GIG HARBOR CITY COUNCIL MEETING

JANUARY 25, 1993

7:00 P.M., CITY HALL COUNCIL CHAMBERS

AGENDA FOR GIG HARBOR CITY COUNCIL MEETING
JANUARY 25, 1993

PUBLIC COMMENT/DISCUSSION:

CALL TO ORDER:

APPROVAL OF MINUTES:

CORRESPONDENCE:
1. 1993 Trolley Plan.

OLD BUSINESS:
1. Resolution - Variance 92-08 Perrow.

2. Grande Bank Utility Extension Capacity Agreement.

NEW BUSINESS:
1. Resolution for Groundwater Management.

2. Resolution adopting Court Administrator Job Description.

3. Contribution to Parks Master Planning.

4. Liquor License Renewals - Harbor Inn; Shoreline.

5. Special Occasion Liquor License - Harbor Montessori.

6. Bid Advertisement for Newspaper Services.

DEPARTMENT MANAGERS' REPORTS:
1. Ray Gilmore, Planning - Visioning Report Distribution.

2. Tom Enlow, Finance - Quarterly Financial Report.

MAYOR'S REPORT:

APPOINTMENTS: Councilman John English to be Mayor Pro Tem for the calendar year 1993.

ANNOUNCEMENT OF OTHER MEETINGS:

APPROVAL OF BILLS:
Warrants # through # in the amount of $

EXECUTIVE SESSION:
1. To discuss personnel and legal issues.

ADJOURN:

WORKSESSION: Urban Growth Area Policy - Immediately following this council meeting.

REGULAR GIG HARBOR CITY COUNCIL MEETING OF JANUARY 11, 1993

PRESENT: Councilmembers Frisbie, Stevens-Taylor, Platt, English, Markovich, and Mayor Wilbert.

PUBLIC COMMENT:
John Paglia - 12924 State Road 16, Gig Harbor. Mr. Paglia offered an apology to the councilmembers for comments he made at a previous council meeting regarding the Darrah project.

Jack Bujacich - 3607 Ross Avenue. Mr. Bujacich voiced concerns regarding the site distance visibility from driveways and side streets located on Soundview Drive. He also stated he thought fences that create a sight hazard should not be allowed to be built on city right-of-way.

Mr. Felker - 9305 Crescent Valley Drive. Mr. Felker withdrew his wish to speak at this time.

CALL TO ORDER: 7:08 p.m.

APPROVAL OF MINUTES:

MOTION: To approve the minutes of the meeting of December 14, 1992.
Platt/Stevens-Taylor - Four voted in favor, Councilmember English abstained.

CORRESPONDENCE: None scheduled.

OLD BUSINESS:
1. Second Reading - 1993 Budget Amendment. Tom Enlow presented the ordinance.

MOTION: Move to approve the Ordinance #642 as submitted.
Frisbie/English - unanimously approved.

NEW BUSINESS:
1. Sewer Extension Request - William Cuddy. Mark Hoppen presented the extension request for property located just north of city limits on Peacock Hill. Mr. Cuddy gave a presentation on behalf of his request. Mr Wallace, legal representation for the city in place of Wayne Tanaka, explained the need for change in certification language. Mr. Cuddy stated he approved of the language change, and stated he has a letter of authorization from the legal property owners. This was satisfactory to legal counsel and Mr. Cuddy agreed to re-execute certification with the new language.

MOTION: Move we grant the utility extension condition upon entering into the Utility Extension Capacity Agreement with the actual owners of the subject property.
Markovich/Stevens-Taylor - unanimously approved.

2. Resolution to Reclassify Existing Sergeant Job Description and add Lieutenant Job Description. Mark Hoppen presented this resolution to council.

MOTION: Move to approve Resolution #366.
English/Markovich - unanimously approved.

3. Resolution to Approve Construction Inspector Job Description. Mark Hoppen introduced the resolution for the one-year position.

MOTION: Move for approval of Resolution #367 as presented.
Frisbie/English - unanimously approved.

4. Contract for City of Gig Harbor Prosecutor. Mark Hoppen presented the resolution for Andrew Becker's contract, which expires January 31, 1993. Changes to the contract were explained and questions regarding these changes answered. Councilman Markovich stated concern that the court is currently operating at a deficit, and offered to be part of a committee that could study and take steps to reduce this deficit.

MOTION: Move to approve City Prosecutor Contract.
English/Stevens-Taylor - unanimously approved.

5. Hazardous Waste Project Interlocal Agreement. Mark Hoppen introduced the interlocal agreement for joint participation in a household hazardous waste hotline pilot program, proposed by Marilyn Owel. Ms. Owel gave a brief overview of the program and answered questions. Councilman Frisbie voiced concern for city liability in possible distribution of illegal substances. Mr. Wallace stated that because the city never comes into possession of the substance, liability is minimal, and a disclaimer message may take care of any further concerns.

MOTION: Move approval to enter into an interlocal agreement with Pierce County for joint participation in the hazardous waste program.
English/Stevens-Taylor - four in favor, Councilman Frisbie voting against.

6. Hearing Examiner Recommendation - SDP 92-03 Hugh Magnussen. Ray Gilmore presented this resolution recommending denial of a shoreline conditional use permit.

MOTION: Move that the recommendation of the Hearing

Examiner be accepted, and that his findings, facts, and conclusion all be incorporated into Resolution #368 as defined.
Markovich/English - unanimously passed.

7. Hearing Examiner Recommendation - SDP 92-04 Pete Darrah.
Ray Gilmore explained the recommendations for denial of the shoreline management substantial development/variance permit and zoning variance. The item was opened for public hearing. Councilman Frisbie submitted a written motion as follows:

MOTION: To table this item until the meeting of April 12, 1993, to allow time for the applicant and staff to prepare the following:

Staff:
1. Modify all documents to reflect the applicant is within the WM zone.
2. Prepare a staff report detailing the required parking based on the parking condition contained within the WM zone under 17.48.070.

Appl:
1. Prepare and submit a scale plan, signed by a Washington State Registered Engineer or Land Surveyor, detailing a minimum of the following:
   a. Show all existing improvements from Harborview Drive to the Outer Harbor Line and from the northerly side of the Bayview Marina (Hix property) south to the northerly side of the covered condominium moorage.
   b. Show the area of the Hix tideland lease and the area of the Hix Harbor Area Lease.
   c. Show the area of the Ross tideland lease and the area of the Ross Harbor Area Lease.
   d. Show the tidelands area proposed to be leased by the applicant, if any and the Harbor Area proposed to be leased by the applicant.
   e. Locate the Outer Harbor Line consistent with the surveys done prior to Pac Tech and Mel Garland's survey of the Hix property.
   f. Clearly indicate all new improvements proposed.
   g. For the applicant's property, draw a cross section of all existing improvements and proposed improvements from Harborview to the Outer Harbor Line.
   h. Dimension major components in the drawing.
   i. The plan view shall contain five (5) foot vertical contour lines of the applicant's property from Harborview to the Outer Harbor Line.

2. List all of the various uses existing and proposed for the applicant's property such as, but not limited to:
   a. Moorages greater than 45 feet.
   b. Moorages less than 45 feet.
   c. Museum.
   d. Single Family Residence(s).
   e. Bed and Breakfast.
   f. Office.
   g. Repair Shop.
   h. Detail and/all other uses.
3. Show the location of the parking to support number two above.

Frisbie/English seconded. No action taken.

Mr. Gilmore presented copies of a letter from DNR. After council discussion, the item was opened for public comment.

John Paglia - 12924 State Road. Mr. Paglia stated his support for the Hearing Examiner's recommendation for denial. He expressed concern that the issue had continued since 1988 and added that Mr. Darrah has had plenty of time to comply.

Bob Felker - 9305 Crescent Valley Road. Mr. Felker, attorney for the Darrahs, said the city should be able to act upon the variance without the approval of the state on the boundary issues. He stated it was not the province of the council to sit in judicial authority to decide boundary disputes. He said the ninety day extension put forth in Councilman Frisbie's motion would be sufficient to compile the necessary information.

Mr. Wallace clarified that once the city is aware of potential boundary disputes, it has an affirmative duty that final approvals not be given until disputes are resolved.

AMENDED MOTION: Amend motion for a full hearing to be held Monday, May 10, 1993, and completed application must be in staff's possession on or before April 1, 1993.
Frisbie/English - four in favor, Councilman Platt voting against.

8. Appeal of Hearing Examiner Decision - VAR 92-08 Wade Perrow. Ray Gilmore gave a history of the appeal and opened the item for brief public testimony. It should be noted that Councilmember Jeanne Steven-Taylor chose to refrain from participating in this agenda item, and left council chambers.

Wade Perrow - 4012 Benson Road, Gig Harbor. Mr. Perrow utilized a model of his home design to illustrate the need

for the two-foot variance. He answered council questions.

John Paglia - 12924 State Road 16, Gig Harbor. Mr. Paglia spoke in favor of the hearing examiner's decision to deny the variance.

Paul Vermet - 9113 Harborview Drive, Gig Harbor. Mr. Vermet examined the model and asked questions regarding sight distance concerns.

After further discussion and questions, the following motion was made.

MOTION: Motion to grant the variance. Staff to prepare findings and conclusions to bring back to council at the next meeting for formal adoption. Markovich/Platt - no action taken.

AMENDED MOTION: Move to add an additional requirement that the Perrow's file, with the auditor, against their property, a caveat stating there would be no fences or hedges planted or built that would be from the edge of the garages out to the right-of-way lines. Frisbie/English - Frisbie and English voted in favor. Councilmen Markovich and Platt voted against. Mayor Wilbert voted in favor to break the tie.

Ray Gilmore suggested that the applicants bring a sample of the document to city council for their review at the next session, as a condition of approval for the variance.

9. Hearing Examiner Recommendation - PUD 9101 (R-2) Rush Construction.
Ray Gilmore presented the Resolution support the Hearing Examiner recommendation.

MOTION: Move that Resolution #369 be adopted. Markovich/Stevens-Taylor - unanimously passed.

DEPARTMENT MANAGERS' REPORTS:

1. Planning Department. Ray Gilmore gave a brief report on the status of GMA funding in 1993, and announced the visioning survey report to be presented to council at a worksession.

2. Public Works Department. Ben Yazici presented council with a copy of his 1993 Objectives schedule. The issue of sight distance problems on Soundview was discussed. Mr. Yazici will work with property owners to resolve the situation and prepare a resolution if necessary.

3. Chief Denny Richards. Chief Richards presented his monthly activity report.

MAYOR'S REPORT:

1. Urban Growth Boundary Update. Mayor Wilbert asked for a workshop to develop a policy to identify an urban growth area. Councilman Markovich suggested this workshop be held following the next council meeting.

ANNOUNCEMENT OF OTHER MEETINGS:

1. Workshop for Urban Growth Boundary Update - following council meeting of 1/25/93.

2. Visioning Survey Report Presentation - January 19, 1993 at 7:00 pm at city hall.

APPROVAL OF BILLS:

MOTION: To approve warrants #9905 through #9972, less #9909 used as feeder and #9965, not there, in the amount of $193,470.09.
Platt/Stevens-Taylor - unanimously approved.

EXECUTIVE SESSION:

MOTION: To go into executive session at to discuss personnel issues at 10:00 p.m.
Markovich/English - unanimously approved.

MOTION: To return to regular session.
Stevens-Taylor/Platt - unanimously approved.

APPROVAL OF PAYROLL:

MOTION: To approve warrants #7844 through #7998, less #'s 7885, 7886, 7888, and 7916 through 7922, which jammed in the printer. Warrant #7883 used as a feeder. Total amount: $140,527.37.
Platt/English - unanimously passed.

ADJOURN:

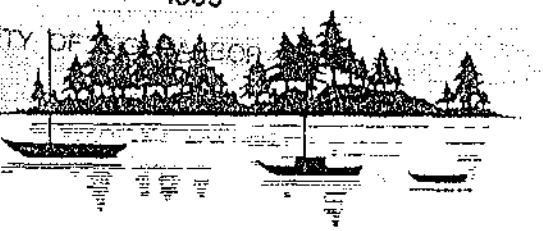
MOTION: To adjourn at 11:00 p.m.
English/Stevens-Taylor - unanimously approved.

Cassette recorder utilized.
Tape 299 Side B 430 - end.
Tape 300 Side A 000 - end.
Side B 000 - end.
Tape 301 Side A 000 - end.
Side B 000 - 436.

Mayor

City Administrator

GIG HARBOR ✓ PENINSULA AREA
CHAMBER OF COMMERCE
3125 JUDSON STREET P.O. BOX 1245 GIG HARBOR, WA 98335 PHONE (206) 851-6865 FAX (206) 851-6881



Dear Chamber Member,

In 1992, your Chamber of Commerce sponsored a vital service to our community with The Trolley. With financial support from Chamber members, this project was a success, so heartfelt thanks go out to all who participated.

Last year, The Trolley made the rounds through Olympic Village Shopping Center, Pioneer Plaza, Harbor Plaza and several stops along Harborview and Soundview Drives.

In 1993, The Trolley will run again, bringing those important shoppers to your place of business every Saturday and Sunday from Memorial Day weekend through Labor Day weekend. The Chamber of Commerce Marketing Committee is now accepting pledges for Trolley Stops. Your generous contribution will bring customers to your vicinity every weekend next summer.

Trolley Stops are $650 for the season. This is an excellent way for groups of shops and malls to co-sponsor and share the cost. An excellent bargain considering up to 100 shoppers a day will have the opportunity to stop near your place of business.

Please send the attached card back with your pledge by January 31, 1993. Donations will be accepted at any time, but we ask that complete payment of your Trolley Stop be made by May 1, 1993.

For stops outside last year's Trolley route or advertising inside and outside The Trolley, please call Gordon Wohlfeil at the Chamber (851-6865) or Margaret Stark at Eclectic Gallery (851-6150).

1993 Trolley Stop Pledge

_____ *Yes!* **I/We want to support the Trolley for $650!**

Group Name_____

Address_____

Contact/Phone _____

Would you like the Trolley season to be extended? _____

_____

What other suggestions do you have for The Trolley? _____

_____

Payment Method: Check_____ Visa_____ MasterCard_____

Make checks payable to
Gig Harbor/Peninsula Area Chamber of Commerce

Card #: _____ Exp. _____

Deadline for pledges-January 31, 1993

sponsored by the Gig Harbor/Peninsula Area Chamber of Commerce

City of Gig Harbor. The "Maritime City."
3105 JUDSON STREET • P.O. BOX 145
GIG HARBOR, WASHINGTON 98335
(206) 851-8136

MEMORANDUM

TO: City Council

FROM: Planning Staff

DATE: September 25, 1993

RE: VAR 92-08 -- Wade Perrow

The Staff has prepared a resolution for the Council's approval of Wade Perrow's variance request. The resolution is based upon the Staff's interpretation of the Council's discussion of this issue during the previous Council meeting. Please review it carefully to determine if the language is consistent with the Council's previous action on this request.

CITY OF GIG HARBOR
RESOLUTION NO. ---

Whereas, Mr. Wade Perrow had requested an administrative variance for a reduced front yard setback at 9119 North Harborview Drive (VAR 92-08); and

Whereas, the Planning Staff denied the administrative variance based upon findings that the request was not based upon site specific hardships as required by section 17.66 of the Gig Harbor Zoning Code; and

Whereas, the Staff's decision was appealed to the Hearing Examiner, who ultimately denied the variance, also finding that the requested variance was not based upon site specific hardships as stated in the Hearing Examiner's Findings and Conclusions of December 8, 1992; and

Whereas, the Gig Harbor City Council has adopted Ordinance #489 which establishes guidelines for the reviewing of appeals of decisions of the Hearing Examiner; and

Whereas, the applicant has filed a timely appeal in a letter to the City Council dated December 14, 1992; and

Whereas, the Gig Harbor City Council has reviewed the record of the Staff determination, the appeal to the Hearing Examiner, the record of the Hearing Examiner's initial and final decision, the appeal filed by the applicant and the applicant's presentation at its regular session of January 11, 1993; and

Whereas, the City Council disagrees with the determinations and findings of the City's Staff and Hearing Examiner (as stated in his final determination); and

Whereas, the City Council has determined that the requested two foot encroachment is of minor consequence and meets the criteria for a variance; and

Whereas, the City Council further finds as follows:

1. The proposed variance will not amount to a rezone nor authorize any use not allowed in the district;

2. That special conditions and circumstances exist which are peculiar to the land, in particular the 9,645 square foot buildable area and the limited 85 foot depth of the buildable area combined with the inability to build over the water, which are not applicable to other parcels in the same district and that literal interpretation of the

provisions of this title would deprive the property owner of rights commonly enjoyed by other properties similarly situated in the same district under the terms of the City's code;

3. That the special conditions and circumstance are not a result from the actions of the applicant but are attributable to the property's topography and location;

4. That granting of the variance requested will not confer a special privilege that is denied other lands in the same district as there are several parcels with non-conforming garages built near the front property line;

5. That the granting of the variance is not materially detrimental to the public welfare or injurious to the property or improvements in the vicinity and zone in which the subject property is situated;

6. The variance is the minimum variance that will make possible the reasonable use of the land;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Gig Harbor, Washington, that the requested variance for a two foot encroachment at 9119 North Harborview Drive is hereby approved subject to the condition that the applicant record with Pierce County a deed restriction on the property which prohibits fences or shrubbery along the side property lines extending from the front of the house up to the road right-of-way. The applicant shall present evidence of the recorded deed restriction to the City's Planning Department prior to issuance of certificate of occupancy.

PASSED this 25th day of January, 1993.

GRETCHEN A. WILBERT, MAYOR

ATTEST:

Mark E. Hoppen
City Administrator

Filed with City Clerk:
Passed by City Council:

City of Gig Harbor. The "Maritime City."
3105 JUDSON STREET • P.O. BOX 145
GIG HARBOR, WASHINGTON 98335
(206) 851-8136

MEMORANDUM

TO: MAYOR WILBERT AND CITY COUNCIL

FROM: BEN YAZICI, PUBLIC WORKS DIRECTOR BY.

DATE: JANUARY 21, 1993

RE: GRANDE BANK SUBDIVISION

The Council authorized the City Administrator and the Mayor to sign a standard Utility Extension Capacity Agreement with Grande Bank Development's owner, Jeffrey Edwards, with the following contingencies:

1) The Grande Bank Development is to be developed as single family dwelling units with a minimum lot size of 12,000 sq. ft.

