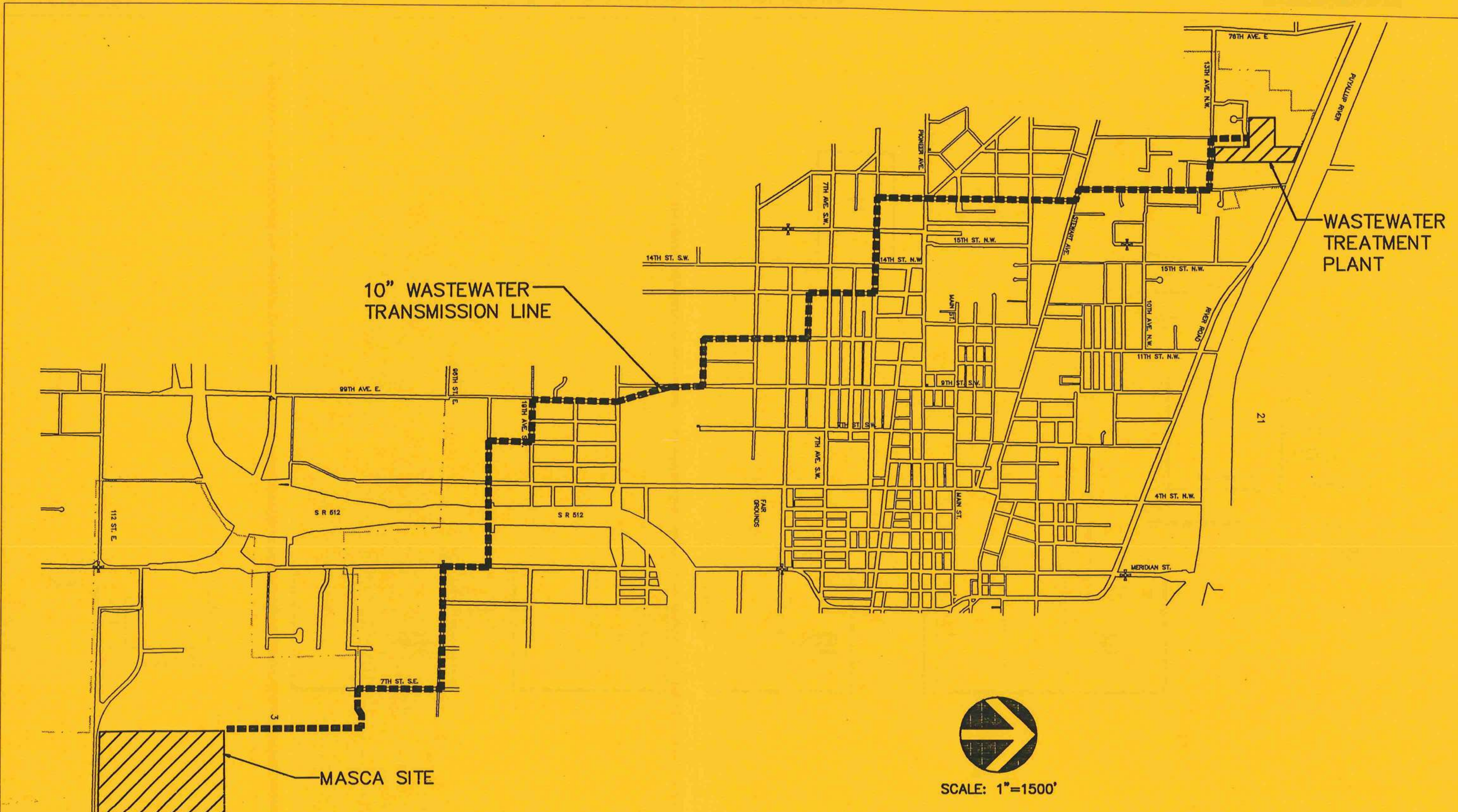
***NOTE*: Outfalls to Tightline**

Source: *Matsushita Semiconductor Corporation of America*

Figure 6:
Acid Wastewater Treatment System
UTILITIES - SANITARY SEWER

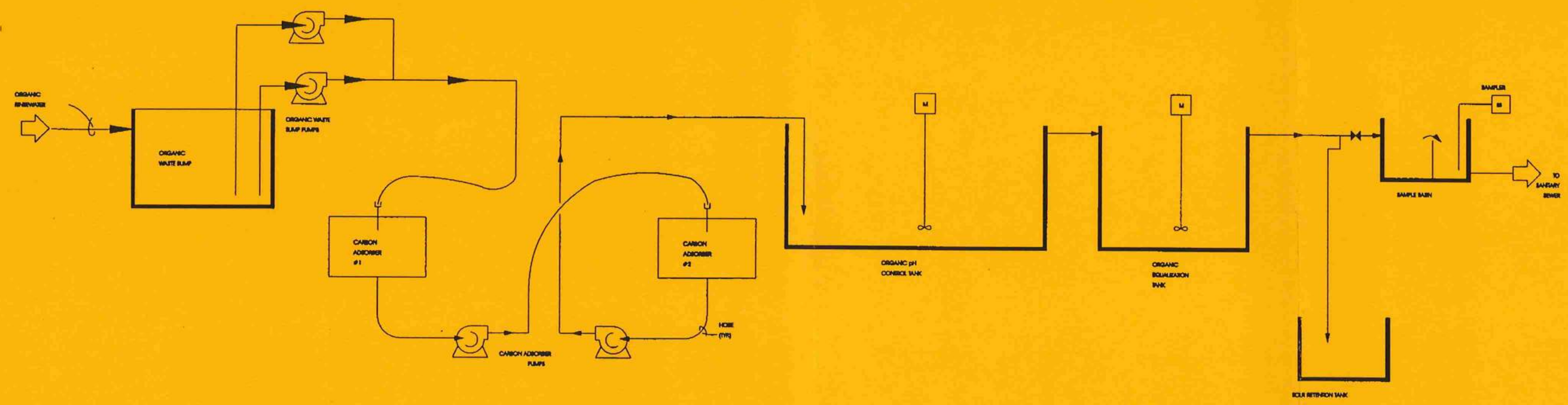
Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT



Source: *Matsushita Semiconductor Corporation of America*

Figure 7:
Outfall #001 Tightline Map
UTILITIES - SANITARY SEWER



Source: Matsushita Semiconductor Corporation of America

NOTE: Outfalls to Tightline

Figure 8:
Solvent Rinse Treatment Process
UTILITIES-SANITARY SEWER

During a site visit on February 1, 1996, it was noted that the upset tank was full. Treatment plant operators indicated that an upset condition had taken place and flow was discharged into the upset tank. Later, a precipitate was created in the tank through chemical reactions. This precipitate was then de-watered and trucked to off-site facilities for disposal. A by-product of the upset condition was that one of the carbon filters was plugged prior to getting the wastewater rerouted into the upset tank. The effected carbon filter was taken off-line and the treatment process was put back into operation with only one carbon filter on-line. It is unknown whether this completely protected Outfall #002 from violation of the NPDES permit. The final engineering report of the expansion of the wastewater treatment plant requires a minimum carbon contact time of 10 minutes (Kennedy Jenks Consultants, 1994). The peak reported flow rate in the 6 months between July, 1995, and January, 1996, was 18 gpm. At that flow rate, one (1) carbon filter provides 75 minutes of contact time.

Existing sanitary sewer mains draining from the MASCA site to the POTW consists of an eight- to 10-inch diameter sewer main running to 23rd Avenue SE. This main ties into a 12-inch main at 23rd Avenue SE, which drains west to Meridian Street. All of these mains flow at well under capacity for their systems. From Meridian Street, flow continues north and west through the Meridian Branch trunk line, sections of which are as small as eight inches in diameter. The Meridian Branch ties into the Cross-Valley trunk main at the northwest corner of the Western Washington State Fairgrounds. Sections of the Meridian Branch trunk line have flows over the existing system's capacity. Re-construction is anticipated in the early part of 1997 to upgrade the Meridian Branch.

The Cross-Valley trunk is a 24- and 36-inch diameter sewer main which drains to the 19th Street West/Pioneer Avenue lift station. The Cross-Valley trunk line is well under capacity with existing flow rates. The Pioneer Avenue lift station has recently been upgraded and takes into account the future growth rate as shown in the September 1985 Sewer Comprehensive Plan. The pump station pumps into a 36-inch diameter gravity main which flows north to the POTW. This 36-inch gravity line is over capacity with existing flows and has been identified as in need of an upgrade. The schedule for this upgrade is unknown.

The POTW has also been identified as near-or over-capacity with existing flow rates. The City has prepared an upgrade plan which is currently under review by the DOE. The existing POTW site plan is shown on Figure 9 and the existing POTW schematic flow diagram is shown on Figure 10. The proposed upgraded POTW site plan is shown on Figure 11 and the upgraded POTW schematic flow diagram is included as Figure 12.

3.3.3 Detention Pond -- Outfall #003

Process wastewater discharges from the filter backwash occur approximately once a week over an eight-hour period. The flow consists of the backwash from eight (8) separate carbon filters in the on-site water treatment facility.

These carbon filter backwashes typically consist of approximately 500 gallons per minute, and reportedly takes approximately 30 minutes for each of the eight (8) filters. Each of the filters is taken off-line independently to avoid disruption of the water supply for the plant. These backwashes typically occur in the early part of the week, either Sunday, Monday, or Tuesday, and typically in the night shift, which runs from 7 p.m. to 7 a.m.

3.4 OUTFALL FLOW RATES

Outfall #1 maximum flow rate, during the period of August 1995 through January 1996, was 1.3 MGD. For the same period, the average flow rate was 0.89 MGD.

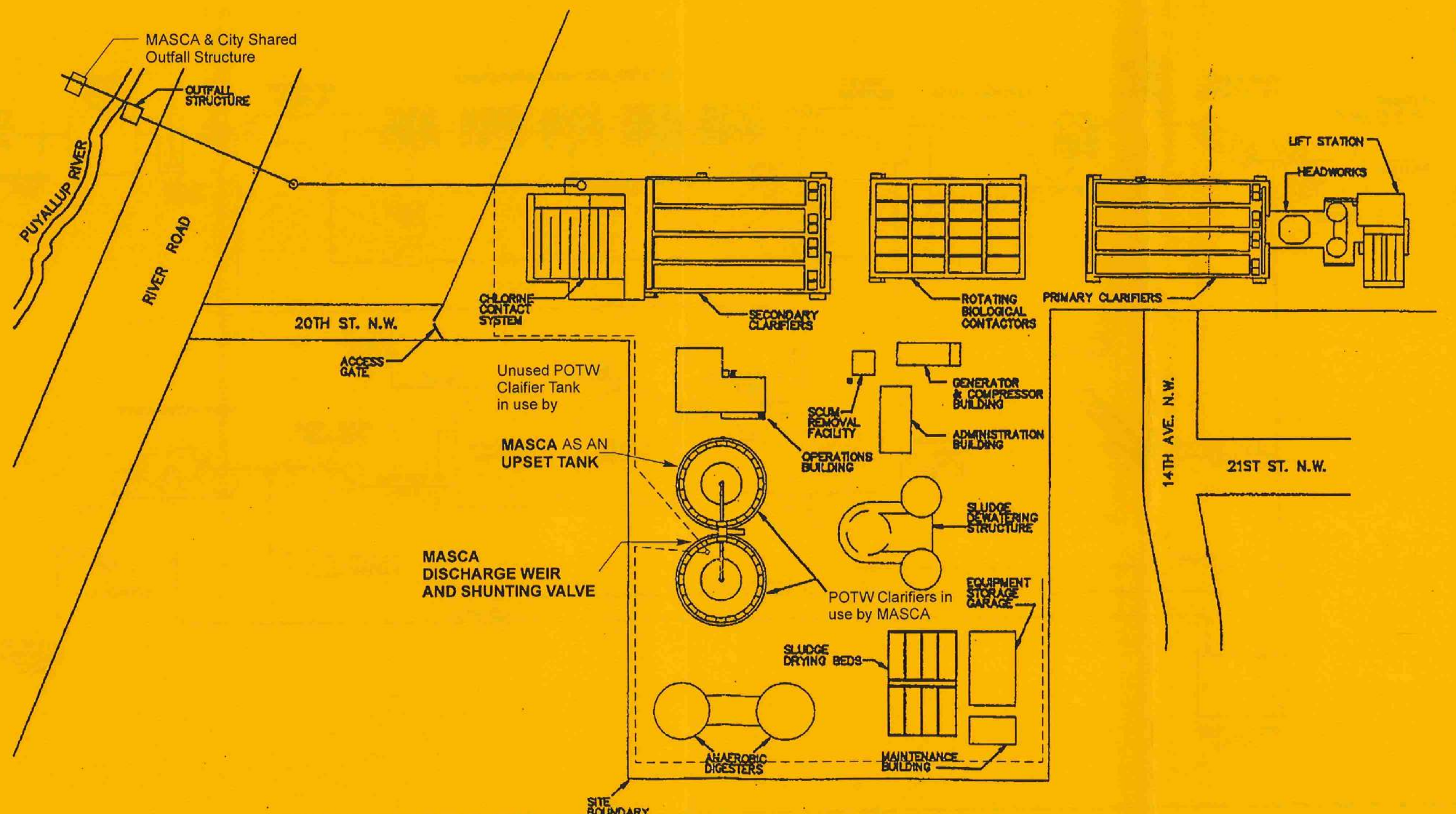
For Outfall #2, the average flow rate in April, 1996, was 34 gallons per minute (DOE, 1996). Flow rates in the process water discharge seem to be highly variable.

No flow rate data were available for Outfall #3, which flows into the infiltration pond.

3.5 NPDES PERMIT

A majority of the efforts surrounding the construction and maintenance operations at the on-site treatment plant, as well as the outfalls, are governed by the requirements of the NPDES permit for the site (WWA-003957-8). The current NPDES permit was issued June 30, 1994, and is effective through June 30, 1999. The permit contains three (3) authorized discharge points: Outfall #001 permits treated process wastewater to be discharged via a ten (10)-inch five (5)-mile-long tightline which runs from the site to the Puyallup River, in the area of the POTW, and discharges into the Puyallup River via a shared outfall; Outfall #002 permits the discharge of treated process wastewater and untreated domestic wastewater to the City of Puyallup POTW; and Outfall #003 permits the discharge of sand, carbon, and de-ionized filter backwash waters and non-contaminated storm waters into the on-site detention pond.

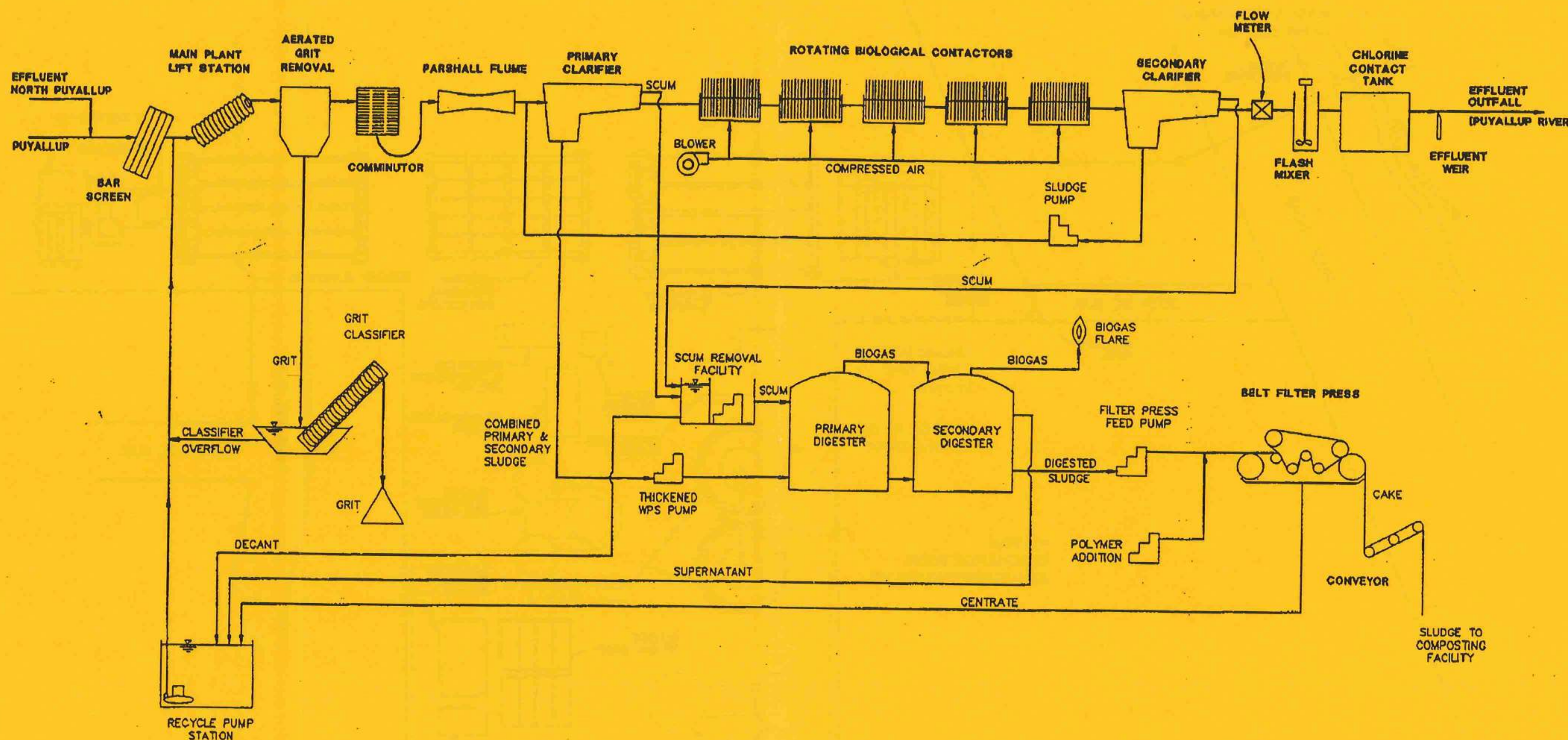
The quality of the untreated process wastewater streams is presented in the Table 1. The sampling of the untreated wastewater was performed in July, 1994, under direct supervision from MASCA.



Source: Matsushita Semiconductor Corporation of America

NOTE: Outfalls to Tightline

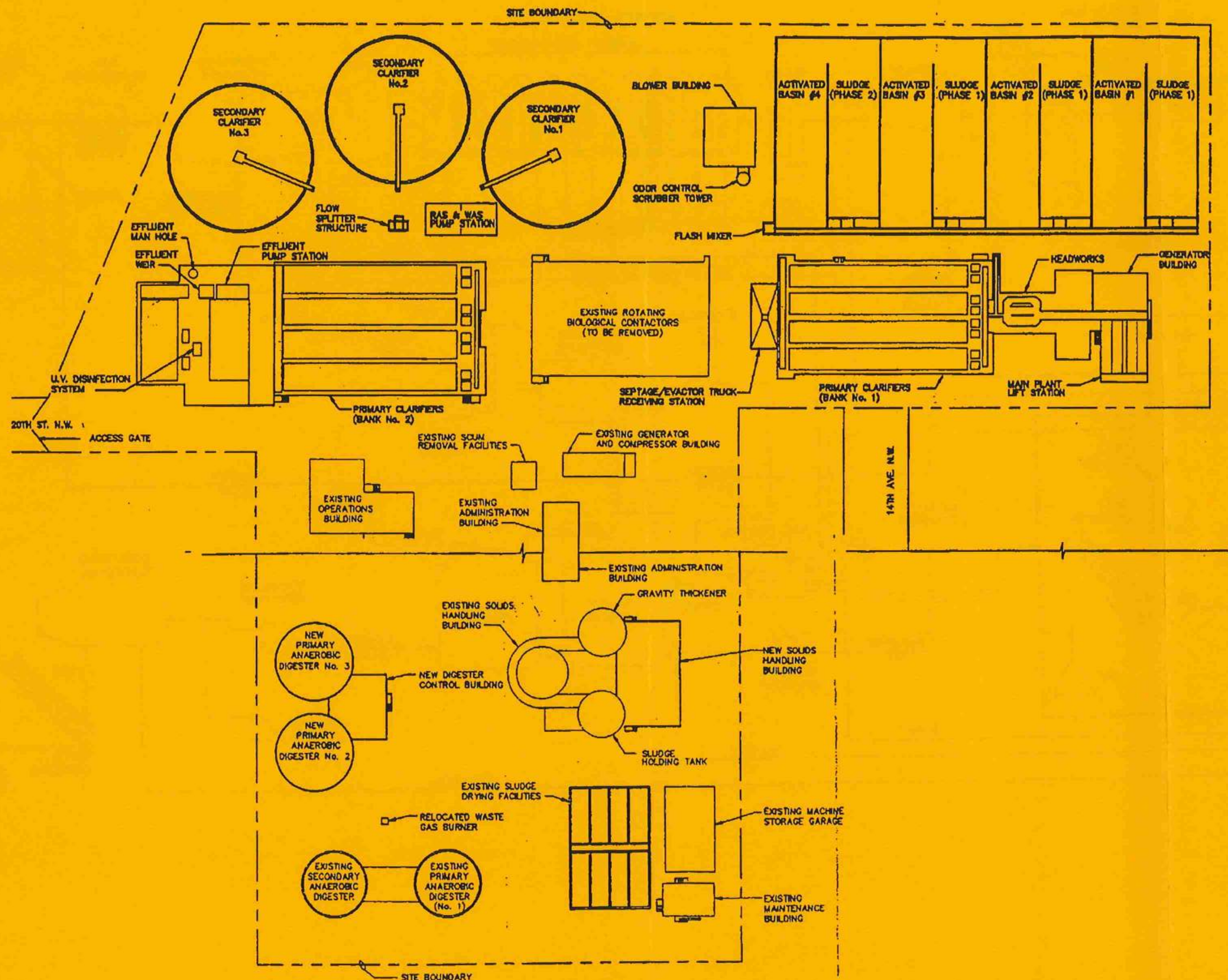
Figure 9:
Existing POTW Site Plan
UTILITIES-SANITARY SEWER



Source: City of Puyallup Wastewater Facility Plan, November 1995

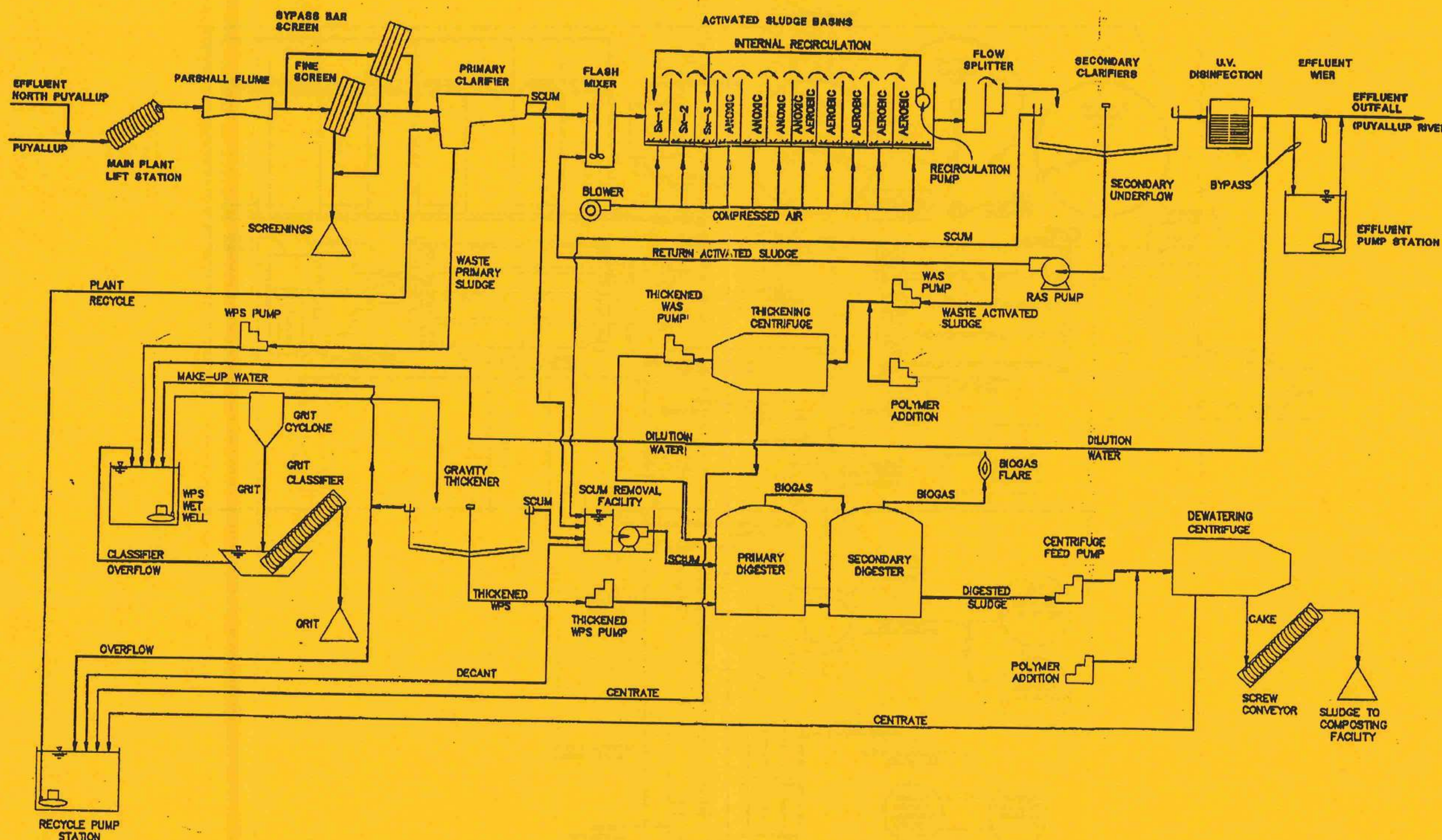
DAVID EVANS AND ASSOCIATES, INC.

Figure 10:
Existing POTW Schematic Flow Diagram
UTILITIES-SANITARY SEWER



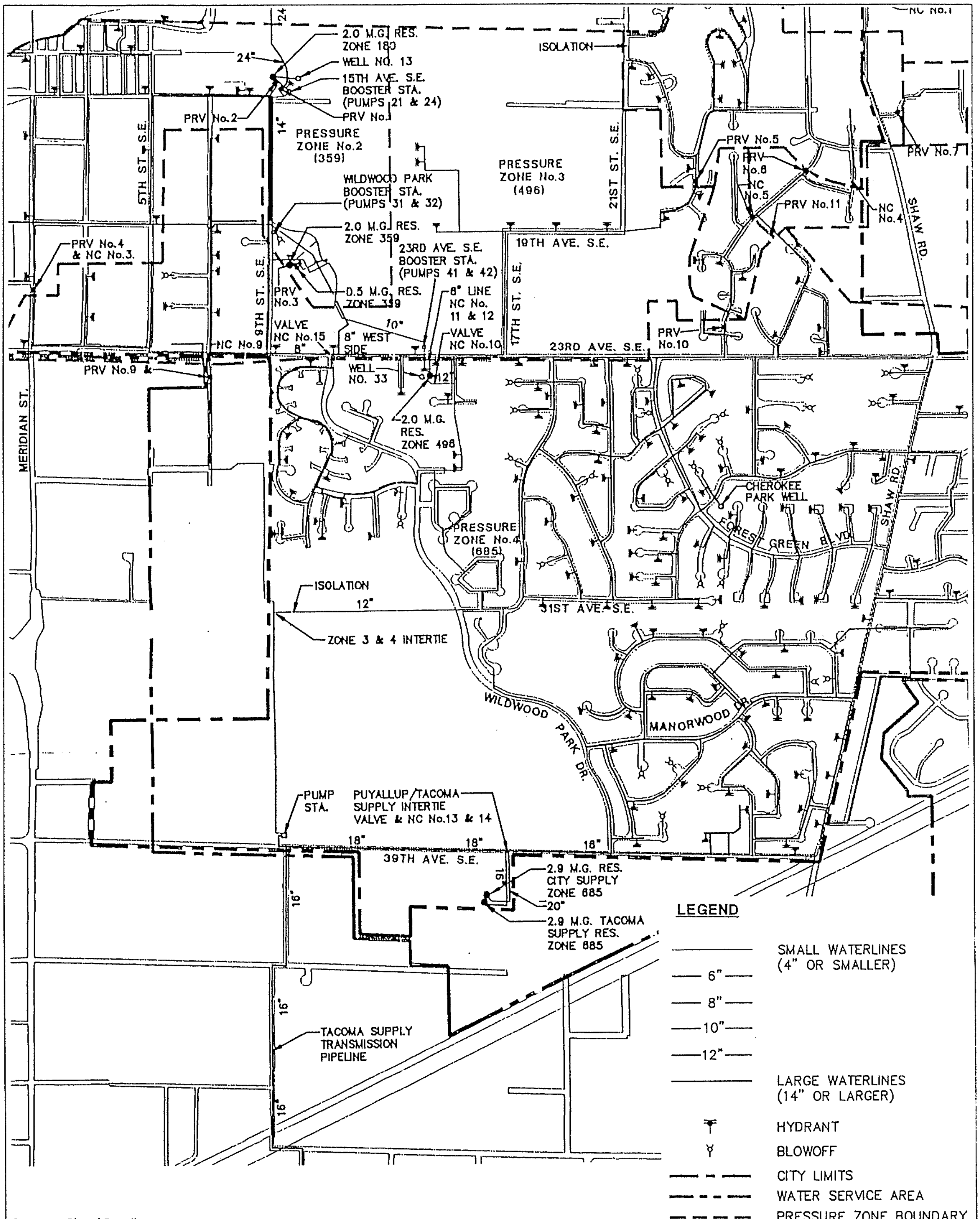
Source: City of Puyallup Wastewater Facility Plan, November 1995

Figure 11:
Proposed POTW Upgrade Plan
UTILITIES-SANITARY SEWER



Source: City of Puyallup Wastewater Facility Plan, November 1995

Figure 12:
Proposed POTW Upgrade Schematic Flow Diagram
UTILITIES-SANITARY SEWER



Source: *City of Puyallup*

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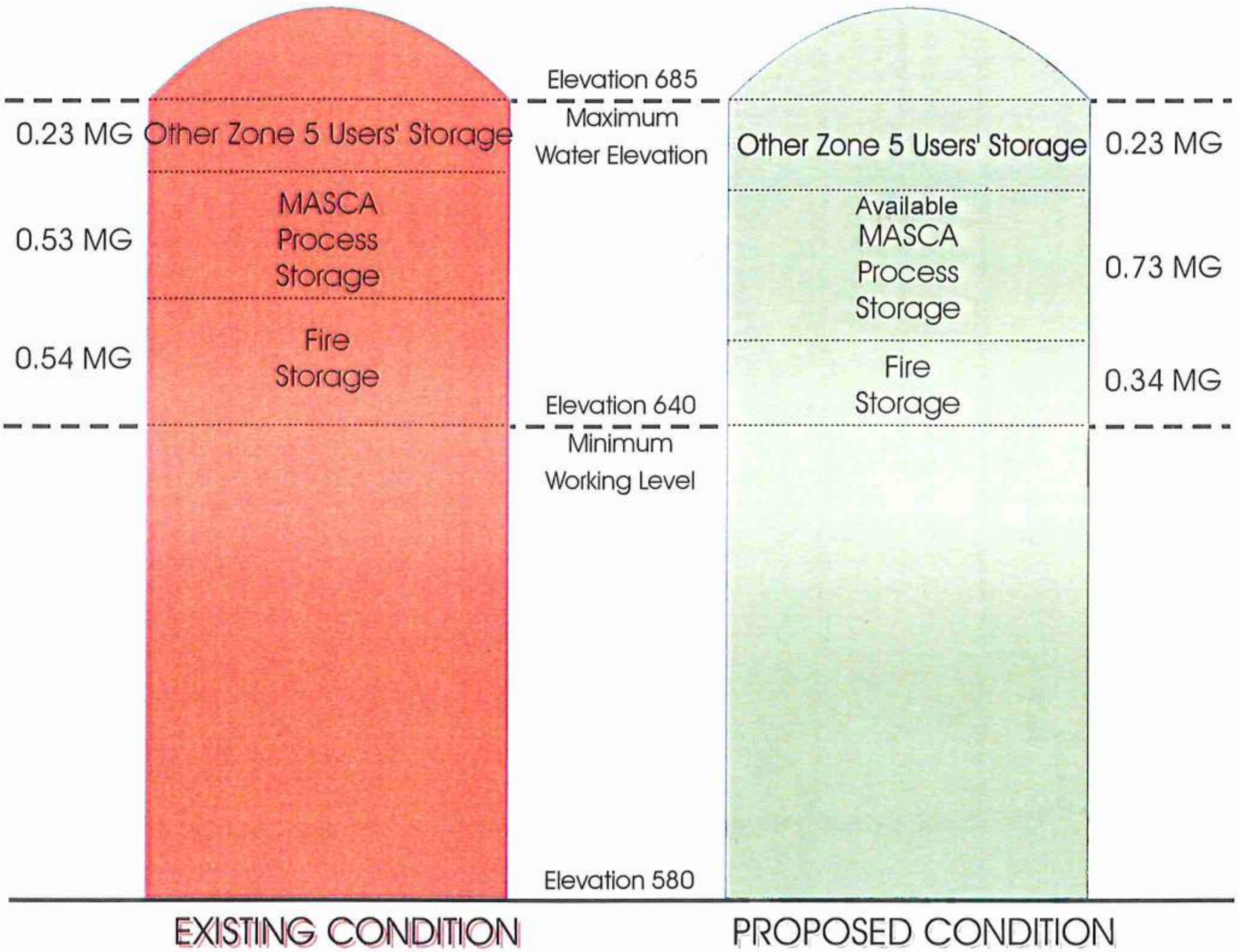
Figure 5:
Water Distribution System
UTILITIES - WATER



Tank has a storage capacity of 1.30 MG above hydraulic working grade of 640 feet.

Note: *MG = Million Gallons*

Figure 6
Zone 5 Storage Tank
UTILITIES - WATER

The water from the Tacoma intertie is available on an interruptable, off-peak basis. That is, water cannot technically be supplied by the Tacoma intertie during Tacoma's eight-hour peak usage period from 3:30 p.m. to 11:30 p.m. Therefore, all of the water to be used by MASCA for each day should be pumped during a 16-hour period from 11:30 p.m. to 3:30 p.m. and stored in the Zone 5 reservoir.