2) The Grande Bank Development will build a capacity sewer line along Reid Road between the Hollycroft/Reid Road intersection and the Grande Bank Development. The Grande Bank Development will be eligible for the Latecomers Agreement for costs associated with this capacity sewer line; and,

3) The existing lift station at the LongAcres Development will be dismantled and delivered to the Public Works Department.

All of the aforementioned contingencies have been included in the enclosed agreement.

RECOMMENDATION:

I recommend a Council motion to approve the enclosed Utility Extension Agreement.

UTILITY EXTENSION, CAPACITY AGREEMENT
AND AGREEMENT WAIVING RIGHT TO PROTEST LID

THIS AGREEMENT is entered into on this 21st day of January, 1993, between the City of Gig Harbor, Washington, hereinafter referred to as the "City", and Grande Bank, hereinafter referred to as "the Owner".

WHEREAS, the Owner is the owner of certain real property located in Pierce County which is legally described as set forth in Exhibit "A" attached hereto and incorporated herein by this reference as though set forth in full, and

WHEREAS, the Owner's property is not currently within the City limits of the City, and

WHEREAS, the Owner desires to connect to the City sewer utility system, hereinafter referred to as "the utility" and is willing to allow connection only upon certain terms and conditions in accordance with Title 13 of the Gig Harbor Municipal code, as now enacted or hereinafter amended, NOW, THEREFORE,

FOR AND IN CONSIDERATION OF the mutual benefits and conditions hereinafter contained, the parties agree as follows:

1. Warranty of Title. The Owner warrants that he/she is the Owner of the property described in Exhibit "A" and is authorized to enter into this Agreement.

2. Extension Authorized. The City hereby authorizes the Owner to extend service to Owner's property from the existing utility line on Reid Road (street or right-of-way) at the following location:

GRANDE BANK SUBDIVISION - Thirty, single family homes on lots not less than 12,000 square feet.

3. Costs. Owner will pay all costs of designing, engineering and constructing the extension. All construction shall be done to City standards and according to plans approved by the City's Public Works Director. Any and all costs incurred by the City in reviewing plans and inspecting construction shall be paid for by the Owner.

4. Sewer Capacity Commitment. The City agrees to provide to the Owner sewer utility service and hereby reserves to the Owner the right to discharge to the City's sewerage system 30 ERU's, 6,930 gallons per day average

flow. These capacity rights are allocated only to the Owner's system as herein described. Any addition to this system must first be approved by the City. Capacity rights acquired by the Owner pursuant to this agreement shall not constitute ownership by the Owner of any facilities comprising the City sewerage system. The City agrees to reserve to the Owner this capacity for a period of 36 months ending on January 31, 1996, provided this agreement is signed and payment for sewer capacity commitment received within 45 days after City Council approval of extending sewer capacity to the Owner's property. Sewer capacity shall not be committed beyond a three year period.

5. Capacity Commitment Payment. The Owner agrees to pay the City the sum of Sixty three thousand, seven hundred and fifty dollars ($63,750.00) to reserve the above specified time in accordance with the schedule set forth below.

	Commitment period	Percent (%) of Connection Fee	
	One year	Five percent	(5%)
	Two years	Ten percent	(10%)
x	Three years	Fifteen percent	(15%)

In no event, however, shall the Owner pay the City less than five hundred dollars ($500) for commitment for sewer reserve capacity. In the event the Owner has not made connection to the City's utility system by the date set forth above, such capacity commitment shall expire and the Owner shall forfeit one hundred percent (100%) of this capacity commitment payment to cover the City's administrative and related expenses.

In the event the Pierce County Boundary Review Board should not approve extension of the City's sewer system prior to the extension of the commitment period, the Owner shall be entitled to a full refund (without interest) from the City of the capacity agreement.

6. Extension of Commitment Period. In the event the Owner chooses to permanently reserve sewer capacity by paying the entire connection fee for the number of equivalent residential units desired to be reserved before the expiration date set forth above, the Owner shall be responsible for paying each year for the sewer utility system's depreciation based on the following formula: (Owner's reserved capacity divided by the total plant capacity times the annual budgeted depreciation of the sewer facilities.)

7. Permits - Easements. Owner shall secure and obtain, at Owner's sole cost and expense any necessary permits, easements and licenses to construct the

extension, including, but not limited to, all necessary easements, excavation permits, street use permits, or other permits required by state, county and city governmental departments including the Pierce County Public Works Department, Pierce County Environmental Health Department, State Department of Ecology, Pierce County Boundary Review Board, and City of Gig Harbor Public Works Department.

8. Turn Over of Capital Facilities. If the extension of utility service to Owner's property involves the construction of water or sewer main lines, pump stations, wells, and/or other city required capital facilities, the Owner agrees to turn over and dedicate such facilities to the City, at no cost, upon the completion of construction and approval and acceptance of the same by the City. As a prerequisite to such turn over and acceptance, the Owner will furnish to the City the following:

A. As built plans or drawings in a form acceptable to the City Public Works Department;

B. Any necessary easements, permits or licenses for the continued operation, maintenance, repair or reconstruction of such facilities by the City, in a form approved by the City Attorney;

C. A bill of sale in a form approved by the City Attorney; and

D. A bond or other suitable security in a form approved by the City Attorney and in an amount approved by the City Public Works Director, ensuring that the facilities will remain free from defects in workmanship and materials for a period of two (2) year(s).

9. Connection Charges. The Owner agrees to pay the connection charges, in addition to any costs of construction as a condition of connecting to the City utility system at the rate schedules applicable at the time the Owner requests to actually connect his property to the system. Any commitment payment that has not been forfeited shall be applied to the City's connection charges. Should the Owner not initially connect 100% of the Sewer Capacity Commitment, the Capacity Commitment payment shall be credited on a pro-rated percentage basis to the connection charges as they are levied.

10. Service Charges. In addition to the charges for connection, the Owner agrees to pay for utility service rendered according to the rates for services applicable to properties outside the city limits as such rates exist,

which is presently at 150% the rate charged to customers inside city limits, or as they may be hereafter amended or modified.

11. Annexation. Owner understands that annexation of the property described on Exhibit "A" to the City will result in the following consequences:

A. Pierce County ordinances, resolutions, rules and regulations will cease to apply to the property upon the effective date of annexation;

B. City of Gig Harbor ordinances, resolutions, rules and regulations will begin to apply to the property upon the effective date of annexation;

C. Governmental services, such as police, fire and utility service, will be provided to the property by the City of Gig Harbor upon the effective date of annexation;

D. The property may be required to assume all or any portion of the existing City of Gig Harbor indebtedness, and property tax rates and assessments applicable to the property may be different from those applicable prior to the effective date of annexation;

E. Zoning and land use regulations applicable to the property after annexation may be different from those applicable to the property prior to annexation; and

F. All or any portion of the property may be annexed and the property may be annexed in conjunction with, or at the same time as, other property in the vicinity.

With full knowledge and understanding of these consequences of annexation and with full knowledge and understanding of Owner's right to oppose annexation of the property to the City of Gig Harbor, Owner agrees to sign a petition for annexation to the City of the property described on Exhibit A as provided in RCW 35.14.120, as it now exists or as it may hereafter be amended, at such time as the Owner is requested by the City to do so. The Owner also agrees and appoints the Mayor of the City as Owner's attorney-in-fact to execute an annexation petition on Owner's behalf in the event that Owner shall fail or refuse to do so and agrees that such signature shall constitute full authority from the Owner for annexation as if Owner had signed the petition himself. Owner further agrees not to litigate, challenge or in any manner contest, annexation to the City. This Agreement shall be

deemed to be continuing, and if Owner's property is not annexed for whatever reason, including a decision by the City not to annex, Owner agrees to sign any and all subsequent petitions for annexations. In the event that any property described on Exhibit "A" is subdivided into smaller lots, the purchases of each subdivided lot shall be bound by the provisions of this paragraph.

12. Land Use. The Owner agrees that any development or redevelopment of the property described on Exhibit "A" shall meet the following conditions after execution of Agreement:

A. The use of the property will be restricted to uses allowed in the following City zoning district at the time of development or redevelopment. (Check One):

X Single Family Residential
Commercial
Industrial
Multiple Family Residential

B. The development or redevelopment shall comply with all requirements of the City Comprehensive Land Use Plan, Zoning Code and Building Regulations for similar zoned development or redevelopment in effect in the City at the time of such development or redevelopment. The intent of this section is that future annexation of the property to the City of Gig Harbor shall result in a development which does conform to City standards.

C. The Grande Bank Subdivision will build only 30 single family homes and the lot sizes will not be less than 12,000 square feet.

13. Liens. The Owner understands and agrees that delinquent payments under this agreement shall constitute a lien upon the above described property. If the extension is for sewer service, the lien shall be as provided in RCW 35.67.200, and shall be enforced in accordance with RCW 35.67.220 through RCW 35.67.280, all as now enacted or hereafter amended. If the extension is for water service, the lien shall be as provided in RCW 35.21.290 and enforced as provided in RCW 35.21.300, all as currently enacted or hereafter amended.

14. Termination for Non-Compliance. In the event Owner fails to comply with any term or condition of this Agreement, the City shall have the right to terminate utility service to the Owner's property in addition to any other remedies available to it.

15. Waiver of Right to Protest LID. Owner acknowledges that the entire property legally described in Exhibit "A" would be specially benefited by the following improvements to the utility (specify):

None.

Owner agrees to sign a petition for the formation of an LID or ULID for the specified improvements at such time as one is circulated and Owner hereby appoints the Mayor of the City as his attorney-in-fact to sign such a petition in the event Owner fails or refuses to do so.

With full understanding of Owner's right to protest formation of an LID or ULID to construct such improvements pursuant to RCW 35.43.180, Owner agrees to participate in any such LID or ULID and to waive his right to protest formation of the same. Owner shall retain the right to contest the method of calculating any assessment and the amount thereof, and shall further retain the right to appeal the decision of the City Council affirming the final assessment roll to the superior court. Notwithstanding any other provisions of this Agreement, this waiver of the right to protest shall only be valid for a period of ten (10) years from the date this Agreement is signed by the Owner.

16. Other contingencies. Owner agrees to build a gravity sewer line along Reid Road from the Hollycroft Road intersection to the Grande Bank Subdivision. Owner will be responsible for eliminating the lift station at the LongAcres Development, and delivery of all the equipment and materials associated with the lift station to the City Shop.

17. Agreement to enter into latecomers agreement. If requested by the developer, the City agrees to enter into a latecomers agreement with the developer at such time as the developer constructs the sewer facilities identified in this agreement. The latecomers agreement shall contain provisions for reimbursement of the City's expenses in administration and contain an indemnification for City liability. The developer shall have the obligation to request the latecomers agreement.

18. Specific Enforcement. In addition to any other remedy provided by law or this Agreement, the terms of this Agreement may be specifically enforced by a court of competent jurisdiction.

19. Covenant. This agreement shall be recorded with the Pierce County Auditor and shall constitute a covenant running with the land described on Exhibit "A", and shall be binding on the Owner, his/her heirs, successors and

assigns. All costs of recording this Agreement with the Pierce County Auditor shall be borne by the Owner.

20. Attorney's Fees. In any suit or action seeking to enforce any provision of this Agreement, the prevailing party shall be entitled to reasonable attorney's fees and costs, in addition to any other remedy provided by law or this agreement.

DATED this 21st day of January, 1993.

CITY OF GIG HARBOR

Mayor Gretchen Wilbert

OWNER

W.A. Edwards - President

Name:

Title: W.A. EDWARDS CONST. CO.

ATTEST/AUTHENTICATED:

City Clerk, Mark Hoppen

APPROVED AS TO FORM:
OFFICE OF THE CITY ATTORNEY:

STATE OF WASHINGTON)
) ss.
COUNTY OF PIERCE)

On this 21st day of January, 1993, before me personally appeared Jeffrey Edwards, to me known to be the individual described in and who executed the foregoing
and acknowledged that he signed the same as his free and voluntary act and deed, for the uses and purposed therein mentioned.

IN WITNESS THEREOF, I have hereto set my hand and affixed by official seal the day and year first above written.

Molly M Towslee
NOTARY PUBLIC for the State of Washington, residing at Gig Harbor.
My commission expires 12/2/95.

STATE OF WASHINGTON)
)ss:
COUNTY OF PIERCE)

On this _____ day of _____, 1993, before me personally appeared Mayor and City Clerk of the municipal corporation described in and that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said municipal corporation, for the uses and purposes therein mentioned, and on oath stated that he/she was authorized to execute said instrument.

IN WITNESS WHEREOF, I have hereto set my hand and affixed my official seal the day year first above written.

_____
NOTARY PUBLIC for the state of Washington, residing at
_____.
My commission expires_____.

City of Gig Harbor. The "Maritime City."
3105 JUDSON STREET • P.O. BOX 145
GIG HARBOR, WASHINGTON 98335
(206) 851-8136

MEMORANDUM

TO: MAYOR WILBERT AND CITY COUNCIL

FROM: BEN YAZICI, PUBLIC WORKS DIRECTOR

DATE: JANUARY 21, 1993

RE: GIG HARBOR PENINSULA GROUND WATER MANAGEMENT PROGRAM

After four years of work, the Gig Harbor Ground Water Management Program is now published. Before you is the resolution and copy of the report which we are recommending for your approval.

This program was started in 1989 with the leadership of the Tacoma Pierce County Health Department and guided partially by the Department of Ecology grants.

The goal of the program is to insure safe, sustained supplies of drinking water for residents of the Gig Harbor Ground Water Management area. Under this goal, the program intends to achieve the following objectives:

1) Facilitate efforts to obtain the information necessary to support proper utilization of ground water resources.

2) Support the achievement of new programs and/or the enhancement of existing programs for management of ground water resources utilization.

3) Enhance efforts to protect ground water resources from the impact of all significant sources of contamination.

4) Reduce the potential for ground water contamination associated with the improper construction or abandonment of wells.

5) Promote greater public recognition of the importance of Gig Harbor's Ground Water Management Area water resources and the negative consequences of improper management of those resources.

6) Provide support to efforts by Pierce County to develop a Comprehensive Land Use Management Plan pursuant to the requirements of the State Growth Management Act.

7) Develop a viable option for providing adequate levels of funding to support achievement of the aforementioned objective.

We installed automatic static water level measuring devices on all of our wells and our system is entirely interconnected. In addition, each pump house has independent meters and other devices to measure its performance. We feel that we are doing a good job of managing our wells.

We hope that this Ground Water Management Program will provide the means and the encouragement to other water utilities that also service the Gig Harbor Peninsula to do a better job of managing the water supply system.

RECOMMENDATION:

I recommend a Council motion to approve the enclosed resolution which indicates the Council's intent to support implementation of the Gig Harbor Peninsula Ground Water Management Program.

CITY OF GIG HARBOR

RESOLUTION NO.

A RESOLUTION INDICATING THE COUNCIL'S INTENT TO SUPPORT IMPLEMENTATION OF THE GIG HARBOR PENINSULA GROUND WATER MANAGEMENT PROGRAM.

WHEREAS, the State of Washington Department of Ecology declared Gig Harbor Peninsula as a Ground Water Management Area under RCW 90.44 and WAC 173-100; and

WHEREAS, the goal of the Gig Harbor Ground Water Management Program is to ensure safe, sustained supplies of drinking water for residents of the Gig Harbor Peninsula, who receive all of their water from ground water; and

WHEREAS, after four years of work, a peninsula-wide ground water management program has been developed through a joint effort of the citizens of the peninsula and local and state government; and

WHEREAS, the City Council advocates environmentally sound management of the Gig Harbor Peninsula ground water resources; NOW THEREFORE,

BE IT RESOLVED by the City Council:

Section 1. Gig Harbor City Council concurs with the Gig Harbor Ground Water Management Program which is attached as Exhibit A.

Section 2. It is the intent of the Council to work with the Tacoma-Pierce County Health Department to implement the Gig Harbor Ground Water Management Plan.

Section 3. It is understood that once final certification of the program is received from the Washington State Department of Ecology, it may be amended from time to time; and

PASSED this _____ day of _____, 1993.

_____
Gretchen A. Wilbert, Mayor

ATTEST:

_____
Mark E. Hoppen
City Clerk

Filed with city clerk: 1/5/93
Passed by city council: 1/11/93

Gig Harbor Peninsula Ground Water Management Program

Prepared for

Tacoma-Pierce County Health Department and
Gig Harbor Ground Water Advisory Committee

May 28, 1992

**A Project Funded in Part Through
Centennial Clean Water Fund
Grant/Contract #WFG88013**

Prepared by

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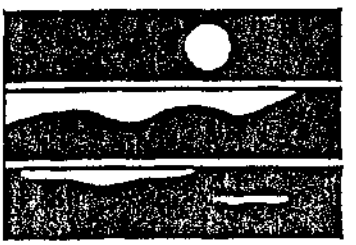
and

Adolfson Associates, Inc.
600 Main Street
Edmonds, Washington 98020

Project S5602.09



Gig Harbor Peninsula
Ground Water Management Program

A PROJECT FUNDED
IN PART THROUGH
CENTENNIAL CLEAN WATER FUND
GRANT/CONTRACT # WFG88013

Water Quality Financial Assistance Program
Nonpoint Section
Mail Stop PV-11
Olympia, Washington 98504
(206) 459-6251

May 1992

S5602.09

GIG HARBOR GROUND WATER ADVISORY COMMITTEE MEMBERS

Member	Representing
Marsh Allen	Sunnyview Terrace Association
Roy Bingman	Firgrove Mutual, Inc.
Ken Canfield	Pierce County Public Works
John Hugh Gayton	Public
Christina Hansen	Washington Well Drillers Association
Bob James	Washington Department of Health
Don McCarty	Regional Water Association
Ken Merry	Tacoma Water Division
Don Perry	Pierce County Utilities Department
Elizabeth Phinney	Washington Department of Ecology
Janine Redmond	Pierce County Department of Planning
Dave Hufford	Tacoma Public Utilities
Carl Teitge	Public
Marilyn Tolan	League of Women Voters
Pat Wiles	Harbor Water Company, Inc.
Ben Yazici	City of Gig Harbor
Ray Zimmerman	Public

Staff	Position
Jane Hedges, R.S.	Section Manager - Water Resources
Steve Marek, R.S.	Senior Environmental Health Specialist
Cynthia Wanless, R.S.	Environmental Health Specialist, II
Brad Harp, R.S.	Environmental Health Specialist

LIST OF ABBREVIATIONS

APA	Aquifer Protection Area
CAD	Computer Aided Design
CCWF	Centennial Clean Water Fund
CEMP	Comprehensive Emergency Management Plan
CWSP	Coordinated Water System Plan
CWSSA	Critical Water Supply Service Area
DEM	Pierce County Department of Emergency Management
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
GPM	Gallons Per Minute
GWAC	Ground Water Advisory Committee
GWMA	Ground Water Management Area
GWMP	Ground Water Management Program
HB	House Bill
MCL	Maximum Contaminant Level
MGD	Million Gallons Per Day
MTCA	Model Toxics Control Act (Washington)

LIST OF ABBREVIATIONS (Continued)

RCRA	Resource Conservation and Recovery Act (U.S.)
RCW	Revised Code - Washington
RWA	Regional Water Association
SEPA	State Environmental Policy Act (Washington)
SPA	Special Protection Area
SR	Washington State Route
TPCHD	Tacoma-Pierce County Health Department
UST	Underground Storage Tank
WAC	Washington Administrative Code
WDOT	Washington Department of Transportation
WHPA	Well Head Protection Area

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CONTENTS (Continued)

FIGURE

SECTION I

SUMMARY

The Gig Harbor Peninsula Ground Water Management Program (GWMP) provides a compendium of issues, alternatives, and policies or direction statements adopted by the Gig Harbor Peninsula Ground Water Advisory Committee. Each of the issue papers discusses a particular problem or concern relative to the Gig Harbor Peninsula aquifer system in terms of current and potential problems, existing programs and existing regulations, alternatives for resolving or avoiding conflicts, evaluation of the pros and cons of each alternative, and a recommended or preferred alternative.