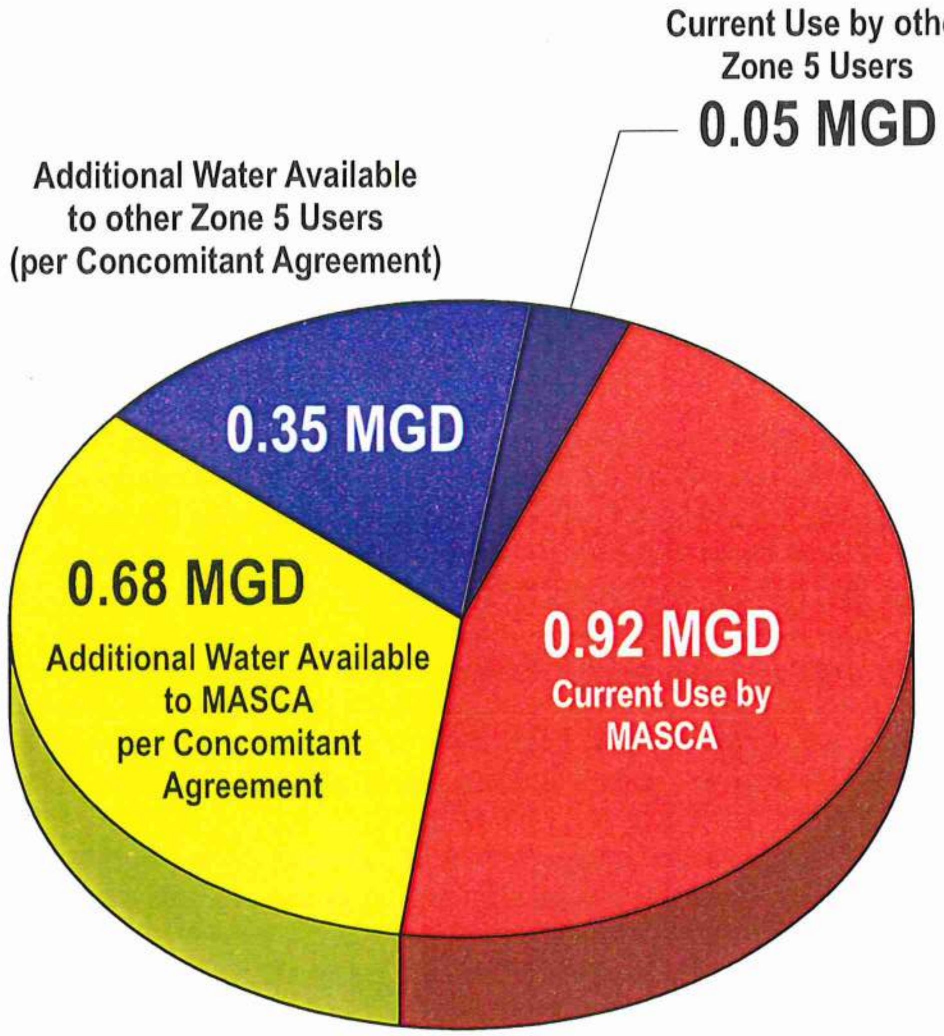
Since the MASCA site operates on a 24-hour basis and water is available only 16 hours per day, water must be supplied at a rate equal to the full day's usage in a 16-hour period. As previously stated, the plant's daily water usage for design purposes is 1.6 MGD, or 1,111 gpm for 24 hours. Because the plant cannot plan on receiving water from the Tacoma intertie for an eight- (8) hour period, the storage tank was sized to store eight hours of average daily flow of 1,111 gpm, or 0.53 MG. This amount of storage, in conjunction with 16 hours of direct water use from the Tacoma intertie, satisfies MASCA's average flow requirement of 1,111 gpm for 24 hours.

In addition to the storage capacity required to provide sufficient process water to the site, the Zone 5 storage tank was also designed to provide an additional 0.54 MG of storage for fire fighting. This 0.54 MG of fire reserve was based on a peak fire flow of 4,500 gpm for two (2) hours, which was mandated by the fire codes in 1981. The codes have since changed, and less fire reserve storage is required today.

The storage tank has a storage capacity of 1.30 MG above the minimum working hydraulic grade line of 640 feet. All water stored in the tank above the 640 elevation can provide adequate fire flow pressure via gravity. Water stored below the 640 elevation requires the use of a pumper truck for fire fighting. Therefore, water stored below the 640 elevation is not considered as available in any of the storage calculations. A schematic diagram of the Zone 5 tank is shown in Figure 6.

Fire flow from Zone 4 is also available to Zone 5 on an emergency only. A cross connecting pipe exists between the two zones which is normally valve closed. The valve operation was originally intended to be automated, opening when Zone 5 system pressure becomes excessively low. However, at this time, opening of this valve can only be performed manually.

When MASCA's process water storage of 0.53 MG and fire storage of 0.54 MG was subtracted from the 1.30 MG total available storage, there was an excess available storage of 0.23 MG. This 0.23 MG of storage was designated as "City Demand Storage". Accordingly, the cost of constructing the storage tank was allocated and paid for by MASCA. In addition, depreciation has been and is being charged to MASCA each month.

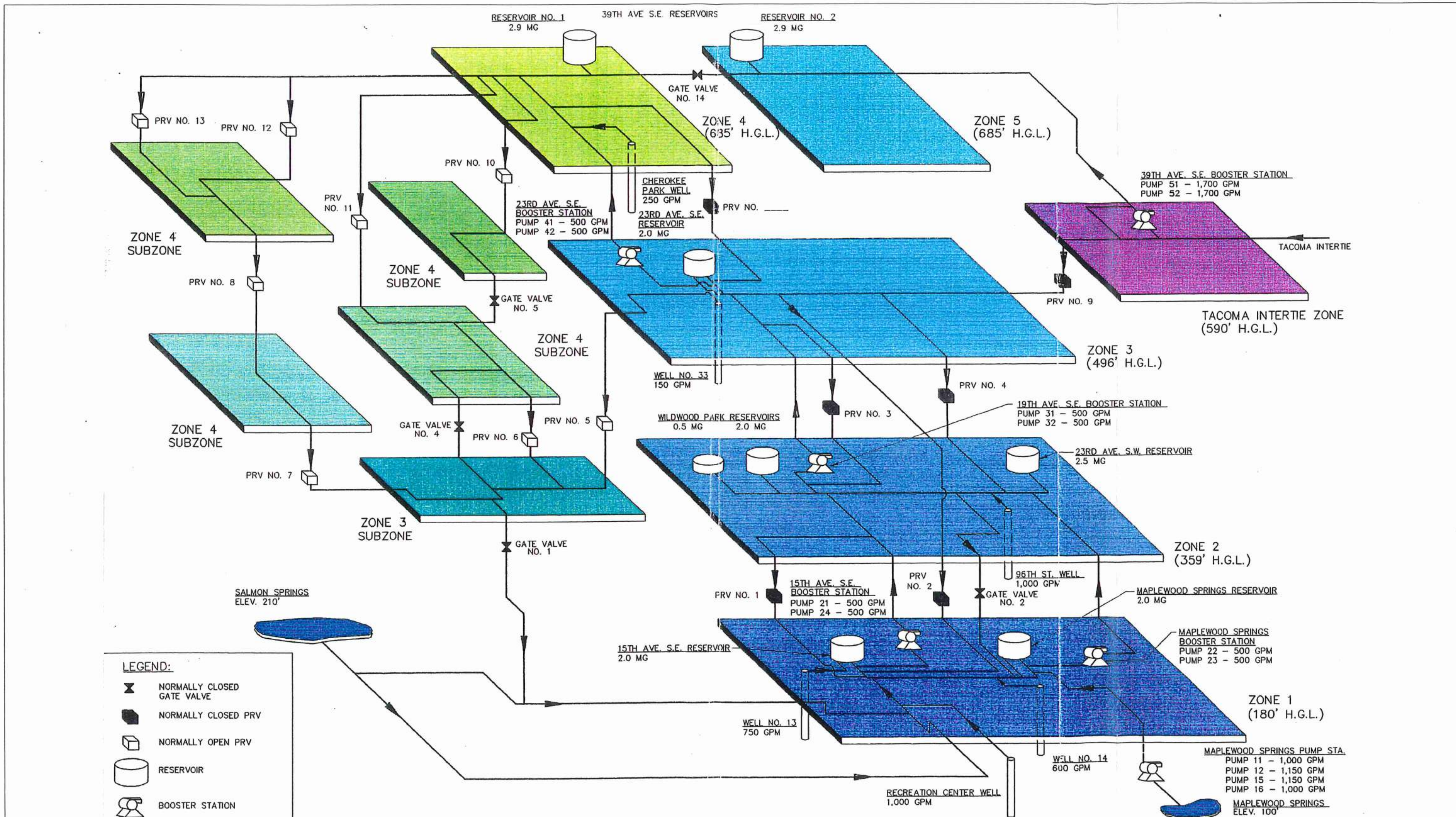


Water Source: *Tacoma Pipeline*

Figure 7:
Current Zone 5 Water Allocation
UTILITIES - WATER

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT



Source: *Gray & Osborne, Inc.*

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DAVID EVANS AND ASSOCIATES, INC.

Figure 4:
Schematic Water Distribution Network
UTILITIES - WATER

Table 1
Untreated Wastewater Compositions (July, 1994)

	F/P/A Stream Components			Acidic Stream Components		
Parameters (mg/L)	F/P/A Influent Sump	RO Flush	DI Mixed Bed Regenerant	Acid Wastewater Influent Sump	RO Reject Wastewater	Solvent/Organic Rinsewater Influent Sump
Na	0.175	nm	nm	0.49	2.7	nm
Ca	12.2	nm	nm	0.11 - 0.22	nm	nm
NH_3-N	110-190	0.23-0.54	nd	2.4-2.9	<0.1	3.5
F	1.3-190	1.5-2.9	47 (E)	1.46-6	nm	1.51
SO_4	9.7-530	nm	<1.0	17-36	34.9	13.4
PO_4-P	130-200	0-50	nd	0.17-0.55	nm	9.6
NO_3-N	0.61-9.4	nm	nm	0.40-0.63	0.119	2.2
Cl	0.14-3.0	nm	nm	1.63	11.2	3.89
Cl_2	12	0-1.1	nm	1.6	nm	nm
Hg	<0.001	0-0.0008	<0.001	<0.001	nm	nm
COD[1]	104	nm	7	<0.5	nm	530
BOD5[2]	<2.0	<5.0	<2.0	<2.0	<2.0	142
Silica as (SiO_2)	170	nm	2.4	<1.0	nm	nm
TDS[3]	1,000-1,370	nm	60	31-40	150	41,000
TSS[4]	2.2-310	3-67	16.5	0.2-3.0	3.1	56.7
pH	2.1	nm	6.2	2.9-3.4	5.9	5.6
TOC[5]	5.0	nm	nm	8.2	nm	65
TTO[6]	<0.12	nm	nm	<0.12	nm	2.62
Total Toxic Metals (TTM)	**0.7**	**nm**	**nm**	**0.2**	**nm**	**0.2**

Source: Kennedy-Jenks Consultants, August 1994
Note: [1] COD = Chemical Oxygen Demand
[2] BOD5 = 5-Day Biochemical Oxygen Demand
[3] TDS = Total Dissolved Solids
[4] TSS = Total Suspended Solids
[5] TOC = Total Organic Carbon
[6] TTO = Total Toxic Organics

MASCA received a fine for non-compliance to their NPDES permit in 1994. The DOE reported that the non-compliance event covered approximately one (1) year. The event included excursions outside of the permitted ranges for pH, biochemical oxygen demand, total suspended solids, fluorides, phosphates, and ammonia. MASCA noted problems with treatment system components breaking, malfunctioning testing probes, and clarifier floc tank overflows. These problems were due to operations and maintenance practices at the on-site MASCA treatment plant. MASCA corrected the problems. Since 1994, only one (1) non-compliance event has occurred at MASCA. The event resulted from the failure of a calcium chloride addition pump. MASCA fixed the pump and installed a sensor to detect and alarm future pump failures.

Table 2 shows the results of the last seven (7) months worth of NPDES testing that was submitted to DOE.

Table 2
NPDES Testing Results for July 95 to January 1996

Outfall	Parameter	July 95	Aug 95	Sept 95	Oct 95	Nov 95	Dec 95	Jan 96
#001	Avg. Flow (MGD)	0.64	0.70	0.64	0.63	0.59	0.67	0.63
	Max. Flow (MGD)	0.83	0.98	0.76	0.79	0.69	0.90	0.79
	Min. pH	6.7	6.7	6.7	7.0	6.6	6.4	7.5
	Max. pH	8.0	7.7	8.3	8.5	7.8	7.2	8.2
	Avg. BOD5 (lb.. per day)	33.5	29.3	45.9	26.8	38.19	39.2	31.6
	Max. BOD5 (lb. per day)	40.5	41.1	81.1	35.14	79.6	42.2	47.9
	Avg. BOD5 (ppm)	6.2	5.0	8.5	5.2	7.7	7.0	6.0
	Max. BOD5 (ppm)	8.0	5.0	15.0	6.0	16.0	9.0	9.0
	Avg. TSS (lb.. per day)	17.3	23.5	21.6	11.8	20.9	19.6	11.5
	Max. TSS (lb.. per day)	42.5	36.3	34.5	18.2	29.06	32.8	15.0
	Avg. TSS (ppm)	3.2	4.0	4.0	2.6	4.2	3.5	2.2
	Max. TSS (ppm)	7.0	7.0	6.0	4.0	6.0	7.0	3.0
	Avg. Fluoride (ppm)	7.7	7.8	10.9	10.9	10.0	10.6	10.1
	Max. Fluoride (ppm)	10.0	9.6	14.0	17.0	11.0	12.0	13.0
	Avg. Phosphate (ppm)	0.55	0.40	0.37	0.52	0.49	0.38	0.45
	Max. Phosphate (ppm)	1.20	0.58	0.60	0.80	0.81	0.65	0.94
	Avg. Ammonia (lb. per day)	73.58	71.2	49.1	29.2	34.2	29.8	37.9
	Max. Ammonia (lb. per day)	83.2	77.8	80.6	40.2	42.3	34.3	58.3
	Avg. Ammonia (ppm)	13.6	12.1	9.1	5.8	6.9	5.8	7.2
	Max. Ammonia (ppm)	15.0	15.0	14.0	8.8	8.5	6.7	11.0
	Max. Mercury (ppb)	0.2	0.2	0.2	0.2	0.2	0.02	0.02
	TRCl (ppm)	0.04	0.04	0.04	0.04	0.05	0.04	0.04
#002	Flow (MGD)	0.010	0.012	0.017	0.008	0.011	0.026	0.015
	Min. pH	7.1	7.7	7.1	8.3	8.6	7.8	7.5
	Max. pH	7.5	8.0	8.6	9.0	8.9	8.8	8.6
	Max. Flash Point (deg F)	>200	>200	nr	nr	nr	nr	nr
#003	Max. Flow (MGD overflow)	0	0	0	0	0	0	0
	Min. pH	6.8	7.7	6.2	6.4	6.2	6.2	6.1
	Max. pH	7.4	8.4	6.7	7.8	7.2	7.0	6.9
	Pond Iron (ppb)	100	580	nr	nr	nr	nr	nr
	Well Iron (ppb)	4100	2700	nr	nr	nr	nr	nr
	Pond Manganese (ppb)	55	45	nr	nr	nr	nr	nr
	Well Manganese (ppb)	150	93	nr	nr	nr	nr	nr

Source: MASCA Discharge Monitoring Reports for the period

Notes: na - Data on this parameter was not available or not readable on the NPDES monthly report form.
nr - Data on this parameter is not required to be reported on the NPDES monthly report form.

Under the NPDES permit, the effluent for Outfall #001 is allowed to have certain contaminants as shown in Table 3. Table 4 is the schedule for testing the process wastewater discharge from Outfall #001 that is required under the NPDES permit.

Table 3
NPDES Process Wastewater Discharge Limitations From Outfall #001

Parameter	Average Monthly	Maximum Daily
Flow, MGD	0.7 0 - 1.6[1]	0.98 - 1.88[1]
pH, std units	Between 6.0 and 9.0	
BOD_5, lb./day	88	175
BOD_5, mg/L	15-7[1]	30-13[1]
TSS, lb./day	88-200[1]	175-400[1]
TSS/mg/L	15	30
Fluoride, mg/L	16	26
Phosphorus, mg/L	3	5
Ammonia, lb./day	217[2]	347[2]
Ammonia, mg/L	20[2]	32[2]
TRCl, mg/L		50
TTO		Narrative statement required
Mercury, mg/L		0.08
WET (acute)		No significant response
WET (chronic)		No significance response

Source: DOE - 1994

Notes [1]Flow limit depends on the production level:

Parameter	Average Monthly/Daily Maximum Limit at wafer-outs/month				
	10K	15K	20K	30K	40K
Flow (MGD)	0.7/0. 98	0.85/1 .13	1.0/1. 28	1.3/1. 58	1.6/1. 88
BOD_5	15/30	12/25	11/21	8/16	7/13
TSS (lb./day)	88/17 5	106/2 13	125/2 50	163/3 25	200/4 00

[2]Limits applicable for 40K wafer-outs after three years of compliance schedule. See actual permit for other limits
The sampling point for outfall #001 is located on the property of the POTW is sampled at frequencies shown in Table 4.

Table 4
Sampling Schedule for Process Wastewater Discharge from Outfall #001

Tests	Sample Point	Sampling Frequency	Sample Type
Flow	final effluent	continuous	totaling flow recorder
BOD 5	final effluent	1/week	24-hour composite
TSS	final effluent	1/week	24-hour composite
Fluoride	final effluent	1/week	24-hour composite
Phosphorus	final effluent	1/week	grab
Ammonia	final effluent	1/week	24-hour composite
TRCl	final effluent	1/week	grab
Temperature	final effluent	1/week	grab
pH	final effluent	continuous	pH probe
TTO	final effluent	quarterly in fourth year	grab
WET (acute)	final effluent	Quarterly	grab
WET (chronic)	final effluent	Quarterly	grab
Mercury	final effluent	monthly	grab

Source: DOE, 1994

The NPDES permit authorizes sanitary sewer and process water discharges to the City's sanitary sewer collection system, which then flows through gravity and pump systems to the POTW. The allowable effluent constituents of this flow are listed in Table 5. Table 6 shows the schedule sampling for the MASCA discharges.

Table 5
Municipal Sewer System Discharges Limits -- Outfall #002
Treated Process Water from the Solvent Rinse System

Parameter	Daily Maximum
Flow (MGD)	0.038 - 0.076[1]
Total Toxic Organic (TTO)	Narrative standard required
pH	Between the range of 6-9 standard units

Source: DOE, 1994
Notes: [1]Flow limit depends on the production level:

Parameter	Daily Maximum Limit of wafer-outs per month				
	10K	15K	20K	30K	40K
Flow (MGD)	0.038	0.045	0.051	0.064	0.076

[3]A narrative statement contained in S1. A(f) must submitted with discharge monitoring report. A single statement may be submitted for both Outfalls 001 and 002.

Table 6
Municipal Sewer System Discharges Monitoring Schedule (Outfall #002)

Tests	Sample Point[1]	Sampling Frequency	Sample Type
Flow	final effluent	continuous	totaling recorder
TTO[2]	final effluent	quarterly in fourth year	grab
Flash point	final effluent	1/month in first year	grab
pH	final effluent	1/week	grab

Source: DOE, 1994

Notes:
[1]All samples shall be taken following treatment and immediately prior to discharge to the sanitary sewer system.
[2]The complete list of toxic organic comprising TTO is obtained in 40 CFR 469.12. Data from the four quarterly samples collected in the fourth quarter shall be submitted with the application for permit renewal.

The NPDES permit authorizes stormwater and process wastewater discharge to the on-site detention/infiltration pond. The permits requires that the pond not overflow and that the pH be monitored and kept between 6.0 and 9.0 during all the backwash operation. It also requires tests for iron and manganese, but does not identify limits for those pollutants. The discharge for process wastewater is authorized to include sand, carbon, and de-ionization filter backwash waters. Those are explicitly the only process wastewater discharges from the on-site facility allowed into the detention/infiltration pond. The NPDES permit calls for testing of those flows according to the schedule shown on Table 7.

Table 7
Filter Backwash and Storm Water Discharge Limits--Outfall #003

Tests	Sample Point	Sampling Frequency	Sample Type
Flow	final effluent[1]	when discharging	calculated
pH[2]	final effluent[1]	1/week	grab
Iron[2]	final effluent[1]	1/month for first year	grab
Iron[2,3]	monitoring well	1/month for first year	grab
Manganese[2]	final effluent[1]	1/month for first year	grab
Manganese[2,3]	monitoring well	1/month for first year	grab

Notes: [1] Flow shall be measured at a point to discharge to the retention pond. Samples for other parameters shall be collected prior to discharge to the detention pond. The specific waste stream (sand, carbon, or DI filter backwash operations) sampled must be reported in the discharge monitoring report.
[2] Iron and manganese shall be measured as total metals. After first year of monitoring, effluent limits may be imposed in the permit through permit modification if monitoring results indicate potential for violation of the ground water quality criteria.
[3] Existing monitoring well, up gradient from the retention pond, shall be sampled.

As a condition of their respective NPDES permits, both MASCA and the POTW are required to perform WET evaluations to ensure that the toxic concentrations are within the acceptable limits of the permits. WET testing does not identify what is in the effluent, it simply quantifies the effect the effluent has on the surrounding environment. Sensitive indicator species from the environment are exposed to the treated effluent from the site, and the effect on those species is quantified. The three species that MASCA has to test against are the fathead minnow, the daphnid, and the water flea. The effluent limit is identified as no statistical difference between the survival rate of the test species in effluent and the survival rate of the test species in clean control water. The test is performed both on 100% effluent, and on effluent that is diluted based on the specifics of the river that receives the discharge. In the case of MASCA, they perform two (2) separate tests, one (1) at a 5% concentration of effluent, and the other at a 38.5% effluent. Results from both the 100% effluent and the diluted effluent are reported, but only the diluted effluent result determines the pass/fail of the test. This test is a good back stop for other screening tests, and provides an assurance of what the effects on the environment.

Under its current NPDES permit, MASCA is required to meet a chronic whole effluent toxicity (WET) limit at a 5% dilution factor. In April, 1995 DOE notified MASCA of their failure to meet the WET limits and required additional monitoring. The additional monitoring determined that MASCA was not meeting its WET limits and in September 1995, DOE notified MASCA that it must perform a Toxicity Identification/Reduction Evaluation (TI/RE).

A TI/RE is being performed; however, the results have not conclusively identified the specific pollutant(s) that caused the WET test failures. DOE noted that a cationic surfactant may have been the problem. However, another consultant was asked to review the TI/RE information and concluded that organic materials (surfactants are an organic compound) are not likely to be causing toxicity, but heavy metals such as copper or zinc may be of concern. To date MASCA has not identified the toxicity in its effluent and will continue the TI/RE process. DOE has indicated that the evaluation should be conducted with more rigorous attention to the sampling protocol.

The TI/RE (Parametrix, Inc., 1995) noted that the operational aspects of the plant had changed in the course of the toxicity evaluation. In 1991, the wafer fabrication process changed from plasma to acid etching. This increased the ammonia concentrations, and caused problems with discharges outside of the allowable NPDES limits. Part of MASCA's response was to refine the operations of the ammonia treatment process. This system came on-line during the TIE process, and has proven to be more efficient for ammonia removal. The TI/RE noted that on-going testing had shown toxicity, but within the permit limits. The TI/RE also noted that some WET results have shown no toxicity over this period. DOE responded that the toxicity reports from July, 1995, to December, 1995, have been within the limits of the NPDES, but the toxicity was not significantly better than seen in prior tests. There have been occasional peak toxicity tests such as the ones which caused MASCA to prepare a TI/RE.

DOE reviewed the TI/RE workplan, but were unsure why MASCA seemed to be pursuing ammonia as the likely culprit for the problem. The indicators species giving MASCA the most trouble with their chronic toxicity was the water flea which is typically more resistant to ammonia concentrations than the fathead minnow indicator species. MASCA has not had toxicity problems indicated by the fathead minnow. Most of the improvements to the on-site process are for ammonia removal. DOE noted that, in their opinion, a cationic surfactant was the most likely type of toxin to be in the MASCA waste stream. This type of toxin would be susceptible to problems in the sampling protocol. The TI/RE did not reach a conclusive result, because they ran out of toxin in the sample they were using. DOE indicated that the test should be repeated with more rigorous attention to the sampling protocol.

In the past year, the POTW operators report that they have been out of compliance for the WET test two times. Reports indicate that in one of the two cases, POTW was receiving or had just received discharge from the MASCA upset tank. This has led the City to believe that the toxicity problems that they are encountering may be tied to the discharges from the MASCA upset tank.

The City has asked the permit administrator for DOE to assess whether their toxicity problems correlate to any high toxicity problems in the waste stream from Outfall #001. DOE responded that there was no specific correlation. However, they noted that it would be difficult to draw any conclusion from the lack of correlation, due to the on-going toxicity problems in Outfall #001.

3.6 RESULTS OF 1996 FIELD TESTS

Additional testing for priority pollutants was performed at the request of the City of Puyallup. The results indicate that virtually none of 129 EPA identified priority pollutants were detected in the process water discharges or sediments that were sampled. Of the pollutants actually detected, none were at concentrations considered high enough to be of significant impact on the environment.

Other pollutants that may impact the environment would not be detected in the tests performed. To protect the environment against those, a second level of protection is needed. This is the reason that WET testing is performed.

4.0 IMPACT ANALYSIS

MASCA has started a process of upgrading their facilities for the anticipated expansion. DOE has approved the expansion of the on-site wastewater treatment plant to handle the wastewater flows generated from increasing the production from the current maximum of 20,000 wafer-outs per month to a maximum production rate of 40,000 wafer-outs per month. MASCA's NPDES permit allows for this increase.

4.1 INCREASED FLOW RATES

The proposed expansion on the sanitary sewer and process wastewater discharges from the site is expected to double the existing flow rates. In the MASCA Wastewater Treatment Plant Expansion Final Engineering Report (Kennedy Jenks Consultants, 1994) linear relationships were identified which compare the process wastewater flow rates to the wafer production rate per month. These relationships take into account the existing wastewater flows for the processes now used. They also account for the future processes being much more efficient with regards to water use. The new processes are estimated to use approximately 40% of the flow per wafer-out of the existing processes. MASCA has since prepared a water balance that succeeds in an even more conservative water usage. With full build-out of Building D, it is anticipated that peak domestic water demand will be 1.6 MGD. This would lead to a peak Outfall #001 flow rate of 1.3 MGD, a peak Outfall #002 process wastewater flow rate of 0.06 MGD, a peak Outfall #003 wastewater flow rate of 0.05 MGD, and a peak sanitary flow (excluding process wastewater) of 0.07 MGD. The existing and predicted full buildout water balances are included in tables 8 and 9.

4.1.1 Tightline -- Outfall #001

Outfall #001 has a design capacity of 1.6 MGD. The calculated peak flow rate of 1.3 MGD would not overload that system. Current operating procedures call for the tightline to receive a caustic flush approximately once per month to purge the biological activity in the tightline. This flush consists of approximately 0.3 MGD for an hour. Increased flow rates in the tightline may lead to a higher level of deterioration of the line and unknown quantities of ex-filtration. This may result in higher maintenance requirements for the tightline, which belongs to the City of Puyallup. The tightline currently receives little or no on-going maintenance by either the City or MASCA.

Construction of a second tightline to the river is part of the Building D construction plans of the MASCA development to prevent having to stop production if the first tightline has to be shut down. Construction of a second tightline to the river would allow flows to be switched into an alternative tightline. In periods where flow rates in the tightline reach capacity, the second tightline could be used in parallel with the first tightline to provide additionally capacity.

Maintenance and inspection of the tightlines would become much easier since flows could be diverted from one tightline to the other. The second tightline will be constructed within the existing right-of-way. MASCA will submit construction plans to the City to obtain a permit to construct in the right-of-way.

Table 8
Facility Water Balance for Production Level of 12,000 Wafer-outs Per Month

Item No.	Steam	Flow[1] (gpm)	Disposal Means	Comments
1	Water Intake	468	--	City of Tacoma Water Average of Billings from 6/93 through 5/94[2]
2	Domestic Usage	(16)	City of Puyallup POTW (Sanitary Sewer)	Estimate based on 45 gpd/employee for 351 employees plus 5 gpm for plumbing trap primers.
3	Treated Process Wastewater (Fluoride/Phosphate/Ammo nia waste plus	(356)	Puyallup River via Tightline per NPDES Permit (Outfall 001)	DMR[3] flows averages from 6/93 through 5/94.
4	Treated Process Wastewater (Solvent/Organics)	(7)	City of Puyallup POTW (Outfall 002)	DMR[3] flows averages from 6/93 through 5/94.
5	Water Out with Fluoride/Phosphate Sludge	(1)	Kitsap County Landfill	Based on sludge shipment records and a sludge moisture of 70%.
6	Bldgs. A/B Non-Contact Cooling Tower Blowdown	(2)	Puyallup River via Tightline per NPDES Permit (Outfall 001)	10% of estimated cooling tower intake.
7	Bldgs. A/B Non-Contact Cooling	(16)	Evaporation	90% of estimated cooling tower intake.
8	Bldg. C Non-Contact Cooling Tower Blowdown	(1)	City of Puyallup POTW (Outfall 002)	10% of estimated cooling tower intake
9	Bldg. C Non-Contact Cooling	(13)	Evaporation	90% of estimated cooling tower intake.
10	Non-Contact Process Cooling	(11)	Evaporation	Estimate
11	Steam loss	(5)	Evaporation	Estimate
12	Scrubber and Exhaust	(15)	Evaporation	Estimate
13	Washdown	(5)	Evaporation	Estimate
14	Sprinkler System	(1)	Evaporation	Estimate
15	Miscellaneous	(14)	Evaporation	Estimate
16	DI System Filter Backwash (from sand, carbon, and final filters)	(1)	Storm Detention Pond (Outfall 003)	DMR[b] flow averages from 6/93 through 5/94.
17	Cleanroom Garment Laundry	(4)	City of Puyallup (Sanitary Sewer)	Estimate - 2 washers run 40 hours/week, 150 gallons per wash load.

Source: Kennedy/Jenks Consultants, 1994.
Notes: [1] Numbers in parentheses are consumption at the plant.
[2] Data used was the most current available from MASCA.
[3] DMR stands for Discharge monitoring reports.

Table 9
Predicted Facility Water Balance for Production Level of 40,000 Wafer-outs Per Month

Item No.	Steam	Flow[1] (gpm)	Disposal Means	Comments
1	Water Intake	1,111	--	Sum of predicted usage.
2	Domestic Usage	(32)	City of Puyallup POTW (Sanitary Sewer)	Estimate based on 45 gpd/employee for 700 employees plus 10 gpm for plumbing trap primers.
3	Treated Process Wastewater (Fluoride/Phosphate/ Ammonia wastewater)	(906)	Puyallup River via Tightline per NPDES Permit (Outfall 001)	Predicted from data correlation in Appendix A, and as adopted in the Draft NPDES Permit.
4	Treated Process Wastewater (Solvent/Organics)	(42)	City of Puyallup POTW (Outfall 002)	Predicted from data correlation in Appendix A, and as adopted in the Draft NPDES Permit. Average is assumed as 80% of the correlated maximum flow rate.
5	Water Out with Fluoride/Phosphate Sludge	(1)	Kitsap County Landfill	Estimated value. Value is based on an average sludge moisture of 53%.
6	Bldgs. A/B Non-Contact Cooling Tower Blowdown	(2)	Puyallup River via Tightline per NPDES Permit (Outfall 001)	10% of estimated cooling tower intake.
7	Bldgs. A/B Non-Contact Cooling	(16)	Evaporation	90% of estimated cooling tower intake.
8	Bldg. C Non-Contact Cooling Tower Blowdown	(1)	City of Puyallup POTW (Outfall 002)	10% of estimated cooling tower intake
9	Bldg. C Non-Contact Cooling	(13)	Evaporation	90% of estimated cooling tower intake.
10	Non-Contact Process Cooling	(11)	Evaporation	Estimate
11	Steam loss	(5)	Evaporation	Estimate
12	Scrubber and Exhaust	(15)	Evaporation	Estimate
13	Washdown	(5)	Evaporation	Estimate
14	Sprinkler System	(1)	Evaporation	Estimate
15	Miscellaneous	(14)	Evaporation	Estimate
16	DI System Filter Backwash (from sand, carbon, and final filters)	(32)	Storm Detention Pond (Outfall 003)/Evaporation	Predicted from data correlation in Appendix A, and as adopted in the Draft NPDES Permit. Average is assumed as 80% of the correlated maximum flow rate.
17	Cleanroom Garment Laundry	(15)	City of Puyallup (Sanitary Sewer)	Estimate - 2 washers run 80 hours/week, 150 gallons per wash load.

Source: Kennedy/Jenks Consultants, 1994. The data was revised for inclusion in SEIS by MASCA, 1996.
Note: [1] Numbers in parentheses are consumption at the plant.

The hydraulic limitations for the tightline flows will be the pipe from the weir control at the POTW to the combined outfall. The existing outfall pipe has become severely plugged due to broken diffusers that have caused rock and debris to enter the outfall line. The outfall will be repaired during the POTW upgrades scheduled for 1997-99. When the outfall is repaired, it will be able to carry projected peak hour design flows form the POTW of 35.8 MGD. It will be necessary to pump the peak flows from the POTW at the 100-year high flow level in the river, thus an effluent pump station will be included in the POTW upgrade.

Additional flows from MASCA in the 1.3-1.9 MGD range may be accommodated once the new diffuser is repaired. However, when high river elevations and peak flow through the POTW occur simultaneously, flow in the MASCA tightline will back up. Currently this condition (back-up in the pipeline) can be accommodated by temporarily diverting flow to the upset tank located at the POTW. When MASCA constructs a new upset tank, the pipeline hydraulics for a high river/high flow period must be considered in the design of the upset tank.

An agreement between MASCA and the City will be renegotiated to take into account the projected changes in the tightline and upset tank operation and configuration. This new agreement will specifically address costs for the operation and maintenance of the new tightline and upset tank and the existing tightline. The agreement will also address monitoring and testing requirements (discussed elsewhere in this section), including who will conduct and pay for the monitoring and testing. The agreement will also be written to clearly identify procedures to be followed for preventing spills/releases from the upset tank and tightlines, including shutdown of the tightline(s).

The planned increase in the MASCA wastewater treatment plant capacity includes one additional F/P/A treatment trains which would operate in parallel with the existing two treatment systems. By having three treatment trains, two of which would be necessary to operate in parallel at full capacity, the third could be used as a space treatment train to allow operational maintenance on any of the other two without impacting the discharge capacity from the plant. The ammonia removal system installed by MASCA in 1995 is efficient enough to meet the lower limits of the NPDES permit.

An increase in the treatment capacity for acid waste discharges from the wastewater treatment plant, is also proposed. This increase in capacity will provide two acid waste treatment trains which would operate in parallel to treat the maximum load of the acid waste system. The construction of the second system will also incorporate bypasses that will allow maintenance of individual system components without having to shut down production.

These increases in wastewater treatment plant capacity would be required in order to meet the NPDES discharge permit conditions for the site for any increase in capacity beyond 20,000 wafer-outs per month. The increase in on-site treatment plant capacity will have a corresponding increase in on-site use of chemicals for the treatment plant operation. DOE has approved the construction plans for the expanding of MASCA's on-site wastewater treatment facility to accommodate 40,000 wafer-outs.

The City has interest in MASCA's compliance with the limits of the NPDES permit due to the City's ownership of the existing tightline and upset tank, as well as the shared outfall. The upset tank operation is of great concern to the City due to the increasing frequency and severity of discharges to the upset tank. In June 1996, the upset tank overflowed causing a high pH solution to spill over the upset tank walls and onto the grounds of the POTW. Due to rapid response by the POTW operations staff, this spill did not result in a non-compliant discharge into the storm sewer which flows directly to the river. However, if the City's operating staff had not been present, a non-compliant discharge would have occurred with possible significant adverse impacts on the river.

Conditions must be identified as soon as they occur which could lead to the upset tank becoming full and overflowing. To prevent the upset tank from overflowing, an alarm should be installed that will notify both MASCA and City POTW personnel when the upset tank fills to within one volume of the tightline volume. MASCA must also develop and obtain City approval for an emergency response plan for responding to spills/releases of any type from the upset tank or tightlines. MASCA should grant authority to the City to shutdown the tightline flow under conditions where a spill/release from the tightline or upset tank could occur. This protocol (for shutdown) should specifically identify the individuals allowed to make such a decision and who may make such decisions in the absence of the primary decision maker(s).

As an additional measure of safety, flow metering and sampling stations shall be located at both ends of the two tightlines (existing and new). Continuous flow metering shall be provided on both lines to measure line loss or gain (leakage, infiltration).

4.1.2 Sanitary Sewer -- Outfall #002

Outfall #002 process wastewater flow rates are anticipated to double with the expansion. The anticipated flow from the domestic waste facilities on-site is also expected to increase approximately two (2) times based on an approximate 100% increase in workforce at the site. For the majority of the sanitary sewer system, these flow rates are within the existing capacity of the system. However, there are two (2) sections that are currently overloaded: Meridian Branch and the main leading from the Pioneer Street pump station to the POTW.

The overloaded Meridian Branch is expected to be replaced, starting in the spring of 1997 and should be on-line about the time the MASCA facility comes into full production. The existing 36-inch diameter trunk line from the Pioneer Avenue pump station to the POTW serves approximately 80 percent of the POTW service area and is currently in an overloaded condition. MASCA currently represents a very small portion of the flows in that main, and an increase of 50 gallons per minute would be insignificant as compared to other sources of the overloading problem on that section of pipe.

The hydraulic capacity for the upgraded POTW is based on flow projections from residential, commercial, and industrial growth and development. Projections for sanitary sewer flows from industrial and commercial activities were based on land use. For industrial land use, flows were estimated as 0.0027 MGD/acre. For MASCA this would equate to 0.26 MGD. MASCA's maximum domestic flow (i.e. discharge to #002) is expected to be 0.13 MGD, which is well under the projected flow for this type of land use. Accordingly, MASCA's sanitary sewer discharge is not expected to adversely impact the future POTW hydraulic capacity.

The existing treatment train on the organic solvent rinsewater system has a design capacity in excess of both the existing flow rates and the estimated flow rate at 40,000 wafer-outs per month (Kennedy Jenks Consultants, 1994). The City has expressed concerns regarding the impact of upset conditions in the treatment train, and the potential impact upset conditions could have on the POTW. A priority pollutant scan was performed on upset conditions. No toxin were identified at concentrations harmful to the POTW. However, the test was inconclusive on whether upset conditions could impact the POTW. The City will require MASCA to divert process wastewater flows from Outfall #002 to Outfall #001, which can handle the flows. However, this will require modification of MASCA's NPDES permit. Additionally, the City will no longer treat MASCA's non-compliant flows at the City's POTW.

While the quantity of wastewater from Outfall #002 does not present a significant impact, the quality of the effluent stream poses some risk to the POTW. Risk analysis is a combination of the probability of an event times the magnitude of the harm. The greater the harm, the lower need be the probability of an event for there to be significant risk. Analyzing and quantifying that risk is difficult because of numerous unknown factors. When there is scientific uncertainty concerning significant impacts, SEPA allows agencies to proceed in the absence of the vital information (WAC 197-11-080). To do so, the agency shall indicate in the SEIS its worst case analysis and the likelihood of occurrence, to the extent this information can reasonably be developed

In the case of MASCA's discharge from Outfall #002 to the POTW, the probability of an upset event occurring may be relatively small but the potential magnitude of harm is very large. The discharge from the POTW goes directly into the Puyallup River. The City is in the process of expanding the POTW in response to a request from the DOE to upgrade their system. The treatment process will be modified from a fixed biological growth activated sludge system to a suspended biological growth activated sludge system. In either case, the microorganisms responsible for the breakdown of waste are the same.

A partial or complete failure of the bacterial system could result from toxic discharges out of Outfall #002. The time needed to reestablish the biological population is not known. Because of the many factors involved it is possible that two weeks or more could be needed to return to minimal levels of treatment. Based on a projected sludge retention time of 10 days, it could be 30 days or more before the treatment process is completely stabilized or operating at design efficiency. Under this worst-case scenario, untreated sewage would be discharged to the Puyallup River because storage capacity for the flow is not available on the site. The impacts on the Puyallup River could be long lasting or permanent, and cannot be accurately estimated at this time.

The cause of a toxic discharge through Outfall #002 that could impact the POTW may fall into three categories: human error, mechanical failure, and unknown side effects. Human error has, and always will be, a potential cause of a toxic discharge. The system should be designed to minimize the possibility of such an error resulting in serious harm. But the recent example of the overflow at the clarifier tank illustrates that human error at MASCA has the potential to occur. It is not possible to predict all the possible scenarios in which human error could play a role that would result in damage to the POTW through the discharge from Outfall #002. Some event as simple as pouring the wrong chemical down the wrong drain or opening the wrong valve may occur.

The possibility for mechanical failure also exists. The existing treatment train on the organic solvent rinsewater system has a design capacity in excess of both existing flow rates and the estimated flow rates with Building D. The flow is passed through two carbon filters in series followed by adjustment to neutral pH. When an upset occurs that causes the waste stream to exceed its pH parameters, the stream is diverted to an upset tank. The current upset tank provides nine hours of storage to allow for correction of any problems. With one filter operating at the reported existing peak flow rate of 18 gpm, 75 minutes of contact time with the carbon filter is provided. It is recommended that 10 minutes of contact time is required to meet discharge requirements.

Any mechanical system, no matter how elaborately designed, has some probability for failure. The treatment system at MASCA for Outfall #002 has numerous places where mechanical failure could result in a toxic discharge. Recently one of the carbon filters plugged and it was necessary to divert the process stream into the upset tank. While this event illustrates successful containment of a potential upset, it also illustrates that mechanical failures occur. A worst case scenario would be the failure of the carbon filter to properly filter toxic substances and a failure of the upset detection system to alert operators of an upset condition. Together, these two events could result in an undetected toxic discharge to the POTW.

The third type of event that could cause harm to the POTW through Outfall #002 is from unknown side effects. Computer chip manufacturing technology is evolving with new products being developed continuously. In response, MASCA has altered its manufacturing process several times over the past 12 years to capture "market windows." These new products often require new processes that use new and different chemicals than what is currently being used today. In many cases, the development of these new chemicals proceeds the ability of the regulatory agencies to detect and monitor the chemical's environmental and human health impacts. The development of chemical extraction methods that allow for accurate detection may be behind the development of the new chemicals. Also, these new chemicals may have unknown synergistic side effects when combined with other substances. Many of these questions are not resolved before the chemicals are put into use in the industry.

As an example, the toxin in Outfall #001 causing MASCA to fail several of its NPDES discharge permit WET tests has not been identified despite having several different tests run. This event highlights how unknown side effects can cause significant impacts. The proposed change in volume of discharge to Outfall #002 and any future changes in manufacturing process or chemicals that discharge via this outfall could produce an unknown side effect on the POTW. A worst case scenario is where a change in process produces a new toxic chemical that is undetected by current methods and is still present in toxic levels after going through the pre-treatment level. Such a chemical could kill or seriously disrupt the bacteria at the POTW.

To mitigate these potential impacts and reduce the risk of a POTW failure, MASCA shall remove the organic solvent wastewater stream from Outfall #002 and thereby prevent discharge to the City's POTW.

4.1.3 Infiltration Pond -- Outfall #003

Flow rates from the DI plant to Outfall #003 at the infiltration/detention pond are projected to almost double. The existing system uses approximately 120,000 gallons in one eight-hour maintenance cycle once per week. The pond volume prior to overflow is approximately 1,276,387 gallons. It takes the existing pond approximately 24-36 hours to drain to its normal, low-water surface condition after each maintenance cycle. Based on expected inflow and outflow rates in the pond, the process wastewater discharge increase is expected to use 19 percent of the available pond volume once a week when the maintenance cycle is run. This would reduce the amount of volume that the pond could absorb from storm drainage for approximately one to one-and-a-half days per week.

The existing pond is underlain by Everett soils according the Natural Resource Conservation Service soils maps for Pierce County. Everett soils are excessively drained and considered to create a potential ground water pollution problem with infiltration if the water is not pretreated prior to entering the system. To eliminate this problem, MASCA would need to discontinue process water discharge to Outfall #003 and route the flow to another outfall. The process water would require pretreatment to discharge through Outfall #001. According to MASCA's predicted water balance, at full build-out, water use will be a maximum of 1.6 MGD. This is the current capacity of the tightline, and lower than the allocated capacity of the City/MASCA shared outfall. Outfall #001 has the capacity to handled the additional flow rate from Outfall #003 if a surge tank is constructed to detain and slowly release the high flows associated with a filter backwash operation. MASCA's NPDES permit will need to be modified in order for the process water flow to be re-routed from discharging through Outfall #0003 to Outfall #001.

4.2 INCREASED EFFLUENT LOADING ON PUYALLUP RIVER SYSTEM

The increased wastewater flow rates discharged from MASCA via Outfall #001 are anticipated to consist of higher concentrations of the same constituent base as currently exists. The increased wastewater flow discharged would lead to an increased Waste Load Allocation (WLA) in the Puyallup River. Table 10 shows seasonal WLA for the critical months of the year.

Table 10
Seasonal Waste Load Allocations (May - October, 1994)

Entity	BOD5 Maximum per Week (lb./d)	NH_3-N Maximum per Day (lb./d)
City of Puyallup	2085	880
Matsushita	175	240
Other Point Discharges	4,689	1,005
Non-Point/Background	9,878	241
Growth/Reserve	3,670	1,200
TMDL'S	**20,322**	**3,350**

Source: DOE, 1994.

The increased load in the Puyallup River would lead to decreased dilution factor and lead to an increase in the individual constituents concentrations. Due to the sensitive nature of the Puyallup River system, this could have a detrimental impact on the natural ecosystem there. It may also put the MASCA plant outside of its NPDES discharge permit allowances. The expanded MASCA wastewater treatment plant is designed to take this into account, but the results of these efforts would need to be verified by testing in the future condition.

The existing wastewater treatment system in place at MASCA is designed to meet the NPDES permit requirements. DOE has already approved the sanitary sewer improvements proposed by MASCA to handle the expansion of the facility. DOE anticipates that the proposed improvements will treat the wastewater sufficiently so that the concentration of toxins in the discharge would be within the limits of the NPDES permit (Ahmed, per. comm.). The permit requirements limit the concentration of constituents discharged, but do not completely eliminate impacts on the Puyallup River system and the surrounding environment. DOE is required to take into account the entire Puyallup River system in the NPDES permit process through examination of the WLA. There is no indication that the permitted levels of constituents in the effluent would have additional significant adverse effect on the Puyallup River system.

Literature reviewed indicates that there is a wide variability to the concentration of regulated constituents that are discharged from the MASCA site. Over the last six months of 1995, the NPDES report shows the following variances:

Outfall #001 Monthly Peak Flow: 0.69 - 0.98 MGD (42% change)
Outfall #001 pH High-Low: 8.3 - 6.4

Outfall #001 BOD_5 Monthly Max.: 5.0 - 16.0 mg/L (220% change)
Outfall #001 Ammonia Monthly Average: 5.8 - 13.6 mg/L (134% change)
Outfall #001 Fluoride Monthly Average: 7.7 - 10.9 mg/L (42% change)
Outfall #002 Flow Monthly Max.: 0.008 - 0.026 MGD (225% change)
Outfall #002 pH Monthly Peak: 7.5 - 9.0

No permit excursions were noted in these results. Since testing is periodic for most constituents, a more rigorous testing procedure may show different results. The results exclude the WET tests. A new monitoring/testing program shall be implemented that utilizes an impartial third party. The monitoring/testing plan will include: WET testing quarterly; results of the tests for flow rates and pH to be continuously recorded; and continuous, real-time metering provided on Outfall #002 to quantify domestic sewage flows to the City's POTW. The monitoring program shall be updated whenever the NPDES discharge permit limits for Outfall #001 are revised by Department of Ecology. Monitoring results shall be given to both the City and MASCA as soon as the results are available from the certified testing lab performing the analysis. Testing, calibration, and reporting, as required under the NPDES permit, will be performed by a neutral third part hired by the City and paid for by MASCA. Both MASCA and the City will have oversight of the testing. Reports will be submitted to MASCA, the City, and DOE.

The existing flow rates of process water in all three (3) outfalls will increase based on MASCA's predicted water balance. The new systems that MASCA will put in place in Building D expansion are planned to be less dependent on process water. The newer systems may use somewhat different processes, and hence it is prudent to expect that MASCA will have somewhat different concentrations of constituents, or even different constituents in the discharges. To mitigate for this, MASCA should inform the City about the changes prior to instituting the new systems. MASCA should also be interactive with both the DOE and the City, to identify any new potential impacts to the environment. As soon as the new processes are started in the Building D expansion, MASCA should start a complete discharge testing screen for regulated pollutants. This should identify any new or changed concentrations of regulated pollutants that escape the treatment systems.

Any significant changes in the process or chemical use will be subject to further SEPA review. This SEIS covers existing systems and process and is limited to the expansion of Building D. Changes to the existing process or new processes that are not part of the Building D expansion, are not covered under this analysis.

The Concomitant Agreement between the City and MASCA will need to be modified to incorporate the Building D expansion and the testing procedure described above. In addition, MASCA's NPDES permit will need to be modified/

4.3 DECREASED UPSET TANK LOADING TIME

The existing system has two (2) upset tanks in place. One of the upset tanks is for the solvent rinse system (Outfall #002), with the upset tank in the MASCA treatment plant. The other tank is for the combined acid waste and other treated wastewater which drain through the tightline (Outflow #001), and is located at the POTW. The upset tank volume, in each case, provides time to mitigate any problems that may occur at the wastewater treatment plant on-site, or in lines draining from the manufacturing buildings on-site.

The tightline (Outfall #001) and its upset tank at the POTW currently provides eight to 12 hours of protection in which the flows from the tightline can be fully diverted into the upset tank. This would be decreased to five and one-half hours at 1.6 MGD. Under all flow conditions, for both present and future conditions, water takes approximately 90 minutes to travel through the tightline. In any situation where diversion to the upset tank is initiated by the automated systems at the discharge end of the tightline, MASCA operators have 90 minutes less than the total time it takes to fill the upset tank to shut off flows. This means that MASCA would only have four hours in which to respond at 1.6 MGD flows. With the process water discharge re-routed to Outfall #001, flows in the tightline could reach 1.6 MGD.

The existing upset tank at the POTW will not be available in the future due to the proposed improvements at the POTW. Without the upset tank, caustic flush would be discharged directly into the Puyallup River. The constituents of the caustic flush would have a detrimental impact on the Puyallup River system. This is not allowed under the NPDES permit.

If MASCA were to construct a new upset tank somewhere in the vicinity of the existing tank, then the existing upset tank could be taken off-line without impacting the ability of MASCA to provide upset capacity. MASCA shall own, operate, and maintain the new upset tank. A new upset/diversion tank with a minimum 500,000 gallon capacity shall be provided by MASCA at the outlet of both tightlines. The basis of tank sizing shall be provided prior to construction in an engineering report meeting City and DOE requirements.

The upset tank on the current Outfall #002 provides a minimum of 16 hours of protection under full build-out conditions (33,220 gallons/34 gallons per minute/60 min. per hour = 16 hours). This gives MASCA time to correct problems, or potentially shut down the discharge completely.

4.4 POTENTIAL TOXIC SANITARY SEWER FLOWS AND IMPACT ON POTW

Outfall #002 is not tested for WET. The toxin causing the problems in the WET test for Outfall #001 has not been identified in a standard TTO priority pollutant screen (Parametrix, 1995; DEA, 1996). TTO screens are periodically performed on all outfalls, but have not identified problems (Ahmed, per. comm.). Data are not available to determine if the toxin providing WET test problems in Outfall #001 are in other outfall flows. Combining all process wastewater flows into Outfall #001 may eliminate the uncertainty.

Increased flow rates and decreased upset tank loading time on Outfall #001 would increase the need to keep the existing upset tank at the POTW empty for emergency situations. If the current scheme of draining the upset tank into the headworks of the POTW continues with the MASCA build-out, an increase in toxins from Outfall #001 draining into the POTW can be anticipated. As noted earlier, MASCA has had a problem with WET in their system, even though in most cases they have not been outside of their NPDES permit limits for toxicity. The impact of increased toxins on the POTW may cause the City to fail their WET testing criteria for their NPDES. The POTW is currently experiencing problems which are assumed to be related to the MASCA caustic flush or discharged out-of-condition wastewater diverted into the upset tank on the POTW property. Although no direct relationship has been documented, this does seem reasonable. If the POTW continues to fail their WET testing criteria, they could be potentially forced to treat or pre-treat their influent for the toxins present. Given the large flows that the POTW handles, this would be very expensive.

The current standard operating procedure of trickling the upset tank discharge into the POTW headworks should be discontinued and alternate measures of treatment, such as batch treatment in place, should be undertaken. In the case of batch treatment in place, the discharge pipes from the existing upset tank would need to be altered to allow discharge back into the Outfall #001 discharge. As an alternative to batch treating, the upset tank effluent could be transported from the POTW to MASCA's wastewater treatment plant and re-treated there. After re-treatment, the wastewater would be allowed to discharge, normally through Outfall #001.

It may be possible to install cation exchange resin based filters on Outfall #001 in an attempt to filter toxins out before discharged into the river. Due to the high flow rates of the wastewater discharged through Outfall #001, the filter system necessary to provide this kind of protection would be very large and costly. It is also not certain that the filter would remove the toxins identified as causing the problem, since these compounds are unknown at this time. A back-up system would also need to be provided.

The TIE should be continued in an attempt to identify the source of the toxins. After the source of the toxin has been identified, then treatment would only have to be for that portion of the system containing the toxin. Since the TIE has not been completed, it is not known what flow rates would be associated with treating the toxins at their source.

4.5 HISTORICAL TIES BETWEEN AGENCIES AND MASCA

With the interdependency of the treatment facilities for both the City and MASCA wastewater systems, cooperation between the two (2) entities is essential. As a whole, MASCA tends to be self-reliant. There are problems at the site that are handled at an operational level that may not be made public. MASCA will develop protocols to make the City more aware of these individual problems and how they are handled. Documentation will be copied to both the City and DOE. Additionally, City personnel involved at the POTW shall be allowed to observe and train with MASCA.

5.0 SUMMARY OF MITIGATION MEASURES

1. Flow metering and sampling stations shall be constructed at both ends of the existing tightline and at both ends of the proposed tightlines prior to issuance of any certificate of occupancy. Continuous flow metering shall be provided on both lines to measure line loss or gain (e.g. leakage, infiltration).

2. The MASCA wastewater treatment expansion shall be completed prior to the discharge of any process waste from Building D.

3. The City will require MASCA to institute testing that will include the following:

   a. Installing pH probes at the inlets and outlets of both tightlines;
   b. Installing flow totalizers at the inlets and outlets of both tightlines;
   c. Installing flow transmitter on existing Parshall flume measuring flows in the sanitary sewer and across the V-notch at Outfall #002. Flow signal shall be transmitted to a new flow recorder at the POTW;
   d. Installing composite samplers, flow proportion capable, at the inlets and outlets of both tightlines; and
   e. Results of flow proportioned composite sampling shall be furnished to the City and MASCA as soon as they become available.

4. A monitoring/testing program for Outfall #001 shall be implemented that utilizes an impartial third party following the monitoring/testing schedule shown below. MASCA and the City shall enter into contracts with a third party to collect grab and 24-hour flow-paced composite samples for compliance with the testing requirements. Testing is to be carried out by a Washington State certified laboratory. The cost of testing will be the responsibility of MASCA. The laboratory shall send the test data to the City for information and to MASCA for submission of monthly discharge monitoring reports to DOE. Should MASCA elect to operate their own outfall to the Puyallup River, the City will not require this monitoring/testing schedule.

Parameter	Location(s)*	Frequency*	Sample Type
Flow	Both tightline inlets and outlets	Continuous	Flow totalizer
pH	Both tightline inlets and outlets	Continuous	pH probe
BOD_5	Both tightline outlets	Weekly	24-hour flow-paced composite
TSS	Both tightline outlets	Weekly	24-hour flow-paced composite
Fluoride	Both tightline outlets	Weekly	24-hour flow-paced composite
Phosphorous	Both tightline outlets	Weekly	24-hour flow-paced composite
Ammonia	Both tightline outlets	Weekly	Automated sampler/analyzer
TRCl	Both tightline outlets	Weekly	24-hour flow-paced composite
TTO	Both tightline outlets	Quarterly in the 4th year	grab[2]
WET	Both tightline outlets	Quarterly	grab/24-hour flow-paced composite
Mercury	Both tightline outlets	Monthly	24-hour flow-paced composite
Priority Pollutants[1]	Both tightline outlets	Quarterly	24-hour flow-paced composite

* Sampling and testing shall be performed on any day there is flow in a given tightline.

1 - After one year, the City and MASCA will discuss the benefits of continuing the testing.

2 - First sampling year 1998

5. The monitoring program shall be updated whenever the NPDES discharge permit limits for Outfall #001 are revised by DOE. Monitoring results shall be given to both the City and MASCA as soon as the results are available from the certified testing lab performing the analysis.

6. Prior to the the discharge of any process waste from Building D, MASCA shall have operational upset tank(s) with a minimum 500,000 gallon capacity. The basis of tank sizing shall be provided prior to construction in an engineering report meeting City and DOE requirements. The upset tank shall be designed to accommodate pipeline hydraulics for high river/high flow periods.

7. Once the MASCA on-site upset tank is made fully operational, the operation shall be as follows:

   a. When monitoring results show the flows to be out of compliance for pH, MASCA shall immediately notify the City and, the flows shall be diverted to the upset tank. When the upset tank is full and the flows are still not in compliance, flows to the tightlines shall be stopped. The upset tank at the POTW shall be used only to drain and treat wastewater remaining in the tightline following an upset condition, and for diversion of high pH water during tightline sanitation.

   b. If flow into the upset tank continues to the point where less than 100,000 gallons of capacity remain and corrective measures have not been successful in getting the tested parameter within allowable ranges, MASCA shall shut down flows prior to entering the tightline pipe. The City shall have the authority to shutdown the tightline flow under these conditions. Access to the shutdown valve for both tightlines shall be provided for the City on a 24-hour basis.

c. The upset tank shall be emptied through Outfall #001 only after its contents have been tested and shown to be in compliance with permit limits.

d. If the upset tank contents cannot be brought into compliance, MASCA shall pump out and transport the contents back to the MASCA treatment facility or to another permitted treatment facility that can legally treat and dispose of the wastewater.

e. If flows from the MASCA treatment plant through the primary tightline are not in compliance, these flows may not be diverted into the secondary tightline until the upset tank has been emptied and has capacity to receive non-compliance flows discharged to the secondary tightline.

8. The current practice of discharging MASCA flows from the existing upset tank into the City's POTW headworks shall be discontinued prior to the completion of the POTW expansion. During the interim, pumping improvements shall be made at the POTW to control the flow rate from the upset tank to the headworks. Cost of such improvements shall be the responsibility of MASCA and be approved by the City. Prior to discharge of MASCA wastewater from the upset tank to the POTW headworks, the tank contents shall be treated by MASCA to pH between 6 and 9 which shall be confirmed by testing performed by the City. Tank contents shall not be released to the headworks without authorization by the City's POTW Superintendent or Chief Operator and only during hours specified by the same.

9. The TI/RE underway to identify the source of toxicity in the MASCA effluent shall be in conformance to the RCW's and WAC's. When the source of toxicity has been determined, MASCA shall promptly take appropriate action to eliminate the source of toxicity either through treatment, manufacturing process changes, or tightline maintenance.

10. MASCA shall alert the City whenever treatment process changes or upsets occur at the MASCA wastewater treatment facility. An emergency response plan providing a written protocol for managing upset conditions and alerting the appropriate individuals shall be developed by MASCA and approved by the City and the DOE prior to Building D operation. MASCA shall also familiarize City personnel with its treatment facilities and operations.

11. Flows from all process water discharges from all MASCA plant operations, including process waters presently discharged through outfalls #002 and all flows discharged through Outfall #003, shall be combined and discharged only through Outfall #001. Control shall be implemented to ensure that the wastewater from Outfall #002 receives adequate pretreatment at MASCA prior to discharge to Outfall #001. In addition, all pipes which could divert the process wastewater into Outfall #002 shall be removed. Process water from Outfall #003

will not be discharged to the existing detention/infiltration pond, but will instead be pretreated before discharge to Outfall #001.

12. MASCA shall coordinate the change of Outfall #002 and Outfall #003 into their NPDES permit and shall initiate the amendment process immediately. MASCA shall begin investigating treatment processes for Outfall #002 and Outfall #003 by preparing an engineering study to investigate methods for elimination of the solvent stream from Outfall #002 and process wastewater from Outfall #003. This study must be conducted, the approach approved, and the construction completed prior to MASCA's NPDES permit renewal date scheduled for 1999.

13. Domestic sanitary sewage flows from the current Outfall #002 will continue to be conveyed to the POTW for treatment. Continuous, real time flow metering shall be provided on Outfall #002 to quantify domestic sewage flows to the City's POTW.

14. When MASCA constructs a second tightline, MASCA shall own, operate, and maintain a second tightline.

15. The second tightline shall be designed and constructed to meet the following minimum requirements:
    a. Meet all applicable DOE and City standards;
    b. Be properly located in right-of-way, easements, or on purchased property;
    c. Have at least the capacity of the existing tightline so that one of the tightlines can be taken off-line for maintenance and cleaning;
    d. Be designed and constructed of adequate design and materials to prevent exfiltration and to withstand instantaneous pressures associated with the hydraulic grade line of the system;
    e. Accommodate scouring and/or cleaning of the line to alleviate potential biological growth.
    f. Provide drainage, monitoring, and sampling facilities along the length of the tightline; and
    g. Install an upset tank and related diversion system on the second tightline shall be implemented to prevent discharge of out of compliance wastewater to the Puyallup River.

16. Prior to issuance of a certificate of occupancy, MASCA shall install a high level alarm on the upset tank at the POTW which notifies both MASCA and the City of an impending overflow condition.

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APPENDIX

Human Health Risk Assessment -- Sanitary Sewer

1. INTRODUCTION

1.1 Analysis Framework. This analysis evaluates the potential impact of MASCA facility effluent on the local POTW and on a proposed activated sludge treatment system. The two (2)-day effort allocated for the review permitted only a brief review of the materials received. The following report is the professional judgment of a senior sanitary engineer based on these data.

1.2 Issue. This technical appendix addresses the potential impact of effluent discharges from the MASCA plant on the City of Puyallup POTW.

2. METHODS

2.1 Literature Review. A Workplan for Conducting a Toxicity Identification/Reduction Evaluation (TIE) prepared by Parametrix, Inc. (November, 1995) and a Final Engineering Report Wastewater Treatment Plant Expansion Puyallup Facility (Kennedy/Jenks Consultants, August, 1994) were reviewed.

2.2 Data Collection. Site maps and chemical data related to the applicable National Pollutant Discharge and Elimination System Permits (NPDES) for the outfalls from the facility and copies of the NPDES permits were reviewed, as well as monthly records of operation of the POTW and reports of three bioassay tests conducted in February, May , and September of 1995, on the POTW effluent. Phone conversations with John Wilson of Gray and Osborne and Randy Marshall of the Washington Department of Ecology (DOE) were also data sources.

3. RESULTS AND DESCRIPTION OF EXISTING CONDITION

MASCA's discharges are regulated by National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit Number WA-003957-8.

Table 1
Key Permit Limitations For Outfall #001

Parameter	Average Monthly	Maximum Daily
Flow, mgd	0.7-1.6	0.98-1.88
pH	6.0-9.0	
BOD5, mg/L	15-7	30-13
TSS, mg/L	15	30
Fluoride, mg/L	16	26
Phosphorus, mg/L	3	5
Ammonia, mg/L	11	18
Residual Chlorin, mg/L		50
Total Toxic Organics	Narrative	
Mercury, g/L		0.08
WET (acute)		No significant response
WET (chronic)		No significant response

These limits reflect receiving water quality requirements of the Puyallup River.

Table 2
Permit Limits For The Discharge To The POTW (Outfall #002)

Parameter	Average Monthly	Maximum Daily
Flow, mgd		0.038-0.076
pH	6.0-9.0	
Total Toxic Organics	Narrative	

Table 3
Permit Limits For The Stormwater Detention Pond (Outfall #003) Are:

Parameter	Average Monthly	Maximum Daily
Flow, mgd	No pond overflow permitted	
pH	6.0-9.0	

The streams tributary to Outfall #001 include:

1. A fluoride/phosphate/ammonia (F/P/A) stream composed of drain wastewaters collected from various points around the MASCA plant;
2. A reverse osmosis system flushing/cleaning solution (ROF);
3. A deionization mixed bed regenerant (DIMBR);
4. An acidic stream composed of spent process acid baths and acid rinsewaters (Acid); and
5. A reverse osmosis system reject water stream (ROR).

Table 4
Estimated Quality (in mg/L) Of Regulated Parameters Tributary To Outfall #001

Parameter	F/P/A Waste	ROF	DIMBR	Acid	ROR
NH3-N	110-190	0.23-0.54		2.4-2.9	<0.1
F	1.3-190	1.5-2.9	47	1.46-6	
PO4-P	130-200	0-50		0.17-0.55	
Cl2	12	0-1.1		1.6	
Hg	<0.001	0-0.0008	<0.001	<0.001	
BOD5	<2.0	<5.0	<2.0	<2.0	<2.0
TSS	2.2-310	3-67	16.5	0.2-3.0	3.1
pH	2.1		6.2	2.9-3.4	5.9
TTO	<0.12			8.2	

Source: Kennedy/Jenks, 1994

Table 5
Estimated quality of the Solvent/Organic rinse water tributary to Outfall #002

Parameter	S/O
NH3-N	3.5
F	1.51
PO4-P	9.6
Cl2	
Hg	
BOD5	142
TSS	57
pH	5.6
TTO	2.62

Source: Kennedy/Jenks

Outfall #003 receives deionization filter system backwash waters from the sand, carbon, and final polishing filters that does not require treatment (Kennedy/Jenks, 1994).

The NPDES permit for the POTW was not reviewed, however, this permit requires ammonia removal to 8 mg/L in addition to standard secondary treatment and that the effluent must pass tests for Whole Effluent Toxicity (WET) (John Wilson, pers. comm.)

MASCA provides treatment facilities for each of the streams tributary to outfalls #001 and #002. Inspection of the influent and effluent requirements given in the above tables indicated that treatment is required for adjustment of pH and removal of TSS, fluoride, phosphorus, ammonia, and total toxic organics (TTO) prior to discharge to the Puyallup River via Outfall #001. For the stream tributary to the POTW via Outfall #002, all parameters are in the range of normal domestic sewage that should be treatable in a conventional treatment facility with the notable exception of TTO.

MASCA's treatment system for the F/P/A waste, DIMBR, and ROF streams includes lime addition and sedimentation for acid neutralization and precipitation of fluoride and phosphorus and liquid/air stripping for removal of ammonia. The effluent from this stream is combined with the Acid and ROR streams and treated for pH adjustment in two (2)trains each with a series of four (4) tanks in series. The effluent from this treatment scheme is dechlorinated using sodium bisulfite prior to discharge to Outfall #001. At the POTW a pH monitoring point automatically diverts effluent to an equalization tank if the pH is out of permit limits (6-9 units.) No further pH neutralization facilities are provided at this equalization tank. This effluent is manually released into the POTW system by City personnel when a diversion takes place. It is noteworthy that there is no specific treatment step for removal of the 8.2 mg/L of TTO estimated in the Acid waste stream except for pH neutralization and dechlorination.

The S/O stream tributary to Outfall #002 is treated at MASCA by carbon adsorption and pH neutralization. The carbon adsorption step would be targeted at removal of the 2.62 mg/L of TTO estimated for this stream (Kennedy/Jenks, 1994).

The Parametrix report states that the MASCA effluent tributary to Outfall #001 consistently failed to meet NPDES permit requirements for WET tests through April 1995. There has been no access to reports of WET testing on this outfall. The report includes preliminary results from efforts to identify the cause of failure. The report states that since notification by the DOE in September of 1995, of WET test failure, MASCA has made improvements in the treatment system resulting in significant concentration reductions and/or improved treatment consistency for total solids, calcium, fluoride, phosphate, and ammonia in the final effluent. Since all of the improvements have been operational, MASCA has been in compliance with its NPDES permit limit for WET testing.

The Parametrix report summarizes the results of a Toxicity Identification Evaluation (TIE). None of the standard TIE procedures were effective to reduce effluent toxicity. Additional treatments including ion exchange and powdered activated carbon treatment and high pH stripping were tried. Only zeolite and cation exchange resins were successful in reducing effluent toxicity. Parametrix concluded that the toxicant was either an inorganic cation (e.g., metals, salts) or a low molecular weight polar organic compound with cationic charge. The TIE was interrupted when the sample became non-toxic. It is hypothesized by Randy Marshall that this could have happened if the toxicant were a surfactant that had adsorbed onto the sides of the sample bottle.

4. POTENTIAL FOR IMPACT

Potential for impact to the City of Puyallup POTW operation exists for each of the two (2) MASCA outfalls tributary to the POTW (Outfall #001 and Outfall #002). This potential exists due to the possibility of failure of MASCA's treatment systems to remove regulated pollutants.

A failure of MASCA treatment processes for the streams tributary to Outfall #001 in removal of phosphorus, ammonia, pH neutralization, and TTO could adversely effect the ability of the City's plant to meet its discharge requirements for these parameters in the event of transfer to the City's plant upon diversion of wastewater at the equalization tank. The City plant currently includes grit removal, primary sedimentation, and secondary treatment by rotating biological contactors prior to chlorination and discharge. The City's new plant will replace the RBC units with an activated sludge process designed for a solids residence time of 10 days for removal of organics and ammonia. High concentrations of ammonia and phosphorus from upstream treatment failure at MASCA could cause failure of the City's biological process to remove these nutrients down to the limits set in their NPDES permit. Un-neutralized pH shocks could kill biological treatment organisms at the City plant and cause failure of the units to remove organics as well. If all MASCA treatment processes are efficient in reduction of phosphorus and ammonia, and in neutralization of pH, then the high TTO values indicated in the Kennedy/Jenks report and the failure of the Outfall #001 WET tests suggest that potential still exists for toxic impact at the City plant in the event of diversion.

It is not certain that the change from RBC to activated sludge will result in a significant change in the susceptibility of the City plant to upset or failure as a result of MASCA diversion. The RBC process features attached biological growth. The solids residence time of treatment organisms in the process is not controlled, but may be in the neighborhood of 5 days. The activated sludge process will be designed for a solids residence of 10 days, so that a larger inventory of treatment organisms will be available. It is possible that the activated sludge process may be more effective in removal of TTO components by biological uptake than the RBC process for this reason. The activated sludge process has an additional mechanism for removal of molecular ammonia and organics, namely stripping, that also may tend to increase removals.

Depending on the process configuration used, whether plug flow, complete mix, or contact/stabilization, the process may be more or less susceptible to upset than the RBC process. The RBC process is similar to the plug flow configuration for activated sludge and would be expected to have a similar response to shock loads. The complete mix configuration reduces the concentration of all substrates in the treatment tank, but exposes all organisms in the aeration tank to this concentration at once. The contact/reaeration configuration could be the most resistant to process upset from shock loads since the bulk of the treatment organisms are stored off-line and would not see shock loadings. Capability for operation in all three of these modes is advisable for the new Puyallup plant.

For the stream tributary to Outfall #001, there is no data on the toxicity of the stream. The treatment method employed at MASCA, namely, carbon adsorption would be expected to remove many organic toxicants. Failure of these systems would endanger the City system in that the high concentration of TTO in the stream could cause the City to fail its WET test.

5. MITIGATION MEASURES

Alternative methods of handling diversions from MASCA effluent Outfall #001 should be investigated, these could include:

1. Return of effluent to the MASCA plant for treatment,;
2. Installation of treatment capability at the diversion site for pH neutralization and/or organics removal; and
3. MASCA plant process modifications to remove streams containing toxic organics from the stream that can be diverted to the City plant without treatment and/or separate treatment for organics removal.