In addition to detailed discussions of major issues as documented in each issue paper, a number of items are addressed which are considered to be of lesser significance in the Gig Harbor Ground Water Management Area (GWMA), either due to nonoccurrence in the area, or to natural factors which reduce the severity of the potential concern. These are addressed briefly in a separate section. Separate sections are also devoted to federal and state ground water and management programs long-term monitoring needs. Each issue paper discussion includes a reference list for articles or documents that were considered in evaluating the alternatives.

The Ground Water Management Program (GWMP) summarizes the issues and the discussion points considered by the GWAC and presents a preferred alternative (Section IV) addressing what are felt to be, at this time, the most pressing issues currently facing the Gig Harbor Peninsula aquifer system. Data and monitoring programs necessary to refine the preferred alternatives, or provide a focus for activities, are identified in the long-term monitoring issue paper. The preferred alternative provides a road map for long-term aquifer management and protection while Section V-20 - Aquifer Protection Area Implementation, provides the outlines for an administrative mechanism for achieving aquifer management goals.

The GWMP report is complemented by the Task 5 Hydrogeologic Evaluation Report (EMCON Northwest, 1992) which provides the technical data and interpretation on which the discussion of management alternatives is based.

The GWMP, because it contains alternatives recommended as the result of a public review process, should receive strong implementation support from the local public agencies. The overall GWMP develops much of the framework necessary to provide for future aquifer management, however, as currently developed, the GWMP provides only preliminary guidance regarding cost and financing elements necessary to make such a program self-sustaining.

SECTION II

GOALS AND OBJECTIVES

This section is prepared consistent with Section 100(B) of Chapter 173-100 WAC

The goal of the Gig Harbor Ground Water Management Program is to ensure safe, sustained supplies of drinking water for residents of the Gig Harbor Ground Water Management Area (GWMA).

The Ground Water Advisory Committee (GWAC) intends to achieve this goal through the development and implementation of a Ground Water Management Program (GWMP) for the Gig Harbor Peninsula and Fox Island, which will attempt to accomplish the following objectives:

1. Facilitate efforts to obtain the information necessary to support proper utilization of ground water resources, including

    - Determination of the ultimate resource capacity of the aquifers within the GWMA

    - Implementation of a long-term ground water quantity and quality monitoring program

2. Support the advancement of new programs and/or the enhancement of existing programs for management of ground water resource utilization, including

    - Coordination of the development of ground water resources by public water systems to prevent local aquifer overdraft and seawater intrusion

    - Full implementation of the provisions of the Pierce County Coordinated Water System Plan

    - Incorporation of water use efficiency and demand reduction principals into the institutional framework for management of public water supplies in Pierce County

    - Implementation of measures to require owners of wells, for which water rights have been issued, to regularly document the amount of water withdrawn from those wells and to monitor the impact of the withdrawals on water levels

3. Provide support to efforts by Pierce County to develop a comprehensive land use management plan pursuant to the requirements of the State Growth Management Act (RCW 36.70A).

4. Enhance efforts to protect ground water resources from the impacts of all significant sources of contamination including but not limited to

   - Leakage from underground storage tanks
   - Improper commercial and household hazardous waste disposal practices
   - Improper application of on-site sewage disposal system technology
   - Contaminated surface waters
   - Former solid waste disposal sites

5. Reduce the potential for ground water contamination associated with the improper construction or abandonment of wells through promotion of a joint surveillance and enforcement program between the Washington Department of Ecology (Ecology) and the Tacoma-Pierce County Health Department (TPCHD).

6. Promote greater public recognition of the importance of Gig Harbor GWMA water resources and the negative consequences of improper management of those resources.

7. Develop a viable option for providing adequate levels of funding to support achievement of the aforementioned objectives.

SECTION III

ALTERNATIVES EVALUATION

1 AQUIFER CAPACITY MANAGEMENT ISSUE PAPER

1.1 Problem Statement

1.1.1 Issue Background

Aquifer mining is the over-withdrawal of ground water leading to the progressive decline of potentiometric surfaces (water levels). For confined aquifers (defined as water tables where the water level in a well is above the aquifer zone elevation), which occur in both the Upper and Sea Level aquifers on the Gig Harbor Peninsula, this would mean that withdrawal would progressively exceed recharge.

In a steady state condition without pumping, water flows out of the aquifer at a rate, on an annual average, equal to recharge to the aquifer. Recharge may occur as the result of rainfall percolation, leakage from rivers and streams, or communication with other aquifers.

On the Gig Harbor Peninsula, available evidence suggests that, for the Upper and Sea Level aquifers, recharge is almost exclusively from percolating rainfall because connections to other aquifers are limited, stream flows are minimal, and streams originate from rainfall percolation seepage (i.e., are the result of shallow ground water discharge).

For the deeper aquifers (below the Sea Level Aquifer) the situation is less clear and recharge may result from both downward percolation from the Sea Level Aquifer, recharge from mainland areas, or upward recharge from deeper aquifers.

Water is lost from the aquifer by discharge. Discharge can involve percolation to a deeper aquifer, seepage to surface water streams, or release of ground water at the seawater interface. Percolation and stream seepage are the exclusive discharge mechanisms for the Upper Aquifer, and release to Puget Sound is the primary discharge mechanism for the

Sea Level Aquifer. Under steady state conditions the annual discharge balances the annual recharge.

Under conditions of low pumpage, discharges may be reduced with little or no noticeable change in water table levels. This may result in generally minor reductions (although sometimes locally significant) in surface stream flows and generally insignificant changes in the seepage equilibrium to Puget Sound. The estimated annual seepage from the Sea Level Aquifer is roughly 1 to 3 million cubic feet per year and is the equivalent of 15,000 to 45,000 gallons per minute (gpm) in withdrawal.

As withdrawal increases, local drawdown may translate into regionally declining water tables. The exact division between aquifer "mining" and normal withdrawal is poorly defined, but may be roughly assumed to occur when net pumpage (minus reinfiltration) exceeds recharge, or roughly 15,000 to 45,000 gpm usage. Depending on estimates of the amount of water reinfiltrated to the aquifer (10 to 40 percent), this corresponds to 17,000 to 63,000 gpm pumpage.

Even under these conditions mining may have a dramatic impact because it may result in increased recharge due to higher gradients between the Upper and Sea Level aquifers or increased upwards recharge from deeper aquifers. Steady state conditions may be reached that reflect decreased surface water seepage flows and/or increased flows between aquifers. This may be characterized as a condition of "limited" mining.

Under more extreme "mining" conditions, withdrawal will greatly exceed recharge and water levels will drop progressively over time. In shoreline areas, saltwater zones will move inland.

Current modeling, using available data, indicates the Gig Harbor Peninsula is generally in the premining condition over much of the peninsula with discrete areas of heaviest demand in a state of "limited mining." These conclusions are tentative since data are insufficient either to quantify current pumpage or to define the exact recharge/discharge conditions in the Sea Level Aquifer.

Nonetheless, it is clear that the potential exists for substantial local declines in water levels under current demand projections. In particular, it can be expected that areas of heaviest demand will show modest to severe local drawdowns when pumpage exceeds 1,500 gpm for any area of less than 10 square miles, and that seawater intrusion may be generally a problem if withdrawals over 500 gpm occur within 500 to 1,000 feet of the shoreline. In areas with more restricted local aquifer capacities, significant mining may

occur at much lower pumpage levels and seawater intrusion may occur at lower withdrawal rates or may be noticed further inshore.

1.1.2 Water Supply Needs

Nearly all of the 9 million gallons per day (MGD) (6,250 gpm) in ground water rights that have been issued in the Gig Harbor GWMA are for public water supply purposes. Although currently water production is not precisely monitored, it is estimated that on an average day water right holders withdraw a little under half of the permitted quantity of ground water, or 4 MGD (2,800 gpm) (Pierce County, 1988). According to the Pierce County Coordinated Water System Plan (CWSP) (Pierce County, 1988), based on population projections developed by the Puget Sound Council of Governments, the current average consumption of water within the Gig Harbor GWMA will increase to 6 MGD (4,167 gpm) by the year 2000 and 6.5 MGD (4,514 gpm) by 2010.

The CWSP suggests that peak demand for water in the Gig Harbor GWMA is likely to be approximately 2.6 times that of the average demand. Demand generally peaks during the warm summer months when outdoor consumption of water for purposes such as lawn watering and car washing is highest. Using the 2.6 factor, peak demand within the Gig Harbor GWMA is currently over 10 MGD. By the year 2000 peak demand is expected to rise to over 15 MGD (10,400 gpm). By 2010 peak demand could be as high as 17 MGD (11,800 gpm).

An additional 1 MGD (694 gpm) of water is estimated to be withdrawn by individual wells that are exempt from water right requirements (Pierce County, 1984). However, demand attributable to individual wells is not expected to significantly increase in the future (ibid). Since the use of individual wells for new residential development within the GWMA is now primarily restricted to large-lot, rural applications, most of the additional growth on the peninsula, which is expected to be primarily urban and suburban residential land-use, will be served by existing public water systems.

1.2 Existing Programs

1.2.1 Resource Allocation and Availability

Department of Ecology Program. Ground water use in Washington state is regulated under RCW 90.44 (Regulation of Public Ground Water) and RCW 90.54 (The Water Resources Act of 1971). Under RCW 90.44, a permit to appropriate ground water (to put it to some beneficial use, such as irrigation or public water supply) must be obtained from Ecology prior to construction of any well that will extract 5,000 gallons or more of ground water per day. Permits to appropriate water are commonly referred to as water rights. Under an appropriative system of water rights, the appropriator of ground water that is first to put the ground water to a beneficial use has a "prior right" to its use. In other words, an appropriation permit that predates another permit takes precedence.

According to Ecology staff, applications for appropriation permits are evaluated within the context of all available geohydrologic data (Sinclair, 1990). Ecology evaluates whether a new appropriation permit can be issued without adversely impacting existing water right holders, depleting the aquifer, or inducing seawater intrusion. In addition, the potential for hydraulic continuity between ground and surface water must be considered, particularly in drainage basins where surface waters are closed to further appropriation.

If, based on available information, it appears that the requested amount of ground water can be extracted without significant adverse impacts on the ground or surface water system(s), an appropriation permit will be issued subject to certain conditions. At a minimum, the conditions will include requirements for aquifer tests to be conducted on the newly constructed well to help establish transmissivity and storativity and to assess long term impacts on water levels. As a result of the aquifer tests, limits might be placed on pumping rates or pump elevations.

If sufficient geohydrologic data are not available to determine whether an appropriation permit can be approved, a temporary permit may be issued for construction of one or more test wells. The purpose of a test well(s) is to allow aquifer testing to be conducted to provide Ecology with adequate information upon which to base a decision on the appropriation permit. The appropriation permit will be issued only if the aquifer tests indicate that the requested withdrawal of ground water will have no significant adverse impact on existing permit holders, will not deplete the resource, or will not induce seawater intrusion.

(NOTE: Ecology's approach to ground water resource allocation vis-a-vis seawater intrusion potential is addressed in greater detail in the Seawater Intrusion Issue Paper [See Section III-2].)

Under ideal circumstances, the total amount of ground water that is permitted for appropriation will not exceed the safe, sustainable yield of the aquifer (i.e., a condition of "limited" mining). Unfortunately, due to the complexity of aquifer systems such as that of the Gig Harbor GWMA, determining what actually constitutes a safe, sustainable yield is very difficult, especially on a local basis. As demand for ground water increases in the Gig Harbor GWMA, the potential for overall allocation of the resource will increase, especially on a localized basis. Should water levels decline significantly in an area or seawater intrusion begin to occur, water usage by the most recent water right holders in that area would likely be curtailed.

Exemption to Ecology Program. Ground water use for individual and small public water supply wells is not currently managed. A driller report must be filed with Ecology at the time of construction, however, under RCW 90.44.050, appropriation permits are not required for wells that supply under 5,000 gallons of water per day (.005 MGD = 3.5 gpm).

Owners of wells that supply less than 5,000 gallons per day enjoy the same rights with respect to priority usage as water right holders (Sinclair, 1990). Should the operation of a new public water system well have an adverse impact on older individual wells located nearby, the owners of the individual wells could potentially assert their prior rights (ibid). In that event, Ecology would be forced to determine whether the public interest is best served by allocating the available ground water resources to the individual well owners or to the public water system.

Adequacy of Water Supply Under the Growth Management Act. Pursuant to Section 63 of the State Growth Management Act (RCW 36.70A), TPCHD has recently implemented requirements that applicants for building permits or proponents of development projects must demonstrate that adequate supplies of water are available to support the intended purpose of the building or development.

Adequacy is generally established based on the Interim Criteria for Determining Water Availability for New Buildings developed by Ecology. Under the Interim Criteria, adequacy may be demonstrated by

- A water right permit issued by Ecology
- A letter from an approved public water system expressing ability and willingness to supply water in compliance with the State Board of Health Drinking Water Regulations (WAC 246-290)
- In the case of wells that do not require a water right permit (domestic wells withdrawing less than 5,000 gallons per day), documentation verifying that the well can provide water of suitable quantity and quality

Such documentation includes a well driller's log and 1-hour bailer test or air line test indicating the yield of the well. If the well is to be a source for a small public water system, it must be test pumped continuously for a minimum of 4 hours. Necessary water quality data include, at a minimum, levels of coliform bacteria, nitrate, and, in coastal areas, chloride. TPCHD can also require any additional testing necessary to verify the existence of an adequate water supply. The Interim Criteria also provide standards for evaluating water quantity and quality data as they pertain to the issue of adequacy.

Acknowledging that seawater intrusion represents a unique problem and that provisions of the Interim Criteria may not adequately identify the potential for or serve to prevent seawater intrusion, TPCHD has developed a draft Seawater Intrusion Policy. This policy will control the placement and construction of wells in coastal areas that are exempt from water right requirements under RCW 90.44. The TPCHD draft Seawater Intrusion Policy is discussed in greater detail in the Seawater Intrusion Issue Paper.

1.2.2 Resource Planning: Coordinated Water System Plan

In 1982 a study of public water system adequacy was commissioned by the Pierce County Council. The study, prepared jointly by the DOH, TPCHD, and the Pierce County Planning Department, investigated concerns over drinking water quality, water quantity, and the lack of coordination among water utilities in regard to resource development, service area boundaries, and water system designs.

Findings of the study were enumerated in a report entitled *Preliminary Assessment of Water System Issues in Pierce County* (DOH, 1982). In

response to problems identified in the preliminary assessment, the Pierce County Council declared the entire county a Critical Water Supply Service Area (CWSSA) in 1983. Declaration of the CWSSA was the first step in the development of a CWSP under the Public Water System Coordination Act of 1977 (RCW 70.116).

A CWSP is intended to integrate water system planning with land use planning, establish uniform water system design standards, and explore the feasibility of regional supply systems. One critical aspect of a CWSP is the establishment of service areas and future service areas for individual public water systems. Service areas are defined in the Procedural Regulations for Administering the Public Water System Coordination Act (WAC 246-293) as those specific areas within which direct service is currently available from a public water system. In essence, a service area is the geographic region where a water system has installed capacity that is capable of supporting additional service connections up to the maximum number approved by DOH.

A future service area is a region where an individual public water system is planning to provide water service at some later date. Generally, this would involve development of new wells and mains in an area or the extension of mains from an existing service area.

Under the Public Water Supply Coordination Act, the creation of new public water systems is prohibited unless existing systems in an area are unable to provide service in a timely and reasonable manner. Once service areas and future service areas have been delineated, service within those areas generally must be supplied by the individual water utility that has claimed each specific service area and future service area. That is, service areas and, in most cases, future service areas are regarded by the state and Pierce County as exclusive.

The intent behind granting exclusive service areas is to provide individual public water systems with a firm planning base for determining the quantity of water resources, as well as the extent of utility infrastructure (mains, storage facilities, etc.), necessary to meet projected growth within their existing and future service areas.

The CWSP has segregated much of Pierce County, including the Gig Harbor GWMA, into existing and future water system service areas. However, within the Gig Harbor GWMA, a number of the future service areas planned by public water systems overlap, particularly in the eastern portions of the Gig Harbor Peninsula. DOH is responsible for resolving

service area boundary conflicts but has not yet exercised its authority to do so.

Coordinated Water System Plan: Water System Plans for Individual Utilities. Before a future service area established under a CWSP can be formally recognized, the individual public water system that is claiming the future service area must prepare a water system plan. The water system plan must demonstrate that the individual water utility has the available quantities of water, infrastructure, technical capability, and financial resources to provide reliable water service within its future service area. If that capability cannot be demonstrated, then another existing water system(s) or a new water system(s) should be given the opportunity to demonstrate, through preparation of a water system plan, adequate capability to serve the area.

Under WAC 246-293-230, water system plans for individual water utilities with identified future service areas were required to be developed or updated at the time of CWSP preparation. In spite of the fact that the CWSP was completed in 1988, to date few water system plans have been submitted to DOH. However, extensions of existing public water systems into their future service areas continue to be allowed by DOH.