Supplemental Environmental Impact Statement

Human Health Risk Assessment

MASCA Puyallup Plant
Building D Expansion
(*Puyallup Science Park*)

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LIST OF ACRONYMS

Acronym	Definition
ACGIH	American Conference of Government Industrial Hygienists
ASIL	Acceptable Source Impact Levels
BAAQMD	Bay Area Quality Mangement District
City	City of Puyallup
DI	De-ionization
DOE	Washington State Department of Ecology
EF	Emissions Factors
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
HAP	Hazardous Air Pollutant
HEAST	Health Effects Assessment Summary Tables
HQ	Hazard Quotient
IDLH	Immediately Dangerous to Life and Health
IRIS	Integrated Risk Information System
ISCST3	Industrial Source Complex Short Term Model
MASCA	Matsushita Semiconductor Corporation of America
MSDS	Material Safety and Data Sheets
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated Biphenyl
POTW	City of Puyallup Publicly Owned Treatment Works
PSAPCA	Puget South Air Pollution Control Authority
RBSC	Risk-based Screening Concentrations
RfC	Reference Concentrations
RfD	Reference Doses
RME	Reasonable Maximum Exposure
SEIS	Supplemental Environmental Impact Statement
SF	Slope Factors
STEL	Short Term Exposure Limits
TWA	Time Weighted Averages
VOC	Volatile Organic Carbon

EXECUTIVE SUMMARY

A screening level human health risk assessment was performed for the Matsushita Semiconductor Corporation of America (MASCA) computer wafer production facility located in Puyallup, Washington. This risk assessment was conducted as part of a Supplemental Environmental Impact Statement (SEIS) for the expansion of the current facility, and focuses on correlating human exposure to site-related environmental media with human health pathologies. The two media focused on were wastewater and stormwater discharges into a detention/infiltration pond on the MASCA property, and air emissions from the acid scrubber stacks and the uncontrolled Volatile Organic Carbon (VOC) stack. A comparison was made between existing environmental conditions at the facility and projected conditions as a result of the facility expansion.

Surface water data consisted of the analysis of one (1) grab sample of water taken from the detention/infiltration pond and process water outflow. Air stack test data and estimated concentrations calculated from process knowledge and emission factors provided chemical concentrations for air dispersion modeling. The resulting air chemical concentrations were modeled at the MASCA fenceline, for both existing and projected conditions.

Most chemicals found in the detention/infiltration pond water were at concentrations below background levels or below toxic thresholds. One (1) organic chemical, bis (2-ethylhexyl) phthalate, was detected at levels above the regulatory limit of 1.0 E-6 excess cumulative cancer risk. Exposure pathways modeled included dermal adsorption and ingestion of pond water containing this compound. Ways of mitigating potential toxic exposures are suggested in this report include regular testing of the infiltration pond water and construction of stormwater bioswales

Monitoring data, obtained via stack testing, indicated that air emissions from the MASCA VOC stacks may be high enough to warrant review by the Puget Sound Air Pollution Control Authority (PSAPCA). The screening-level risk assessment concluded that current emissions do not exceed regulatory limits. Analysis of anisole and catechol air concentrations, if extrapolated from benzene carcinogenicity data, indicated potential health problems as a result of exposure to current uncontrolled emissions of these two compounds. It should be noted that neither of these compounds is currently classified as a known carcinogen and the extrapolation from benzene data most likely resulted in an overestimate of human health risk related to inhalation of current MASCA-related levels of these compounds.

It is likely that after facility expansion, levels of VOC and Hazardous Air Pollutant (HAP) emissions, if left unabated, would be large enough to quality MASCA as a major source. MASCA has announced plans to install thermal destruction equipment on the existing Building C VOC stack and on the proposed Building D VOC stack. Installation of this equipment should reduce air emissions below any regulatory limit or toxic threshold.

It is recommended that MASCA further study process chemical usage and process flow design, and further test stack emissions for chemical concentrations. The results of these studies should be forwarded to PSAPCA so strategies may be developed to prevent contaminating the local airshed. It should be noted that MASCA has agreed to install state-of-the-art VOC abatement equipment on both the existing Building C and the proposed Building D VOC stacks. The planned installation of

these control devices will reduce MASCA VOC emissions below regulatory limits and should reduce emissions to levels below toxic thresholds.

There is potential for impact on the City of Puyallup Publicly Owned Treatment Works (POTW) if treatment systems maintained by MASCA fail to remove regulated pollutants. One waste stream in the flow to Outfall #001 may contain toxic organic compounds. The treatment system for this stream does not currently have a unit treatment process to remove organic chemicals. The MASCA effluent has failed to pass required whole effluent toxicity (WET) tests in the past. Thus diversion of this stream to the City of Puyallup's sewage treatment plant poses some risk that the City's biological treatment processes will be adversely affected by the discharge and/or that the City's effluent may not pass its required WET tests while the MASCA effluent is being diverted.

The MASCA wastewater stream that routinely flows to the City plant (Outfall #002) does have a treatment process for removal of organics. There is no evidence to date that this stream has been harmful to the POTW, and it is not likely that changing unit process at the City plant from rotating biological contactors to activated sludge would change that situation. However, the City is going to require MASCA to re-route the existing process wastewater discharging via Outfall #002 to discharge through Outfall #001. This will combine all of MASCA's process wastewater into a controlled system that can be shut down when flows are out of compliance and eliminate any potential for MASCA flows to harm POTW facility. This will require modifications to MASCA's National Pollutant Discharge Elimination System (NPDES) permit.

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1.0 INTRODUCTION

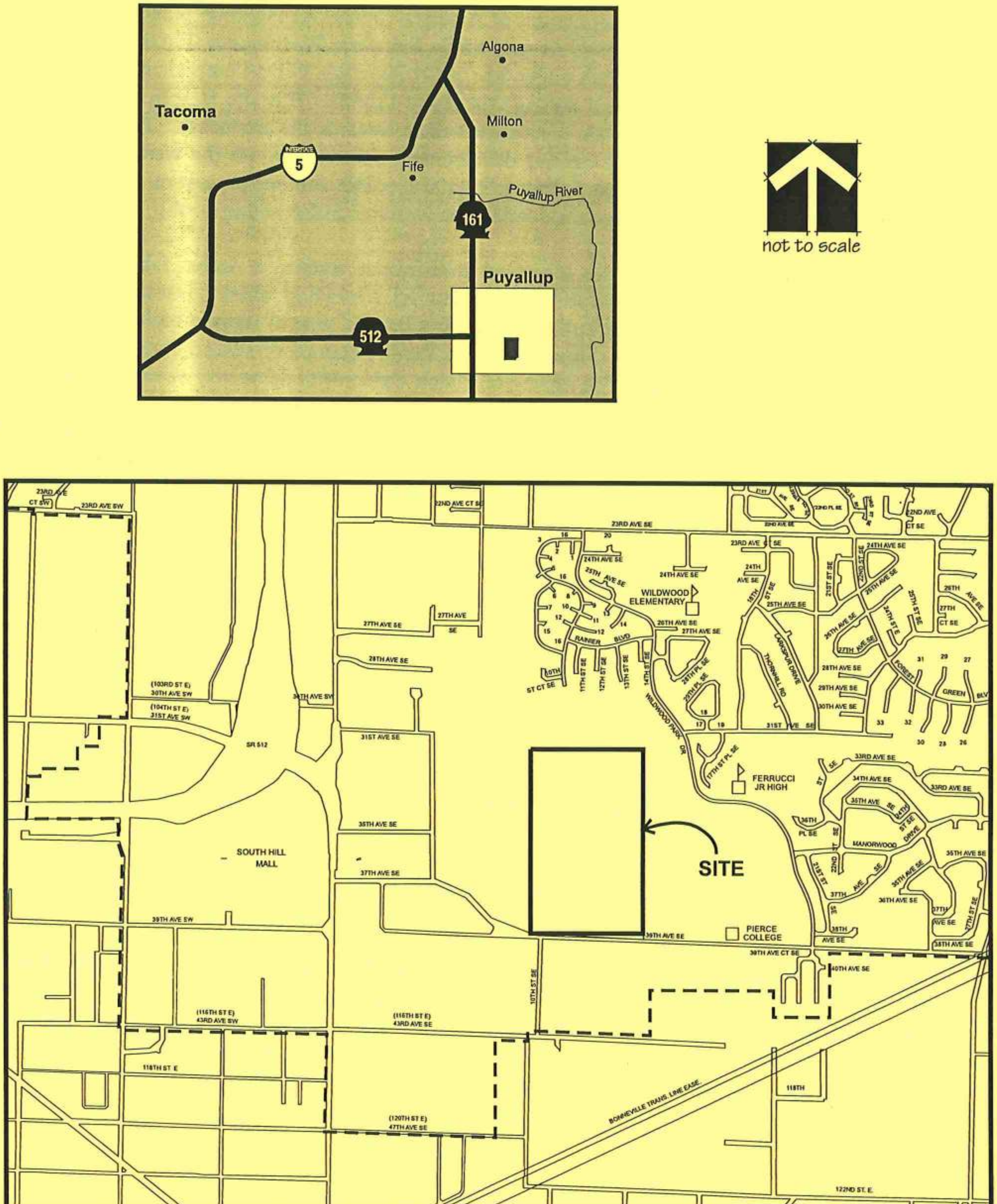
The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitant zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.

The site is served by gravity sewers, which drain to the City of Puyallup Publicly Owned Treatment Works (POTW), and by a tightline system which drains to the Puyallup River. The tightline discharges treated wastewater which bypasses the POTW. Periodic backwash water from carbon filters is discharged into an existing on-site infiltration pond. All three discharges are permitted and regulated under a National Pollutant Discharge Elimination System (NPDES) permit.



Source: *City of Puyallup*

Figure 1:
Vicinity Map
ENVIRONMENTAL HEALTH - HUMAN HEALTH RISK ASSESSMENT

MASCA

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

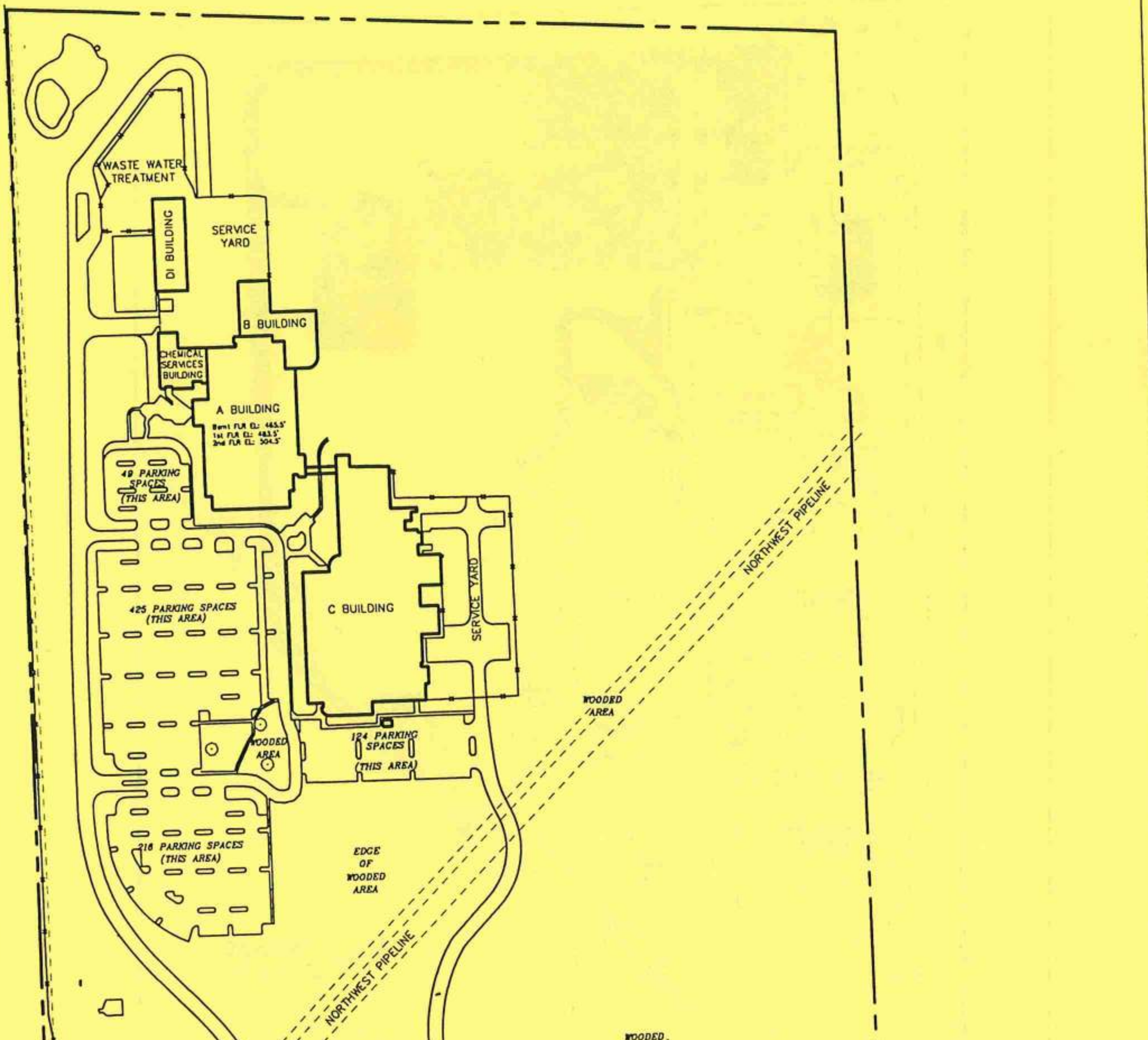


Figure 2:
Existing Site Plan

DAVID EVANS AND ASSOCIATES, INC.

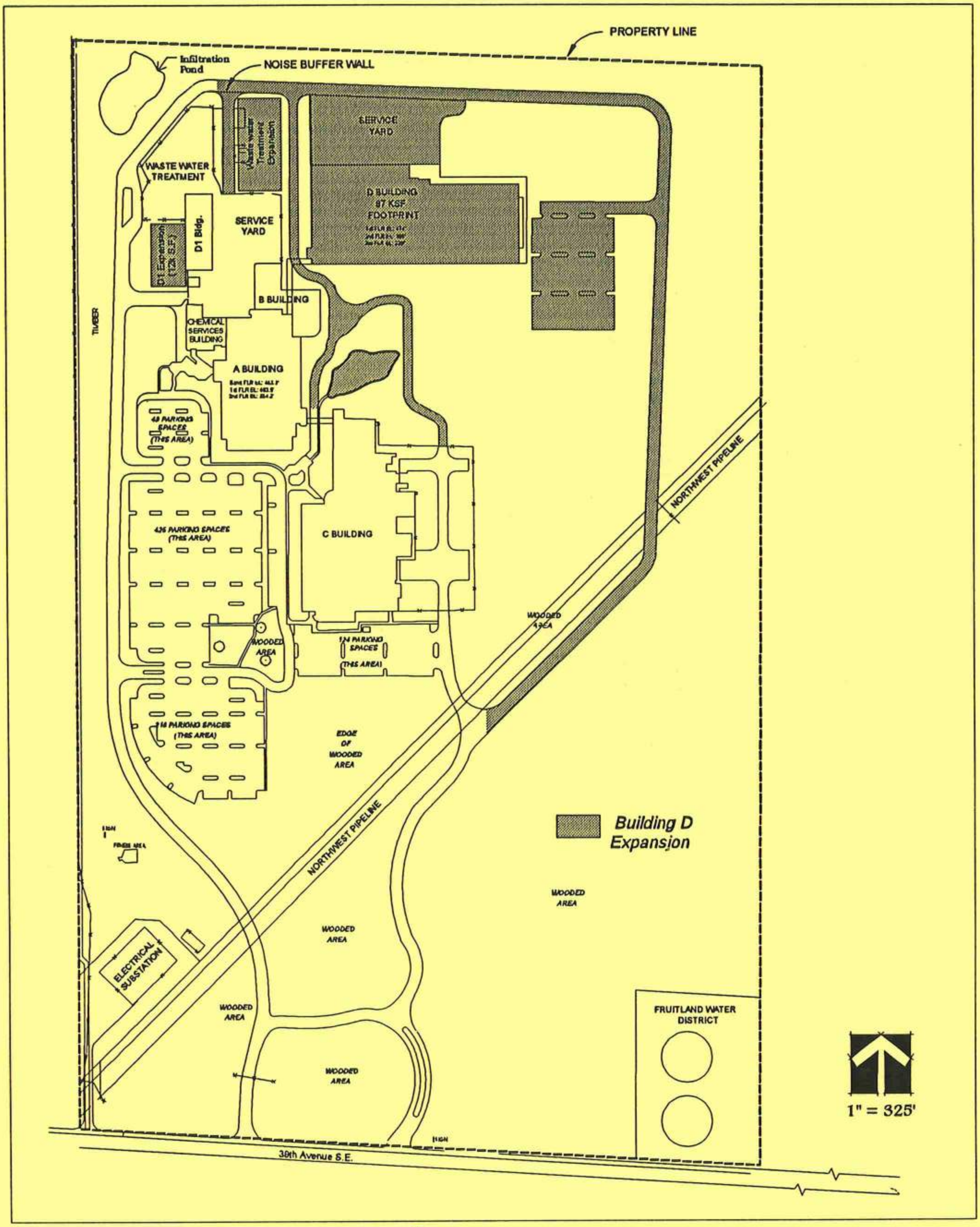


Figure 3:
Proposed Expansion Site Plan

This assessment focuses on correlating human exposure to site-related environmental media with human health pathologies. The media evaluated included wastewater and stormwater discharges from the facility and air emissions from the acid scrubber stacks and the uncontrolled Volatile Organic Componds (VOC) stacks. Human exposure is possible from this detention/infiltration pond, either through direct contact or infiltration of the wastewater into surface and groundwaters. Exposure to ambient air containing MASCA-related chemicals is possible, most likely as a result of normal industrial operations.

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2.0 METHODS

A scientific method to determine human health risks from possible exposure to toxic chemicals is termed a Human Health Risk Assessment. This term applies to a series of analyses which include the following: demographics, meteorology, site, and exposure analysis; toxicological evaluation; and risk characterization. The site was first analyzed for general geographic location, demographics, climate, and hydrogeology. This provides the setting for the risk assessment. Data was collected from various environmental media to determine the toxic substances involved. Appropriate exposure scenarios were then envisioned for the site to identify the human population potentially affected. The chemicals identified in the data collection step were then evaluated for their toxicity and cancer-causing effects. Finally, the risk to the exposed populations of adverse health effects due to site-related chemical exposures was estimated using equations developed by the U.S. Environmental Protection Agency (EPA) (1989, 1991a).

This methodology can be extended to include calculations of the chemical concentrations that would indicate unacceptable risk (risk-based screening concentrations [RBSCs]), which are then compared with site-related data. If the site data are shown to be less than the RBSCs, an assumption is made that the site-related chemical concentrations do not indicate toxic levels.

2.1 LITERATURE REVIEW

This risk assessment was performed using appropriate EPA risk assessment guidance (EPA 1989; 1990; 1991a, b, c, d; and 1992). In addition, the EPA Integrated Risk Information System (IRIS) (EPA 1995) database and the Health Effects Assessment Summary Tables (HEAST 1994) were used to obtain EPA-certified toxicity factors. The following additional sources of toxicity information were used:

- Threshold Limit Values (American Conference of Government Industrial Hygienists [ACGIH] 1994),
- National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards (NIOSH 1994); and
- Puget South Air Pollution Authority Regulation III (PSAPCA 1994).

2.2 DATA EVALUATION

This section evaluates available data for the detention/infiltration pond surface water composition. In addition, modeled fenceline concentrations of site-related air contaminants were provided (Bloom, personal communication, February 20, 1996).

2.2.1 Surface Water

Surface water data were derived from the following sources:

Sampling performed on September 13, 1993, by MASCA. The data were submitted to Spectra Laboratories on the date of sampling as part of the NPDES application. One grab sample from the infiltration pond was analyzed for metals, semivolatiles, volatiles, organochlorine pesticides, and polychlorinated biphenyl (PCBs) (Spectra Laboratories, 1993). The metals detected above the detection limits were zinc, aluminum, and manganese. The only organic compound detected above the detection limit was phenol.

Sampling performed by MASCA in 1994. The data were submitted to Laucks Laboratories as part of the requirements for the NPDES permit. Ten grab samples from the infiltration pond were analyzed for manganese and iron. The average concentration for manganese was used for this risk analysis; iron is considered an essential nutrient and is only toxic at extreme concentrations.

Sampling performed in February, 1996, by David Evans and Associates, Inc. (DEA). The data were submitted to Analytical Resources, Inc. One grab sample from the process water outfall going into the infiltration pond (Outfall #3), and two grab samples from the detention/infiltration pond were analyzed for volatile and semivolatile organics, pesticides, PCBs, metals, and cyanide. Arsenic, copper, zinc, lead, chloroform, and bis (2-ethylhexyl) phthalate were detected above detection limits.

Detection limits for metals and organic compounds were reported in parts per million (mg/L) and in parts per billion (g/L), respectively. All tests were performed using EPA standard methods. For more detailed information on sampling, including methods and detection limits, refer to the Water, Wastewater, and Sediment Sampling Plan (DEA, 1996).

2.2.2 Air

Three (3) different sets of data were used to determine the fenceline air concentrations. An original 1995 air emission rate dataset (Dataset #1) was based on information provided by MASCA. The second dataset was based on estimated emissions using standard emission factors and chemical mass through-puts (Dataset #2). The third dataset came from actual stack testing results (Dataset #3). This section discusses each of these datasets separately.

Dataset #1. This dataset was provided by MASCA and was calculated using mass/balance analysis. However, emission rates provided by MASCA for nitric and sulfuric acids were extrapolated from a 1992 sampling event (C. Bloom, personal communication; AMTEST, 1992). The following chemicals were detected in MASCA air emissions: acetone, ammonia, hydrofluoric acid, isopropanol, methacrylate, nitric acid, phosphine, phosphoric acid, and sulfuric acid. Emission rates were provided by MASCA for current conditions and for predicted conditions after the facility expansion. A multiplicative factor of 2.55 was used to extrapolate from current to predicted air contaminant concentrations. This factor, provided by MASCA, was based on the predicted additional productivity (number of wafers) as a result of the Building D expansion.

Dataset #2. Given the limitations of dataset #1, a more extensive analysis of MASCA air emissions was performed to develop Dataset #2. This analysis involved four steps: 1. touring the facility; 2. reviewing the chemicals used; 3. examining their fate; and 4. estimating emissions for each chemical.

The fabrication building was first toured and carefully examined. Close attention was paid to process air flows, ventilation systems, methods of chemical usage, and air pollution controls. Overall pictures of how ventilation systems and the process flow of hazardous chemicals were developed.

The second step was a review of Material Safety and Data Sheets (MSDS's) for all chemicals used on site. MASCA provided a list, based on chemical inventories, which showed the mass of each compound used on-site. Each compound which was toxic or for which regulatory limits existed was further analyzed.

The third step was examining the fate of each compound. Process flow diagrams provided by MASCA showed the air pathway for each main compound, whether the chemical exited the facility via the acid scrubbers and stacks or was released unabated to the environment via the VOC stacks. This investigation showed that pyrophoric and process gases (e.g., arsine, silane, phosphine) flow through primary treatment (termed "burn boxes" or guardians) where they are oxidized at high temperature, then through acid scrubbers before being released through the acid stacks.

The fourth step was to estimate emission rates for each major compound. Methodology developed by the Bay Area Air Quality Management District (BAAQMD) was used to estimate air chemical emission rates (BAAQMD 1996). The BAAQMD has been regulating air pollutants from semiconductor facilities for 30 years. Based on years of analysis of specific industrial processes, the chemicals associated with each process, chemical physical properties, and pollution control devices, the BAAQMD has derived specific emission factors (EF's) for three main classes of compounds: 1. process solvents (EF=0.30); 2. photoresist-related chemicals (EF=0.90); and 3. process gasses (EF=0.10). To calculate emissions from semiconductor facilities, the EF is multiplied by the mass of the chemical used on-site, producing an emission rate (mass chemical/unit time) for each chemical. This process was completed for each applicable chemical used at MASCA. Chemicals that were analyzed in the first data set were not reanalyzed in this step.

Dataset #3. In addition to the mass/balance and modeling approaches, actual stack testing was performed in March, 1996, by AMTEST. Tests were performed for the most toxic chemicals thought to be emitted from the stacks to measure chemical concentrations and emission rates were determined by testing at the exit points of the VOC and acid stack.

The dispersion of chemical contaminants and resulting concentrations related to normal facility operations were determined using the Industrial Source Complex Short Term Model (ISCST3)

(Bloom, 1996). This model uses local annual meteorological data and site-specific information, such as building heights and stack parameters, to estimate fenceline air concentrations. Air quality data from 1991, a year with documented high pollutant levels, was entered into the ISCST3 model for the analysis. A grid was established with 100 meters between receptor points. The highest modeled fenceline contaminant concentrations were at a point due north of the site. Air contaminant concentrations at Pierce College and nearby residential areas were lower than this modeled concentration.

Each dataset was modeled to determine maximum fenceline concentrations. Data representing the highest modeled annual average air concentration were used in the risk screening assessment. Modeling results for current conditions were contrasted with the predicted concentrations after the facilities expansion.

Maximum fenceline chemical concentrations were also modeled using the EPA model TSCREEN to evaluate a possible accidental release of toxic gases from the facility (Bloom, 1996). This model is flexible and allows for various applications including the rupture of pressurized gas containers. The model was used to assess a possible rupture of a 50-pound chlorine tank and a 2-pound phosphine tank, stored east of Building C.

2.3 EXPOSURE ASSESSMENT

Exposure assessment discusses the sources and mechanisms of chemical releases, examines specific site characteristics, evaluates potential exposure pathways and exposed populations, and determines the magnitude and duration of chemical exposure.

The following areas with potentially exposed populations are nearby: Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large area of residential Puyallup (1,500 feet due north). The facility expansion will add an additional fabrication building on the north part of the property. Access to the facility is monitored, but there is no security fence to deter trespassers (HLA 1992).

The site is underlain by glacial till and advance outwash deposits. These deposits are comprised of gravel, silt, and clay. Groundwater is found 10 to 30 feet below ground surface; flow is generally towards the northwest. Groundwater is used as a drinking water source in the area. Six (6) wells are used as potable sources within one- (1) mile downgradient of the MASCA site. Depths to water bearing zones which these wells tap range from 118 to 465 feet. (HLA 1992).

Exposure is quantified, in a deterministic risk approach, by developing a reasonable maximum exposure (RME) scenario. This scenario utilizes standard EPA default exposure parameters, and is designed to represent a very conservative exposure case still within the range of possible exposures (EPA 1989, 1990). In some circumstances, exposure parameters may be tailored specifically for the site.

Various exposure pathways have been envisioned for this assessment: exposure to surface water via incidental ingestion and dermal penetration; exposure to groundwater (as a potable source) via drinking water and dermal adsorption; and inhalation of air emissions.

The following exposure pathways have been evaluated in this assessment:

- Exposure to surface water via incidental ingestion and dermal penetration;
- Exposure to groundwater (as a potable source) via drinking water and dermal adsorption; and
- Inhalation of air emissions.

2.3.1 Surface Water

Two (2) scenarios are used to evaluate possible exposure to surface water in the MASCA infiltration pond. One assumes that child and adult trespassers swim in the pond and are thus exposed via incidental ingestion of surface water and dermal exposure to organics (note: for dermal exposure only phenol is considered). The other scenario assumes that based on the proximity of the pond to potable groundwater sources, the detention/infiltration pond effluent permeates into potable groundwater sources undiluted and adult and child residents are exposed, again via ingestion and dermal exposure. Appropriate EPA exposure parameters for water are shown on Table 1.

Table 1
EPA Water Exposure Parameters

	Surface Water (Ingestion)				Surface Water (Dermal Absorption)			
	Adult		Child		Adult		Child	
Parameter	Resident	Trespasser	Resident	Trespasser	Resident	Trespasser	Resident	Trespasser
Intake Rate	2 L	0.05 L	1 L	0.025 L	NA	NA	NA	NA
Cintact Rate	NA	NA	NA	NA	15 min/day	15 min/day	15 min/day	15 min/day
Surface Area	NA	NA	NA	NA	19,400 cm^2	19,400 cm^2	7,200 cm^2	7,200 cm^2
Exposure Duration	30 yr.	30 yr.	6 yr.	6 yr.	30 yr.	30 yr.	6 yr.	6 yr.
Exposure Frequency	350 days	50 days	350 days	50 days	350 days	50 days	350 days	50 days
Body Weight	70 kg	70 kg	15 kg	15 kg	70 kg	70 kg	15 kg	15 kg
Average Time (Non-cancer)	10,950 days	10,950 days	2,190 days	2,190 days	10,950 days	10,950 days	2,190 days	2,190 days

NA = Not Applicable

2.3.2 Air

Two scenarios are used to evaluate possible exposure of children and adults via inhalation of MASCA chemicals in the ambient air. One assesses exposure to child and adult residents[1]; the other assesses exposure to child and adult trespassers[2]. Appropriate EPA exposure parameters for air emissions are shown on Table 2.

[1] A resident is defined as a person who lives at the fenceline and is exposed 24-hours per day, 365 days per year for 30 years.
[2] A trespasser is defined as a person who is exposed one day per weekend, or 50 days per year.

Table 2
EPA Air Emission Exposure Parameters

Parameter	Inhalation			
	Adult		Child	
	Resident	Trespasser	Resident	Trespasser
Intake Rate	15 m^3/day	15 m^3/day	7.5 m^3/day	7.5 m^3/day
Cintact Rate	NA	NA	NA	NA
Surface Area	NA	NA	NA	NA
Exposure Duration	30 yr.	30 yr.	6 yr.	6 yr.
Exposure Frequency	350 days	50 days	350 days	50 days
Body Weight	70 kg	70 kg	15 kg	15 kg
Averaging Time (Non-cancer)	10,950 days	10,950 days	2,190 days	2,190 days

NA = Not applicable

2.4 TOXICOLOGICAL EVALUATION

Quantitative estimates of toxic response developed by EPA are used to evaluate potential carcinogenicity and non-cancer toxicity for xenobiotics. Generally, cancer risks are calculated using toxicity factors known as slope factors, while noncancer risks rely on reference doses.

Slope factors (SFs) have been developed by EPA for estimating lifetime excess cancer risks associated with exposure to potential carcinogens. SFs are expressed in units of mg/kg/day and are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the lifetime excess cancer risk associated with exposure at that intake level. The term "upper bound" reflects a conservative estimate of the risks calculated from the SF. This approach minimizes the potential of underestimating cancer risks. SFs are derived from the results of human epidemiological studies or chronic animal bioassay data, with results mathematically extrapolated from high to low and from animal to human doses.

Reference Doses (RfDs) and reference concentrations (RfCs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. The RfD or RfC is an estimate of lifetime daily exposure for humans (including sensitive subpopulations) that is likely to be without risk of adverse effect. RfDs for ingestion exposures are expressed in mg/kg per day, and RfCs for inhalation exposures are expressed in mg/m3. Estimated intakes of chemicals in environmental media (e.g., the amount of a chemical inhaled from ambient air) can be compared to the RfD or RfC. RfDs and RfCs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied. This risk assessment relies on oral ingestion and inhalation RfDs and RfCs.

Table 3 provides toxicity information for those chemicals for which EPA-approved toxicological values are available. These toxicity factors are obtained from the EPA. If no IRIS values are available from EPA, then the HEAST values were used.

Table 3
Reference Doses and Uncertainty Factors for RBSC Chemicals

Chemical	Oral (g/kg/day)	RfC ($mg/m^3/day$)	Uncertainty Factor	Critical Effect	Source
Acetone	0.1		1,000	Nephrotoxicity	IRIS
Ammonia		0.1	30	Respiratory lesions	IRIS
Chlorine	0.1		100	Decreased body wt.	IRIS
Fluorine	0.06		1	Flurosis	IRIS
Manganese	0.005		1	CNS effects	HEAST
Methacrylate	0.001		300	Increased SGOT, brain lesions	IRIS
Phenols	0.6		100	Fetotoxicity	IRIS
Phosphine	0.0003		100	Decrease in rethricyte, superoxide, dismutase	IRIS

The remaining site-related chemicals were analyzed qualitatively for relative toxicity. Since neither RfDs nor Sfs were available for these chemicals, other toxicological or regulatory indices were used. Table 4 relates these comparative toxicity values to exposures to site-specific concentrations. The following values were evaluated:

Immediately Dangerous to Life and Health (IDLH) values represent the maximum concentrations from which a person could escape within 30 minutes without serious damage to human health in the event of a respirator failure. They were developed by the NIOSH.

Time Weighted Averages (TWA) are concentrations that represent the maximum air concentration considered safe based on an 8-hour worker exposure (ACGIH, 1994). These values are based on good scientific toxicological research.

Similar to TWAs **Short Term Exposure Limits** (STEL) represent the maximum allowable chemical concentration that a receptor could be exposed to in a 15-minute period (ACGIH, 1994).

Acceptable Source Impact Levels (ASIL) values are used by PSAPCA as reference toxic threshold concentrations for the inhalation of industrial emissions (originally developed by the Washington Department of Ecology [DOE]). These numbers are based on daily exposures to toxicants.

Table 4
Slope Factors, References Doses, and Uncertainty Factors For RBSC Chemicals

	Noncarcinogenic					Carcinogenic			
Chemical	Oral RfD (mg/kg/day)	Inhalation RfC (mg/m3/day)	Uncertainty Factor	Critical Effect	Source	Slope Factor	Carcinogen Classification [d]	Cancer Type	Source
Acetone	0.1		1000	Nephrotoxicity	IRIS				
Ammonia		0.1	30	Respiratory lesions	IRIS				
Arsenic	0.0003		3	Hyperpigmentation, keratosis	IRIS	1.5	A	Skin	IRIS
Arsine	0.0003	0.00005	3	Anemia, Vascular changes	IRIS	15.1	A	Skin	IRIS
Bis (2-ethylhexyl) phthalate [a]	0.02		1000	Increases relative liver weight	IRIS	0.014	B2	hepatocellular carcinoma, adenoma	IRIS
Boron trifluoride		0.0007	NA	Necrosis	HEAST				
Chlorine	0.1		100	Decreased body weight	IRIS				
Chloroform	0.01		1000	Fatty cyst formation in liver	IRIS	0.0061	B2	Kidney tumors	IRIS
Dichloroethylene	0.02		1000		IRIS				
Fluorine	0.06		1	Fluorosis	IRIS				
Manganese	0.005		1	CNS effects	HEAST				
Methacrylate	0.001		300	Increased SGOT, brain lesions	IRIS				
PGMEA [b]		2	300	Mild reversible sedation	IRIS				
PGmonomethylether (PGME)		2	300	Mild reversible sedation	IRIS				
Phenols	0.6		100	Fetotoxicity	IRIS				
Phosphine	0.0003		100	Renal necrosis	IRIS				
Trimethyl phosphite [c]						0.037	C	Uterine tumors	HEAST
Zinc	0.3		3	Decrease in erythrocyte, superoxide, dismutase	IRIS				

[a] adopted from Di (2-ethylhexyl) phthalate

[b] adopted from PGME

[c] adopted from trimethyl phosphate

[d] Carcinogen classification: A = human carcinogen; C = possible human carcinogen; B2 = probable carcinogen

3.0 RESULTS AND DESCRIPTION OF EXISTING CONDITION

This section discusses the results of the human health screening assessment for current MASCA site conditions. Risk-based screening concentrations (RBSCs) were used to determine whether existing chemical concentrations in the MASCA detention/infiltration pond and air emissions exceed levels that may adversely affect human health. These levels were defined as a cumulative excess cancer risk greater than 1.0 E-06, and a noncancer hazard quotient greater than 1.0. Using these levels, RBSCs were calculated for air and for surface water/stormwater. RBSCs were calculated for different exposure scenarios, such as residents and trespassers, with exposure parameters (e.g., hours exposure per day) adjusted for each scenario.