Coordinated Water System Plan: Regional Water Supply Program. The Pierce County CWSP initiated development of a Regional Water Supply Plan for the urbanizing portions of Pierce County. Regional supply options that were identified for the Gig Harbor GWMA through the CWSP included

- Diversion and transmission of surface water from the Skokomish River in Mason County
- Coordinated development of wells and distribution systems within the Gig Harbor GWMA by a number of the larger purveyors
- Implementation of a joint resource utilization and management program with Kitsap County

According to the CWSP, development of the Skokomish River as a water supply source for the Gig Harbor GWM would require construction of a long transmission line, impoundment facilities, and a filtration plant. Aside from the economic constraints of such a project, current Ecology in-stream resources requirements for the Skokomish River limit the feasibility of this option.

No significant progress has been made concerning either a program for coordinated development of ground water resources by purveyors within the Gig Harbor GWMA or a joint resource utilization and management program between Pierce and Kitsap counties.

Due to capital facility financing considerations, development of a major regional supply system would likely require overall sponsorship by a publicly owned utility or formation of a public utility district. Unlike investor-owned water utilities, public utilities are not constrained by rate structure limitations imposed by the Washington Utilities and Transportation Commission (WUTC). Public utilities are also eligible to receive grant and loan funding from public sources such as the Community Development Block Grant Program, Farmers Home Administration, and state referendum programs.

Development of a major regional supply system would also involve economy of scale consideration. If high capacity regional water production and distribution facilities are developed, the customer base for which the system is intended to serve must be sufficiently large to reduce marginal costs to a reasonable level.

Coordinated Water System Plan: Reservation of Water for Future Public Water Supply. The CWSP recommended that Ecology be petitioned to reserve a portion of the currently unallocated ground waters of the Gig Harbor GWMA for future public water supply use. Under the state's Water Resources Act of 1971 (RCW 90.54) and accompanying procedural regulations (WAC 173-590), Ecology can reserve ground water for future public supply within a given geographic area. The intent of such a reservation is to protect water resources so that they may be fully utilized for the maximum benefit of the people of the state.

According to the CWSP, the petition should request reservation of 15 MGD of unallocated waters in the Gig Harbor GWMA for future use by western Pierce County water purveyors. Ground water would not be reserved for any specific water purveyor. Instead, a sort of ground water "bank" would be established for future allocations to expanding water systems in accordance with provisions of the CWSP.

If Ecology accepts and approves the petition, it must develop a regulation (Washington Administrative Code) establishing the reservation of some or all of the petitioned resources. From that point on, the priority date of any future water rights applications for public water supply purposes will be the effective date of the regulation establishing the reservation. Thus, future applications for public water supply use of Gig Harbor GWMA ground water

would ordinarily have prior right over future applications for other beneficial uses.

1.2.3 Resource Planning: Conservation Program

Interim conservation requirements for public water systems have been promulgated at a state level by Ecology, the DOH, and the Washington Water Utility Council (WWUC). The requirements divide responsibility for implementing various conservation program elements between individual water utilities and regional associations of water utilities, such as the Pierce County Regional Water Association. The portion of the conservation program assigned to individual water utilities increases proportionately with water system size and customer base. A large water utility is required to maintain a significant in-house program for conservation while a small water utility relies primarily on its regional association of utilities to conduct the conservation program.

The interim requirements identify three levels of program intensity: Base, Moderate, and Full. The Base program is required of all systems with less than 1,000 connections. The Moderate program is required of systems with between 1,000 and 10,000 connections and the Full program is required of systems with more than 10,000 connections. Within the Gig Harbor GWMA there is only one public water system with more than 1,000 connections, the city of Gig Harbor municipal system. With the exception of the city of Gig Harbor, which is required to implement a Moderate program, all other public water utilities are required to implement the Base program.

The Base program has two principal elements: program promotion and master metering of water sources. The program promotion element is intended to advertise the need for water conservation through television and radio public service announcements, news articles, and water system bill inserts.

The Moderate program involves a number of program elements, including

- Conducting public education and program promotion efforts
- Distributing kits containing inexpensive, easily installed, water saving devices to single-family residential homes and managers of apartment buildings (flow restrictors, tank displacement devices, etc.)
- Providing assistance to customers who request aid in implementing water conservation practices

- Detecting leaks in the water distribution system
- Providing customers with their consumption history on water bills
- Metering source production and customer consumption
- Promoting low water demand landscaping in all retail customer classes
- Developing seasonal pricing structures to discourage consumption during peak periods of demand

Under the state requirements, in areas with predominantly small utilities conducting Base programs, the regional water utility association must undertake a significant portion of the conservation program efforts. Elements of the regional program include

- Conducting a public school outreach program
- Maintaining a speakers bureau
- Promoting the conservation program through public service announcements and other efforts to increase public awareness
- Distributing residential conservation kits
- Providing assistance to purveyors in developing conservation programs
- Promoting conservation among nurseries and commercial agriculture groups
- Developing recommendations for revisions to local plumbing codes

The Regional Water Association of Pierce County, largely through the leadership of one of its members, the Tacoma Water Division, is in the process of implementing elements of the regional program throughout Pierce County. Unfortunately, with exception of the city of Tacoma, little progress has been made by individual water utilities in Pierce County in implementing the conservation programs envisioned by the state.

The problem lies at least partially with the mechanisms that trigger enforcement of the state requirements. For Ecology, applications for new water rights provide the best opportunity for imposing the conservation requirements. Such requirements become a condition of the water right or

appropriation permit. However, as noted previously, most of the water right holders in the Gig Harbor GWMA are not pumping up their permitted rights. Thus, it is not likely that a great number of the existing water right holders, which are primarily public water utilities, will be applying for new water rights in the near future. Ecology's limited resources argue against the likelihood that regulatory action will be undertaken against each existing water right holder to enforce the conservation requirements.

DOH can force compliance with the conservation program through its review and approval process for water system plans prepared by individual utilities as required under the CWSP. However, as pointed out previously, very few water systems have complied with water system planning provisions of the CWSP.

1.3 Issue Statement: Aquifer Supply Management

While it appears that the overall supply of ground water in the Gig Harbor GWMA is adequate to meet current demand and may accommodate considerable additional demand, areas of local "mining" or overdraft may occur, particularly in the lower peninsula area. This could result in discrete areas of locally declining water levels and, in coastal areas, of an inward migration of the seawater interface. These potential local areas of "mining" or overdraft may result in constraints on existing systems, higher supply costs, or limitations on development in areas of highest demand. In addition, in areas of highest demand, increased pumpage may escalate the risk of water supply contamination due to increased gradients and higher flow velocities. Should adverse impacts on existing (prior) water rights be observed related to either ground water "mining" or induced contamination resulting from high levels of pumpage, Ecology is likely to restrict water use in that area.

Ideally, the areas chosen to augment existing supply should have a low risk of contamination, be close to recharge zones, and be located relatively distant from the shoreline. In addition, wells and/or well fields should be sufficiently spaced so that the resource is efficiently used with the least potential for well interference effects. Location of supply sources according to these guidelines will reduce the potential for conflicts.

A major technical concern relating to aquifer capacity management is the lack of reliable data regarding water usage for most of the Gig Harbor GWMA wells. This lack of data severely limits the development of accurate long-term projections of ground water supply limits. This is coupled with the scarcity of data concerning water level fluctuations over time in the various regions of the Gig Harbor GWMA.

1.3.1 Alternatives

Alternative 1: No Action. Take no action.

Alternative 2: DOH Public Water System Policies. Request that the DOH modify its public water system policies to promote more efficient management of ground water resources by

- Completing the process of delineation of Existing and Future Service Area Boundaries for public water systems within the Gig Harbor GWMA as required under section 250 of the Procedural Regulations for Administering the Public Water System Coordination Act, WAC 246-293

- Suspending enforcement of exclusive Future Service Areas for a public water system until that system has an approved water system plan prepared under requirements of WAC 246-293-230 and Section 100 of the State Board of Health Drinking Water Regulations, WAC 246-290

- Prohibiting public water system line extensions unless a public water system has an approved water system plan prepared pursuant to WAC 246-293-230 and WAC 246-290-100

Alternative 3: Coordinated Resource Planning. Revise Pierce County ordinances relating to the implementation of the CWSP to require that water system plans prepared by individual public water utilities within the Gig Harbor GWMA demonstrate that water resource management planning has been coordinated with adjacent Group A purveyors.

Alternative 4: Water Rights Usage Verification. Request that Ecology implement requirements for ongoing metering of pumpage and, where possible, water level monitoring in all wells within the Gig Harbor GWMA for which a permit for appropriation (water right) has been issued. Ecology is also requested to develop procedures for granting variances from the water level monitoring requirement in cases where its enforcement is deemed unreasonable or would create undue hardship for the well owner.

Alternative 5: Conservation Programs. Request that the Pierce County Council incorporate the water conservation provisions of the Interim Guidelines for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology, and Conservation Programs (Ecology,

DOH, WWUC, 1990) into the Pierce County CWSP and the Pierce County Water General Plan. In addition, the Pierce County Council should stipulate that those conservation provisions must be reflected in the water system plans prepared by individual water utilities.

Alternative 6: Petition for Reservation. Request that the Group A public water systems within the Gig Harbor GWMA prepare a petition for reservation of currently unallocated ground water to meet future public water supply needs. The petition will be submitted to Ecology for review and approval under protocols established in the Procedures Relating to the Reservation of Water for Future Public Water Supply, WAC 173-590.

Alternative 7: Determination of Adequacy of Water Supply. Request that Ecology and the DOH develop more precise standards for determining the adequacy of water supplies proposed to serve existing and new development as required under Section 63 of the Growth Management Act, RCW 36.70A.

Alternative 8: Regional or Subregional Monitoring and Aquifer Evaluation Program. Design and implement a ground water monitoring and aquifer evaluation program, possibly including modeling, capable of predicting the ultimate resource capability for the Gig Harbor GWMA.

> **Alternative within the Alternative:** Design and implement a ground water monitoring and aquifer evaluation program to determine ultimate resource capability for the most critical subregions of the Gig Harbor GWMA. Priority will be given to subregions located substantially within the Urban Growth Boundary established under provisions of the Growth Management Act, RCW 36.70A.

Alternative 9: Combined Alternatives. Any combination of Alternatives 2 through 8.

1.3.2 Evaluation of Alternatives

Alternative 1: No Action. Selection of the no action alternative will place reliance on the existing Ecology water rights program, the DOH public water supply program, and the Pierce County CWSP for ensuring proper long-term management of ground water resources.

The primary advantage of this alternative is that, in the short term, it is the least costly option. However, longer term selection of the no action

alternative may result in very substantial social costs. If efforts are not undertaken to carefully coordinate water supply planning and management beyond the minimum levels required under state law, the risk of local ground water "mining" or depletion and seawater intrusion will be relatively high.

Problems resulting from inadequate aquifer capacity management may result in extensive litigation and may necessitate construction of expensive replacement water supply facilities. The potential for significant and insoluble problems would appear to be greatest for owners of small (low capacity) wells in the shoreline areas downgradient of wells operated by major purveyors.

Alternative 2: DOH Public Water System Policies. This alternative is intended to compel public water systems to develop plans for future expansion that reflect the limitations of known ground water resources. The plans should also demonstrate that public water systems that intend to expand their existing service areas possess adequate financial and technical capability to provide reliable levels of service commensurate with anticipated growth and development.

Under this alternative, the DOH will be requested to modify its public water system policies to promote more efficient management of ground water resources by completing the process of delineating existing and future service area boundaries for public water systems operating within the Gig Harbor GWMA. Delineation of service areas is required under Section 250 of the Procedural Regulations for Administering the Public Water System Coordination Act. WAC 246-293.

DOH will also be requested to suspend enforcement of the exclusive future service areas claimed by public water systems under the CWSP until those systems prepare individual water system plans and receive approval for those plans from DOH and Pierce County. Such an action by DOH would be consistent with WAC 246-293. Finally, DOH will be requested to prohibit any public water system line extensions unless the public water system has a water system plan prepared pursuant to WAC 248-56-230 and WAC 246-290-100 and approved by DOH and Pierce County.

Suspending enforcement of exclusive service areas and refusing to allow public water systems to extend lines beyond their existing retail service area until water system plans are completed by individual purveyors should prove to be highly controversial. Those actions will likely result in temporary development moratoriums in some portions of the Gig Harbor GWMA. An optional scenario for the impacts of these actions would be the proliferation

of new small (Group B) public water systems and/or individual wells in areas where existing purveyors cannot provide service in a timely manner because they lack approved water system plans. Such a proliferation of small water systems would be contrary to Pierce County and state water system management policies.

Alternative 3: Coordinated Resource Planning. Under this alternative, the Pierce County Council will be requested to revise Pierce County Ordinance No. 86-117S to require that water system plans prepared by individual public water utilities within the Gig Harbor GWMA demonstrate that water resource management planning has been coordinated with adjacent Group A purveyors. The objective of this coordinated planning requirement is to help ensure that development of ground water resources for public water supply purposes will not result in local or regional aquifer depletion. The adequacy of water system plans prepared by individual water utilities in meeting this objective shall be evaluated by Pierce County based on criteria to be developed by the Regional Water Association.

This alternative will not preempt the existing authority of the state of Washington to manage water resources under RCW 90.44 and RCW 90.54. Instead, it is intended to augment and complement that authority.

Costs incurred by Pierce County in review of water system plans to ensure adequacy of coordinated resource planning should be offset by plan review fees based on time and materials.

Alternative 4: Water Rights Usage Verification. This alternative involves requesting Ecology to implement a requirement for ongoing monitoring of water levels and metering of pumpage in all wells with an appropriation permit (water right). Such a requirement will generate valuable data concerning water consumption and water level trends that are necessary to support competent resource management decisions. Authority to implement this requirement is already vested with Ecology under existing statutes.

It is recognized that there may be difficulties in installing water level monitoring devices in some existing wells. As such, Ecology is requested to develop procedures for granting variances from the water level monitoring requirement in cases where its enforcement is deemed unreasonable or would create undue hardship for the well owner.

Implementation of this alternative will create a need to identify an appropriate data management system to assimilate and fully utilized generated data. Development of such a data management system may

require funding under the Aquifer Protection Area proposed as part of the GWMA.

Alternative 5: Conservation Programs. The Pierce County Council will be requested to incorporate the water conservation provisions of the Interim Guidelines for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology, and Conservation Programs (Ecology, DOH, WWUC, July 1990 or any subsequent revision) into the Pierce County CWSP and the Pierce County Water General Plan. The Pierce County Council will stipulate that those conservation provisions must be reflected in the water system plans prepared by individual water utilities.

This alternative is intended to integrate the principals of water conservation into Pierce County's institutional framework for water supply planning. Additionally, when coupled with provisions of Alternative 2, this alternative will accelerate the implementation of the state conservation program within the Gig Harbor GWMA. Alternative 2 will compel purveyors that claimed future service areas under the CWSP, including nearly all major purveyors within the Gig Harbor GWMA, to prepare and submit their individual water system plans to DOH and Pierce County. Water system plans submitted by individual utilities cannot receive DOH approval unless they incorporate the state conservation requirements. Thus, under this alternative, individual public water systems will be required to incorporate water conservation into plans for meeting future increases in demand for water supply.

Implementation of conservation or demand reduction programs provides a very low-cost extension to available water resources. However, conservation may provide no more than a short- to mid-term solution to long-term population and water demand growth. In the event that additional resource supply studies are pursued under Alternative 8, demand reduction techniques will provide some surety that supply limits will not be exceeded before such studies are completed.

Implementation of conservation measures will have positive impacts on ground water resource management throughout the Gig Harbor GWMA. However, the areas that are likely to receive the greatest benefits will be the shoreline areas where local aquifer inhomogeneities may make prediction of overdraft potential highly uncertain and where fewer source alternatives are available to individual water supply systems.

Alternative 6: Petition for Reservation. Under this alternative, the Group A public water systems within the Gig Harbor GWMA will be requested to prepare a petition for reservation of currently unallocated ground water to meet future public water supply needs. The petition will be submitted to Ecology for review and approval under protocols established in Procedures Relating to the Reservation of Water for Future Public Water Supply, WAC 173-590.

Should Ecology approve the petition, it must develop a regulation establishing the reservation of some or all of the petitioned resources. From that point on, the priority date of any future water rights applications for public water supply purposes will be the effective date of the regulation establishing the reservation. Thus, future applications for public water supply use of Gig Harbor GWMA ground water would ordinarily take precedence over future applications for other beneficial uses such as industrial process water and agriculture.

Since public water supply is, and will probably continue to be, the most important beneficial use of Gig Harbor GWMA ground water, an effort should be made to preserve remaining unallocated ground water for that purpose. The reservation process outlined in WAC 173-590 is the only available method for maximizing the amount of unallocated ground water that will be available for meeting future drinking water needs.

The preparation of a petition for reservation of 15 MGD of Gig Harbor GWMA ground water was recommended in the Pierce County CWSP. The support of a reservation of 15 MGD (equivalent to 10,400 gpm $\approx$ 4 times current demand) would appear to be a prudent alternative unless clear guarantees are available to prevent population or demand increases. However, the basis for this reservation is unclear, since the availability of Gig Harbor GWMA ground water resources has only generally been identified.

The 15 MGD reservation may only be feasible within the context of a revised CWSP demonstrating a proactive resource management program. The reservation may also need to be supported by detailed resource availability studies that may, in fact, indicate that 15 MGD in additional resources are not available.

Petition preparation is likely to cost between $3,000 to $10,000. This is a crude estimate based on the assumption that the data generated through the Pierce County CWSP and the Gig Harbor GWMA will be sufficient to support the reservation. Should more detailed information be required, implementation of Alternative 8 (ground water monitoring/aquifer evaluation

program) may be necessary to provide supporting data for the petition. Under that circumstance, implementation of this alternative could require an investment of hundreds of thousands of dollars.

Alternative 7: Determination of Adequacy of Water Supply. Section 63 of the Growth Management Act (RCW 36.70A) stipulates that an applicant for a building permit must provide evidence that an adequate supply of water is available to serve the intended use of the building. Evidence may be in the form of a water right permit from Ecology, a letter from a public water supplier stating the ability to provide water in a manner consistent with DOH drinking water regulations, or another form sufficient to verify the existence of an adequate supply. It is the latter form that is a matter of great concern to local government agencies who are responsible for determining adequacy; specifically, situations where water service is not being provided by a major public water supply system or from a well for which a water right is required by Ecology. This typically involves proposed service from a small public water system or a single domestic well.

In the existing programs section, it was noted that Ecology has developed criteria for determining adequacy of water supplies under Section 63: the Interim Criteria for Determining Water Availability for New Buildings. However, based on the experience of TPCHD in administering these criteria, there appears to be a need for more definitive standards to evaluate the adequacy of water service when the proposed source is a small public water system or a single domestic well. The current criteria call for a few, short-term tests to assess the long-term adequacy of a proposed water supply.

Under this alternative, Ecology and the DOH will be requested to develop more precise standards for determining adequate water supplies to serve existing and new development as required under provisions of the Growth Management Act (RCW 36.70A). Such standards would provide a firmer basis for decision-making by local permitting authorities concerning the adequacy of water supply and resources.

One potential drawback of this alternative is that the implementation of more complex evaluation criteria will likely place additional responsibilities on local permitting authorities, which will result in a significant increase in agency workloads.

Alternative 8: Regional or Subregional Aquifer Evaluation Program.

This alternative proposes that a ground water monitoring and aquifer evaluation program capable of predicting the ultimate resource capability of the Gig Harbor GWMA be designed and implemented. This program will involve implementing the basic and special purpose monitoring programs identified in the Long Term Monitoring Issue Paper (Section III-3), augmenting those monitoring programs with additional data collection efforts, and evaluating all available data through modeling or other means necessary to accurately characterize aquifer conditions.

TPCHD, as lead agency for the Gig Harbor GWMP, will be responsible for implementing the program with substantial participation and assistance from area water purveyors, Ecology, and DOH.

A potential alternative within this alternative is to design and implement a ground water monitoring and aquifer evaluation program for purposes of determining the ultimate resource capability for the most critical of the five subregions of the Gig Harbor GWMA. Priority will be given to subregions located substantially within the Urban Growth Boundary established under provisions of the Growth Management Act (RCW 36.70A).

Cost of implementing this alternative will be approximately $200,000 for each of the five subregions, or roughly $800,000 to $1,000,000 for the entire Gig Harbor GWMA. Since these cost far exceed existing sources of funding available to conduct monitoring and aquifer evaluation activities, other sources of funding will need to be identified. The most plausible approach to procuring additional funding would be pursuing a Centennial Clean Water Fund implementation grant and seeking voter approval of an Aquifer Protection Area (APA) taxing district under RCW 36.36. APAs are more completely described in the Special Programs Section of the Gig Harbor GWMA (Appendix A.3).

Even if voters approve formation of an APA, revenues raised through the APA will not be sufficient annually to execute the full monitoring and aquifer evaluation program in the first or second year. Monitoring and aquifer evaluation efforts will need to be implemented incrementally over many years.

Alternative 9: Combined Alternatives. With the exception of the no action alternative, the selection of any one alternative does not preclude selection of additional alternatives. Thus, any combination of Alternatives 2 through 8 may be selected as the preferred alternative.

1.3.3 Preferred Alternative

The preferred alternative for aquifer capacity management within the Gig Harbor GWMA is composed of a number of different program elements selected from the various action alternatives considered by the GWAC. Those elements include

Element A (Alt. 2, part): DOH Public Water System Policies. Request that the DOH modify its public water system policies to promote more efficient management of ground water resources by

- Completing the process of delineating Existing and Future Service Area Boundaries for public water systems within the Gig Harbor GWMA

- Suspending enforcement of exclusive Future Service Areas for a public water system until that system has an approved water system plan

Element B (Alt. 3): Coordinated Resource Planning. Revise Pierce County ordinances relating to the implementation of the CWSP to require that water system plans prepared by individual public water utilities demonstrate that water resource management planning has been coordinated with adjacent Group A purveyors.

Element C (Alt. 4): Water Rights Usage Verification. Request that Ecology implement requirements for ongoing metering of pumpage and, where possible, water level monitoring in all wells within the Gig Harbor GWMA for which a permit for appropriation has been issued. A variance process should be available for instances when water level monitoring is not feasible due to the construction or configuration of wells and pumps.

Element D (Alt. 5): Conservation Programs. Request that the Pierce County Council incorporate state water conservation guidelines for public water systems into the Pierce County CWSP and the Pierce County Water General Plan. In addition, the Pierce County Council should stipulate that those conservation guidelines must be reflected in the water system plans prepared by individual water utilities.

Element E (Alt. 7): Determination of Adequacy of Water Supply. Request that Ecology and the DOH develop more precise standards for determining the adequacy of water supplies proposed to serve existing and new development as required under the Growth Management Act, RCW 36.70A.

Element F (Alt. 8): Regional or Subregional Monitoring and Aquifer Evaluation Program. Design and implement a ground water monitoring and aquifer evaluation program capable of predicting the ultimate resource capability for the Gig Harbor GWMA. As an alternative within the alternative, design and implement a monitoring and aquifer evaluation program to determine the ultimate resource capability for the most critical subregions of the Gig Harbor GWMA. Priority will be given to subregions located substantially within the Urban Growth Boundary established under provisions of the Growth Management Act.

1.3.4 Rationale

In selecting a preferred alternative, the GWAC determined that no single action alternative will provide an appropriate aquifer capacity management structure for the Gig Harbor GWMA. Thus, the GWAC selected Alternative 9 and combined Alternatives 3, 4, 5, 7, 8, and portions of Alternative 2 as the preferred alternative.

One provision of Alternative 2 was rejected by the GWAC. That provision recommended prohibition of line extensions by individual public water utilities until their water system plans have been approved by the DOH and Pierce County. The rejection was based on concerns that the prohibition would lead to a proliferation of new small public water systems and/or individual wells in portions of the Gig Harbor GWMA.

Alternative 6 was also rejected by the Gig Harbor GWAC. That alternative called for reservation of 15 million gallons per day in currently unallocated Gig Harbor GWMA ground water resources for meeting future increases in demand for drinking water. The GWAC concluded that insufficient data currently exists to support the reservation request.

The remainder of the action alternatives were deemed by the GWAC to be appropriate resource management options. However, the most ambitious of those alternatives, the design and implementation of a monitoring and aquifer evaluation program intended to establish total resource capability, cannot be implemented without establishment of an APA taxing district by voters within the Gig Harbor GWMA.

1.3.5 Implementation Plan

Implementation Actions.

Action (Responsible Party)	Target Date
Element A - Pierce County Council concurrence with program	January 1991
Element B - Prepare ordinance amendments (TPCHD, GWAC)	30 days after certification of program by Ecology
Element B - Submit ordinance amendments to the Pierce County Council for approval (TPCHD, GWAC)	60 days after certification of program by Ecology
Element C - Pierce County Council concurrence with program	January 1991
Element D - Prepare ordinance amendments (TPCHD, GWAC)	30 days after certification of program by Ecology
Element D - Submit ordinance amendments to the Pierce County Council for approval (TPCHD, GWAC)	60 days after certification of program by Ecology
Element E - Pierce County Council concurrence with program	January 1991
Element F - Design conceptual aquifer evaluation program and develop cost estimates (TPCHD, GWAC, RWA, DOH)	90 days after certification of program by Ecology
Element F - Integrate aquifer evaluation program plan with program plans for other activities proposed for funding through the APA (TPCHD, GWAC)	180 days after certification of program by Ecology
Element F - Prepare and submit proposal for APA ballot issue to Pierce County Council (GWAC, TPCHD)	1 year after certification of program by Ecology

Funding Plan. Funding for most of the elements of the preferred alternative will be provided through existing funding sources or through fees charged for services. For instance, costs incurred by Pierce County in review of water system plans to ensure adequacy of coordinated resource planning will be offset by plan review fees based on time and materials.

Some elements may require significant increases in existing fees to offset implementation costs of responsible agencies. For example, implementation of the conservation program element could substantially increase the

amount of time spent by DOH staff in review of water system plans prepared by individual water utilities. Implementation of more complex criteria for determining adequacy of water supply under Section 63 of the Growth Management Act could result in a significant increase in TPCHD workloads. Both DOH and TPCHD should review their permit and plan review fees to ensure that they are adequate to offset costs associated with these elements of the Preferred Alternative.

However, the most substantive elements of the preferred alternative will necessitate procurement of significant additional funding. Evaluation of the resource capability of the aquifers within the Gig Harbor GWMA may require several hundred thousand to a million dollars in additional funding. The only plausible source of additional funding is voter approval of an APA by voters within the GWMA.

Noting the importance of aquifer capacity management and long-term monitoring efforts in ensuring sustained yields of ground water, the GWAC is committed to pursuing the APA designation. Upon certification of the Gig Harbor GWMA, an integrated program plan and budget for all activities proposed for funding under the APA will be prepared. The integrated program plan and budget will be submitted to the Pierce County Council as part of a package requesting placement of the APA issue on an upcoming election ballot.

1.4 References

Department of Ecology, Department of Health, and Washington Water Utilities Council; Interim Guidelines for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology, and Conservation Programs, July 1990.

Department of Health, Preliminary Assessment of Water System Issues in Pierce County, 1982.

Drost, Brian W., Water Resources of the Gig Harbor Peninsula and Adjacent Areas, Washington, U.S.G.S., Water Resources Investigations Open-File Report 81-1021, 1982.

EMCON Northwest, May 1992. Gig Harbor Peninsula Ground Water Management Program Task 5 Hydrogeologic Evaluation Report with Robinson and Noble, Inc. prepared for Tacoma-Pierce County Health Department.

Pierce County, Coordinated Water System Plan, Prepared by Economic and Engineering Services for Pierce County Planning, 1988.

Pierce County, Ground Water Resource Evaluation for Pierce County, Prepared by Hart-Crowser, Inc. for Pierce County Planning, 1984.

Sinclair, Kirk, Personal Communication, Department of Ecology 1990.

Sweet-Edwards/EMCON, Inc., April 1990. Gig Harbor Peninsula Ground Water Management Plan Task 2 Land and Water Use Background Report with Adolfson Associates, Inc., prepared for the Tacoma-Pierce County Health Department.

Sweet-Edwards/EMCON, Inc., April 1990. Gig Harbor Peninsula Ground Water Management Plan Task 3 Hydrogeological Summary Report with Robinson and Noble, Inc., prepared for Tacoma-Pierce County Health Department.

1.5 Laws and Regulations

Planning Enabling Act, RCW 36.70.

Growth Management Act, RCW 36.70A.

Aquifer Protection Area Enabling Act, RCW 36.36

Sewerage, Water, and Drainage Systems Act, RCW 36.94.

Water Supply Coordination Act of 1977, RCW 70.116.

Water Code - 1917 Act, RCW 90.03.

Regulation of Public Ground Waters, RCW 90.44.

Water Resources Act of 1971, RCW 90.54.

Procedures Relating to the Reservation of Water for Future Public Water Supply, WAC 173-590.

State Board of Health Drinking Water Regulations, WAC 246-290.

Procedural Regulations for Administering the Public Water System Coordination Act, WAC 246-293.

2 SEAWATER INTRUSION ISSUE PAPER

2.1 Problem Statement

Seawater intrusion is the movement of salt water from a marine water body into a ground water zone or aquifer that has previously been occupied by fresh water. When seawater intrudes an aquifer used for public water supply, the high salinity of the seawater can render the water unpalatable and can contribute to rapid corrosion of pumps, well casings, and plumbing. Once seawater intrudes an aquifer, it can be impossible to control or reverse the process.

In order for intrusion to occur, two basic geohydrologic conditions must exist: the coastal fresh water aquifer must be in hydraulic continuity with seawater and the hydraulic head of the fresh water aquifer must be reduced relative to the elevation of the seawater. The latter condition may be associated with global (eustatic) sea-level rise, local tidal phenomena, subsidence (downward, vertical land movement), or declining aquifer levels (water table or potentiometric surface). Aquifer levels may decline as a result of drought, reductions in recharge due to the effects of urbanization (e.g., impervious surfaces), or withdrawals of ground water by wells.

The potential for seawater intrusion can vary from one area to another depending on geologic conditions, aquifer characteristics, topography, and the size of recharge area. In addition, seawater intrusion may vary over time at a single location due to cyclic seasonal precipitation and water-use patterns. When aquifer recharge is lowest, seawater tends to intrude inland. This seasonal variability is most pronounced in areas where periods of low recharge coincide with the periods of highest ground water pumping, such as summers in the Gig Harbor GWMA. The seasonal intrusion may reverse during winter months when recharge increases and pumping rates drop.

The problem of seawater intrusion is complex and its occurrence cannot be predicted without an adequate understanding of the local hydrogeology. Additionally, unusual concentrations in well water of the parameter most commonly used as an indicator of seawater intrusion, chloride, does not

necessarily confirm the occurrence of seawater intrusion. Chloride can be introduced to ground water from on-site sewage disposal systems, landfills, road salts, and sea spray. Naturally elevated chloride levels, unrelated to present day seawater influence, are also encountered in some geologic formations. Thus, the precise source of chloride in a well cannot always be easily ascertained.

Seawater contains about 19,000 milligrams per liter (mg/L of chloride while uncontaminated ground water in coastal areas of Washington typically contains less than 10 mg/L (Walters, 1971). Normal chloride values of Gig Harbor GWMA ground waters range from about 2.5 to 4.0 mg/L (Drost, 1982). A study conducted by the Department of Ecology in 1984 concluded that chloride levels of 100 mg/L or more suggest seawater intrusion (Dion and Sumioka, 1984). Chloride levels between 10 mg/L and 100 mg/L may be attributable to a variety of sources including seawater intrusion (ibid).

Chloride levels in shoreline areas of the Gig Harbor GWMA have been observed as high as 645 mg/L. Chloride levels of over 100 mg/L have been observed in wells in the following areas: Allan Point, Point Evans, Kopachuck, Fox Island, and Horsehead Bay. Among those areas, the most significant seawater intrusion problems are occurring near Horsehead Bay. Additionally, although chloride levels have not exceeded 100 mg/L, several wells on Point Fosdick have demonstrated levels between 20 and 100 mg/L.

As development continues in the Gig Harbor GWMA, particularly in coastal areas, the potential for problems with seawater intrusion can be expected to increase.

2.2 Existing Programs

2.2.1 General Water Resource Management

The Ecology is responsible for assuring proper management of ground water resources in Washington state. Ecology's authority to prevent and control seawater intrusion is vested in RCW 90.03 (Water Code - 1917 Act), RCW 90.44 (Regulation of Public Ground Waters), and RCW 90.54 (Water Resources Act of 1971). These RCWs empower Ecology to deny a water right under the following circumstances: if it is not in the public interest, if water is not available, if the intended use is not beneficial, or if issuance of the water right would impair existing rights. This is interpreted by Ecology to constitute authority to deny or place conditions on a water right if the potential for seawater intrusion exists (Ecology, 1990). In addition, the

Antidegradation Policy of the State of Washington, as articulated in RCW 90.48 (Water Pollution Control Act) and RCW 90.54 (Water Resources Act of 1971), provides additional authority for Ecology to prevent seawater intrusion into fresh water coastal aquifers.

2.2.2 Ecology Seawater Intrusion Policy

As part of a recent ruling by the Pollution Control Hearings Board (Prairie Management V.H. Wilbert), Ecology was directed to develop a seawater intrusion policy. A Seawater Water Intrusion Team was formed by Ecology in October 1989 to develop and implement a strategy for managing seawater intrusion problems. The Seawater Intrusion Team has a 2-tier structure. A core group consisting of Ecology staff and an advisory committee consisting of representatives from other state agencies, federal agencies, Indian tribes, citizen groups, and the lead agencies for GWMA (established under WAC 173-100) that are, or potentially are, affected by seawater intrusion.

The objectives of the Seawater Intrusion Team, as enumerated in its *Proposed Plan* (Ecology, 1990), are as follows:

- Define all aspects of the seawater intrusion problem (technical, legal, political, etc.).
- Develop a seawater intrusion policy framework to guide water rights administration and to promote sound resource management.
- Develop analytical and predictive capabilities (including a monitoring network to determine trends and to provide early warning of seawater intrusion problems in coastal areas).
- Educate the public, government agencies, and water purveyors about seawater intrusion causes and effects.
- Develop and implement measures for preventing and/or minimizing seawater intrusion through protection and monitoring of aquifers.
- Improve coordination with state and local regulatory agencies.
- Integrate seawater intrusion control efforts with water rights administration and planning activities such as Ground Water Management Programs (under WAC 173-100), Coordinated Water

System Plans (under WAC 248-56), regional water supply plans, and comprehensive land use plans.

- Determine the costs of implementing team recommendations and propose funding options.

In November 1990 the Ecology Seawater Intrusion Team released a Draft Seawater Intrusion Policy. The draft policy applies to areas where seawater intrusion problems have been documented or areas where natural conditions are conducive to seawater intrusion. The goal of the draft policy is to prevent seawater intrusion in areas where it has not occurred and to control seawater intrusion where it already exists. The draft policy emphasizes

- Implementation of water use efficiency and demand reduction measures

- Upholding sustained yields of ground water resources in coastal areas

- Improving the quality and quantity of information available to support sound resource allocation decisions

- Promoting public and industry education

The draft policy is intended to serve as guidance for Ecology's regional office staff in the administration and regulation of water rights in situations where a seawater intrusion risk has been identified. Ecology's regional office staff will evaluate water right applications from the perspective of the overall hydrologic system. Since all wells within a ground water basin contribute to seawater intrusion to some degree, seawater intrusion risk will be approached from a basin-wide perspective wherever and whenever possible. The burden of proof will lie with water rights applicants to demonstrate that additional withdrawals will not impair the ground water resource or adversely affect existing water rights.

In implementing the Draft Seawater Intrusion Policy, Ecology will work in cooperation with the Washington Department of Health (DOH), local health departments, and local planning departments to maximize the use of the combined statutory and regulatory authority of state and local governments. For purposes of implementation, the draft policy identifies three categories of risk: low, moderate, and high.

A **low risk** area is identified as an area where chloride concentrations of between 25 and 100 mg/L are observed in

- An existing water system well or wells
- A newly drilled well or wells
- The surrounding ground water basin in general

Where boundaries of a ground water basin are unclear or unknown, the risk area will be a 0.5-mile radius around a well of established chloride concentration.

Where chloride levels in specific wells or the surrounding basin are between 100 and 200 mg/L, the area is deemed to be **moderate risk**, while the threshold chloride concentration for **high risk** areas is in excess of 200 mg/L. Areas can be identified as moderate or high risk even if chloride levels are less than the threshold concentrations if statistical evidence demonstrates a consistent trend toward increasing chloride levels.