This section compares current site concentrations with RBSCs. For those chemicals for which no RBSC could be calculated, a qualitative comparison is provided. In addition, a brief analysis of the accidental release scenario is presented using a qualitative comparison. The section is divided into air and water analyses and quantitative and qualitative screening.

3.1 WATER

The data collected from sampling the detention/infiltration pond are summarized in Table 5. Surface water data from the three (3) datasets were compiled and screened against surface water ingestion and dermal contact RBSCs. Metals and organic chemicals detected in detention/ infiltration pond water included aluminum, arsenic, manganese, zinc, lead, copper, phenol, chloroform, and bis (2-ethylhexyl) phthalate. Dermal contact was evaluated as a pathway only for the organic compounds chloroform, phenol, and bis (2-ethylhexyl) phthalate, since metals are not generally considered to cause systemic toxicity via dermal penetration.

Ingestion of undiluted pond water was evaluated as a pathway for all detected compounds. Adult and child residents were assumed to be drinking undiluted pond water as the main drinking water source. This is obviously an unrealistic scenario, but it was assessed to provide a conservative benchmark. It- has not been determined whether water from the detention/infiltration pond infiltrates into potable groundwater.

The RBSC analysis is provided in tables 6 and 7. Surface water concentrations of arsenic, chloroform, bis (2-ethylhexyl) phthalate, and manganese exceeded RBSCs for water ingestion. However, infiltration pond levels of arsenic (0.001 mg/L), chloroform (0.004 mg/L) and manganese (0.26 mg/L) are equal to or less than background concentrations of these compounds contained in the ambient water supply (Tacoma Public Utilities, 1996). Therefore, no excess human health risk is predicted from ingestion of these three chemicals from MASCA infiltration pond water (i.e., the risk is not greater than background risk).

Table 5
Detected Chemicals for 1993 and 1996 Infiltration Pond Grab Samples

Sample	Chemical	Chemical Group	Concentration (mg/l)
RET Pond-27/39[1]	zinc	metal	0.616
	aluminum	metal	0.071
	manganese	metal	0.090
	iron	metal	0.407
	magnesium	metal	1.930
	phenols	semi-volatile	0.007
003A	arsenic	metal	0.002
	copper	metal	0.155
	lead	metal	0.006
	zinc	metal	0.025
	bis (2-ethylhexyl) phthalat	semi-volatile	0.0016
	chloroform	volatile	0.0031
003B	copper	metal	0.014
	lead	metal	0.012
	zinc	metal	0.007
	chloroform	volatile	0.0044
DP1	lead	volatile	0.002
	zinc	metal	0.024
	bis (2-ethylhexyl) phthalat	semi-volatile	0.0014
	chloroform	volatile	0.0016
DP2	copper	metal	0.006
	lead	metal	0.003
	zinc	metal	0.027
	chloroform	volatile	0.0013

Notes: [1] Sample was collected on September 13, 1993. All other samples were collected in March 3-6, 1996.

Table 6
Comparison of Site-related Data to Surface Water Ingestion RBSCs

	Background Concentration	Site Concentration	Hazard RBSC (mg/L)c				Cancer RBSC (mg/L)c			
			Adult		Child		Adult		Child	
Chemical	(mg/l)	(mg/L)	Resident	Trespasser	Resident	Trespasser	Resident	Trespasser	Resident	Trespasser
Arsenic	0.01	0.002	0.011	3.07	0.0047	1.31	5.68E-05	0.016	1.22E-05	0.0034
Bis (2-ethylhexyl) phthalate	< 0.0001	0.0016	0.73	204.4	0.313	87.6	0.0061	1.70	0.0013	0.37
Chloroform	0.04	0.0044	0.365	102.2	0.156	43.8	0.0140	3.91	0.0030	0.84
Copper	0.02	0.0140	1.35	318.1	0.57	162.8				
Lead	0.002	0.0120	0.015[b]							
Manganese	0.03	0.26 [a]	0.18	51.1	0.07	21.9				
Phenols	< 0.0001	0.007	21.9	6132	9.4	2628				
Zinc	< 0.05	0.616	11	3066	4.7	1314				

a = Value is mean concentration of sample data from 14 samples.

b = Based on MCL.

c = RBSC's were calculated using a HQ of 1.0 for surface water ingestion and a HQ of 0.1 for surface water dermal adsorption.

Reported site concentrations are the maximum values of 1993 and 1996 data.

Table 7
Comparison of Site-related Data to Surface Water Dermal Adsorption RBSCs

	Background Concentrations	Site Concentration	Hazard RBSC (mg/L)				Cancer RBSC (mg/L)			
			Adult		Child		Adult		Child	
Chemical	(mg/l)	(mg/L)	Resident	Trespasser	Resident	Trespasser	Resident	Trespasser	Resident	Trespasser
Bis (2-ethylhexyl) phthalate	< 0.0001	0.0016	0.912	6.39	0.527	3.69	0.0011	0.0075	0.00023	0.0016
Chloroform	0.04	0.0044	0.116	0.81	0.067	0.468	0.00027	0.0019	5.79E-05	0.00041
Phenols	< 0.0001	0.007	110	771	63.6	445				

Shading indicates site concentration exceeding ambient background level and toxic threshold (RBSC)

Surface water concentrations of bis (2-ethylhexyl) phthalate (0.0016 mg/L) in the detention/ infiltration pond are greater than background levels (<0.0001 mg/L). Estimated excess cumulative cancer risk for surface water ingestion exceeded 1.0 E-06 for residential children. For dermal exposures, the estimated excess cumulative cancer risk exceeded 1 E-06 for bis (2-ethylhexyl) phthalate for adult residents (1.5 E-06) and child residents (7.0 E-06). The total cancer risk for exposure to this compound via both exposure pathways was 1.8 E-06 (adult resident) and 8.4 E-06 (child resident). Risk estimates are provided in Table 8. It should be noted that the elevated level of bis (2-ethylhexyl) phthalate in the infiltration pond water appears anomalous as this chemical is not used in any MASCA process; this chemical is, however, a common laboratory contaminant.

Table 8
Cancer Risk Characterization for Surface Water Exposure

Chemical	Adult			Child		
	Ingestion	Dermal	Total	Ingestion	Dermal	Total
Bis (2-ethylhexyl) phthalate	2.60E-07	1.50E-06	1.80E-06	1.20E-06	7.00E-06	8.40E-06

Cancer risk . 1E-06 is considered significant (i.e., results in one excess cancer per 1,000,000 population).

Lead concentrations in the infiltration pond are not expected to adversely affect human health because measured concentrations (0.012 mg/L) are below the Mean Contaminant Level (MCL) for lead (0.015 mg/L). The MCL is deemed by EPA to be a toxic threshold for human ingestion of water.

3.2 AIR EMISSIONS FROM DAILY OPERATIONS

Chemical concentrations at the facility fenceline were estimated for the existing facility using the ISCST3 model (Bloom, 1996). The risk assessment compared these concentrations with RBSCs for inhalation. Three datasets were available for assessing inhalation risks. The actual stack testing data (Dataset #3) was considered most representative for actual site air chemical emissions, so this data was preferentially used for the risk assessment are shown in Table 9. Concentrations of chemicals not analyzed in the stack test analysis were estimated by emission factor analysis.

Table 9
MASCA Stack Test Data

	Emission Rate			Extrapolation to 1997 Expansion Emission Rate			
Chemical	mg/min.	lbs/year	tons/yr.	Chemical	mg/min.	lbs/year	tons/yr.
VOC STACK				**VOC STACK**			
Acetone	30237	34772.55	17.386275	Acetone	77104.35	88670.003	44.335001
Anisole	3413	3924.95	1.962475	Anisole	8703.15	10008.623	5.0043113
Catechol	2526	2904.9	1.45245	Catechol	6441.3	7407.495	3.7037475
IPA	65247	75034.05	37.517025	IPA	166379.85	191336.83	95.668414
Me Methacryllate	ND			Me Methacryllate	ND		
MEK	ND			MEK	ND		
Phosphine	36	41.4	0.0207	Phosphine	91.8	105.57	0.052785
Prop. Glycol Ether	10357	11910.55	5.955275	Prop. Glycol Ether	26410.35	30371.903	15.185951
Silica	19389	22297.35	11.148675	Silica	49441.95	56858.243	28.429121
Sulfuric Acid	2238	2573.7	1.28685	Sulfuric Acid	5706.9	6562.935	3.2814675
Toluene	8.4	9.66	0.00483	Toluene	21.42	24.633	0.0123165
TOTAL HAPs	***8886.4***	***10219.36***	***5.10968***	***TOTAL HAPs***	***22660.32***	***26059.37***	***13.02968***
TOTAL VOCs[1]	***90393.4***	***103952.4***	***51.97621***	***TOTAL VOCs[1]***	***230503.2***	***265078.6***	***132.5393***
ACID STACK				**ACID STACK**			
Ammonia	11824	13597.6	6.7988	Ammonia	30151.2	34673.88	17.33694
Boron Trifluoride	ND			Boron Trifluoride	ND		
Hydrochloric Acid	290.9	334.535	0.1672675	Hydrochloric Acid	741.795	853.06425	0.4265321
Hydrofluoric	283.1	325.565	0.1627825	Hydrofluoric	721.905	830.19075	0.4150954
Nitric Acid	93.6	107.64	0.05382	Nitric Acid	238.68	274.482	0.137241
Phos. Acid	16.52	18.998	0.009499	Phos. Acid	42.126	48.4449	0.0242225
Sulfuric Acid	17.2	19.78	0.00989	Sulfuric Acid	43.86	50.439	0.0252195
TOTAL ACIDS	***12525.32***	***14404.12***	***7.202059***	***TOTAL ACIDS***	***31939.566***	***36730.5***	***18.36525***
TOTAL HAPs	***574.318***	***660.4657***	***0.330233***	***TOTAL HAPs***	***1464.5109***	***1684.188***	***0.842094***

Notes: [1] Total VOCs does not include acetone, silane, phosphine, or sulfuric acid.
Shading indicates compound is Clean Air Act 112B Hazardous Air Pollutant (HAP).

3.2.1 Comparison with RBSCs

The results for the air pathway analysis are provided in tables 10 and 11. The analyses demonstrate that present and future fenceline air concentrations do not exceed the toxic thresholds. It should be noted, however, that catechol concentrations may indicate some toxic exposures, if catechol (dihydroxy benzene) is analyzed with extrapolated toxicological values from benzene. Several scientific studies have indicated that catechol, a toxic, metabolic intermediate of benzene detoxication, may be responsible for toxic or carcinogenic properties associated with benzene (Caserett and Doull, 1990). Therefore, it is probable that catechol exposures would result in pathological endpoints similar to benzene exposures (e.g. cancer).

Table 10
Comparison of Site-related Data to Inhalation RBSCs

Chemical	Source of Emission Rate	1995 Site Concentration ($\mu g/m^3$)	1997 Site Concentration ($\mu g/m^3$)	Hazard RBSC ($\mu g/m^3$) Adult Resident	Hazard RBSC Adult Trespasser	Hazard RBSC Child Resident	Hazard RBSC Child Trespasser	Cancer RBSC ($\mu g/m^3$) Adult Resident	Cancer RBSC Adult Trespasser	Cancer RBSC Child Resident	Cancer RBSC Child Trespasser
Acetone	AMTEST	3.8	4.70	486.7	3406.7	208.6	1460				
Ammonia	AMTEST	5.79	14.35	486.7	3406.7	208.6	1460				
Boron trifluoride	Tetra Tech	0.00002	0.00003	3.41	23.85	1.46	10.22				
Dichloroethylene	Tetra Tech	0.0002	0.0006	97.3	681.3	41.7	292				
Hydrofluoric acid (as Fluorine)	MASCA	0.29	0.35	292	2044	125	876				
Methacrylate	MASCA	0.0077	0.01	4.87	34.07	2.09	14.6				
PGMEA	Tetra Tech	3.34	4.1000	9733.3	68133.3	4171.43	29200				
PG monomethyl ether	AMTEST	1.11	1.6000	9733.3	68133.3	4171.43	29200				
Phosphine	AMTEST	0.0045	0.0056	1.46	10.22	0.6257	4.38				
Trimethyl phosphite	Tetra Tech	0.00003	0.00003					0.31	2.15	0.66	4.6

Source of data had following priority: AMTEST>Mass balance> Tetra Tech modeling.
Shading indicates site concentration exceeding toxic threshold (RBSC).

However, given that EPA has not yet derived a separate, approved toxicological factor for catechol, a quantitative analysis of this compound is not presented in this document. It should be noted, that potential toxic risks due to MASCA-related levels of catechol in ambient air may have been underestimated. Catechol exposures are serious enough so as to be included in the Clean Air Hazardous Air Pollutant (HAP) list.

3.2.2 Comparison with Other Toxic Indices

Table 12 compares modeled current and future maximum 24-hour air chemical concentrations at the MASCA fenceline with other accepted toxicity standards. No modeled current concentration exceeds any of the toxicity thresholds. Future modeled concentrations of sulfuric acid exceed the PSAPCA ASILs.

Table 11
Qualitative Comparison of Toxicity

Chemical	1995 24 hr. Air Concentration (μg/m^3)	1997 24 hr. Air Concentration (μg/m^3)	ACGIH (μg/m^3)	ASIL (μg/m^3)
Acetone	32.09	52.6	1.80E+06	5,900
Catechol	0.32	0.39	NA	77
Diglycolamines	27.9	45.4	NA	33.1
Hydrochloric Acid	1.21	2.24	7,500	7
Isoproponal	69.4	114.17	9.83E+05	3,263
Nitric acid	0.38	0.72	5,200	16.7
Sulfuric acid	2.44	4.02	1,000	3.3
Tolune	0.0051	0.0085	188,00	400
Trimethyl phoshite	0.003	0.004	10,000	33

Shading indicates exceedence of Washington Department of Ecology and PSAPCA standards.

3.3 ACCIDENTAL RELEASE OF PROCESS GASES

A scenario was envisioned where a 50-pound tank of chlorine gas and a 2-pound tank of phosphine gas explode at the gas storage area on the east perimeter of the MASCA facility. The resultant maximum air concentrations at the fenceline (averaged over a one-hour period) were compared with acute toxicity standards in Table 13. The estimated air chemical concentrations did not exceed the TWA (8-hour industrial exposure concentration), the STEL (15-minute industrial exposure threshold concentration), or the IDLH (30-minute industrial toxic threshold concentration).

Table 12
Qualitative Comparison of Emergency Release of Chemical and Toxicity

Chemical	Site Air Concentration (mg/m^3)	TWA (mg/m^3)	STEL (mg/m^3)	IDLH (mg/m^3)
Chlorine	0.87	1.5	2.9	30
Phosphine	0.001	0.42	1.4	66

TWA (ACGIH 1994)
STEL (ACGIH 1994)
IDLH (NIOSH 1994)

4.0 IMPACT ANALYSIS

This section evaluates the possible environmental impact of current conditions at MASCA and examines additional impacts that may result from facility expansion. This section also discusses the current and future compliance of MASCA with the Puget Sound Air Pollution Control Authority (PSAPCA) air regulations. No data were available to estimate chemical concentrations in the detention/infiltration pond as a result of the expansion. It is not expected, based on comments from MASCA personnel (B. Adams, personal communication), that additional compounds will be present in the infiltration pond surface water as a result of adding a fabrication building.

4.1 WATER

This human health risk analysis concludes that with the exception of bis (2-ethylhexyl) phthalate, chemicals contained in the MASCA infiltration pond are either below toxic threshold levels or less than ambient background levels. This conclusion is based on a conservative scenario which assumes that water from the detention/infiltration pond could infiltrate, undiluted, into a potable drinking water source downgradient from the site.

Most, if not all, of the contaminants detected in the pond water are probably related to stormwater discharge. The source of the bis (2-ethylhexyl) phthalate is uncertain, as it is not used in MASCA processes. The compound is used as a plasticizer or lubricant. Possible sources could be pump lubrication, offgassing from PVC pipes, or laboratory sample contamination. The observed low chemical levels in the infiltration pond could be further reduced by adding a bioswale at a location before the stormwater enters the pond. Bioswales consist of plants which help filter and adsorb some of the chemical contaminants. In addition, it would be prudent to conduct scheduled weekly testing of the deionized water treatment plant effluent, in order to confirm that unexpected contamination is not entering the infiltration pond.

4.2 AIR

PSAPCA regulates air quality for Pierce, King and Snohomish counties. The agency has the authority to enforce compliance with federal regulations (e.g. Clean Air Act, New Source Standards), state regulations (e.g., WAC 173-460), and PSAPCA regulations.

The facility does not currently use thermal destruction to control VOC emissions. The health problems which may be associated with MASCA air emissions, and the possible PSAPCA regulatory compliance violations, are a result of chemicals exiting the facility unabated through the VOC stack. Stack test data and the air modeling indicate that the acid scrubber systems are apparently functioning properly.

Other reporting errors appear to have been made by MASCA (A. Lee, personal communication, April 25, 1996). Current data indicate that at least 52 tons of VOCs are being emitted from

MASCA annually. According to PSAPCA, this is enough to require MASCA to have a Synthetic Minor Air Contaminant Discharge Permit for air emissions.

The addition of another fabrication facility at MASCA would appear to put MASCA into the Major Source category of regulation -- the highest regulatory level of compliance. Under federal law (Clean Air Act) and PSAPCA rules, a facility which emits over 100 tons per year of any Criterion Pollutant (e.g., VOC, carbon monoxide, NO_x, SOx, PM_{10}, Pb) is considered a major source. Also any facility which emits over 10 tons of any defined HAP or 25 tons total of all HAPs is considered a major source. Based on the 1996 stack test, it is predicted that MASCA would emit 132 tons of VOCs per year. These emissions would classify MASCA as a major source. Being qualified as a major source has many regulatory ramifications, the most important being the requirement to use Best Available Control Technology (BACT) for pollution abatement. BACT means that the facility must use the most efficient control system for emissions that is available, regardless of cost.

With installation, however, of VOC thermal destruction controls on both the existing and new fabrication buildings, and with installation of low-NOx boilers, MASCA will be below regulatory limits listed for a Major Source. The destruction for the thermal incinerators has been estimated at 95%.

The qualitative analysis shows that the expanded facility emissions will result in sulfuric acid emissions exceeding the state regulatory limit (ASIL). Exceeding the ASIL could require MASCA to obtain a Synthetic Minor Air Contaminant Discharge Permit. The exceedence f the sulfuric acid ASIL is driven by the sulfuric acid emissions found to be present emanating from the VOC vent. MASCA should research the facility design and do further testing to further document the presence or absence of acid emissions from the VOC stack.

5.0 MITIGATION

1. MASCA shall install a VOC abatement system for both buildings C and D prior to any certificate of occupancy.

2. MASCA shall obtain the appropriate air quality permit(s) from PSAPCA prior to any certificate of occupancy.

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Supplemental Environmental Impact Statement

Utilities--Water Technical Appendix

MASCA Puyallup Plant
Building D Expansion
(*Puyallup Science Park*)

Prepared for:

City of Puyallup
218 West Puyallup
Puyallup, Washington 98371

Matsushita Semiconductor Corp. of America
1111 - 39th Avenue SE
Puyallup, Washington 98374

Prepared by:

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415 - 118th Avenue SE
Bellevue, Washington 98005-3553

July 1, 1996

List of Acronyms

Acronym	Definition
City	City of Puyallup
DI	Process Water Deionization System
EIS	Environmental Impact Statement
gpm	gallons per minute
MASCA	Matsushita Semiconductor Corporation of America
MG	Million Gallons
MGD	Million Gallons Per Day
NPDES	National Pollutant Discharge Elimination System
POTW	City of Puyallup's Publically Owned Treatment Works
SEIS	Supplemental Environmental Impact Statement

EXECUTIVE SUMMARY

Matsushita Semiconductor Corporation of America (MASCA) proposes to expand their Puyallup plant in order to increase production of microchips from 18,000 wafer-outs per month to 40,000 wafer-outs per month.

The City of Puyallup (City) is the water purveyor (using water supplied by the City of Tacoma) that directly serves MASCA.. A large quantity of City water is utilized during the wafer fabrication process. MASCA is one of the largest single consumers of City supplied water and currently uses approximately 920,000 gallons of water per working day. The analysis herein addresses the impacts the proposed plant expansion may have on the existing City water system.

After reviewing the existing records and proposed water usage of 1.6 MGD, it has been determined that the proposed plant expansion will not have an impact beyond what was identified and mitigated in the 1981 EIS.

Future additional water demand beyond MASCA's 1.6 MGD peak day demand could come from the Tacoma system. The cost of additional source development should be paid by the beneficiaries of the additional capacity. Further development of this source is not guaranteed and would require negotiations with the City of Tacoma. Other options include using Puyallup water with additional treatment by MASCA, if required.

The existing pump station will need to be modified in the future, in order to permit additional pumping as required by the City of Puyallup. The cost of upgrading the station should be in proportion to the water demand/allocation to customers in Zone 5.

Pumping hours and rates should be monitored to track compliance with Tacoma/Puyallup agreement to determine the peak hour, peak day, and average daily demand. Specifically, MASCA shall provide facilities for peak hour metering.

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1.0 INTRODUCTION

The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitant zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

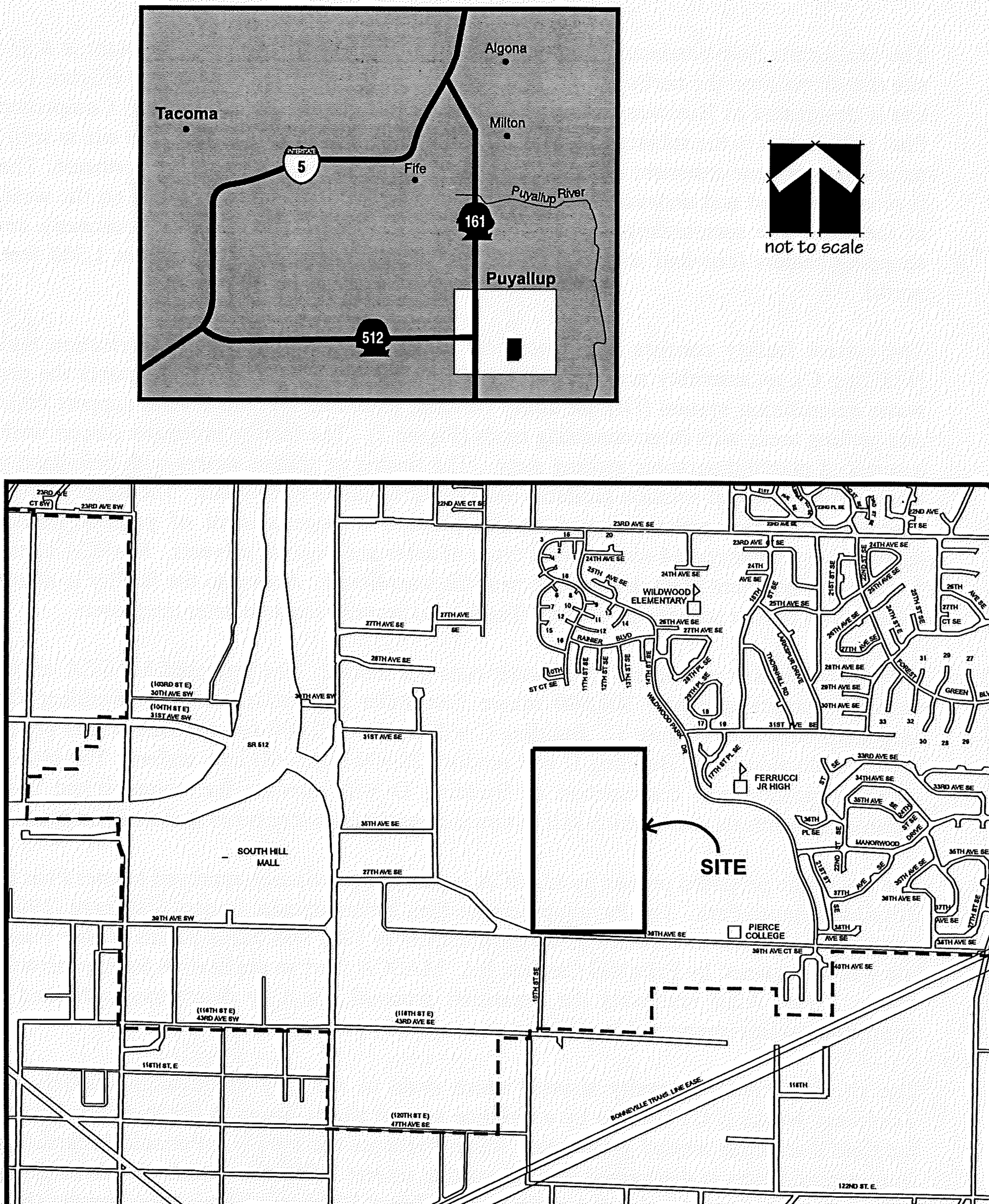
The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.

The site is served by gravity sewers, which drain to the City of Puyallup Publicly Owned Treatment Works (POTW), and by a tightline system which drains to the Puyallup River. The tightline discharges treated wastewater which bypasses the POTW. Periodic backwash water from carbon filters is discharged into an existing on-site infiltration pond. All three discharges are permitted and regulated under a National Pollutant Discharge Elimination System (NPDES) permit.

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA



Source: *City of Puyallup*

Figure 1:
Vicinity Map
UTILITIES - WATER

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA

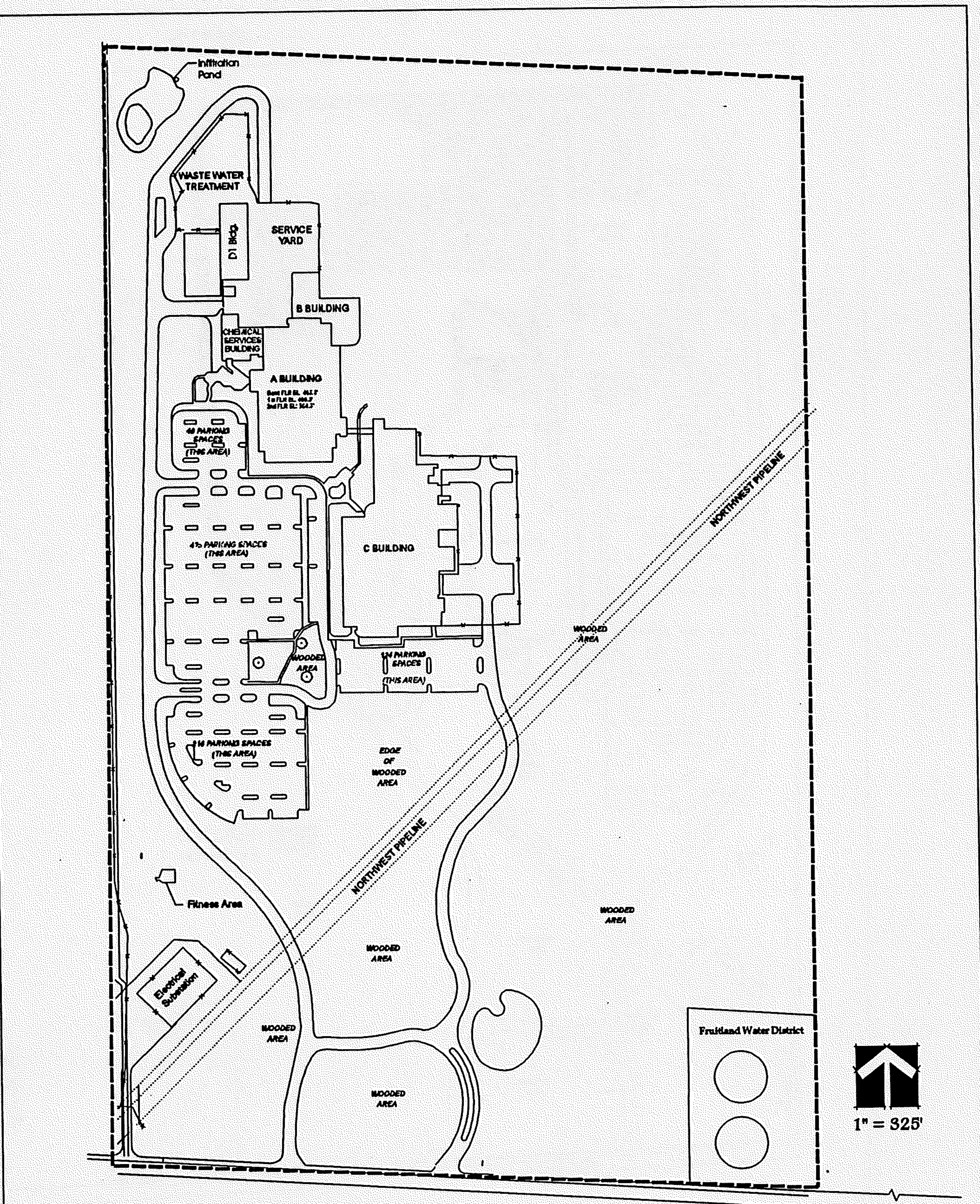


Figure 2:
Existing Site Plan
UTILITIES-WATER

DAVID EVANS AND ASSOCIATES, INC.

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA

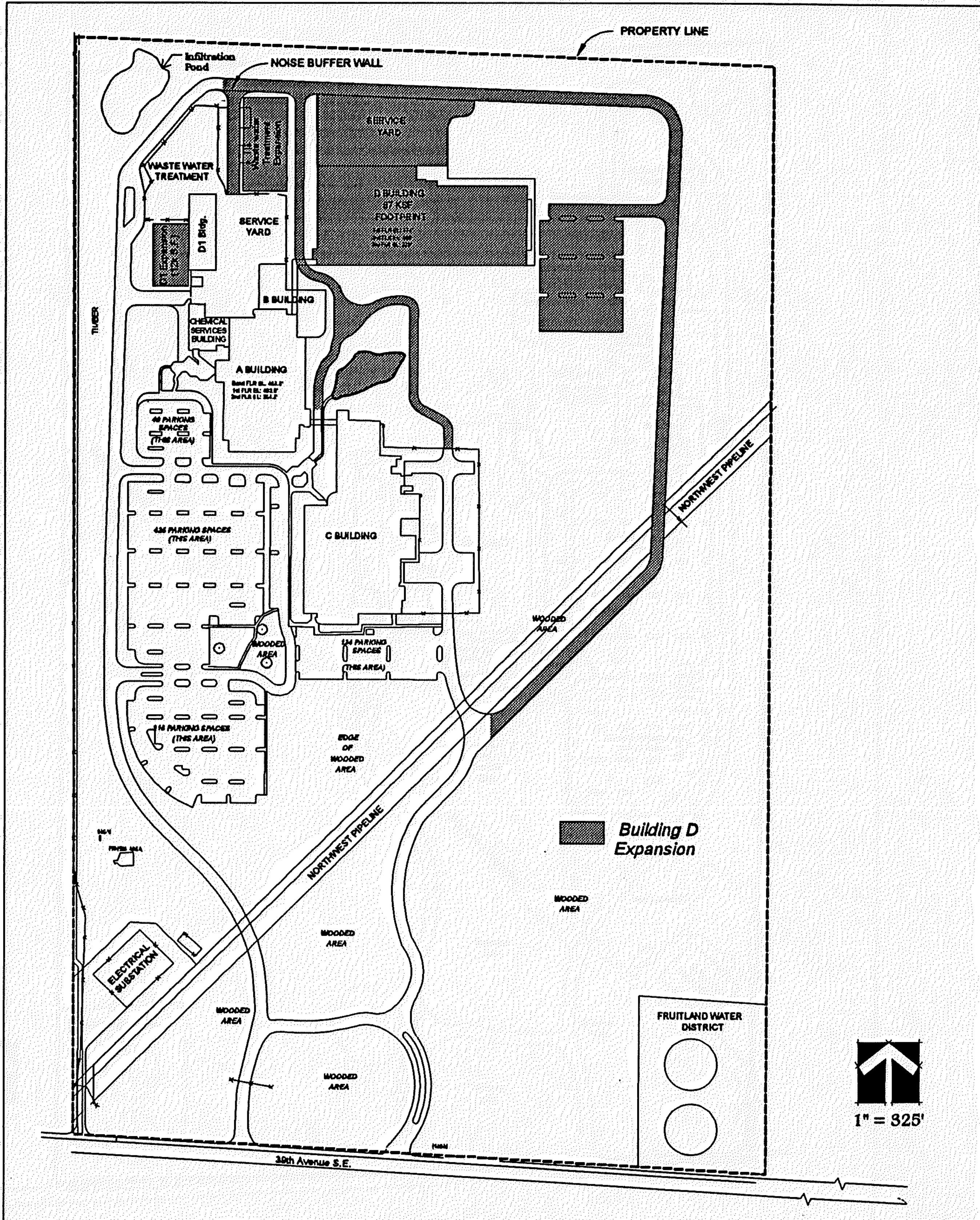


Figure 3:
Proposed Expansion Site Plan
UTILITIES-WATER

DEA

DAVID EVANS AND ASSOCIATES, INC.

Domestic and manufacturing water demand and fire flow storage requirements for the proposed expansion will have an impact on the City water system. Water demand and availability (quantity, quality and fire protection reserve) vis-à-vis the existing and proposed conveyance system and water entitlements were assessed. This Technical Appendix addresses this issue.

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2.0 METHODS

2.1 LITERATURE REVIEW

The impact analysis for this proposed project was determined solely through the analysis of existing documents. The majority of the information presented in this technical appendix is a result from reviewing existing literature. Documents used are provided in Section 6.0 - References.

2.2 DATA COLLECTION

In addition to existing literature that was reviewed, data was collected through correspondence with MASCA and City personnel. The current average daily water supply flow rate for the MASCA site was determined a follows:

1. City water bills for the past year were obtained and analyzed for the MASCA site.

2. The total monthly flows were divided by the number of work days in each billing cycle and then divided by the number of minutes in a day to estimate the average flow per minute during operation hours for the month.

The estimate does not indicate peak day or peak hour water use rates encountered, but rather, an average daily flow rate if the total monthly flow is spread evenly across the total number of work days. Nevertheless, the estimate does give an approximation of MASCA's current water demand.

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3.0 DESCRIPTION OF EXISTING CONDITIONS AND RESULTS

Municipal water is generally delivered to customers via gravity-fed pipe networks. Therefore, municipal systems are typically divided into separate operating zones which are configured to provide water at the proper pressure for the range of service elevations within each zone. Separate storage tanks are generally provided for each zone, and the tanks are usually located at a high point above the entire zone. The tanks are filled by either pumping water from a lower source or utilizing gravity flow from a higher source. Puyallup's system is divided into 5 zones. Figure 4 provides a graphic explanation of the different pressure zones and their relative elevations. MASCA is located in Zone 5.

Zones 4 and 5 are at the same elevation. Zone 5 normally obtains all of its water through the Tacoma intertie, while Zone 4 obtains water from other sources -- primarily Zone 3. The storage tanks for Zone 4 and Zone 5 sit side-by-side, are identical to one another, and are interconnected (for emergency use) by a line that is normally closed. Figure 5 shows the configuration of the Puyallup Water System in the vicinity of the MASCA site.

3.1 SOURCE

The sole water source for Zone 5 is the Tacoma intertie--a 16-inch gravity line which taps the City of Tacoma's 58-inch transmission line from the 144th Street reservoir. In 1981, Puyallup entered into an agreement with the City of Tacoma (see appendix) which entitled Puyallup to receive 2.0 million gallons per day (MGD) from the Tacoma system on an interruptable, off-peak basis. The agreement was obtained for the specific purpose of facilitating development of the site, then known as Fairchild.

The off-peak condition of the agreement allows Puyallup to divert water from the Tacoma system only between the hours of 11:30 p.m. and 3:30 p.m. Therefore, no water is technically available from the intertie during the eight (8)-hour period between 3:30 p.m. and 11:30 p.m. Correspondingly, all water that is used in Zone 5 during this "peak" period must be supplied by the Zone 5 storage tank, which is topped-off every day during the off-peak hours.