Variable levels of control or regulation will be assigned to each risk category commensurate with the likelihood of seawater intrusion impacts. The Ecology policy recognizes four basic categories of wells:

- New public water supply, irrigation, and industrial wells
- Existing public water supply, irrigation, and industrial wells
- New single domestic wells
- Existing single domestic wells

Single domestic wells are wells used to withdraw less than 5,000 gallons per day for domestic use, including irrigation of up 0.5 acre of noncommercial lawn or garden. Such wells are exempted from water right requirements in RCW 90.44.

Pierce County. The Tacoma-Pierce County Health Department (TPCHD) has prepared a draft seawater intrusion sampling policy which identifies high risk areas as those with over 100 mg/L chloride; moderate or medium risk at 50 to 100 mg/L; and low risk at less than 25 mg/L. The draft policy is scheduled for review by the Board of Health in late 1992.

New Public Water Supply, Irrigation, and Industrial Wells. In low risk areas, proponents of new public water supply, irrigation, or industrial wells must conduct 24-hour aquifer tests to assess the potential impact on the resource and existing water right holders. If the water right is issued, the well owner will be required to conduct annual (every August) chloride monitoring and to report the results to DOH. All new sources must be metered and conservation practices must be incorporated into a maintenance and operations agreement.

Applications for new water rights in moderate and high risk areas will be denied unless an applicant is able to demonstrate that adverse impacts on ground water resources or existing water rights will not occur. Should stringent aquifer testing procedures and hydrogeologic evaluations sponsored by an applicant successfully demonstrate that adverse impacts will not occur, the water right issued by Ecology will contain the following conditions:

- The new well must be monitored for chloride levels twice per year (April and August) and the results reported to DOH.
- Water conservation measures must be incorporated into an operations and maintenance agreement.
- Both the source and individual services must be metered and the results reported annually to Ecology.
- Phased development of the facilities proposed for service by the new well is likely to be required.
- Should future degradation of ground water quality result from the operation of the well, further development may be halted, even if the well (water system) is approved for additional connections.

Existing Public Water Supply, Irrigation, and Industrial Wells. All wells in this category are subject to source metering requirements with annual reporting water use to Ecology. Wells in low risk areas must be tested for chloride by their owners once per year (August) and annually reported to DOH.

For medium and high risk areas, wells must be sampled for chlorides and conductivity twice per year. Owners of wells in moderate risk areas must also investigate possible mitigation measures and will be required to institute "rigorous" conservation measures.

In high risk areas, well owners must study possible mitigation measures and implement mitigation measures recommended through the study. Well owners are required to institute "rigorous" conservation measures (in-house-use-only restrictions are specifically identified in the policy). Existing systems with chloride concentrations over 250 mg/L will have moratoriums placed on new hookups or expanded usage, and any unused water rights must be relinquished.

TPCHD policy restricts new hookups on systems in areas with over 100 mg/L chloride.

New Single-Domestic Wells. All domestic well owners are required to provide Ecology with information concerning well location, status, use, and number of persons served. In addition, in low risk areas, conservation measures are encouraged. In moderate risk areas, local governments are requested to require installation of water conservation devices. In high risk areas, new domestic well owners are subject to water use restrictions including limitation of water use to in-house only.

Existing Single-Domestic Wells. Owners of all wells, regardless of risk category, must provide Ecology with information concerning well location, status, use, and number of persons served. In high risk areas, well owners will also be subject to water use restrictions.

2.2.3 Local Program: Adequacy of Water Under the Growth Management Act

Pursuant to Section 63 of the State Growth Management Act (RCW 36.70A), TPCHD has recently implemented requirements that applicants for building permits or proponents of development projects must demonstrate that adequate supplies of water are available to support the intended purpose of the building or development.

Adequacy is generally established based on the *Interim Criteria for Determining Water Availability for New Buildings* developed by Ecology. Under the Interim Criteria, adequacy may be demonstrated by

- A water right permit issued by Ecology
- A letter from an approved public water system expressing ability and willingness to supply water in compliance with the State Board of Health Drinking Water Regulations (WAC 246-290)

- In the case of wells that do not require a water right permit (domestic wells withdrawing less than 5,000 gallons per day), documentation verifying that the well can provide water of suitable quantity and quality

Such documentation includes a well driller's log and 1-hour bailer test or air line test indicating the yield of the well. If the well is to be a source for a small public water system, it must be test pumped continuously for a minimum of 4 hours. Necessary water quality data include, at a minimum, levels of coliform bacteria, nitrate, and, in coastal areas, chloride. TPCHD can also require any additional testing necessary to verify the existence of an adequate water supply. The Interim Criteria also provide standards for evaluating water quantity and quality data as it pertains to the issue of adequacy.

Acknowledging that seawater intrusion represents a unique problem and that provisions of the Interim Criteria may not adequately identify the potential for or serve to prevent seawater intrusion, TPCHD has developed a draft Seawater Intrusion Policy. This policy will control the placement and construction of wells in coastal areas that are exempt from water right requirements under RCW 90.44. The TPCHD draft policy is intended to be interim in nature as it is anticipated that seawater intrusion will be formally addressed in county ordinances and/or the Comprehensive Land Use Plan being prepared in accordance with the Growth Management Act.

If enacted by the Tacoma-Pierce County Board of Health, the TPCHD draft policy will adopt the Ecology Draft Seawater Intrusion Policy with some important distinctions. The TPCHD draft policy establishes lower chloride threshold levels for identifying low, moderate, and high risk areas. Under the TPCHD draft policy, risk areas are classified as follows:

- Low: 25 to 50 mg/L of chloride
- Moderate: 50 to 100 mg/L of chloride
- High: 100 or more mg/L of chloride

All areas within 1,000 feet of the mean high tide line will automatically be considered, at a minimum, low risk areas. Thus, under the TPCHD draft policy, all wells located or proposed for location within 1,000 feet of the coastal shoreline will be subject to seawater intrusion prevention and control measures. The status of areas situated more than 1,000 feet inland from the coast will be determined on a case-by-case basis.

To implement its draft Seawater Intrusion Policy, TPCHD will develop construction and operation standards for wells located in seawater intrusion risk areas, although it is likely that proposals to construct wells in high risk areas will be rejected outright (Harp, 1991). The standards are intended to accomplish the following.

- Prevent the proliferation of wells in seawater intrusion risk areas.
- Establish setback distances between wells and the mean high tide line.
- Control well pumping rates and pump elevations.
- Require source metering.
- Implement conservation measures.

The TPCHD draft Seawater Intrusion Policy will be presented to the Tacoma-Pierce County Board of Health for adoption prior to the end of 1991.

2.3 Issue Statement: Seawater Intrusion

Based on the occurrence of elevated chloride levels in well water, seawater intrusion appears to be occurring in a number of areas within the Gig Harbor GWMA including Allan Point, Point Evans, Kopachuck, Fox Island, and Horsehead Bay. It is essential that policies and programs intended to prevent and control seawater intrusion are properly implemented and supported.

2.3.1 Alternatives

Alternative 1. Take no action.

Alternative 2. Urge the Tacoma-Pierce County Board of Health to adopt the TPCHD draft Seawater Intrusion Policy concerning the placement of wells in coastal areas that are exempt from Ecology administered water right requirements. Further, urge the Tacoma-Pierce County Board of Health to support and, if needed, adopt special water well design and construction standards to be developed by the TPCHD as necessary to implement the Seawater Intrusion Policy.

Alternative 3. Implement the special coastal zone monitoring program as identified in the Long Term Monitoring Issue Paper and the subregional monitoring/aquifer evaluation efforts identified in the Aquifer Capacity Management Issue Paper in order to

- Provide early warning of seawater intrusion problems.
- Generate the data necessary to identify appropriate restrictions on land and water development that should be implemented through comprehensive land use planning being carried out by Pierce County under the State Growth Management Act.
- Assist public water purveyors in the design of coordinated resource planning efforts undertaken in response to Aquifer Capacity Management recommendations of the Gig Harbor GWMA.
- Facilitate a basin-wide approach to management of risks associated with seawater intrusion.

Alternative 4. Request that Ecology designate the coastal zone or portions of the coastal zone as a Special Protection Area (SPA) under WAC 173-200 (Washington Ground Water Quality Standards). The purpose of the SPA would be to encourage Ecology to place a high priority on requiring water level monitoring and production metering as well as semiannual monitoring for chloride and conductance in all existing permitted wells.

Alternative 5. Implement any combination of Alternatives 2, 3, and 4.

2.3.2 Evaluation of Alternatives

Alternative 1. This alternative adopts a wait-and-see attitude toward the emerging Ecology Seawater Intrusion Policy and associated programs. The advantage of this approach is that it avoids potential local duplication of efforts that are being undertaken at the state level.

The disadvantages of this alternative are

- The Ecology Seawater Intrusion Policy may not be specifically tailored to local needs and conditions.
- There is no timetable or schedule for formal implementation of actions that will result from the Ecology policy, particularly actions concerning **existing** permitted wells.

- It does not provide tangible support for comprehensive land use management planning efforts currently being undertaken by Pierce County.

- It does not aid in the process of determining the adequacy of water supplies to support new development as required under the Growth Management Act.

Selection of this alternative assumes that either seawater intrusion problems will not become critical in the immediate future or that any detrimental effects associated with seawater intrusion can be reversed through remedial actions.

Alternative 2. This alternative is based on the assumption that implementation of the Ecology Seawater Intrusion Policy by that department's Southwest Regional Office will be effective in preventing seawater intrusion impacts associated with new wells for which appropriation permits will be issued under RCW 90.44. Alternative 2 focuses on wells that are exempt from appropriation permit requirements and, thus, are not subject to special scrutiny by Ecology. Wells that produce less than 5,000 gallons per day for domestic purposes or are used for irrigation of a lawn or noncommercial garden of less than 0.5 acre are exempt from Ecology water right requirements under RCW 90.44.

Under this alternative, the Tacoma-Pierce County Board of Health is urged to adopt the Draft Seawater Intrusion Policy developed by the TPCHD.

In addition, the board of health is requested to support special water well design and construction standards that will be developed as necessary to implement that policy. The special standards will regulate the location, pump elevation, pumping rate, and monitoring requirements for wells constructed in coastal areas. The standards will also be a mechanism for promoting demand reduction and water use efficiency.

Aquifer modeling conducted as part of the Gig Harbor GWMP suggests that wells pumping less than 5,000 gallons per day should have only localized impacts on the shoreward migration of the fresh water-seawater interface. The policy and special standards proposed under this alternative coupled with the existing limitations on permissible lot sizes (minimum 1 to 2 acres with an individual well) should preclude the installation of sufficient numbers of wells in a given area to create a significant seawater intrusion effect.

Funding for this alternative will be provided through existing sources such as well-site and development review fees collected by TPCHD.

Alternative 3. The Long Term Monitoring Issue Paper recommends a series of special monitoring efforts that could be implemented within the Gig Harbor GWMA, contingent upon the availability of adequate funding. One of the proposed special monitoring efforts addresses the coastal zone of the Gig Harbor GWMA. Monitoring activities that are recommended for the coastal zone include

- Identifying existing public water supply production wells or installing dedicated monitoring wells in five coastal areas with either high development levels or aquifer conditions that suggest a high risk of seawater intrusion

- Designating three wells in each of the five areas for monitoring

- Performing aquifer tests on wells in at least three of the areas

- Conducting short term, intensive aquifer tests in all areas to determine tidal influence

- Monitoring all wells on a semiannual (two times per year) basis for coliform bacteria, pH, conductance, chloride, and sulfate

These monitoring activities, in conjunction with the regional or subregional aquifer evaluation efforts recommended in the Aquifer Capacity Management Issue Paper, will be effective in determining the risk of seawater intrusion in various coastal areas. Assessment of that risk will assist Pierce County in determining the appropriate level of sustainable growth and development in various portions of the Gig Harbor GWMA. Thus, the monitoring and aquifer evaluation activities could prove to be a critical factor in comprehensive land use planning efforts being undertaken pursuant to State Growth Management Act.

The monitoring and aquifer evaluation activities will provide Ecology with information necessary to facilitate development of a basin-wide approach to management of risks associated with seawater intrusion. A broad range of resource management options is available to Ecology under RCW 90.44, 90.48, and 90.54. The monitoring program will also be effective in providing early warning of seawater intrusion problems so that remedial measures can be undertaken to limit possible adverse impacts on public water supply wells.

Costs associated with the coastal zone monitoring and aquifer evaluation program can only be roughly estimated at this time. However, it is apparent that those costs will clearly exceed the existing resources available to the

TPCHD, the Regional Water Association, and public water purveyors in the Gig Harbor GWMA. Current projections for the coastal zone monitoring are $540,000 in initial capital expenditures (mostly related to construction of monitoring wells) and $100,000 per year in operation and maintenance. Costs for the aquifer evaluation program will approach $1,000,000 for the entire Gig Harbor GWMA, or about $200,000 for each of the five subregions.

The only potentially viable source of funding for these programs appears to be voter approval of an Aquifer Protection Area ballot issue as allowed under RCW 36.36. If such a ballot issue is approved by a simple majority of voters, Pierce County can assess a ground water user fee on each household unit within the boundaries of the Aquifer Protection Area. Revenues generated by the user fees would be available to fund ground water protection and management efforts, including seawater intrusion monitoring and control programs.

Alternative 4. Under this alternative, Ecology will be requested to designate the coastal zone or portions of the coastal zone of the Gig Harbor GWMA as an SPA under WAC 173-200 (Washington Ground Water Quality Standards). Justification for the SPA designation will be based on the existence of apparent seawater intrusion problems in specific local areas and the presence, on a more regional basis, of conditions that are conducive to seawater intrusion.

The purpose of the designation is to reinforce Ecology policies concerning limiting the potential for seawater intrusion associated with the construction and operation of permitted wells, particularly relatively high-yield wells. The SPA designation is also intended to facilitate the implementation by Ecology of requirements that water level monitoring and production metering, as well as semiannual monitoring for chloride and conductance, be required of all permitted wells (new and existing) within the SPA. Water level and water quality data obtained under the SPA requirements would be utilized by the TPCHD in observing the effectiveness of land and water use controls in preventing seawater intrusion.

It is recognized that within an SPA Ecology has substantial latitude in giving unique consideration to land and water use activities that may adversely impact ground water.

Unique consideration by Ecology may include

- Establishing unusually restrictive requirements governing Ecology-regulated land and water use activities

- Recommending the establishment of unusually restrictive requirements governing land and water use activities regulated by other state agencies that have entered into a memorandum understanding with Ecology concerning the enforcement of WAC 173-200

- Incorporating specific SPA provisions into departmental water quality and quantity guidelines and policies

- Prioritizing Ecology resources for ground water protection and enforcement actions

It is the intent of this alternative that Ecology limit its unique consideration of land and water use activities within the Gig Harbor Peninsula SPA to those activities that are specifically and directly related to seawater intrusion. That intent will be reevaluated by the GWAC at such time that Ecology has sufficiently developed policies regarding SPA designations to allow a more thorough determination of the long-term ramifications of such a designation.

This alternative could have significant land and water use impacts. Restricting the development of relatively high yield water supply wells in coastal areas may increase the cost of water service in those areas due to the need for longer transmission lines to bring water from inland wells. Greater demand for water from inland wells will result in a greater need for coordinated ground water resource planning and management in the inland areas.

Alternative 5. Alternatives 2, 3, and 4 presented above are not mutually exclusive, that is, selection of one alternative does not necessarily preclude selection of another.

2.3.3 Preferred Alternative

The GWAC recommends implementing a combination of Alternatives 2 and 3 as the Seawater Intrusion Program for the Gig Harbor GWMA. Alternatives 2 and 3 involve the following elements:

- Tacoma-Pierce County Board of Health adoption of the TPCHD draft Seawater Intrusion Policy intended to control the placement

and construction of wells in coastal areas that are exempt from water right (appropriation permit) requirements under state law

- Implementation of the coastal zone monitoring program and aquifer evaluation program intended to provide information necessary to assess the potential for seawater intrusion in various portions of the Gig Harbor GWMA, to evaluate the need for specific types of land use development restrictions, to assist area purveyors in coordinated resource planning and management efforts, and to facilitate Ecology efforts to implement a basin-wide approach to management of risks associated with seawater intrusion

2.3.4 Rationale

To minimize the potential for seawater intrusion, development of the near sea-level and below sea-level ground water resources of the Gig Harbor GWMA must be carefully planned and coordinated. This includes controlling the location and construction of wells that are not subject to appropriation permit requirements under state law and ensuring that future development is compatible with the water resource capacity of the Gig Harbor GWMA. Alternatives 2 and 3 are consistent with those objectives.

The SPA designation for the coastal zone of the Gig Harbor GWMA proposed in Alternative 4 was tabled by the GWAC but will be reconsidered during the first periodic update of the Gig Harbor GWMA. The decision to defer action on the SPA designation was prompted by the following:

- The absence of sufficient written Ecology policies concerning SPA designation to allow the long-term ramifications of the SPA designation on land and water use activities to be evaluated

- Uncertainty over whether Ecology possesses sufficient resources to implement water level monitoring, production metering, and chloride and conductance monitoring requirements for all permitted wells within the SPA

Based on Ecology's negative reaction to certain Preferred Alternatives of the Clover/Chambers Creek Basin Ground Water Management Program (GWMA) involving suggestions that Ecology undertake some specific action in response to the GWMA, the Gig Harbor GWAC is concerned that, in the absence of adequate resources, Ecology may consider a request for providing local assistance to be an issue of program certification nonconcurrence.

2.3.5 Implementation Plan

Implementation Actions.

Action (Responsible Party)	Target Date
Submit Draft Seawater Intrusion Policy to Tacoma Pierce County Board of Health and request approval (TPCHD/GWAC)	December 1991
Prepare plan and budget for coastal zone monitoring/aquifer evaluation program (TPCHD, DOH, GWAC)	180 days after certification
Request Pierce County Council to place Aquifer Protection Area Measure on ballot (GWAC)	1 year after certification

Funding Plan. The preferred alternative consists of two primary components: a program to regulate wells constructed within the coastal zone that are exempt from Ecology appropriation permit requirements and a coastal zone monitoring/aquifer evaluation program. Funding for the regulatory program will be generated from fees collected by TPCHD for well-site and development review.

Adequate funding for the coastal zone monitoring/aquifer evaluation program will be significantly more difficult to obtain. If the complete program described in the evaluation of Alternative 3 is implemented, a new, ongoing, substantial source of direct funding will need to be identified. At present, formation of an Aquifer Protection Area appears to represent the only viable source of such funding. The GWAC will pursue sponsorship of an Aquifer Protection Area (APA) ballot issue. To provide supporting information for the ballot issue TPCHD, with assistance from purveyors, the GWAC, and appropriate state and local agencies, will develop a program plan and budget for the coastal zone monitoring/aquifer evaluation program.

Current projections for the coastal zone monitoring are $540,000 in initial capital expenditures (mostly related to construction of monitoring wells) and $100,000 per year in operation and maintenance. Costs for the aquifer evaluation program will approach $1,000,000 for the entire Gig Harbor GWMA or about $200,000 for each of the five subregions.

For purposes of comparison, a program plan will also be developed describing the maximum level of coastal zone monitoring and aquifer evaluation that can be implemented with existing local resources matched by a Centennial Clean Water Fund implementation grant.

2.4 References

Dion, N.P. and Sumioka, S.S., *Seawater Intrusion into Coastal Aquifers in Washington, 1978*, Department of Ecology, 1984.

Drost, B. W., *Water Resources of the Gig Harbor Peninsula and Adjacent Areas, Washington*, U.S. Geological Survey, Water-Resources Open-File Report 81-1021, 1982.

Department of Ecology (Ecology), *Draft Seawater Intrusion Policy*, November 30, 1990.

Department of Ecology (Ecology), *Interim Criteria for Determining Water Availability for New Buildings*, 1990.

Department of Ecology (Ecology), *Seawater Intrusion Team, Proposed Plan*, April 1990.

EMCON Northwest, Inc., May, 1992. Gig Harbor Peninsula Ground Water Management Program Task 5 Hydrogeologic Evaluation Report with Robinson and Noble, Inc. prepared for Tacoma-Pierce County Health Department.

Harp, Brad, Personal Communication, Tacoma-Pierce County Health Department, October 1991.

Shipman, Hugh, "Vertical Land Movement in Coastal Washington", *Washington Geologic Newsletter*, Vol. 18, No. 1, 1990.

Sinclair, Kirk, Personal Communication, Department of Ecology, Southwest Regional Office, June 1990.

Walsh, Brian, Memo to Elizabeth Phinney concerning Draft Gig Harbor GWMA Issue Paper, Department of Ecology, December 20, 1990.

Walters, Kenneth, L., *Reconnaissance of Sea-Water Intrusion Along Coastal Washington, 1966-1968*, Department of Ecology in Cooperation with United States Geological Survey Water Resources Division, 1971.

2.5 Laws and Regulations

Chapter RCW 36.70A, Growth Management Act, Substitute House Bill 2929, Chapter 17, Laws of 1990.

Chapter 90.03 RCW, Water Code -- 1917.

Chapter 90.44 RCW, Regulation of Public Ground Waters.

Chapter 90.54 RCW, Water Resources Act of 1971.

WAC 173-100, Ground Water Management Areas and Programs.

WAC 173-200, Water Quality Standards for Ground Waters of the State of Washington.

3 LONG TERM MONITORING ISSUE PAPER

3.1 Problem Statement

The approximately 32,000 residents of the Gig Harbor GWMA are solely reliant on underlying ground water for their drinking water supplies. Since demand for water within the Gig Harbor GWMA is expected to increase significantly in the coming decades, actions must be taken now to implement management strategies to sustain the viability of this important resource.

Successful management of the ground water resources of the Gig Harbor GWMA will be partially dependant upon the maintenance of an effective water quality and quantity monitoring program. On-going collection and analysis of ground water data is necessary to detect significant changes in the quality of water or in water levels. Early detection of water quality or quantity problems allows those problems to be addressed at an incipient stage when they are generally easier and less costly to correct.

Currently, there is no comprehensive water level monitoring program in effect within the Gig Harbor GWMA, however, a few well operators conduct such monitoring independently. Ground water quality monitoring efforts are limited to routine testing of public water system wells as required under state and federal regulations.

3.2 Existing Programs

3.2.1 Water Quality Monitoring

There is no coordinated, regional water quality monitoring program operating within the Gig Harbor GWMA. The best available source of ground water quality data is the monitoring conducted by the various public water supply systems within the Gig Harbor GWMA. Such monitoring is required under Washington Department of Health (DOH) and Tacoma-Pierce County Health Department (TPCHD) regulations. DOH and TPCHD

divide public water supply systems into two classes: larger systems, known as Group A systems, and smaller systems, known as Group B systems. Group A systems are those serving 15 or more permanent service connections or 25 or more people per day for 60 or more days per year. Group B systems are those serving less than 15 permanent service connections and less than 25 people for 60 days or more per year or less than 15 permanent service connections and any number of people for less than 60 days per year.

Pursuant to the requirements of WAC 246-290, the *State Board of Health Drinking Water Regulations*, public water systems must be monitored for bacteria, inorganic chemicals, corrosivity, pesticides, radionuclides, trihalomethanes, and selected volatile organic compounds. The required frequency of bacteriological monitoring is variable depending upon the size of the population served. A typical Group A system in the Gig Harbor GWMA is required to sample once per month while a typical Group B must sample once every 12 months. Bacteriological monitoring is conducted at some point in the distribution system. Thus, it is not clear whether positive samples are indicative of contamination of the source or a problem in the distribution system.

Group A. Group A systems must test for inorganic chemicals on a three year basis at a point nearest each source. Among the monitored inorganic chemicals are arsenic, barium, cadmium, chromium, lead, mercury, nitrate, selenium, silver, fluoride, and sodium. These parameters are known as the Primary Chemical Contaminants of drinking water. National maximum contaminant levels (MCLs) have been promulgated for these chemicals based on public health considerations. Another group of inorganic compounds, known as the Secondary Chemical Contaminants, is also monitored in drinking water on a three year cycle. The Secondary Chemical Contaminants include chloride, copper, iron, manganese, sulfate, and specific conductance. MCLs have been developed for these parameters as well, however, those MCLs are based primarily on aesthetic considerations.

Group B. Monitoring of Group B systems also provides information concerning inorganic chemicals. However, testing of Group B systems is much less extensive than that for Group A system wells. For example, unless the initial test for Primary and Secondary Chemical Contaminants demonstrates a contamination problem, requirements for Group B systems can be reduced to sampling only for nitrate every 36 months.

Safe Drinking Water Act. As a result of the 1986 amendments to the federal Safe Drinking Water Act and recent rule making efforts by the Environmental Protection Agency (EPA), DOH is in the process of modifying their public water system monitoring requirements. According to a DOH spokesman (James, 1990), the new monitoring requirements will add between 57 and 59 organic chemicals, volatile organic chemicals, and synthetic organic chemicals to the list of parameters that are currently monitored by Group A public water systems. Under the new requirements, drinking water will, for the first time, be routinely monitored for such hazardous compounds such as trichloroethylene, tetrachloroethylene, and vinyl chloride. Initially, Group A public water systems will test each water supply well once per quarter for four quarters. Group A public water systems with more than 500 service connections will then be required to test for the 57 to 59 new parameters once every three years. Group A public water systems with between 15 and 500 connections will conduct the test on a five year cycle.

SOC Rules. Further modification of the DOH regulations are expected since EPA is in the process of finalizing their proposed Inorganic Chemical (IOC) and Synthetic Organic Chemical (SOC) Rules (ibid). The IOC Rules are expected to tighten MCLs for a number of inorganic contaminants and to add a number of inorganic parameters to those that must be routinely monitored by Group A public water systems.

The SOC Rules will add more synthetic organic chemicals, more pesticides, and PCBs to the list of chemicals required for monitoring. However, monitoring dictated under the SOC Rules will apply only to "vulnerable" wells of Group A public water systems. An operational definition for "vulnerable" has yet to be developed. However, DOH believes that it will be defined based on geologic conditions, land use around a well, and population served by the well (ibid).

Modifications. Monitoring requirements for Group B public water systems are much less stringent. Group B public water systems are required to conduct an initial test for coliform bacteria and the Primary and Secondary Chemical Contaminants. After the initial tests, Group B public water systems are required to monitor only coliform bacteria and nitrates on a three year cycle.

Existing Group B public water systems will be exempt from the new requirements for monitoring 57 to 59 organic chemicals, volatile organic chemicals, and synthetic organic chemicals. However, Group B systems constructed after implementation of the new requirements will be required to initially sample for these contaminants. Follow-up sampling will probably

be limited to those wells that initially test positive for one or more of the contaminants. No determination has been made regarding the impact of the proposed IOC and SOC Rules on Group B public water systems.

Although public water supply monitoring requirements are being greatly expanded, the ground water monitoring programs that are or will be required under state and federal regulations do not constitute an integrated, basin-wide ground water monitoring program. They are effective in ensuring that drinking water supplied by larger water purveyors is safe for human consumption. However, they do not provide an accurate representation of long-term, basin-wide water quality trends; trends that are helpful in assessing the overall purity of the aquifer system.

Additionally, it may be argued that identifying contamination after it has reached a major public water supply well means that the contamination has been identified too late to prevent serious and very costly problems.

3.2.2 Water Quantity Monitoring

Past efforts to perform on-going water quantity monitoring in the GWMA have been virtually nonexistent. Through a voluntary endeavor undertaken as part of the Gig Harbor Ground Water Management Program (GWMP), water level monitoring is now being conducted on several of the larger public systems within the GWMA. However, participation in this effort is limited to only about 10 purveyors. A more extensive on-going monitoring program is needed to enable detection of local and regional declines in ground water levels brought about by over-withdrawals or reduced recharge.

3.3 Issue Statement: Water Supply Database

Proper management of the ground water resources of the Gig Harbor GWMA will be at least partially dependant upon the maintenance of an effective water quality and quantity monitoring program. Water quality is monitored by public water supply systems, however, that monitoring is not part of an integrated regional system. Further, public water system monitoring occurs at the production well or at some point within the distribution system. Because, of the lack of a dedicated monitoring well system, contamination is not observed until it reaches the public water supply. In addition, well production and water levels are being measured by only a few public water systems.

3.3.1 Alternatives

Alternative 1. Take No action.

Alternative 2. Develop a long-term, regional monitoring program utilizing a select group of existing public water supply production wells located in various portions of the Gig Harbor GWMA. All available data from routine tests conducted on public water system wells will also be utilized in the program.

Alternative 3. In addition to the monitoring program identified in Alternative 2, implement a special purpose monitoring program targeting specific areas and aquifer zones where the likelihood of potential water quality and quantity problems is greatest.

3.3.2 Evaluation of Alternatives

Alternative 1. Selection of the no action alternative will result in the continued absence of an adequate system to detect long term trends in ground water quality and quantity within the Gig Harbor GWMA. The lack of vital information concerning such trends contributes to an unnecessary risk of ground water contamination and aquifer over-use. In addition, without adequate feedback mechanisms such as reliable ground water quality data, it will be difficult to assess the overall effectiveness of the Gig Harbor GWMP once it is implemented.

Alternative 2. Under this alternative, monitoring wells would be selected from among existing public water supply production wells in the four general hydrogeologic regions of the Gig Harbor GWMA.

Those hydrogeologic regions are as follows:

- Central peninsula, bounded by McCormick Creek on the North, North Creek on the east, Artondale Creek on the west, and the Tacoma Narrows on the south

- Northern peninsula, the area north of the Central Peninsula region extending to the Kitsap County line (for monitoring purposes, this region includes the Crescent Creek drainage basin)

- Southern peninsula, the area south and west of Artondale Creek draining to Hales Passage and the southern end of Henderson Bay

- Fox Island

Monitoring efforts in each of the hydrogeologic regions would be variable based on the nature of potential or actual ground water quality or quantity problems.

Where possible, water quality and quantity trends in each of the Gig Harbor GWMA's three principal aquifer zones would be observed through the monitoring program. These zones include:

- The shallow "Upper" aquifer (historically referred to as the Colvos Sands aquifer)

- The intermediate "Sea Level" aquifer (historically referred to as the Salmon Springs aquifer)

- The "Deep" aquifer (historically referred to as the Pre-Salmon Springs aquifer)

Water Level Monitoring. Water levels in approximately 40 existing public water supply wells will be monitored on a bimonthly (every two months) basis. The process of selecting the 40 wells would be guided by the necessity of providing a characterization of conditions in each of the various hydrogeologic regions and aquifer zones of the Gig Harbor GWMA. The approximate distribution of wells by hydrogeologic region and aquifer zones would be as follows:

- Northern peninsula - 4 wells will be selected in each of the Upper and Sea Level aquifers.

- Central peninsula - 6 wells will be selected in the upper aquifer, 8 wells in the Sea Level aquifer, and at least two in the Deep aquifer.

- Southern peninsula - 3 wells will be selected in each of the Upper and Sea Level aquifers with two additional wells located in the Horseshoe Bay area.

- Fox Island - 3 wells will be selected in both the Upper and Sea level aquifers.

In addition, 3 to 5 wells will be chosen to supplement the data generated from the 40 wells. These supplementary wells will provide nearby control points or will address areas of special concern such as Raft Island or areas in the immediate vicinity of existing high quantity production wells.

Water Quality Monitoring. The Tacoma-Pierce County Health Department will obtain equipment necessary to allow monitoring of pH and conductivity in the 40 wells on a routine basis in conjunction with the bi-monthly water level measurements. This data, in combination with information obtained through routine public water system monitoring described in the Existing Programs section above, will be used by TPCHD, other state and local agencies, and public water systems to assess trends in water quality in each of the Gig Harbor GWMA aquifers.

Funding. Annual costs for implementation of this alternative would be in the range of $14,000 and $26,000. Funding for this program would be provided by a combination of the existing resources of the TPCHD, the GWAC, and participating public water systems. In addition, a Centennial Clean Water Fund (CCWF) Grant would be needed to fund the development and implementation of a formal monitoring program as well as equipment procurement.

Alternative 3. Contingent upon the availability of funding, additional wells would be monitored in areas with either known water quality problems or a relatively high potential for ground water quality problems. This special purpose monitoring would help to establish the need for remedial measures or for more restrictive land use controls to assure proper management of ground water resources.

These areas, listed in order of descending priority, and the special purpose monitoring activities proposed for each area are listed as follows:

- Horsehead Bay area - Problems: documented seawater intrusion

  Monitoring activities:

  - select at least 10 existing public water supply wells for monitoring
  - install 2 to 4 dedicated monitoring wells
  - monitor water levels in all wells on a bi-monthly basis for a minimum of 3 years
  - conduct short term, intensive pump tests on several wells to determine tidal influence and determine aquifer characteristics
  - evaluate public water supply well pumping rates
  - monitor up to 10 wells for pH, nitrate, conductance, and chlorides for a minimum of 3 years

- State Route 16 corridor, Narrows Bridge to Kitsap County - Potential problems: transportation spills and urban nonpoint contamination

  Monitoring Activities:

  - identify at least 20 existing public water supply wells for monitoring
  - install 3 to 8 monitoring wells in areas that are vulnerable to contamination
  - conduct pump tests on 1 or 2 wells in the Upper aquifer zone
  - monitor water levels in all wells on a bimonthly basis for at least 3 years

- install and monitor at least one precipitation station

- test at least 10 wells for chloride, nitrate, ph, conductivity, sulfates, TDS (total dissolved solids), TOX (total organic halogens), and BTEX (benzene, toluene, ethylbenzene, xylenes) or TPH (total petroleum hydrocarbons) for a period of not less than three years

- The coastal zone of the entire Gig Harbor GWMA, within 400 feet of the littoral zone - Potential problems: seawater intrusion

  Monitoring activities:

  - identify existing public water supply production wells or install dedicated monitoring wells in 5 coastal areas with either high development levels or aquifer conditions which suggest a high risk of seawater intrusion

  - designate 3 wells in each of the 5 areas for monitoring

  - perform aquifer tests on wells in at least 3 of the areas

  - conduct short term, intensive aquifer tests in all areas to determine tidal influence

  - monitor all wells on a semiannual (two times per year) basis for coliform bacteria, pH, conductance, chloride, and sulfate

- Gig Harbor uplands/Sea Level Aquifer - Potential problems: transportation spills and urban nonpoint contamination

  Monitoring Activities:

  - identify 16 to 20 existing public water supply wells that are suitable for monitoring

  - install 2 to 5 dedicated monitoring wells at sites where existing hydrogeologic data is absent or inadequate

  - monitor water levels in all wells on a bi-monthly basis for at least 3 years

  - evaluate production rates of all Group A public water systems wells

- perform aquifer tests in areas where monitoring of both the Upper and Sea Level aquifer zones can be conducted

- monitor up to 10 wells on a bimonthly basis for chloride, nitrate, pH, and conductance

- Purdy area - Potential problems: Inactive landfill and institutional sized on-site sewage systems

  Monitoring Activities:

  - identify all existing wells in the area

  - install 1 to 3 dedicated monitoring wells in each of the upper 2 aquifer zones

  - conduct water level monitoring on 3 to 6 wells in each of the 3 aquifer zones on a bimonthly basis for a period of at least 3 years

  - evaluate pumping rates of all public water supply wells

  - monitor the dedicated monitoring wells for conductance, pH, nitrate, sulfate, chloride, manganese, and iron

- Fox Island - Potential Problem: Inactive landfill

  - construct one dedicated monitoring well upgradient from the Fox Island Landfill and two dedicated monitoring wells downgradient from the landfill

  - monitor the dedicated monitoring wells on a quarterly basis for at least 5 quarters for conductance, pH, nitrate, sulfate, chloride, manganese, and iron

Funding. Specific cost estimates for the special purpose elements of the monitoring program have not been developed. However, preliminary estimates indicate that capital costs will range between $250,000 and $1,000,000 while annual operation and maintenance cost will likely be about $100,000. It is clear that costs of this magnitude would far exceed the existing resources of the TPCHD, the Pierce County RWA, and public water system operators. A CCWF could provide partial funding on a short-term (one to two year) basis but would probably not provide support for ongoing operation of the monitoring program.

The only viable source of ongoing funding for a special purpose monitoring program appears to be creation of an Aquifer Protection Area (APA) as enabled by RCW 36.36. If an APA ballot issue is approved by a simple majority of voters, Pierce County can assess a ground water user fee on each household unit within the boundaries of the APA. Revenues generated by the user fees would be available to fund ground water protection and management efforts, including water quality and quantity monitoring programs.

3.3.3 Preferred Alternative

Develop a long-term, regional monitoring program utilizing a select group of existing public water supply production wells located in various portions of the Gig Harbor GWMA. All available data from routine testing of public water system wells will be utilized in the program.