In order to utilize water for its operations, MASCA must first treat the water in MASCA's own deionizing facility. One of the reasons that the City of Tacoma intertie was chosen as the water source for MASCA is that the Tacoma water has a lower mineral content than the City water. The "cleaner" Tacoma water is more readily treated by MASCA and is therefore preferred. Puyallup's 1981 agreement with the City of Tacoma entitled Puyallup to use up to 2.0 MGD from the Tacoma intertie. However, the 1981 Concomitant Agreement between the City of Puyallup and MASCA allows MASCA to use 1.6 MGD of the 2.0 MGD supplied by the City of Tacoma. The remaining 0.4 MGD is available for other Zone 5 water users.

3.2 PUMP STATION

The water supplied from the Tacoma intertie is lifted up to the Zone 5 tank via a pump station located adjacent to the MASCA site. The water transmission lines, pump (booster) station, and reservoir were constructed by MASCA for the City in 1981 as part of the development of the Master Plan. The water is pumped to the storage tank, which is located southwest of the MASCA site. The pump station was designed to pump 2.0 MGD, but is currently configured to pump 1.6 MGD, with capabilities to pump up to 2.0 MGD during a Zone 5 low pressure emergency.

A 12-inch gravity line was also installed to convey water from the Tacoma intertie to Zone 3. This 12-inch line was intended to enhance the water supply of Zone 3 during peak demands. The City has recently stated that this intertie line is no longer used, but will remain in place for emergency use.

The lift station was designed to provide 2.0 MGD to the Zone 5 system in a 16-hour period. This resulted in a lift station capable of pumping 2,100 gallons per minute (gpm). When constructed, however, the pump station was restricted to a pump discharge of 1,700 gpm, which equates to MASCA's limit of 1.6 MG during the 16 hours that the pump station would operate. Table 1 illustrates the flow relationships for the 1.6 MGD supply to MASCA.

Table 1
Total Daily Flow vs. Pumping and Process Storage Requirements

Total Daily Flow for MASCA Process Use	Average Flow, (over 24-hour period)	Required Pump Rate for 16 hour off-peak period	Required Storage to provided flow during 8-hour peak period.
1.6 MGD	1,111 gpm	1,667 gpm	0.53 MG

3.3 ZONE 5 STORAGE TANK

The Zone 5 storage tank has a working storage of 1.30 million gallons (MG), of which 1.07 MG is currently dedicated for MASCA's wafer fabrication and standby fire protection, and 0.23 MG remains for the other users of Zone 5. Currently, MASCA utilizes nearly 0.69 MG of capacity (including 1981 fire protection standby), and the other Zone 5 customers utilize approximately 0.01 MG of capacity.

The Tacoma intertie, pump station, and the Zone 5 storage tank (sometimes referred to as the "Fairchild Tank") were all constructed in 1982 to accommodate the then-new Fairchild Camera and Instrument Company facility (today known as MASCA site). The 12-inch Zone 3 gravity feed line and the normally closed intertie between the Zone 4 and Zone 5 tanks were also constructed at the same time by the City, but were not directly related to the Fairchild project.

3.4 ZONE 5 WATER USAGE

Currently, the total average monthly water consumption in Zone 5 is approximately 0.97 MGD, of which, MASCA consumes approximately 0.92 MGD (Figure 7). The remainder, or 0.05 MGD, is used by the other City water customers located within Zone 5. MASCA's daily consumption of 0.92 MGD equates to a flow rate of approximately 640 gpm for every hour of every work day. During the last year, MASCA's water usage ranged from a low of 458 gpm average daily demand for April to a high of 826 gpm average daily demand for September.

Table 2 lists the monthly and daily flow to MASCA as obtained from City water billings. Table 3 details the 1994 facility water balance for an intake of 468 gpm. Note that the water usage numbers do not match because Table 2 is 1995 data and Table 3 is 1994 data.

Table 2
MASCA's Monthly Water Use

Period Ending	Total Water Consumed (MG)	Average Daily Flow (MGD)
1/22/96	29.7	0.85
12/18/95	28.8	0.87
11/15/95	23.7	0.88
10/19/95	29.1	0.974
9/19/95	37.0	1.19
8/19/95	27.7	0.92
7/20/95	24.1	0.86
6/22/95	28.6	0.89
5/21/95	27.4	0.83
4/18/95	17.8	0.664
3/22/95	25.3	1.15
2/28/95	25.9	0.95

Currently, MASCA must periodically flush their sanitary tightline to regulate the pH level of the effluent that fluctuates due to microbial growth within the pipeline. This process occurs every four to six weeks and uses 200,000 to 350,000 gallons of water. MASCA has indicated that on these occasions the plant alters operations to ensure that the maximum allowable daily water use is not exceeded. Therefore, adequate fire reserve storage is still available on days when the flushing occurs. The water used in the flushing process is supplied from the Zone 5 tank and is accounted for in monthly water usages listed in Table 2.

Table 3
Facility Water Balance for Production Level of 12,000 Wafer Outs Per Month

Item No.	Steam	Flow[1] (gpm)	Disposal Means	Comments
1	Water Intake	468	--	City of Tacoma Water Average of Billings from 6/93 through 5/94[2]
2	Domestic Usage	(16)	City of Puyallup POTW (Sanitary Sewer)	Estimate based on 45 gpd/employee for 351 employees plus 5 gpm for plumbing trap primers.
3	Treated Process Wastewater (Fluoride/Phosphate/Ammonia waste plus	(356)	Puyallup River via Tightline per NPDES Permit (Outfall 001)	DMR[3] flows averages from 6/93 through 5/94.
4	Treated Process Wastewater (Solvent/Organics)	(7)	City of Puyallup POTW (Outfall 002)	DMR[3] flows averages from 6/93 through 5/94.
5	Water Out with Fluoride/Phosphate Sludge	(1)	Kitsap County Landfill	Based on sludge shipment records and a sludge moisture of 70%.
6	Bldgs. A/B Non-Contact Cooling Tower Blowdown	(2)	Puyallup River via Tightline per NPDES Permit (Outfall 001)	10% of estimated cooling tower intake.
7	Bldgs. A/B Non-Contact Cooling	(16)	Evaporation	90% of estimated cooling tower intake.
8	Bldg. C Non-Contact Cooling Tower Blowdown	(1)	City of Puyallup POTW (Outfall 002)	10% of estimated cooling tower intake
9	Bldg. C Non-Contact Cooling	(13)	Evaporation	90% of estimated cooling tower intake.
10	Non-Contact Process Cooling	(11)	Evaporation	Estimate
11	Steam loss	(5)	Evaporation	Estimate
12	Scrubber and Exhaust	(15)	Evaporation	Estimate
13	Washdown	(5)	Evaporation	Estimate
14	Sprinkler System	(1)	Evaporation	Estimate
15	Miscellaneous	(14)	Evaporation	Estimate
16	DI System Filter Backwash (from sand, carbon, and final filters)	(1)	Storm Detention Pond (Outfall 003)	DMR[b] flow averages from 6/93 through 5/94.
17	Cleanroom Garment Laundry	(4)	City of Puyallup (Sanitary Sewer)	Estimate - 2 washers run 40 hours/week, 150 gallons per wash load.

Source: Kennedy/Jenks Consultants, 1994.
Notes: [1] Numbers in parentheses are consumption at the plant.
[2] Data used was the most current available from MASCA.
[3] DMR stands for Discharge monitoring reports.

4.0 IMPACT ANALYSIS

4.1 PROPOSED WATER USAGE -- PROCESS AND DOMESTIC

The water average daily demand requirements for the entire MASCA site at full build-out, as projected by MASCA, are shown in Table 4.

Table 4
Projected MASCA Water Use -- 1995 Estimate

Date	Average Flow (gpm)	Total Daily Flow (MGD)
Jan 1997	650	0.936
May 1997	950	1.4
Jan 1998	1,111	1.6

Source: MASCA, 1995

MASCA is projecting that less water will be used per wafer in future years due to a change in wafer production technology utilizing more plasma etching and less wet processing. This MASCA water use projection for full build-out is in accordance with MASCA's current rights to 1.6 MGD per their Concomitant Agreement with the City of Puyallup. Table 5 details a predicted facility water balance for full build-out as provided by MASCA, excluding the presence of Building D. The addition on Building D may result in a redistribution of water throughout the facility to accomodate additional needs such as: evaporation for cooling, steam loss, scrubber and exhaust, and wash-down. However, total system demand is limited to 1.6 MGD under the Concomitant Agreement.

The total process storage requirement for the proposed expansions will be 0.53 MG. This figure was arrived at by multiplying the average flow rate of 1,111 gpm times the number of minutes in eight hours, which is the duration of the period that water cannot be pumped from the Tacoma intertie.

Table 5
Predicted Facility Water Balance for Production Level of 40,000 Wafer Outs Per Month as of January, 1996

Item No.	Steam	Flow[1] (gpm)	Disposal Means	Comments
1	Water Intake	1,111	--	Sum of predicted usage.
2	Domestic Usage	(32)	City of Puyallup POTW (Sanitary Sewer)	Estimate based on 45 gpd/employee for 700 employees plus 10 gpm for plumbing trap primers.
3	Treated Process Wastewater (Fluoride/Phosphate/ Ammonia wastewater)	(906)	Puyallup River via Tightline per NPDES Permit (Outfall 001)	Predicted from data correlation in Appendix A, and as adopted in the Draft NPDES Permit.
4	Treated Process Wastewater (Solvent/Organics)	(42)	City of Puyallup POTW (Outfall 002)	Predicted from data correlation in Appendix A, and as adopted in the Draft NPDES Permit. Average is assumed as 80% of the correlated maximum flow rate.
5	Water Out with Fluoride/Phosphate Sludge	(1)	Kitsap County Landfill	Estimated value. Value is based on an average sludge moisture of 53%.
6	Bldgs. A/B Non-Contact Cooling Tower Blowdown	(2)	Puyallup River via Tightline per NPDES Permit (Outfall 001)	10% of estimated cooling tower intake.
7	Bldgs. A/B Non-Contact Cooling	(16)	Evaporation	90% of estimated cooling tower intake.
8	Bldg. C Non-Contact Cooling Tower Blowdown	(1)	City of Puyallup POTW (Outfall 002)	10% of estimated cooling tower intake
9	Bldg. C Non-Contact Cooling	(13)	Evaporation	90% of estimated cooling tower intake.
10	Non-Contact Process Cooling	(11)	Evaporation	Estimate
11	Steam loss	(5)	Evaporation	Estimate
12	Scrubber and Exhaust	(15)	Evaporation	Estimate
13	Washdown	(5)	Evaporation	Estimate
14	Sprinkler System	(1)	Evaporation	Estimate
15	Miscellaneous	(14)	Evaporation	Estimate
16	DI System Filter Backwash (from sand, carbon, and final filters)	(32)	Storm Detention Pond (Outfall 003)/Evaporation	Predicted from data correlation in Appendix A, and as adopted in the Draft NPDES Permit. Average is assumed as 80% of the correlated maximum flow rate.
17	Cleanroom Garment Laundry	(15)	City of Puyallup (Sanitary Sewer)	Estimate - 2 washers run 80 hours/week, 150 gallons per wash load.

Source: Kennedy/Jenks Consultants, 1994. The data was revised for inclusion in SEIS.
Note: [1] Numbers in parentheses are consumption at the plant.

4.2 PUMP STATION IMPACTS

The pump station is currently configured to pump at a rate of 1,700 gpm for 16 hours, which results in a daily flow of 1.6 MGD. During a Zone 5 low pressure emergency, the pumps could operate at a rate up to 2,100 gpm. The 1,700 gpm pump rate satisfies MASCA's water supply of 1.6 MGD per the Concomitant Agreement. However if MASCA actually uses their entire 1.6 MGD allotment, the current pump rate of 1,700 gpm will not be sufficient because 0.05 MGD current average monthly demand must be conveyed to other Zone 5 customers. Table 6 lists the required pump rates for future Zone 5 demands, assuming a 16-hour pumping period and 2.0 MGD supply from Tacoma.

Table 6
Required Pump Rates for Projected Zone 5 Water Use

Date	MASCA's Total Daily Flow (MGD)	Other Zone 5 User's Daily Flow (MGD)	Total Zone 5 Daily Flow (MGD)	Required Pump Rate for 16-Hour Period (gpm)
Current	0.92	0.05	0.97	1,010
Future	1.58	0.05	1.63	1,700
Future	1.23	0.40	1.63	1,700
Future	1.60	0.40	2.00	2,083

Based on these figures, the pump station will require some modification prior to total Zone 5 water demand exceeding an average 1.63 MGD.

4.3 PROPOSED STORAGE

In January of 1996, the City re-calculated the total fire flow demand for the MASCA site after the construction of the proposed plant expansion. The fire flow is 2,813 gpm for 2 hours, which equates to a required fire reserve storage of 0.34 MG. This fire flow storage requirement is significantly less than the amount of fire reserve storage of 0.54 MG that was required by the 1981 fire code.

The required fire storage, the required MASCA process water storage, and the required water storage for the other Zone 5 users must all be stored in the Zone 5 tank. Table 7 lists the storage requirements for various conditions assuming that 2.0 MGD is available from the Tacoma intertie for a 16-hour period each day, as per the existing agreement between Tacoma and Puyallup (Figure 6). This table does not reflect any fire flow storage from Zone 4 available to Zone 5 when the intertie pipe between the two tanks is manually opened in an emergency or any additional flow available through/from the pump station during an emergency.

Table 7
Zone 5 Storage Requirements vs. Daily Flow

Date	MASCA Daily Process Flow	MASCA Process Storage	MASCA Fire Storage	Total MASCA Storage Needs	Remaining Useable Storage in Zone 5 Tank
Current	0.92 MG	0.53 MG	0.54 MG	1.07 MG	0.23 MG
Future	1.60 MG	0.53 MG	0.34 MG	0.87 MG	0.23 MG

MASCA's total storage requirement, based on their worst-case consumption projection of 1.60 MGD, is 0.87 MG. This is less than the 1.07 MG MASCA originally projected and paid for. This, again, is due to the change in the fire code requiring less fire flow for MASCA. Even with MASCA's proposed daily consumption increases, there will be no impact to storage in the existing Zone 5 tank on an average daily basis.

There are no records for Zone 5 water consumption identifying peak day or peak hour demands. In the absence of this data, no peak flow equalization analysis is included. MASCA has indicated that plant production is continuous thereby resulting in a relatively constant demand for water other than during irrigation periods or sewer outfall flushing events.

4.4 UNAVOIDABLE ADVERSE IMPACTS

Based on available storage, water availability from Puyallup per agreement with Tacoma, and the Concomitant Agreement between Puyallup and MASCA, there would be impacts to the Puyallup water system when demand for Zone 5 exceeds 1.6 MGD. At this point, the City would need to modify the existing pump station to permit additional pumping to the maximum allowed by agreement with Tacoma.

Additional process storage is available beyond the original design due to the reduction in fire storage requirements (0.2 MG). Should other Zone 5 users not require this available storage, it could be allocated to peak hour equalization.

Should the combination of MASCA's and other Zone 5 user's demands exceed 2.0 MGD, additional source development would be required. This source development could come from the Tacoma intertie, assuming Tacoma was agreeable. Otherwise, additional treatment of water from other sources would be required before use in the MASCA plant.

5.0 MITIGATION MEASURES

Any additional increase in water demand by MASCA beyond a peak day demand of 1.6 MGD shall require modifications to the Concomitant Agreement between MASCA and the City. MASCA's average daily demand, peak day, and peak hour flow rates shall be specifically quantified in the revised Concomitant Agreement. All costs associated with such modifications of the Concomitant Agreement and additional source development shall be the responsibility of MASCA.

Future additional water demand beyond MASCA's 1.6 MGD peak day demand could come from the Tacoma system. The cost of additional source development should be paid by the beneficiaries of the additional capacity. Further development of this source is not guaranteed and would require negotiations with the City of Tacoma. Other options include using Puyallup water with additional treatment by MASCA, if required.

The existing pump station will need to be modified in the future, in order to permit additional pumping as required by the City of Puyallup. The cost of upgrading the station should be in proportion to the water demand/allocation to customers in Zone 5.

Pump hours and rates should be monitored to track compliance with Tacoma/Puyallup agreement to determine the peak hour, peak day, and average daily demand. Specifically, MASCA shall provide facilities for peak hours metering.

A tank level monitoring program or peak hour metering of all significant Zone 5 users shall be implemented by the City to identify system-peaking factors in Zone 5, and to determine the amount of tank capacity to reserve for equalization. Cost for such monitoring shall be the responsibility of MASCA. If MASCA required equalization storage be in excess of available capacity, additional on-site storage, or additional source development would be required of MASCA.

All MASCA water service connections, including those of a temporary nature, such as the water connection for tightline flushing, shall be equipped with backflow preventers and metering to assist in verifying water system demands and peaking rates prior to issuance of any certificate of occupancy. This shall include water used for tightline flushing.

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6.0 REFERENCES

City of Puyallup. 1981. Puyallup Science Park Final Environmental Impact Statement.

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City of Puyallup. June 1991. "Water System Comprehensive Plan Addendum."

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MASCA. Letter to City of Puyallup dated December 6, 1995 regarding proposed water use.

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Supplemental Environmental Impact Statement

Water, Wastewater, and Sediment Sampling Plan

MASCA Puyallup Plant
Building D Expansion
(*Puyallup Science Park*)

Prepared for:

City of Puyallup
218 West Puyallup
Puyallup, Washington 98371

Matsushita Semiconductor Corp. of America
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Prepared by:

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July 1, 1996

EXECUTIVE SUMMARY

Samples of effluent from the three outfalls that Matsushita Semiconductor Corporation of America (MASCA) discharge, and water and sediment samples from the on-site detention pond were taken and analyzed for U.S. Environmental Protection Agency listed priority pollutants. The results indicated that very few and very low levels of priority pollutants were identified and quantified in the effluents. Natural process provide for the concentration of compounds and metals onto the surfaces of environmental particles, and somewhat higher concentrations of compounds were detected in the sediments. The compounds detected include:

- Chlorinated organics such as chloroform, which is most likely associated with treatment of the source water used by the plant;
- Plasticizers such as bis (2-ethylhexyl) phthalate are known to be a constituent of non-metallic piping systems;
- Heavy end trace organics such as pyrene are often associated with fuels and most likely to be associated with parking lot runoff or as the result of migration from the underground storage tank remediation site; and
- Heavy metals such as zinc and lead which are found in stormwater conveyance and plumbing systems.

No priority pollutants have concentrations near any regulated criteria for protection of human health and the environment.

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1.0 INTRODUCTION

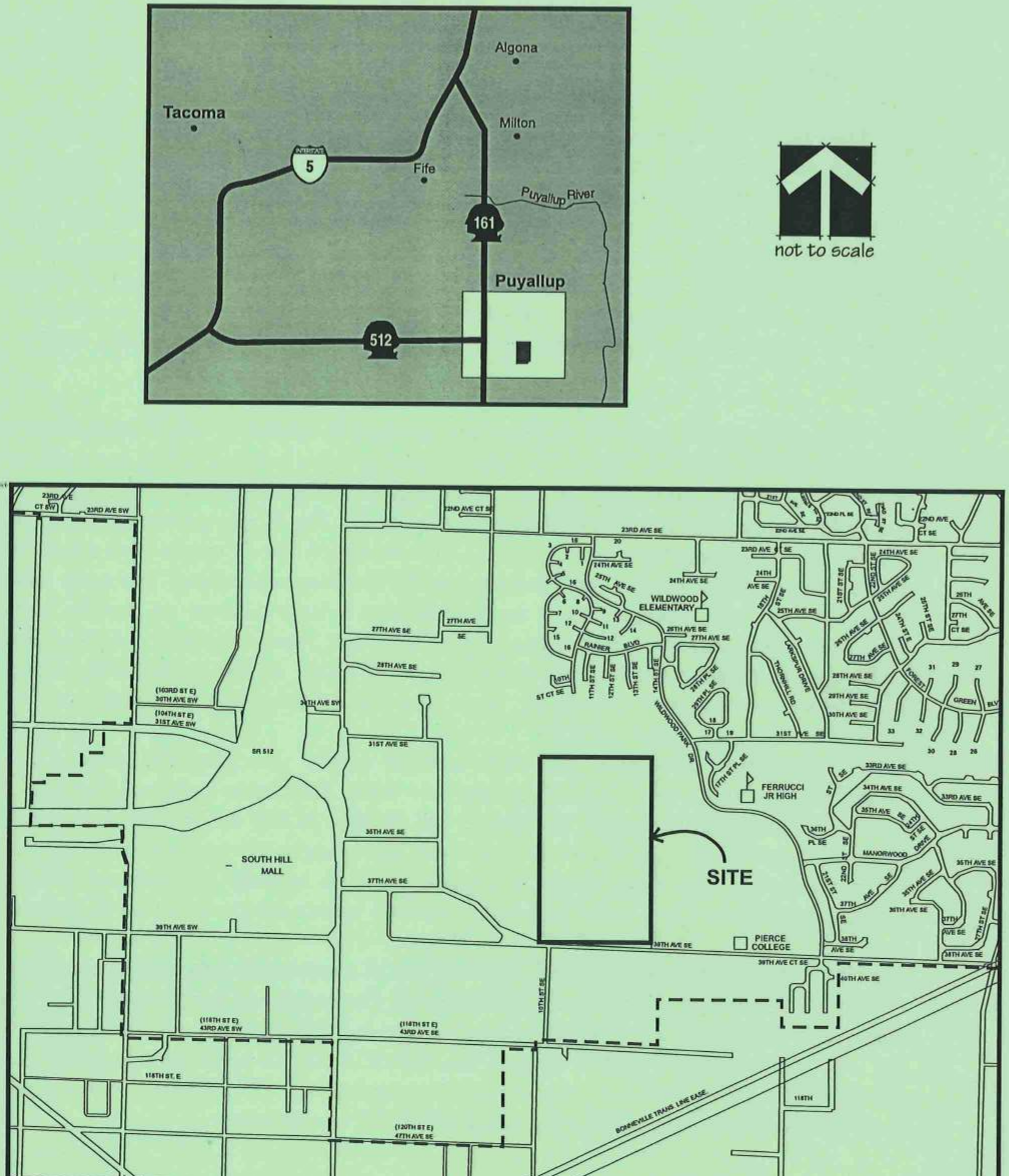
1.1 BACKGROUND

The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitant zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

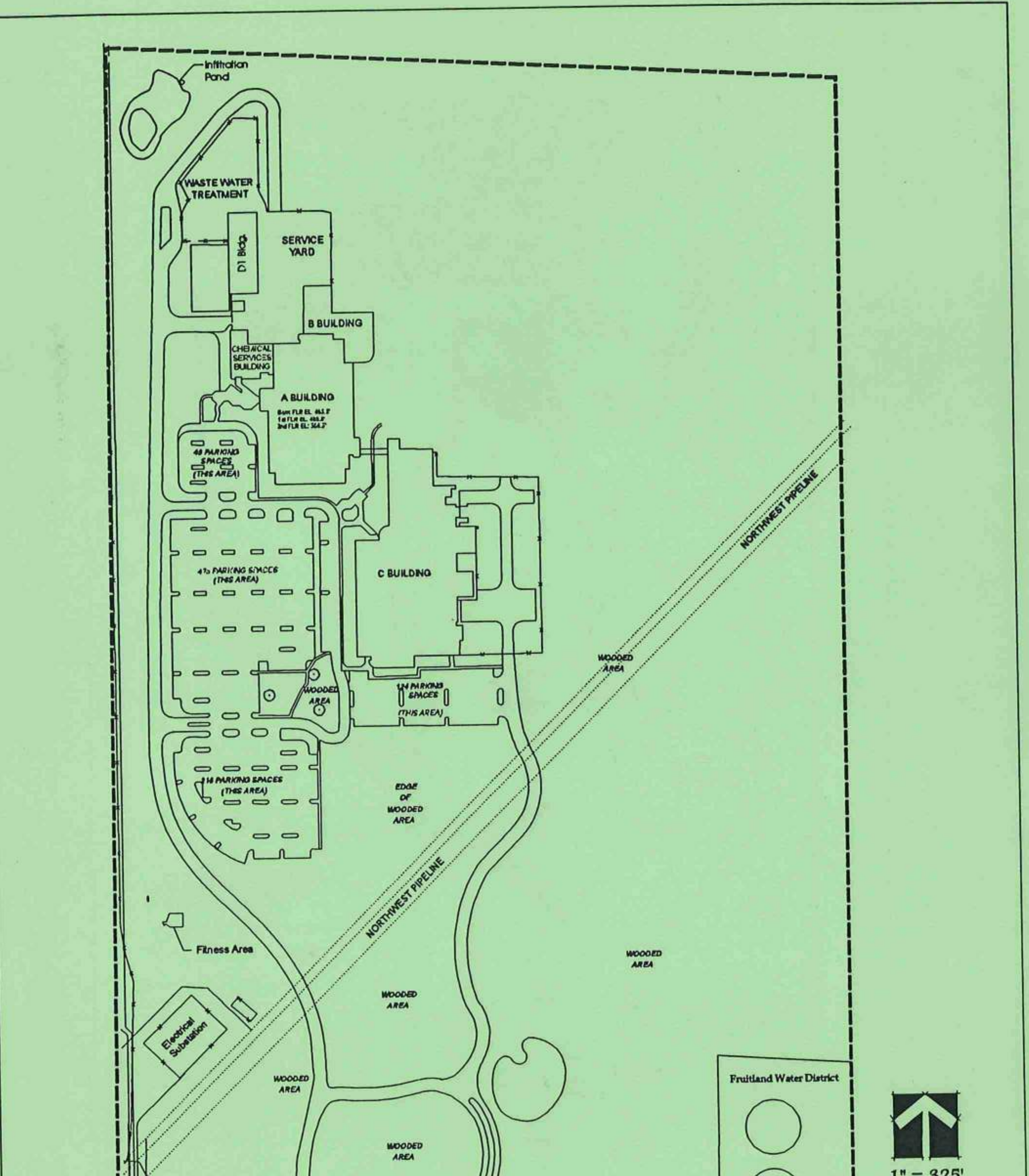
Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.



Source: *City of Puyallup*

Figure 1:
Vicinity Map
SAMPLING PLAN



DAVID EVANS AND ASSOCIATES, INC.

Figure 2:
Existing Site Plan
SAMPLING PLAN

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA

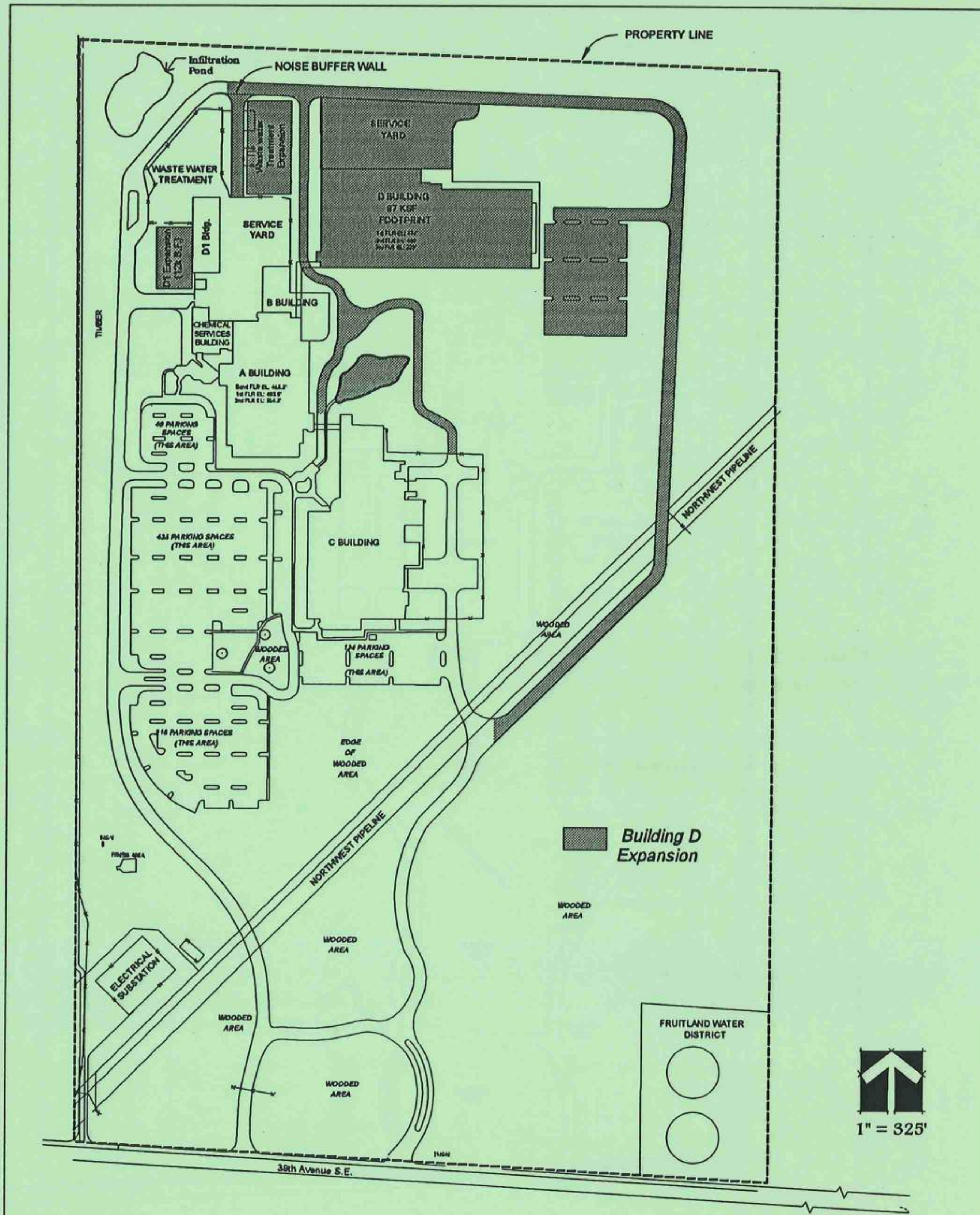


Figure 3:
Proposed Expansion Site Plan
SAMPLING PLAN

DAVID EVANS AND ASSOCIATES, INC.

The site is served by gravity sewers, which drain to the City of Puyallup Publicly Owned Treatment Works (POTW), and by a tightline system which drains to the Puyallup River. The tightline discharges treated wastewater which bypasses the POTW. Periodic backwash water from carbon filters is discharged into an existing on-site infiltration pond. All three discharges are permitted and regulated under a National Pollutant Discharge Elimination System (NPDES) permit.

A detention pond located on the southwest perimeter of the plant receives both stormwater (parking lot run-off) and process wastewater. The wastewater contains backwash of sand and carbon filters from the deionization water treatment process (City of Puyallup, December 26, 1995, Meeting Minutes). Human exposure is possible from this detention pond, either through direct contact or infiltration of the wastewater into surface and groundwaters.MASCA's wastewater comes primarily from the process of rinsing the silicon wafers with deionized water after etching in acid solutions. Other wastewater results from boiler blowdown, non-contact cooling water, filter backwashes and stormwater runoff.

In 1981, an on-site wastewater treatment plant was constructed that allowed the facility to treat much of its own wastewater. The treated wastewater is then discharged into the Puyallup River. The on-site wastewater treatment plant was designed to treat wastewater generated from fabrication of up to 20,000 wafer-outs per month.

The site has three outfalls: Outfall #001 discharges on-site treated wastewater into the Puyallup River, Outfall #002 discharges wastewater to the City of Puyallup Publicly Owned Treatment Works (POTW), and Outfall #003 discharges into an un-lined detention pond on the site. Since the 1981 EIS, the DOE has issued two National Pollutant Discharge and Elimination System (NPDES) permits for the site. The 1991 NPDES Permit (No. WA-00957-81) established acceptable parameters for the outfalls. When this expired in 1994, a new permit was issued including more effluent limitations. It also permitted an increase in wastewater consistent with the creation of a new wafer fabrication facility.

1.2 ANALYSIS FRAMEWORK

An assessment of the potential for community health impacts by the proposed MASCA expansion was required by Determination of Significance (City of Puyallup, 1996) Environmental Element #1 -- Stormwater. In addition, consideration of potential impacts to the City of Puyallup's wastewater treatment facility was required.

David Evans and Associates, Inc. (DEA) completed this sampling plan to address these two issues. The water issue is concerned with the chemical contents of the process waters discharged through Outfall #003. The latter is concerned with both wastewater discharged directly to the City of Puyallup's Publicly Owned Treatment Works (POTW) (Outfall #002), and the instances of discharge of acid process wastewater to the POTW as a result of an upset condition at MASCA.

The most recent existing available information on a full analysis for priority pollutant[1] analyses in the three outfall streams were taken in the Fall of 1993. Since that time, MASCA has changed their use of chemicals in wafer fabrication and wastewater treatment process. It was determined that a new analysis that accurately represented the current chemical constituents of the effluent was needed. Based on the current conditions results, an analysis of the potential risk to environmental health caused by the proposed expansion could be made.

[1] Priority Pollutants are those 129 compounds and metals listed in 40 CFR Part 423. A list of these compounds are included in Appendix A of this report.

2.0 METHODS

2.1 EXISTING INFORMATION

Existing analytical data consists of effluent samples taken from outfalls #001, #002 and #003 in 1993 (SPECTRA Laboratories, Inc. 1993). The 1993 information is not directly comparable with the 1996 data generated by the present study for the following reasons:

1. Although the same EPA methods were used for analysis by SPECTRA Laboratories, Inc. for the 1993 samples, the detection limits reported are typically 5 to 20 times higher than the 1996 detection limits reported by Analytical Resources, Inc. The 1993 analysis would therefore not be expected to report as many occurrences of analytes as would the 1996 analysis of the same samples.

2. The 1993 analysis does not represent a full list of the 129 priority pollutants. A number of the phthalates were not included in the list of semivolatile analytes in the 1993 report.

3. There have been internal process chemistry changes within the plant which are likely to have changed the chemical make-up of the effluents, thereby rendering a direct comparison of the two data sets of undetermined value.

4. The 1993 analyses do not address detention pond sediments.

2.2 SAMPLING AND ANALYSIS PLAN

A sampling and analysis plan was prepared by DEA and reviewed by the City of Puyallup and its technical support contractors. The plan was approved by the City and is provided as Appendix B of this report.

Since the sampling locations were predetermined by the City, little justification was provided for the selection of the sites. The samples were taken by an experienced chemist from DEA, and maintained by him under chain of custody procedures until delivered to the selected laboratory, Analytical Resources, Inc. of Seattle, Washington.

2.3 SELECTION OF ANALYTES

The analysis consisted of water samples collected from the three outfalls that MASCA discharges effluent from, and water and sediment samples from the MASCA on-site detention pond. These samples were stipulated by the City of Puyallup Director of Public Works to be for priority pollutants.

2.4 FIELD OPERATIONS

2.4.1 Sampling Methods

Composite samples were obtained using the Manning Environmental Corporation Automatic Sampler for Outfall #001. The Manning Sampler pools each individual sample in a non-metallic refrigerated reservoir.

An ISCO self-contained compositing sampler was used for Outfall #002. This sampling technique stores individual samples separately during the sampling period. The samples are then pooled by the sampling technician prior to encapsulating the samples in the sample containers. This sampler was packed internally with ice to cool the samples below ambient temperatures.

Grab water samples were taken from Outfall #003 by direct immersion of each sample container in the flow from the outfall during discharge of process waters. Grab water samples from the detention pond were taken by direct immersion of each sample container below the surface of the pond.

Sediment samples were obtained by pushing the wide-mouth sample containers directly into the sediment and removing any major debris or rocks from the surface of the sample.

Field measurement of pH was accomplished by direct measurement in the flow, reservoir or compositing bucket during sample encapsulation. Measurements were made with an Orion Model 230A pH meter which was calibrated at the beginning of each sampling day and checked at the end of the day.

2.4.2 Samples Obtained

Samples were obtained by DEA as guided by the sampling and analysis plan during the period from March 4 through March 7, 1996. The time and date of sample partitioning into the multiple sample jars is provided in Table 1.

Table 1
Sampling Location, Type, Time, And Date

Sample Number	Location	Matrix	Sample Type	Sample Date	Sample Time
001	Outfall 001	Effluent	24 hour composite	3/6/96	0920
002	Outfall 002	Effluent	24 hour composite	3/7/96	0850
003A	Outfall 003	Effluent	Grab (Sand Filter Flush)	3/4/96	1725
003B	Outfall 003	Effluent	Grab (Carbon Filter Flush)	3/5/96	1630
DP1[1]	Detention Pond	Water	Grab	3/5/96	0930
DP2	Detention Pond	Water	Grab	3/6/96	0950
DP3	Field Blank	Distilled Water	Laboratory Prepared	3/5/96	0840
Sediment North[2]	Drainage channel	Sediment	Surface Sediment	3/5/96	1015
Sediment South[3]	Drainage channel	Sediment	Surface Sediment	3/5/96	1000

Notes [1] Detention Pond water grab samples will be surface samples taken from the shore at a point midway between the sampling locations for Sediment North and Sediment South.
[1] Sediment South will be taken at the point where the outflow from the southernmost outfall to the Detention Pond meets the pond proper.
[3] Sediment North will be taken at the point where the outflow from the northerly outfall to the detention pond meets the pond proper.

Sample 001 is a 24-hour composite of the effluent from Outfall #001. It was obtained from a Manning Environmental Corporation automatic sampler located in a fiberglass cabinet adjacent to the sump which routes Outfall #001 flows into the tightline that discharges into the Puyallup River. Upon starting the 24-hour sampling period, the cabinet was chained and locked with a padlock. The keys were held by the DEA sampler and by Darla Wise (an employee of the Maintenance Division of the Public Works Department of the City of Puyallup). Each subsample for analysis was decanted from the Manning's reservoir.

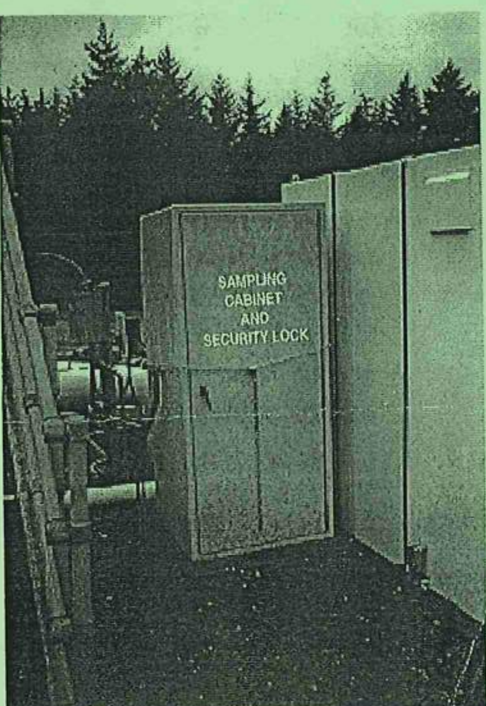


Photo 1. Sampling cabinet with security lock at Outfall #001.

Sample 002 is a 24-hour composite that was originally planned to be taken with another Manning sampler located in another cabinet adjacent to the Outfall #002 sump, but this sampler malfunctioned. It was replaced with a portable ISCO sampler, and that sampler was locked in the same manner as described above. The 24 individual hourly samples were composited in a decontaminated plastic bucket and decanted into the sample containers. The only exception was that the samples for Volatile Organic Analysis (VOA) were taken as discrete grab samples at the direction of Ms. Wise from the City of Puyallup. This sample was from the solvent treatment system stream before it was commingled with the sanitary wastewater from the plant.

Photo 2. ISCO compositing sampler at Outfall #002.

Sample Sediment South was taken from the bottom of the drainage channel approximately 15 feet from the termination of the Outfall #003 pipe on the south eastern side of the detention pond, and approximately 6 feet below the level of the pipe.

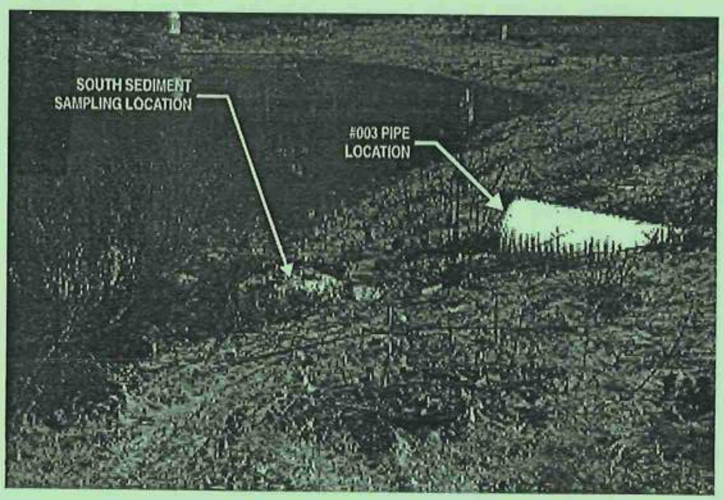


Photo 3. Sediment South sampling location and Outfall #003 where grab samples 003A and 003 B wer taken.

This location was selected because visual inspection of the drainage channel showed an easily recognizable build up of white sand and black carbon granules known to be part of the process stream that is conducted to the detention pond through this route. The sample is considered to be more representative of the solids being introduced into the pond through the process water, than the pond sediments themselves.

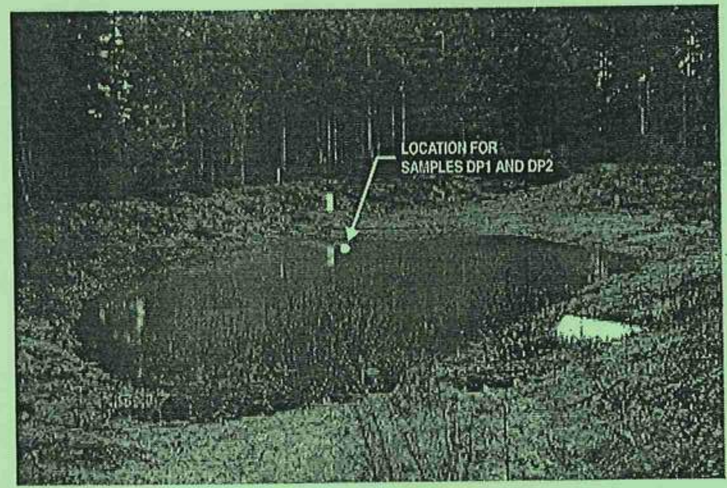
Sample #003A was a grab sample obtained from the free flowing output stream immediately adjacent to the end of pipe at the southerly outfall into the detention pond. This sample is of process waters which were being employed to flush sand filters in the water treatment section of the plant.

Sample 003B was a grab sample obtained at the same location, but 24 hours later. The process water issuing from the pipe had been employed to backflush an activated carbon column in the water treatment section of the plant.

Sample Sediment North was taken from the drainage channel approximately 10 feet from the opening of the drainage pipe which enters the detention pond from the north northeast and carries wastewater flows from the northern part of the MASCA site.

Photo 4. Sediment Norht sampling location.

The channel showed a muddy bottom with substantial roots and organic material. When the sampling jars were pushed into the sediment, a sheen formed on the water surface, indicative of petroleum hydrocarbons probably associated with stormwater runoff from the parking areas.



Samples DP1 and DP2 were surface grab samples of detention pond water taken approximately 24 hours apart. The samples were taken to provide additional confidence in the analysis of the source water that leaves the detention pond and enters the ground water or proceeds downstream by other routes.

Photo 5. Locations of samples DP1 and DP2.

While DP1 and DP2 are not duplicate samples, the relatively short time between the samples, the relatively small amount of wastewater which entered the pond (estimated at 1-2 gpm), and the delivery of sand filter backwash water through Outfall #003 should provide a pair of samples which approximates a typical pond condition. The potential community health impacts depend on long term exposure and an average condition of the pond was considered a data requirement.

Sample Transport

Samples were maintained under a strict chain of custody procedure (Ref. 1) by the sampling technician.

Analytical Methods

Priority pollutant analyses were accomplished on the samples by Analytical Resources, Inc. of Seattle, Washington. Standard EPA Methods were performed as shown in Table 2.

Table 2
EPA Standard Analytical Methods

Analytes	EPA Analytical Method
Priority Pollutant Metals	6010/7000
Total Cyanide	335.2
Semivolatile Organics	8270
Volatile Organics	8260
Pesticide/PCBs	8081
pH	150.1

Quality Control/Quality Assurance

Analytical quality control was accomplished by the encapsulation of a field blank using organic free, deionized water provided by Analytical Resources, Inc. This field blank served the purpose of both a trip blank and a transfer blank. It was identified as Sample #DP3 to disguise its purpose from the analytical laboratory.

The analytical laboratory provided information on method blanks necessary to account for contamination which might have been introduced into the sample during its preparation and manipulation prior to analysis.

3.0 RESULTS AND DESCRIPTION OF EXISTING CONDITION

3.1 ANALYTICAL RESULTS

The data analysis using the EPA protocols is summarized in the following tables. In all cases, the original results are included as Appendix B of this report. Each analyte reported here was quantified at a concentration at or above the "Reporting Limit" (EPA 1991) established for the analysis.

Table 3
Sample 001 -- Acid Waste Line, Effluent, 24-hour Composite

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics Carbon		
Chloroform	2.1 ug/L	1.0 ug/L
Semivolatile Organics		
bis (2-ethylhexyl) phthalate	2.1 ug/L	1.0 ug/L
Metals		
Arsenic	0.002 mg/L	0.001 mg/L
Zinc	0.006 mg/L	0.004 mg/L
Cyanide	Not reported	0.004 mg/L
pH	8.6	

Table 4
Sample #002 -- Solvent Waste Line, Effluent, 24-hour Composite

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics	None Reported	
Semivolatile Organics		
bis (2-ethylhexyl) phthalate	20 ug/L	1.0 ug/L
Pesticides/PCBs	None Reported	
Metals		
Zinc	0.008 mg/L	0.004 mg/L
Cyanide	Not reported	0.004 mg/L
pH	9.1	

Table 5
Sample 003A -- Process Water, Effluent From Sand Filter Flush, Grab Sample

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics -		
Chloroform	3.1 ug/L	1.0 ug/L
Semivolatile Organics		
bis (2-ethylhexyl) phthalate	1.6 ug/L	1.0 ug/L
Pesticides/PCBs	None Reported	
Metals		
Arsenic	0.002 mg/L	0.001 mg/L
Copper	0.155 mg/L	0.002 mg/L
Lead	0.006 mg/L	0.001 mg/L
Zinc	0.025 mg/L	0.004 mg/L
Cyanide	Not reported	0.004 mg/L
pH	7.3	

Table 6
Sample 003B -- Process Water, Effluent From Carbon Column Flush, Grab Sample

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics -		
Chloroform	4.4 ug/L	1.0 ug/L
Semivolatile Organics	None Reported	
Pesticides/PCBs	None Reported	
Metals		
Arsenic	0.001 mg/L	0.001 mg/L
Copper	0.014 mg/L	0.002 mg/L
Lead	0.012 mg/L	0.001 mg/L
Zinc	0.007 mg/L	0.004 mg/L
Cyanide	Not reported	0.004 mg/L
pH	7.2	

Table 7
Sample DP1 -- Detention Pond, Surface Water, Grab Sample

Priority Pollutant		Reported Concentration	EPA Reporting Limit
Volatile Organics	Chloroform	1.6 ug/L	1.0 ug/L
Semivolatile Organics	bis (2-ethylhexyl) phthalate	1.4 ug/L	1.0 ug/L
Pesticides/PCBs		None Reported	
Metals	Arsenic	0.001 mg/L	0.001 mg/L
	Copper	0.008 mg/L	0.008 mg/L
	Lead	0.002 mg/L	0.001 mg/L
	Zinc	0.024 mg/L	0.004 mg/L
Cyanide		Not reported	0.004 mg/L
pH		7.6	

Table 8
Sample DP2 -- Detention Pond, Surface Water, Grab Sample

Priority Pollutant		Reported Concentration	EPA Reporting Limits
Volatile Organics -	Chloroform	1.3 ug/L	1.0 ug/L
Semivolatile Organics		None Reported	
Pesticides/PCBs		None Reported	
Metals	Copper	0.006 mg/L	0.002 mg/L
	Lead	0.003 mg/L	0.001 mg/L
	Zinc	0.027 mg/L	0.004 mg/L
Cyanide		Not reported	0.004
pH		7.6	

Table 9
Sample DP3 -- Deionized, Organic Free, Field Blank

Priority Pollutant		Reported Concentration	EPA Reporting Limit
Volatile Organics -		None Reported	
Semivolatile Organics		None Reported	
Pesticides/PCBs		None Reported	
Metals	Lead	0.002 mg/L	0.001 mg/L
	Selenium	0.001 mg/L	0.001 mg/L
Cyanide		Not reported	0.004 mg/L
pH		8.3	

Table 10
Sediment South -- Sediment Grab Sample

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics		
Methylene Chloride	5.4/7.1 ug/Kg	2.0 ug/Kg
Chloroform	310/390 ug/Kg	1.0 ug/Kg
Bromodichloromethane	18/23 ug/Kg	1.0 ug/Kg
Semivolatile Organics		
Butylbenzylphthalate	250 ug/Kg	67 ug/Kg
Bis (2-ethylhexyl) phthalate	790 ug/Kg	67 ug/Kg
Pesticides/PCBs	None Reported	
Metals		
Arsenic	2.2 mg/Kg	0.1 mg/Kg
Beryllium	0.2 mg/Kg	0.1 mg/Kg
Chromium	21.9 mg/Kg	0:7 mg/Kg
Copper	42.8 mg/Kg	0.3 mg/Kg
Lead	16 mg/Kg	1 mg/Kg
Nickel	21 mg/Kg	1 mg/Kg
Zinc	68.1 mg/Kg	0.5 mg/Kg
Cyanide	0.39 mg/Kg	0.22 mg/Kg
pH	6.6	

Table 11
Sediment North -- Sediment Grab Sample

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics		
Methylene Chloride	5.8 ug/Kg	2.0 ug/Kg
Semivolatile Organics		
Dimethyl phthalate	3,400 ug/Kg	67 ug/Kg
Di-n-butyl phthalate	620 ug/Kg	200 ug/Kg
Fluoranthene	180 ug/Kg	200 ug/Kg
Pyrene	220 ug/Kg	67 ug/Kg
Butylbenzylphthalate	920 ug/Kg	67 ug/Kg
Bis (2-ethylhexyl) phthalate	7,300 ug/Kg	67 ug/Kg
Chrysene	180 ug/Kg	67 ug/Kg
Di-n-octyl phthalate	1,100 ug/Kg	200 ug/Kg
Benzo(b)fluoranthene	170 ug/Kg	200 ug/kg
Pesticides/PCBs	None Reported	
Metals		
Antimony	0.7 mg/Kg	0.1 mg/Kg
Arsenic	4.1 mg/Kg	0.1 mg/Kg
Beryllium	0.2 mg/Kg	0.1 mg/Kg
Cadmium	0.4 mg/Kg	0.3 mg/Kg
Chromium	21.7 mg/Kg	0.6 mg/Kg
Copper	22.9 mg/Kg	0.3 mg/Kg
Lead	30 mg/Kg	1 mg/Kg
Nickel	26 mg/Kg	1 mg/Kg
Zinc	409 mg/Kg	0.5 mg/Kg
Cyanide	Not reported	0.5 mg/Kg
pH	6.7	0.24 mg/Kg

3.2 DISCUSSION OF ANALYTICAL RESULTS

A discussion of the data generated for the 1996 samples is based on knowledge of the typical sources for priority pollutants in environmental samples; as well as, a consideration of the in-plant systems that may be acting as sources for commonly observed compounds such as phthalate plasticizers. Since priority pollutant analysis was not performed on the in-coming water supply from the City of Tacoma, it cannot be determined if these compounds are in the water stream before it is treated by MASCA.

3.2.1 Volatile Organic Compounds

Chloroform is reported in Sample 001, the acid waste line, at 2.1 ug/L, twice the reporting limit. The source is not known, but the compound appears to be a background contaminant as is reported in samples 003A, 003B, and in both samples from the detention pond, DP1 and DP2. Chloroform is, however, absent from Sample 002, the solvent waste line. A possible source of the low concentration of this compound might be the Tacoma treatment system which does provide a chlorination step and might generate chloroform as a minor byproduct. This cannot be confirmed with the present data set.

Small amounts of methylene chloride and bromodichloromethane are reported in the two (2) sediment samples. Their sources are unknown.

3.2.1 Semivolatile Organic Compounds

Bis (2-ethylhexyl) phthalate occurs in samples 001, 002, 003A, 003B, DP1, and in both sediment samples (North and South). It may be surmised that the source of this compound is the substantial amount of non-metallic piping and equipment which is used to treat the water used in the manufacturing process. Phthalates of various kinds are used as plasticizers in such materials and are known to slowly leach into water that contacts the surfaces.

The south sediment sample shows the addition of butyl benzyl phthalate at approximately 1/3 the concentration of the bis (2-ethylhexyl) phthalate.

The north sediment sample shows the existence of additional phthalates: dimethyl phthalate, di-n-butyl phthalate, butyl benzyl phthalate and di-n-octyl phthalate. These typically occur at lower concentrations than the bis (2-ethylhexyl) phthalate, and the source may be the same. It should be mentioned that wastewater from the on-site water treatment plant area is routed through the north outfall, and that the washing of the non-metallic tanks by rainwater would move any free phthalates toward the detention pond. Phthalates are lipophilic compounds which preferentially associate themselves with organic rich phases. The organic coating found on environmental particles provides a site and a mechanism for concentrating free phthalates onto the surfaces of particles which are then sampled and analyzed.

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4.0 REFERENCES

U.S. Environmental Protection Agency. 1991. Environmental Compliance Branch Standard Operating Procedures And Quality Assurance Manual. Region IV. February 1, 1991

Appendix A

Water Analysis
U.S. Environmental Protection Agency Priority Pollutants

1.0 INTRODUCTION

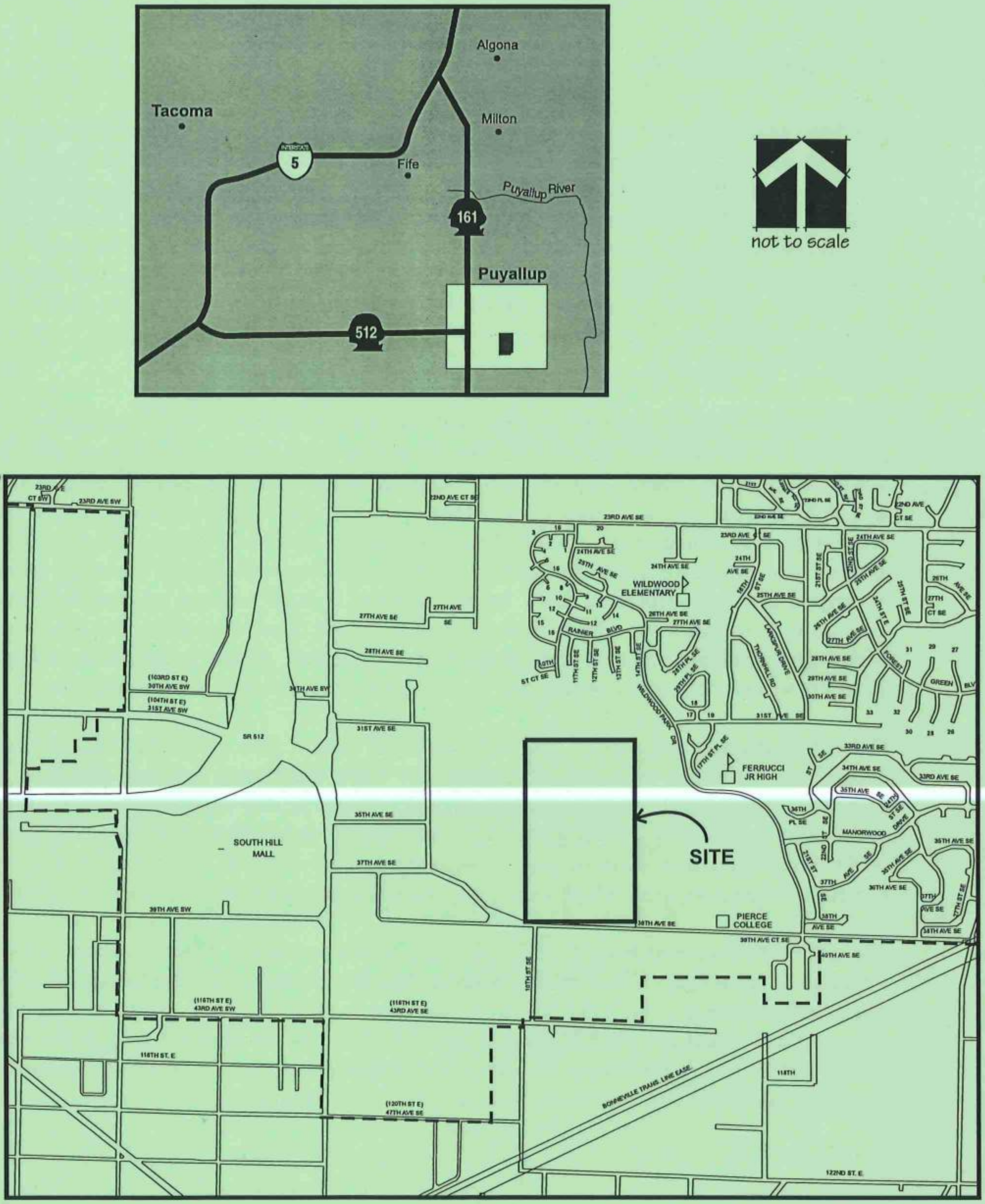
1.1 BACKGROUND

The Matsushita Semiconductor Corporation of America (MASCA) Puyallup plant is a 94-acre site that fronts onto the north-side of 39th Avenue SE in Puyallup, Washington (Figure 1). The site is designated as Business/Industrial Park under the City of Puyallup (City) Comprehensive Plan (1994), and is the subject of a concomitant zoning agreement (1981). The site is split by a natural gas pipeline easement that runs from the southwest corner towards the northeast. The site is mostly wooded and undeveloped with the current development concentrated on the west-side of the site. The surrounding area includes Pierce College (1,500 feet due southeast), several shopping centers (one-half mile due west), and a large residential area (within 1,500 feet due north).

The current facility consists of an electrical transformer station, a wafer fabrication building (Building C), an assembly and test building (Building A), a building which houses the process water deionization system (DI), an utility building (Building B), and several support buildings and parking areas with interconnecting roads (Figure 2). The facility processes silicon wafers in a series of photolithographic etching steps. The rinsing of silicon waters with deionized water after etching in a acid solution produces most of the facilities wastewater. The wafer fabrication, assembly, and test processes used on-site produce a large amount of process water that, untreated, is contaminated with various types of acids and organic solvents. MASCA operates a wastewater treatment plant designed to treat the wastewater. Access to the facility is monitored 24-hours by on-site security personnel. There is no security fence to deter trespassers.

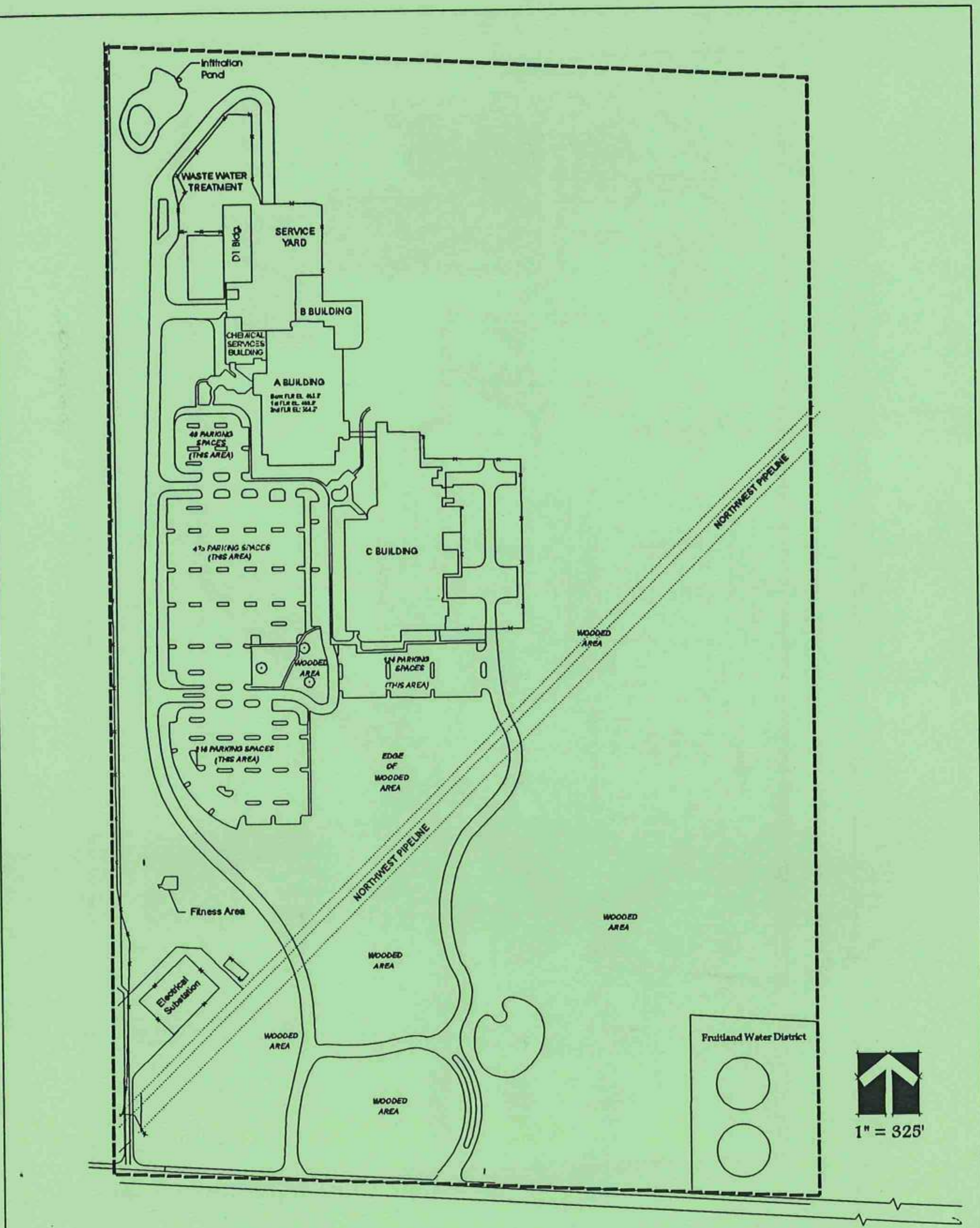
Current production averages 17,000 wafer-outs per month. The proposed MASCA expansion entails constructing a new 300,000 square foot wafer fabrication building (Building D) and associated structures (Figure 3). Building C will produce 20,000 six- (6) inch wafers per month at full production while Building D will produce 20,000 eight- (8) inch wafers. The increase in wafer fabrication and construction of Building D will increase the volumes and types of hazardous chemicals used, which will in turn increase wastewater flows and air emissions.

The site of the proposed project by MASCA is part of a previously approved Master Plan for the Puyallup Science Park. The Puyallup Science Park Environmental Impact Statement (1981 EIS) prepared in response to the site's initial development in 1981 was based on this Master Plan. The site was then owned by Fairchild Camera, Inc. MASCA filed an application for expansion of the site in 1995. After reviewing the expansion proposal, the City determined a limited scope Supplemental Environmental Impact Statement (SEIS) was necessary.



Source: *City of Puyallup*

Figure 1:
Vicinity Map
SAMPLING PLAN



DAVID EVANS AND ASSOCIATES, INC.

Figure 2:
Existing Site Plan
SAMPLING PLAN

Plant Building D Expansion

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MASCA

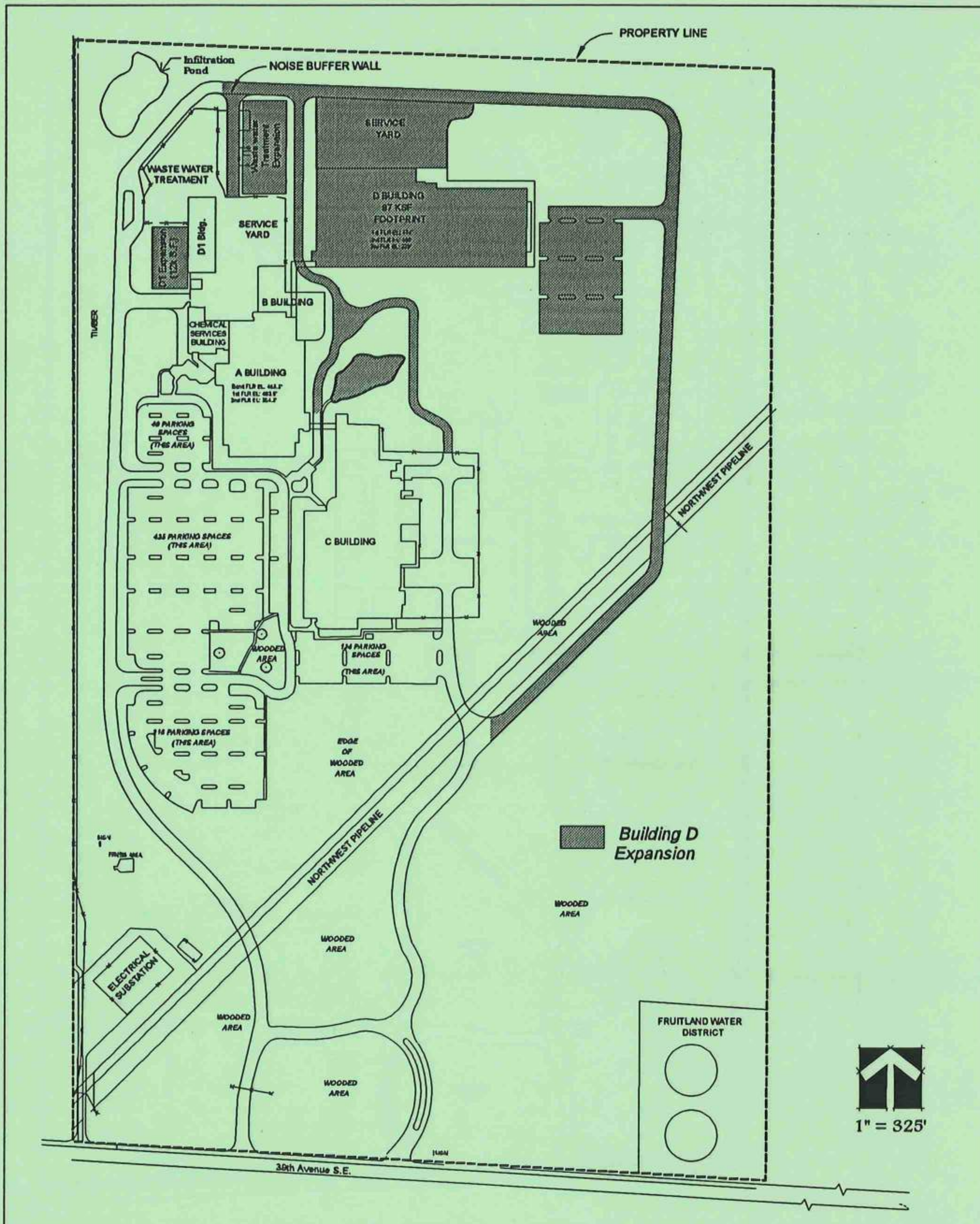


Figure 3:
Proposed Expansion Site Plan
SAMPLING PLAN

DAVID EVANS AND ASSOCIATES, INC.

The site is served by gravity sewers, which drain to the City of Puyallup Publicly Owned Treatment Works (POTW), and by a tightline system which drains to the Puyallup River. The tightline discharges treated wastewater which bypasses the POTW. Periodic backwash water from carbon filters is discharged into an existing on-site infiltration pond. All three discharges are permitted and regulated under a National Pollutant Discharge Elimination System (NPDES) permit.

A detention pond located on the southwest perimeter of the plant receives both stormwater (parking lot run-off) and process wastewater. The wastewater contains backwash of sand and carbon filters from the deionization water treatment process (City of Puyallup, December 26, 1995, Meeting Minutes). Human exposure is possible from this detention pond, either through direct contact or infiltration of the wastewater into surface and groundwaters.MASCA's wastewater comes primarily from the process of rinsing the silicon wafers with deionized water after etching in acid solutions. Other wastewater results from boiler blowdown, non-contact cooling water, filter backwashes and stormwater runoff.

In 1981, an on-site wastewater treatment plant was constructed that allowed the facility to treat much of its own wastewater. The treated wastewater is then discharged into the Puyallup River. The on-site wastewater treatment plant was designed to treat wastewater generated from fabrication of up to 20,000 wafer-outs per month.

The site has three outfalls: Outfall #001 discharges on-site treated wastewater into the Puyallup River, Outfall #002 discharges wastewater to the City of Puyallup Publicly Owned Treatment Works (POTW), and Outfall #003 discharges into an un-lined detention pond on the site. Since the 1981 EIS, the DOE has issued two National Pollutant Discharge and Elimination System (NPDES) permits for the site. The 1991 NPDES Permit (No. WA-00957-81) established acceptable parameters for the outfalls. When this expired in 1994, a new permit was issued including more effluent limitations. It also permitted an increase in wastewater consistent with the creation of a new wafer fabrication facility.

1.2 ANALYSIS FRAMEWORK

An assessment of the potential for community health impacts by the proposed MASCA expansion was required by Determination of Significance (City of Puyallup, 1996) Environmental Element #1 -- Stormwater. In addition, consideration of potential impacts to the City of Puyallup's wastewater treatment facility was required.

David Evans and Associates, Inc. (DEA) completed this sampling plan to address these two issues. The water issue is concerned with the chemical contents of the process waters discharged through Outfall #003. The latter is concerned with both wastewater discharged directly to the City of Puyallup's Publicly Owned Treatment Works (POTW) (Outfall #002), and the instances of discharge of acid process wastewater to the POTW as a result of an upset condition at MASCA.

The most recent existing available information on a full analysis for priority pollutant[1] analyses in the three outfall streams were taken in the Fall of 1993. Since that time, MASCA has changed their use of chemicals in wafer fabrication and wastewater treatment process. It was determined that a new analysis that accurately represented the current chemical constituents of the effluent was needed. Based on the current conditions results, an analysis of the potential risk to environmental health caused by the proposed expansion could be made.

[1] Priority Pollutants are those 129 compounds and metals listed in 40 CFR Part 423. A list of these compounds are included in Appendix A of this report.

2.0 METHODS

2.1 EXISTING INFORMATION

Existing analytical data consists of effluent samples taken from outfalls #001, #002 and #003 in 1993 (SPECTRA Laboratories, Inc. 1993). The 1993 information is not directly comparable with the 1996 data generated by the present study for the following reasons:

1. Although the same EPA methods were used for analysis by SPECTRA Laboratories, Inc. for the 1993 samples, the detection limits reported are typically 5 to 20 times higher than the 1996 detection limits reported by Analytical Resources, Inc. The 1993 analysis would therefore not be expected to report as many occurrences of analytes as would the 1996 analysis of the same samples.

2. The 1993 analysis does not represent a full list of the 129 priority pollutants. A number of the phthalates were not included in the list of semivolatile analytes in the 1993 report.

3. There have been internal process chemistry changes within the plant which are likely to have changed the chemical make-up of the effluents, thereby rendering a direct comparison of the two data sets of undetermined value.

4. The 1993 analyses do not address detention pond sediments.

2.2 SAMPLING AND ANALYSIS PLAN

A sampling and analysis plan was prepared by DEA and reviewed by the City of Puyallup and its technical support contractors. The plan was approved by the City and is provided as Appendix B of this report.

Since the sampling locations were predetermined by the City, little justification was provided for the selection of the sites. The samples were taken by an experienced chemist from DEA, and maintained by him under chain of custody procedures until delivered to the selected laboratory, Analytical Resources, Inc. of Seattle, Washington.

2.3 SELECTION OF ANALYTES

The analysis consisted of water samples collected from the three outfalls that MASCA discharges effluent from, and water and sediment samples from the MASCA on-site detention pond. These samples were stipulated by the City of Puyallup Director of Public Works to be for priority pollutants.

2.4 FIELD OPERATIONS

2.4.1 Sampling Methods

Composite samples were obtained using the Manning Environmental Corporation Automatic Sampler for Outfall #001. The Manning Sampler pools each individual sample in a non-metallic refrigerated reservoir.

An ISCO self-contained compositing sampler was used for Outfall #002. This sampling technique stores individual samples separately during the sampling period. The samples are then pooled by the sampling technician prior to encapsulating the samples in the sample containers. This sampler was packed internally with ice to cool the samples below ambient temperatures.

Grab water samples were taken from Outfall #003 by direct immersion of each sample container in the flow from the outfall during discharge of process waters. Grab water samples from the detention pond were taken by direct immersion of each sample container below the surface of the pond.

Sediment samples were obtained by pushing the wide-mouth sample containers directly into the sediment and removing any major debris or rocks from the surface of the sample.

Field measurement of pH was accomplished by direct measurement in the flow, reservoir or compositing bucket during sample encapsulation. Measurements were made with an Orion Model 230A pH meter which was calibrated at the beginning of each sampling day and checked at the end of the day.

2.4.2 Samples Obtained

Samples were obtained by DEA as guided by the sampling and analysis plan during the period from March 4 through March 7, 1996. The time and date of sample partitioning into the multiple sample jars is provided in Table 1.

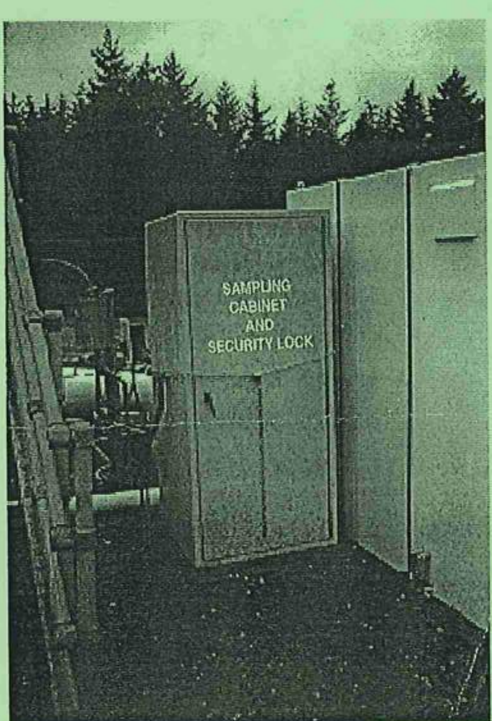
Table 1
Sampling Location, Type, Time, And Date

Sample Number	Location	Matrix	Sample Type	Sample Date	Sample Time
001	Outfall 001	Effluent	24 hour composite	3/6/96	0920
002	Outfall 002	Effluent	24 hour composite	3/7/96	0850
003A	Outfall 003	Effluent	Grab (Sand Filter Flush)	3/4/96	1725
003B	Outfall 003	Effluent	Grab (Carbon Filter Flush)	3/5/96	1630
DP1[1]	Detention Pond	Water	Grab	3/5/96	0930
DP2	Detention Pond	Water	Grab	3/6/96	0950
DP3	Field Blank	Distilled Water	Laboratory Prepared	3/5/96	0840
Sediment North[2]	Drainage channel	Sediment	Surface Sediment	3/5/96	1015
Sediment South[3]	Drainage channel	Sediment	Surface Sediment	3/5/96	1000

Notes [1] Detention Pond water grab samples will be surface samples taken from the shore at a point midway between the sampling locations for Sediment North and Sediment South.

[1] Sediment South will be taken at the point where the outflow from the southernmost outfall to the Detention Pond meets the pond proper.

[3] Sediment North will be taken at the point where the outflow from the northerly outfall to the detention pond meets the pond proper.



Sample 001 is a 24-hour composite of the effluent from Outfall #001. It was obtained from a Manning Environmental Corporation automatic sampler located in a fiberglass cabinet adjacent to the sump which routes Outfall #001 flows into the tightline that discharges into the Puyallup River. Upon starting the 24-hour sampling period, the cabinet was chained and locked with a padlock. The keys were held by the DEA sampler and by Darla Wise (an employee of the Maintenance Division of the Public Works Department of the City of Puyallup). Each subsample for analysis was decanted from the Manning's reservoir.

Photo 1. Sampling cabinet with security lock at Outfall #001.

Sample 002 is a 24-hour composite that was originally planned to be taken with another Manning sampler located in another cabinet adjacent to the Outfall #002 sump, but this sampler malfunctioned. It was replaced with a portable ISCO sampler, and that sampler was locked in the same manner as described above. The 24 individual hourly samples were composited in a decontaminated plastic bucket and decanted into the sample containers. The only exception was that the samples for Volatile Organic Analysis (VOA) were taken as discrete grab samples at the direction of Ms. Wise from the City of Puyallup. This sample was from the solvent treatment system stream before it was commingled with the sanitary wastewater from the plant.

Photo 2. ISCO compositing sampler at Outfall #002.

Sample Sediment South was taken from the bottom of the drainage channel approximately 15 feet from the termination of the Outfall #003 pipe on the south eastern side of the detention pond, and approximately 6 feet below the level of the pipe.

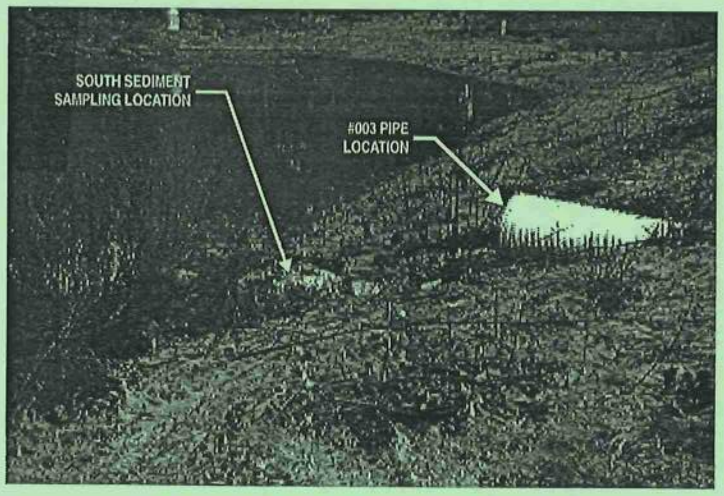


Photo 3. Sediment South sampling location and Outfall #003 where grab samples 003A and 003 B wer taken.

This location was selected because visual inspection of the drainage channel showed an easily recognizable build up of white sand and black carbon granules known to be part of the process stream that is conducted to the detention pond through this route. The sample is considered to be more representative of the solids being introduced into the pond through the process water, than the pond sediments themselves.

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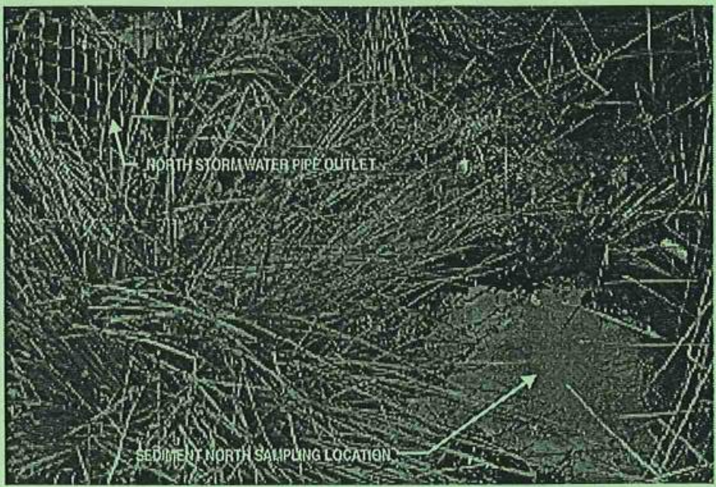

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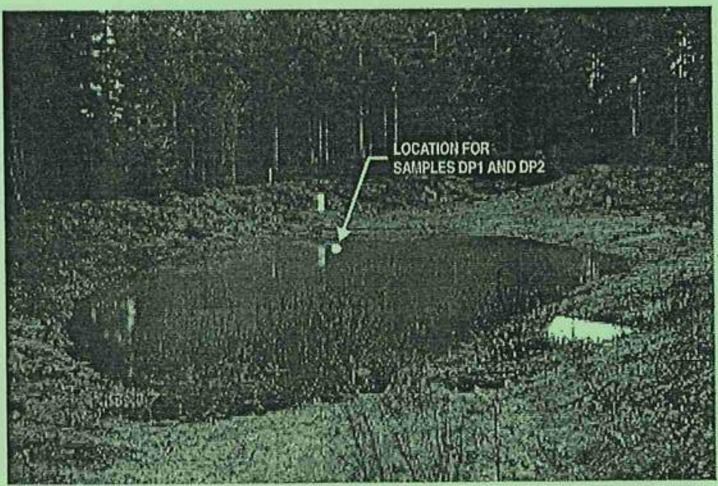
Photo 4. Sediment Norht sampling location.

The channel showed a muddy bottom with substantial roots and organic material. When the sampling jars were pushed into the sediment, a sheen formed on the water surface, indicative of petroleum hydrocarbons probably associated with stormwater runoff from the parking areas.



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EPA Standard Analytical Methods

Analytes	EPA Analytical Method
Priority Pollutant Metals	6010/7000
Total Cyanide	335.2
Semivolatile Organics	8270
Volatile Organics	8260
Pesticide/PCBs	8081
pH	150.1

Quality Control/Quality Assurance

Analytical quality control was accomplished by the encapsulation of a field blank using organic free, deionized water provided by Analytical Resources, Inc. This field blank served the purpose of both a trip blank and a transfer blank. It was identified as Sample #DP3 to disguise its purpose from the analytical laboratory.

The analytical laboratory provided information on method blanks necessary to account for contamination which might have been introduced into the sample during its preparation and manipulation prior to analysis.

3.0 RESULTS AND DESCRIPTION OF EXISTING CONDITION

3.1 ANALYTICAL RESULTS

The data analysis using the EPA protocols is summarized in the following tables. In all cases, the original results are included as Appendix B of this report. Each analyte reported here was quantified at a concentration at or above the "Reporting Limit" (EPA 1991) established for the analysis.

Table 3
Sample 001 -- Acid Waste Line, Effluent, 24-hour Composite

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics Carbon		
Chloroform	2.1 ug/L	1.0 ug/L
Semivolatile Organics		
bis (2-ethylhexyl) phthalate	2.1 ug/L	1.0 ug/L
Metals		
Arsenic	0.002 mg/L	0.001 mg/L
Zinc	0.006 mg/L	0.004 mg/L
Cyanide	Not reported	0.004 mg/L
pH	8.6	

Table 4
Sample #002 -- Solvent Waste Line, Effluent, 24-hour Composite

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics	None Reported	
Semivolatile Organics		
bis (2-ethylhexyl) phthalate	20 ug/L	1.0 ug/L
Pesticides/PCBs	None Reported	
Metals		
Zinc	0.008 mg/L	0.004 mg/L
Cyanide	Not reported	0.004 mg/L
pH	9.1	

Table 5
Sample 003A -- Process Water, Effluent From Sand Filter Flush, Grab Sample

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics -		
Chloroform	3.1 ug/L	1.0 ug/L
Semivolatile Organics		
bis (2-ethylhexyl) phthalate	1.6 ug/L	1.0 ug/L
Pesticides/PCBs	None Reported	
Metals		
Arsenic	0.002 mg/L	0.001 mg/L
Copper	0.155 mg/L	0.002 mg/L
Lead	0.006 mg/L	0.001 mg/L
Zinc	0.025 mg/L	0.004 mg/L
Cyanide	Not reported	0.004 mg/L
pH	7.3	

Table 6
Sample 003B -- Process Water, Effluent From Carbon Column Flush, Grab Sample

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics -		
Chloroform	4.4 ug/L	1.0 ug/L
Semivolatile Organics	None Reported	
Pesticides/PCBs	None Reported	
Metals		
Arsenic	0.001 mg/L	0.001 mg/L
Copper	0.014 mg/L	0.002 mg/L
Lead	0.012 mg/L	0.001 mg/L
Zinc	0.007 mg/L	0.004 mg/L
Cyanide	Not reported	0.004 mg/L
pH	7.2	

Table 7
Sample DP1 -- Detention Pond, Surface Water, Grab Sample

Priority Pollutant		Reported Concentration	EPA Reporting Limit
Volatile Organics			
	Chloroform	1.6 ug/L	1.0 ug/L
Semivolatile Organics			
	bis (2-ethylhexyl) phthalate	1.4 ug/L	1.0 ug/L
Pesticides/PCBs		None Reported	
Metals			
	Arsenic	0.001 mg/L	0.001 mg/L
	Copper	0.008 mg/L	0.008 mg/L
	Lead	0.002 mg/L	0.001 mg/L
	Zinc	0.024 mg/L	0.004 mg/L
Cyanide		Not reported	0.004 mg/L
pH		7.6	

Table 8
Sample DP2 -- Detention Pond, Surface Water, Grab Sample

Priority Pollutant		Reported Concentration	EPA Reporting Limits
Volatile Organics -			
	Chloroform	1.3 ug/L	1.0 ug/L
Semivolatile Organics		None Reported	
Pesticides/PCBs		None Reported	
Metals			
	Copper	0.006 mg/L	0.002 mg/L
	Lead	0.003 mg/L	0.001 mg/L
	Zinc	0.027 mg/L	0.004 mg/L
Cyanide		Not reported	0.004
pH		7.6	

Table 9
Sample DP3 -- Deionized, Organic Free, Field Blank

Priority Pollutant		Reported Concentration	EPA Reporting Limit
Volatile Organics -		None Reported	
Semivolatile Organics		None Reported	
Pesticides/PCBs		None Reported	
Metals			
	Lead	0.002 mg/L	0.001 mg/L
	Selenium	0.001 mg/L	0.001 mg/L
Cyanide		Not reported	0.004 mg/L
pH		8.3	

Table 10
Sediment South -- Sediment Grab Sample

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics		
Methylene Chloride	5.4/7.1 ug/Kg	2.0 ug/Kg
Chloroform	310/390 ug/Kg	1.0 ug/Kg
Bromodichloromethane	18/23 ug/Kg	1.0 ug/Kg
Semivolatile Organics		
Butylbenzylphthalate	250 ug/Kg	67 ug/Kg
Bis (2-ethylhexyl) phthalate	790 ug/Kg	67 ug/Kg
Pesticides/PCBs	None Reported	
Metals		
Arsenic	2.2 mg/Kg	0.1 mg/Kg
Beryllium	0.2 mg/Kg	0.1 mg/Kg
Chromium	21.9 mg/Kg	0:7 mg/Kg
Copper	42.8 mg/Kg	0.3 mg/Kg
Lead	16 mg/Kg	1 mg/Kg
Nickel	21 mg/Kg	1 mg/Kg
Zinc	68.1 mg/Kg	0.5 mg/Kg
Cyanide	0.39 mg/Kg	0.22 mg/Kg
pH	6.6	

Table 11
Sediment North -- Sediment Grab Sample

Priority Pollutant	Reported Concentration	EPA Reporting Limit
Volatile Organics		
Methylene Chloride	5.8 ug/Kg	2.0 ug/Kg
Semivolatile Organics		
Dimethyl phthalate	3,400 ug/Kg	67 ug/Kg
Di-n-butyl phthalate	620 ug/Kg	200 ug/Kg
Fluoranthene	180 ug/Kg	200 ug/Kg
Pyrene	220 ug/Kg	67 ug/Kg
Butylbenzylphthalate	920 ug/Kg	67 ug/Kg
Bis (2-ethylhexyl) phthalate	7,300 ug/Kg	67 ug/Kg
Chrysene	180 ug/Kg	67 ug/Kg
Di-n-octyl phthalate	1,100 ug/Kg	200 ug/Kg
Benzo(b)fluoranthene	170 ug/Kg	200 ug/kg
Pesticides/PCBs	None Reported	
Metals		
Antimony	0.7 mg/Kg	0.1 mg/Kg
Arsenic	4.1 mg/Kg	0.1 mg/Kg
Beryllium	0.2 mg/Kg	0.1 mg/Kg
Cadmium	0.4 mg/Kg	0.3 mg/Kg
Chromium	21.7 mg/Kg	0.6 mg/Kg
Copper	22.9 mg/Kg	0.3 mg/Kg
Lead	30 mg/Kg	1 mg/Kg
Nickel	26 mg/Kg	1 mg/Kg
Zinc	409 mg/Kg	0.5 mg/Kg
Cyanide	Not reported	0.24 mg/Kg
pH	6.7	

3.2 DISCUSSION OF ANALYTICAL RESULTS

A discussion of the data generated for the 1996 samples is based on knowledge of the typical sources for priority pollutants in environmental samples; as well as, a consideration of the in-plant systems that may be acting as sources for commonly observed compounds such as phthalate plasticizers. Since priority pollutant analysis was not performed on the in-coming water supply from the City of Tacoma, it cannot be determined if these compounds are in the water stream before it is treated by MASCA.

3.2.1 Volatile Organic Compounds

Chloroform is reported in Sample 001, the acid waste line, at 2.1 ug/L, twice the reporting limit. The source is not known, but the compound appears to be a background contaminant as is reported in samples 003A, 003B, and in both samples from the detention pond, DP1 and DP2. Chloroform is, however, absent from Sample 002, the solvent waste line. A possible source of the low concentration of this compound might be the Tacoma treatment system which does provide a chlorination step and might generate chloroform as a minor byproduct. This cannot be confirmed with the present data set.

Small amounts of methylene chloride and bromodichloromethane are reported in the two (2) sediment samples. Their sources are unknown.

3.2.1 Semivolatile Organic Compounds

Bis (2-ethylhexyl) phthalate occurs in samples 001, 002, 003A, 003B, DP1, and in both sediment samples (North and South). It may be surmised that the source of this compound is the substantial amount of non-metallic piping and equipment which is used to treat the water used in the manufacturing process. Phthalates of various kinds are used as plasticizers in such materials and are known to slowly leach into water that contacts the surfaces.

The south sediment sample shows the addition of butyl benzyl phthalate at approximately 1/3 the concentration of the bis (2-ethylhexyl) phthalate.

The north sediment sample shows the existence of additional phthalates: dimethyl phthalate, di-n-butyl phthalate, butyl benzyl phthalate and di-n-octyl phthalate. These typically occur at lower concentrations than the bis (2-ethylhexyl) phthalate, and the source may be the same. It should be mentioned that wastewater from the on-site water treatment plant area is routed through the north outfall, and that the washing of the non-metallic tanks by rainwater would move any free phthalates toward the detention pond. Phthalates are lipophilic compounds which preferentially associate themselves with organic rich phases. The organic coating found on environmental particles provides a site and a mechanism for concentrating free phthalates onto the surfaces of particles which are then sampled and analyzed.

The north sediment sample also exhibits "heavy, ring-compounds" fluoranthene, pyrene, chrysene and benzo(b)fluoranthene. These are the least mobile, least biodegradable trace hydrocarbons found in gasolines, diesel fuels and hydraulic oils. The likely source is parking lot runoff, and/or migration from the leaking underground storage tank which was located upgradient from the detention pond. Remediation has been performed for this leaking underground storage tank. These compounds do not appear in the south sediment sample, because that sample was taken in an area selected for its predominant sand/charcoal appearance, to assess the inputs to the detention pond from the filter backwash activities in the water treatment system.

3.3.3 Pesticides/PCBs

No organochlorine pesticides or PCBs were detected or reported for any samples taken in 1996.

3.3.4 Metals

The effluent samples show a zinc background in common which ranges from 0.002 mg/L to 0.025 mg/L. Samples 003A and 003B of the effluents show low amounts of copper and lead. All of these metals might be a result of transport through metallic pipes or from parking lot runoff.

Very low levels of arsenic are seen in the samples 001, 003A, and 003B.

The sediments provide the opportunity for metallic species to adsorb on the surface, so small amounts of, are observed. The source of antimony and beryllium is unknown, while cadmium and chromium latter can often be found in parking lot runoff.

3.3 COMPARISON OF 1993 DATA AND 1996 DATA

A general comparison of summaries of the two data sets for the effluent samples indicates:

1. Neither set showed large numbers nor high concentrations of volatile organic carbons (VOC) for the effluent streams sampled and analyzed. The exception in 1993 was the inferred presence of bis-(Chloromethyl) ether at a concentration of less than 500 ppb in all three streams, which was not detected in 1996.

2. Neither set showed large numbers nor high concentrations of semivolatile organic compounds, organochlorine pesticides, or PCBs occurring in the effluent streams sampled and analyzed.

3. Only trace amounts of priority pollutant metals were detected in the 1996 effluent and detention pond samples. Concentrations of metals reported for the sediment samples showed a larger number of metals detected. This was assumed to be caused by the collection of stormwater run-off from building roofs and parking lots where the conveyance piping can contaminate the rainwater by leaching of metals.

4. Total cyanide was below detection in all effluent samples analyzed for both 1993 and 1996 analyses.

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4.0 REFERENCES

U.S. Environmental Protection Agency. 1991. Environmental Compliance Branch Standard Operating Procedures And Quality Assurance Manual. Region IV. February 1, 1991

Appendix A

Water Analysis
U.S. Environmental Protection Agency Priority Pollutants

US Enviornmental Protection Agency
MASCA Water Analysis

Table A-1.
Volatiles by Method 8260

Priority Pollutant No.	ANALYTE	TTO	Methodf Detective Limit (ug/l)	Reporting Limit (Ug/l)
002	Acrolein		12	50
003	Acrylonitrile		3.6	5.0
004	Benzene		0.8	1.0
005	Benzidine			
006	Carbon Tetrachloride	X	0.6	1.0
007	Chlorobenzene		0.6	1.0
008	1,2,4-Trichlorobenzene	X	1.5	5.0
010	trans-1,2-Dichloroethane	X	0.8	1.0
010	1,2-Dichloroethane		0.9	1.0
011	1,1,1-Trichloroethane	X	0.8	1.0
013	1,1-Dichloroethane		0.6	1.0
014	1,1,2-Trichloroethane	X	1.2	1.0
015	1,1,2,2-Tetrachloroethane		0.8	1.0
016	Chloroethane		1.0	2.0
019	2-Chloroethyl Vinyl Ether		1.2	5.0
023	Chloroform	X	1.0	1.0
025	1,2-Dichlorobenzene	X	0.9	1.0
029	1,1-Dichloroethene	X	1.0	1.0
030	1,2-trans-dichloroethylene			
032	1,2-Dichloropropane		0.9	1.0
033	1,2-dichloropropylene			
038	ethylbenzene	X		
042	bis(2-chloroisopropyl) ether			
044	Methylene Chloride	X	1.9	2.0
045	Methyl chloride (dichloromethane)			
046	Dibromomethane		0.9	1.0
047	Bromoform		0.9	1.0
048	Bromodichloromethane	X	0.7	1.0
051	Chlorodibromomethane		0.6	1.0
085	Tetrachloroethene	X	0.7	1.0
086	Toluene	X	1.1	1.0
087	Trichloroethene	X	0.6	1.0
088	Vinyl Chloride		0.6	2.0

US Enviornmental Protection Agency
MASCA Water Analysis

Table A-2.
Semivolatiles by Method 8270

Priority Pollutant No.	ANALYTE	TTO	Methodf Detective Limit (ug/l)	Reporting Limit (Ug/l)
001	Acenaphthene		0.6	1.0
009	Hexachlorobenzene		0.6	1.0
012	Hexachloroethane		1.1	2.0
020	2-Chloronaphthalene		0.5	1.0
021	2,4,6-Trichlorophenol	X	1.5	5.0
022	parachlorometacresol			
026	1,3-Dichlorobenzene	X	0.6	1.0
027	1,4-Dichlorobenzene	X	0.3	1.0
028	3,3'-Dichlorobenzidine		3.0	5.0
031	2,4-Dichlorophenol	X	1.1	3.0
034	2,4-Dimethylphenol		2.0	3.0
035	2,4-Dinitrotoluene		1.3	5.0
036	2,6-Dinitrotoluene		1.5	5.0
037	1,2-diphenylhydrazine	X		
039	Fluoranthene		0.6	1.0
040	4-Chlorophenyl-phenylether		0.7	1.0
041	4-Bromophenyl-phenylether		0.6	1.0
043	bis(2-Chloroethoxy)Methane		0.5	1.0
052	Hexachlorobutadiene		1.1	2.0
053	Hexachlorocyclopentadiene		2.9	5.0
054	Isophorone	X	0.5	1.0
055	Napthalene	X	0.2	1.0
056	Nitrobenzene		0.5	1.0
057	2-Nitrophenol	X	0.8	5.0
058	4-Nitrophenol	X	2.4	5.0
059	2,4-Dinitrophenol		10.0	10.0
060	4,6-Dinitro-2-Methylphenol		2.7	10.0
061	N-nitrosodimethylamine			
062	N-Nitrosodiphenylamine		0.6	1.0
063	N-Nitroso-di-n-Propylamine		2.4	3.0
064	Pentachlorophenol	X	3.9	5.0
066	bis(2-Ethylhexyl)Phthalate	X	0.6	1.0
067	Butylbenzylphthalate	X	0.7	1.0
068	Di-n-butyl phthalate	X	1.0	1.0
069	Di-n-Octyl Phthalate		0.6	1.0
070	Diethylphthalate		1.0	1.0
071	Dimethyl phthalate		0.7	1.0
072	Benzo(a)Anthracene		0.6	1.0
073	Benzo(a)Pyrene		0.7	1.0
074	3,4-Benzofluoranthene (benzo(b)fluoranthene)			
075	Benzo(b)Fluoranthene		0.6	1.0
076	Chrysene		0.6	1.0

US Enviornmental Protection Agency
MASCA Water Analysis

Table A-2 Continued

Priority Pollutant No.	ANALYTE	TTO	Methodf Detective Limit (ug/l)	Reporting Limit (Ug/l)
077	Acenaphthylene		0.6	1.0
078	Anthracene	X	0.7	1.0
079	Benzo(ghi)Perylene		0.5	1.0
080	Fluorene		0.5	1.0
081	Phenanthrene		0.6	1.0
082	Dibenzo(a,h)Anthracene		0.6	1.0
083	Indeno(1,2,3-cd)Pyrene		0.5	1.0
084	Pyrene		0.6	1.0

Table A-3
Organochlorine Pesticides and Toxaphene by Method 8081

Priority Pollutant No.	ANALYTE	TTO	Methodf Detective Limit (ug/l)	Reporting Limit (Ug/l)
089	Aldrin		0.0053	0.025
090	Dieldrin		0.0042	0.05
091	Chlordane		0.0057	0.025
092	DDT		0.0098	0.05
093	DDE		0.011	0.05
094	DDD		0.0059	0.05
095	Endosulfan I		0.0024	0.025
096	Endosulfan II		0.0061	0.05
097	Endosulfan Sulfate		0.0050	0.05
098	Endrin		0.0046	0.05
099	Endrin Aldehyde		0.010	0.05
100	Heptachlor		0.0042	0.025
101	Heptachlor epoxide		0.0025	0.025
105	Delta-BHC		0.0025	0.025
113	Toxaphene		0.25	1.00

US Enviornmental Protection Agency
MASCA Water Analysis

Table A-7
Other

Priority Pollutant No.	ANALYTE	TTO	Methodf Detective Limit	Reporting Limit
116	Asbestos			
121	Cyanide, Total			.004 mg/l
129	2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD)			

Appendix B

1996 Sampling and Analysis Plan

1.0 INTRODUCTION

This sampling and analysis plan covers effluent and detention pond water samples, and detention pond sediment samples at the Matsushita Semiconductor Plant in Puyallup, Washington. Sampling and analysis is required to provide baseline data necessary for consideration of potential environmental and human health impacts that would result from the proposed expansion of the facility.

This sampling plan was prepared to fulfill a request by the City of Puyallup. The plan was approved by **NAME OF PERSON** (City of Puyallup) on **DATE.**

2.0 SAMPLING LOCATIONS

Table B-1 is a listing of the sample locations, matrices and sample types that were established for this plan.

Table B-1
Sample Locations, Matrices, and Types

Location	Matrix	Sample Type	Schedule
Outfall 001	Effluent	24-hour composite	Upon notice to proceed
Outfall 002	Effluent	24-hour composite	Upon notice to proceed
Field Blank	Distilled Water	Laboratory Prepared	Same as Outfall 002
Outfall 003 (A)	Effluent	Grab	During filter backwash discharge
Outfall 003 (B)	Effluent	Grab	During filter backwash discharge 24 hours after Outfall 003 (A)
Detention Pond #1	Water	Grab	Prior to Weekly filter backwash[1]
Detention Pond #2	Water	Grab	24 hours after Detention Pond #1
Sediment South	Sediment	Surface Sediment	Same as Outfall #001[2]
Sediment North	Sediment	Surface Sediment	Same as Outfall #001[3]

Notes
[1] Detention Pond water grab samples will be surface samples taken from the shore at a point midway between the sampling locations for Sediment North and Sediment South.
[1] Sediment South will be taken at the point where the outflow from the southernmost outfall to the Detention Pond meets the pond proper.
[3] Sediment North will be taken at the point where the outflow from the northerly outfall to the detention pond meets the pond proper.

3.0 SAMPLING PROCEDURES

All samples will be encapsulated in sample containers provided by Analytical Resources, Inc. of Seattle, Washington. The containers are glass, have been precleaned, and contain any preservatives required for the individual analyses that are to be performed on the contents.

24-hour composite samples will be taken at Outfall 001 and 002 at the Matsushita Treatment Plant. Matsushita's installed sampling equipment removes a measured amount of water every hour from the effluent stream at a point where it is leaving the plant and accumulates the water in a reservoir over a 24-hour period. The sampling equipment will be dedicated to the planned sampling and for the duration of the 24-hour compositing effort, access to the sampling equipment will be only available to DEA personnel since they will provide their own locks and keys for securing the sampling cabinets.

Grab samples for water will be obtained by removing surface water in a precleaned and rinsed surface sampler in accordance with procedures outlined in U.S. Environmental Protection Agency, *Environmental Compliance Branch Standard Operating Procedures And Quality Assurance Manual* (EPA, 1991), (The EPA Manual).

Surface sediment samples will be taken in pre-cleaned, wide-mouth glass jars, pushed into the sediment until full. This will avoid the need for additional sampling equipment and avoid chances of sample contamination. The samples will be taken approximately an arms length off shore.

Samples will be placed in coolers and cooled with ice to 4 degrees Celsius for transport to the analytical laboratory.

Samples will be transported directly to the analytical laboratory under Chain of Custody procedures and will be the direct responsibility of the DEA sampling personnel until received and signed for at the laboratory.

4.0 ANALYTICAL PROCEDURES

Analytical procedures for priority pollutant analysis require that different groups of chemical analytes undergo different analytical procedures. Water samples taken in the field are placed in different containers to facilitate these analyses. Sediment samples are maintained as a bulk sample and then partitioned at the laboratory.

The priority pollutant analyses to be performed on each sample listed in Section 2.0 above are as follows:

Analytes	EPA Analytical Method
Priority Pollutant Metals	6010/7000
Total Cyanide	335.2
Semivolatiles	8270
Volatiles	8260
Pesticide/PCBs	8081
pH	150.1

Detection limits for the priority pollutant analytes are shown in Attachment A to this plan.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and quality control procedures to be employed as documented in the EPA Manual (U.S. EPA 1991).

Field quality control procedures will include the appropriate field blanks necessary to guarantee sample integrity. A field blank is a distilled water sample which accompanies the sample containers to the field, is opened distributed into a set of sampling containers, and which is returned to the laboratory for analysis as a check on potential contamination associated with sampling containers and travel activities. The field blank serves as both a trip blank and a transfer blank. Since the samples are to be transported directly to the laboratory under the supervision of the sampling technician, their environment can be maintained under control at all times, minimizing the necessity for additional trip blanks.

Since the outfall samples represent the output of a standardized, ongoing manufacturing scheme. It is intended that the two outfall 003 sample grabs be treated during the evaluation of the data as operational duplicate samples. The water treatment activities that produces the outfall 003 effluent is a stable, engineered process that has been developed to produce consistent quality water for manufacturing use by filtration, activated charcoal treatment and reverse osmosis.

The effluent samples planned are of streams with very low particulate content or other interfering constituents. For this reason, matrix effects are not expected to be significant, and matrix spike duplicate samples are not planned.

Matrix effects associated with the sediment samples will be assessed by review of the recoveries of surrogate compounds added to the samples by the laboratory.

Tom U.

CITY OF PUYALLUP

Municipal Administration Building
218 West Pioneer
Puyallup, WA 98371
206/841-4321

FILE COPY

September 14, 1996

TRANSMITTAL: FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

MATSUSHITA SEMICONDUCTOR CORP. OF AMERICA (MASCA) BUILDING "D" EXPANSION

The City of Puyallup hereby transmits this Final SEIS to public agencies and interested members of the public. This document covers the proposed "Building D" expansion to the MASCA Puyallup site, which is located at 1111 39th Avenue SE in Puyallup. It is supplemental to an EIS prepared in 1980-81 for the plant's original establishment.

The Draft SEIS for this project was released on July 16, 1996. The thirty day comment period on that document expired on August 15, 1996. A public hearing on the Draft SEIS was held on July 31, 1996. **This Final SEIS includes a response to all comments submitted during the Draft SEIS comment period, including those made in writing as well as verbal testimony from the public hearing. The Final SEIS also contains revisions to the Draft SEIS text and mitigation measures which were warranted given comments received.**

This Final SEIS is being sent to all agencies and parties who received copies of the Draft SEIS. In addition, persons who submitted comments (written or verbal) or requested copies of the Draft SEIS are also being sent copies. *A ten day appeal period follows release of this Final SEIS; no permits associated with this project will be issued until completion of the appeal period. Any appeal of the adequacy of this document must be received by the City of Puyallup no later than 5:00 PM on Tuesday, September 24, 1996. In accord with the Municipal Code, to be considered valid, any appeal must include a statement specifying the reasons for the appeal and a fee of $480.00.*

If you have questions regarding this document or the appeal period, please call Tom Utterback, Planning Manager, at 841-5557.

PUBLIC AGENCIES RECEIVING DOCUMENT

State Dept of Ecology
State Dept of Wildlife
Puyallup Tribe
City of Tacoma Public Utilities
Pierce College
Pierce Transit
WSDOT, Olympic Region
Puget Sound Air Pollution Control
Muckleshoot Indian Tribe
Fruitland Mutual Water Company
Puget Sound Power and Light
Central Pierce Fire and Rescue
Pierce County River Improvement
State Dept of Natural Resources
Attorney General - Ecology Division
Economic Development Board
Puyallup Area Chamber of Commerce
Pierce County Herald
The Morning News Tribune
Puyallup Public Library
Pierce County - South Hill Public Library
City of Auburn Fire Department
City of Tacoma Fire Department
McChord Fire Department

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