In addition, seek a viable source funding for the implementation of a special purpose monitoring program intended to target specific areas and aquifer zones where the likelihood of potential water quality and quantity problems appears to be highest.

3.3.4 Rationale

The Preferred Alternative represents a combination of Alternatives 2 and 3. Alternative 2 represents the highest level of effort that can conceivably be achieved through use of the existing, available resources of the TPCHD, the GWAC, and participating public water systems. While it is very possible that even this level of effort may not be financially sustainable on a protracted basis, it is nevertheless, a reasonable target.

The GWAC recognizes that Alternative 3, while vastly exceeding local resource capabilities, is far superior to Alternative 2 in its ability to provide monitoring data necessary to support efficacious ground water resource management. Thus, while implementing the reasonably affordable Alternative 2 program, the GWAC will continue to strive towards developing the funding necessary to implement the special purpose monitoring program envisioned under Alternative 3.

3.3.5 Implementation Plan

Implementation Actions.

Action (Responsible Party)	Target Date
Prepare monitoring plan and CCWF grant application for Regional Monitoring Program (Alternative 2) (TPCHD, GWAC)	180 days after certification of Program by Ecology
Develop plan and budget for Special Purpose Monitoring Program (Alternative 3) (GWAC)	330 days after certification of Program by Ecology
Request Pierce County Council to place Aquifer Protection Area measure on ballot (GWAC)	1 year after certification

Funding Plan. Annual costs for implementation of the ongoing monitoring program described in the evaluation of Alternative 2 would be in the range of $14,000 and $26,000. Funding for this program would be provided by a combination of the existing resources of the TPCHD, the GWAC, and participating public water systems. In addition, a CCWF grant would be needed to fund the development and implementation of the monitoring program, including establishing sufficient background data and procuring necessary equipment. Because local resources are so limited, implementation of this program will be feasible only if the local grant match requirement is reduced to 25 percent (75 percent state - 25 percent local).

As described in the evaluation of Alternative 3, preliminary estimates of costs associated with the proposed special purpose monitoring program range between $250,000 and $1,000,000 in up-front capital expenditures and about $100,000 in annual operation and maintenance. After more precise cost estimates have been developed, costs for the special purpose monitoring program will be combined with those associated with other unfunded activities of the Gig Harbor GWMP to determine the total amount of funding that will need to generated through an APA. Should total funding result in an unrealistically high household user fee, GWMP activities will need to be scaled down to an economically feasible level.

3.4 References

Culp, Gorden L.; "New Drinking Water Rules Will Affect Consultants, Municipalities and Utilities, *The Safe Drinking Water Act Amendments of 1986*, Seminar Document, CWC-HDR, May 1988.

EMCON Northwest, Inc., May, 1992. Gig Harbor Peninsula Ground Water Management Program Task 5 Hydrogeologic Evaluation Report with Robinson and Noble, Inc. prepared for Tacoma-Pierce County Health Department.

James, Robert; Personal Communication, Washington State Department of Health, Seattle, May 1990.

Marek, Steve; Personal Communication, Tacoma-Pierce County Health Department, June 1990.

Thompson, John C.; "Updating the Safe Drinking Water Act and the Drinking Water Regulations" *Water Engineering and Management*, Vol. 133 No.8, August 1986.

3.5 Laws and Regulations

State Board of Health Drinking Water Regulations (WAC 246-290), Revised April 1991.

4 WELL CONSTRUCTION AND ABANDONMENT ISSUE PAPER

4.1 Problem Statement

Although not actually a source of contamination, the methods used to construct a water well can have a significant impact on water quality. For instance, unless a well is sealed properly, the casing can act as a conduit for pollutants originating at the ground surface to travel to an underlying aquifer.

Additionally, if a well penetrates more than one aquifer unit, water from the various units can mix. If the water of one aquifer unit is contaminated, it can introduce pollutants to other aquifer units. Adequate well design and construction standards must be enforced to prevent water quality problems of this nature.

The TPCHD estimates that roughly 3,000 water wells already have been drilled in the Gig Harbor GWMA. As many as a third of these wells may no longer be in use or may be abandoned in the near future due the growth of centralized public water systems in the Gig Harbor GWMA. Many of these wells were drilled prior to the introduction of well construction standards and are not equipped with adequate sanitary seals. Thus, they will continue to provide an opportunity for land surface contaminants to migrate to ground water.

4.2 Existing Programs

Ecology currently regulates well construction and abandonment practices. Ecology's primary enforcement tools are the Well Construction Act of 1971 (RCW 18.04) and the Minimum Standards for Construction and Maintenance of Water Wells (WAC 173-160). Properly enforced, the state's well construction and abandonment requirements are sufficiently stringent to prevent ground water contamination problems. However, in recent years, concerns have arisen over the effectiveness of Ecology's well construction

and abandonment program in light of persistent problems with inadequate levels staffing and funding to properly administer the program.

Currently, direct local involvement in Ecology's well construction and abandonment program is minimal and no independent local program exists. Since 1985 TPCHD has been attempting to gain Ecology cooperation in creating a joint well construction and abandonment program. Ecology has declined participation because existing state laws do not provide explicit authority for the department to enter into interagency agreements with local entities to carry out well construction and abandonment programs.

In support of TPCHD's efforts, the Pierce County Council appropriated funding for a pilot wel construction and abandonment program for the Gig Harbor GWMA. The pilot program was intended to demonstrate the benefits of joint Ecology and TPCHD participation and to provide the underpinnings for what potentially could be expanded into a countywide well construction and abandonment program. Protocols developed under that effort were submitted to Ecology in a report entitled *Well Construction and Abandonment Pilot Program for Gig Harbor* (TPCHD, 1991).

Ecology held action concerning the report in abeyance until the 1991 state legislature acted on a bill that would have provided the authority Ecology believes is necessary to enable the development of cooperative well construction and abandonment programs with local governments. However, the bill, House Bill (HB) 1440 (Companion Senate Bill 5306), failed to pass the House of Representatives. As a result, Ecology rejected the pilot program report, effectively halting progress towards a joint Ecology/TPCHD well construction and abandonment program.

Ecology has indicated the former HB 1440 will not be included in the department's 1992 legislative package, but Ecology will support the bill should it be promoted by some other agency or organization.

4.3 Issue Statement: Well Construction and Abandonment

Poorly constructed or improperly abandoned wells can become conduits for pollutants to enter ground water. A program exists at the state level to regulate well construction and abandonment, however the resources of that program are limited. A mechanism should be found to augment the existing state program with local resources to allow more careful scrutiny of well construction practices and to help ensure safe abandonment of unused wells.

4.3.1 Alternatives

Alternative 1. Take No action.

Alternative 2. Seek development of a permanent, countywide, joint well construction and abandonment program involving the combined resources of the TPCHD and Ecology. Should Ecology continue to maintain that authority is lacking under existing statutes to allow the department to enter into cooperative agreements with local entities, and should the state legislature fail to satisfactorily resolve this issue, TPCHD should pursue development of an independent program through the Pierce County Council and the Tacoma-Pierce County Board of Health.

4.3.2 Evaluation of Alternatives

Alternative 1. While the no action alternative would initially be the least costly alternative, in the long run it may be the most costly from the perspective of future ground water contamination problems resulting from improperly constructed or abandoned wells. Ecology has implemented measures to reinforce its well construction and abandonment program by adding one inspector dedicated to that program in the Southwest Regional Office and by initiating a "start card" notification system. However, even with those improvements it is questionable whether Ecology can provide the daily presence in Pierce County necessary to ensure an adequate level of surveillance and enforcement.

The lack of a highly visible surveillance and enforcement program creates an environment that provides financial incentives for irresponsible well drillers to lower their costs by eliminating legally required and technically essential construction elements, such as an adequate sanitary seal. Responsible well drillers can be placed at a competitive disadvantage when bidding for well construction contracts if their bid is based on meeting the state regulations and a competitor's is not.

Additionally, the need for accurate information concerning well locations, well depth, and hydrostratigraphy will become increasingly important with rising concerns over ground water quality and quantity.

Alternative 2. Development of a joint state and local program appears to be the most reasonable approach to solving problems associated with improper well construction and abandonment. Such a program would result in the pooling and efficient allocation of the resources of Ecology and TPCHD.

Under the program that has been proposed by the TPCHD, local personnel will undertake responsibility for routine surveillance and monitoring leaving Ecology personnel free to deal with serious emergent problems. Enforcement responsibilities will be shared by Ecology and the TPCHD.

Potential problems associated with conflicting regulations will be avoided by requesting the Pierce County Council to adopt the state codes, WAC 173-160 and RCW 18.104, by reference. Thus, TPCHD personnel will be enforcing the same construction and abandonment standards as Ecology personnel.

With Ecology's existing program, drillers are required to notify Ecology 72 hours prior to commencing construction of a well by submitting what is known as a "start card." Under the proposed joint state and local program, start cards will be the triggering mechanism for agency involvement.

Should construction of a well at the location indicated on a start card suggest a problem (for instance, if the well is to be drilled in an area of known ground water contamination), the driller can be notified before significant construction costs are incurred. Otherwise the driller can proceed with construction of the well. Normally at least one inspection will be scheduled for each new well at some time during construction.

The well abandonment portion of the joint program may involve participation of a number of county agencies. By requiring the identification of nearby wells on building, septic tank, and other permit applications, a substantial number of wells could be identified. In addition, a reporting system will be developed involving the large number of county agency personnel who are in the field every working day. County personnel can report to TPCHD the location of any wells they encounter that appear to be no longer in use.

Local involvement in a well construction and abandonment program will require new sources of financial support. Development of procedures for a countywide program and driller notification of those procedures will be accomplished through a Centennial Clean Water Act Second Phase Planning Grant.

Once implemented, program operating expenses will be offset by fees placed on the start card. A well abandonment permit fee will also be established. Fees for the abandonment permit will be payable when a licensed driller submits certification that a well has been abandoned according to proper procedures.

TPCHD estimates that the fees for start cards and abandonment permits will both be about $100.

4.3.3 Preferred Alternative

The TPCHD should continue to seek development of a permanent, countywide joint well construction and abandonment program involving the combined resources of the DOH and Ecology. Should Ecology continue to maintain that authority is lacking under existing statutes to allow the department to enter into cooperative agreements with local entities, and should the state legislature fail to satisfactorily resolve this issue, TPCHD should pursue development of an independent program through the Pierce County Council and the Tacoma-Pierce County Board of Health.

4.3.4 Rationale

The Gig Harbor GWAC fully supports efforts by the Tacoma-Pierce County to develop a joint well construction and abandonment program with Ecology. Such efforts are consistent with the intent and spirit of WAC 173-100, which promotes the forging of partnerships between state and local interests in cooperatively protecting the state's ground water resources.

The GWAC views implementation of an effective well construction and abandonment program to be such a critical element in the Gig Harbor GWMA that, should the state of Washington fail to undertake actions necessary to facilitate implementation of a cooperative DOH-Ecology program, unilateral action by Pierce County may be warranted.

4.3.5 Implementation Plan

Implementation Actions.

Action (Responsible Party)	Target Date
Prepare letter to Ecology urging a renewed commitment to facilitating state/local well construction and abandonment programs (GWAC)	Immediately after completion of SEPA process
Prepare letter to Governor's Office and Pierce County's contingent to the Washington state legislature urging actions to facilitate state and local programs (GWAC)	Immediately after completion of SEPA process

Funding Plan. Implementation of either a joint TPCHD-Ecology program or an independent TPCHD program will require establishment of well construction and abandonment fees. TPCHD currently estimates that fees for both well construction and abandonment permits would be approximately $100.

4.4 References

Tacoma-Pierce County Health Department (TPCHD); *Clover/Chambers Creek Basin Geohydrologic Study*, Prepared by Brown & Caldwell and Sweet-Edwards/EMCON, July 1985.

Tacoma-Pierce County Health Department and the Clover/Chambers Creek Basin Ground Water Advisory Committee; *Clover/Chambers Creek Basin Ground Water Management Program*, Prepared by Brown & Caldwell, Sweet-Edwards/EMCON, and Adolfson Associates, 1990).

Tacoma-Pierce County Health Department; *Well Construction and Abandonment Pilot Program for Gig Harbor*, 1991.

4.5 Laws and Regulations

The Minimum Standards for Construction and Maintenance of Water Wells, WAC 173-160.

Well Construction Act of 1971, RCW 18.04.

5 HAZARDOUS MATERIALS: TRANSPORTATION SPILLS ISSUE PAPER

5.1 Problem Statement

5.1.1 State Route 16

Although few transportation-related spills of hazardous materials have occurred within the Gig Harbor GWMA, the potential for future transportation-related spills, especially as a result of vehicular accidents, is significant. Because railroad service is poorly developed, State Route (SR) 16 is the primary land transportation link between Tacoma and the Kitsap and Olympic Peninsulas. Many of the fuels and chemical products used in the communities of Bremerton, Port Angeles, and Port Townsend as well as the Bremerton Naval Shipyard and the Trident Submarine Base are transported via SR 16.

According to 1987 statistics compiled by the Washington Department of Transportation (WDOT) (Limotti, 1989), approximately 58,000 crossings of the Tacoma Narrows Bridge occur on average each day. Of this number, about 1,740 crossings are by single unit trucks and 1,160 are by truck combinations (tractor/trailer). Based on data collected by the U.S. Department of Transportation (U.S. DOT, 1985), about 290 of the 2,900 trucks that cross the Narrows Bridge on average each day are likely to be carrying hazardous materials, primarily petroleum products.

The WDOT does not maintain records of truck-related hazardous material spills or the percentage of accidents involving trucks transporting hazardous materials that result in spills. However, such records are compiled by the Oregon Department of Transportation for Oregon highways (ODOT, 1987). During 1987 there were 38 accidents in Oregon involving vehicles transporting hazardous materials, accounting for 2.3 percent of the total truck accidents during that year. Twenty-one percent of these accidents resulted in releases or spills of hazardous material.

Based on an analogy with Oregon statistics, it might be expected that roughly 0.5 percent of truck accidents on SR 16 have the potential for causing a hazardous materials release.

Assuming that each of the 2,900 trucks commuting daily on SR 16 travel a minimum of 10 miles, based on the state average for truck accidents of 1 every 600,000 miles (WUTC, 1987), it could be anticipated that an accident involving a truck carrying hazardous materials will occur every 210 days and that a hazardous material spill will occur every 900 days (2.5 years).

5.1.2 County - City Roads

In addition to SR 16, several local roads and streets within the Gig Harbor GWMA are utilized for chemical transport. For example, Soundview Drive, Burnham Drive, and Marine View Drive in the city of Gig Harbor are heavily used by single and double unit tanker trucks traveling to and from bulk fuel storage facilities.

Typically, the highest accident rates occur on signalized arterials with speeds between 30 and 40 mph (U.S. DOT, 1985). According to 1983 accident data compiled by the U.S. Department of Transportation, 46 percent of all urban large truck (both single and multi-axle) accidents occurred on roadways with speed limits between 30 and 40 mph. For single-axle trucks, the second highest accident category was roadways with posted speeds of 25 mph or less (32 percent). Roadways at various locations within the city of Gig Harbor fall into these speed limit categories.

Although firm estimates of truck traffic on county roads are not available, the total volume of traffic at a few major intersections has been recorded. An analysis of data collected in 1986 by the Pierce County Public Works Department indicates that roads serving the major interchanges of SR 16 receive extensive usage (Mitchell, 1989). For instance, over 10,000 vehicles traveled daily on Olympic Drive between Pt. Fosdick Drive and 56th St. NW. Based on studies of traffic patterns in a community with similar land use in King County, about 4 percent to 6 percent of those vehicles are likely to have been trucks, of which about 10 percent may have carried hazardous materials (Water District 105, 1987).

5.1.3 Future Traffic Projections

Traffic volumes on all roadways within the Gig Harbor GWMA are expected to increase in the future. WDOT estimates that by the year 2005, the number of daily trips on SR 16 between the Narrows Bridge and Olympic Drive will be about 100,000, approximately 70 percent above current levels. The Pierce County Public Works Department anticipates that daily vehicle trips on county roads in the GWMA will climb at a rate of at least 3 percent per year (Mitchell, 1989). This will result in approximately a 60 percent increase in traffic on county roads by the year 2005. Even if accident rates remain static, the increased volumes will result in significantly higher numbers of accidents. In all likelihood, greatly increased traffic congestion will result in higher accident rates as well.

5.2 Existing Programs

5.2.1 Hazardous Material Spill Response - Unincorporated Pierce County

The Pierce County Department of Emergency Management (DEM) is designated as the Hazardous Materials Incident Coordinating Agency for Pierce County under Pierce County Code 2.118.030. The Hazardous Materials Incident Coordinating Agency provides the planning, training, and support to first responders and other on-scene agencies to facilitate a concerted response to hazardous materials incidents. DEM maintains a Comprehensive Emergency Management Plan (CEMP) that establishes protocols for response to emergencies and disasters, including transportation-related hazardous material spills. The CEMP applies to all unincorporated areas of the Gig Harbor GWMA.

Under the CEMP, Pierce County Fire Protection District #5 is the Incident Command Agency for all transportation related spills that occur within the Gig Harbor GWMA, except those occurring on SR 16, for which the Washington State Patrol serves as the Incident Command Agency. A number of other state and local agencies participate in hazardous material spill response activities including the state Division of Emergency Management, Ecology, Pierce County Fire Prevention Bureau, and the Pierce County Sheriffs Department.

The fire dispatch center serving Fire Protection District #5 provides the point of contact for notification of hazardous materials incidents occurring within the Gig Harbor GWMA. The fire dispatch center is directly linked to the 911 system. When notified of a hazardous material spill, the fire

dispatch center attempts to obtain as much specific information about an incident as possible and notifies appropriate response agencies.

The initial response to a transportation-related release of hazardous materials involves taking actions to reduce the risk of acute public health and safety impacts (explosion, fire, etc.). This may involve road or highway closure, installing containment devices, and a variety of other activities. Once Fire Protection District #5 and other participating first responders have limited acute public health and safety risks, Ecology is responsible, under the state Model Taxes Control Act (MTCA), for ensuring that remedial actions are undertaken that prevent long-term impacts on public health and the environment. Ecology spill response personnel generally arrive at the scene of a hazardous material release within 1 to 2 hours after notification of an incident (Oberlander, 1990).

Although Ecology normally places the burden of cleanup on the party responsible for a spill, funding is available to Ecology through the MTCA program to undertake cleanup activities if the responsible party is unwilling or unable to do so in a timely manner. The decision as to whether Ecology will directly undertake cleanup actions is generally based on the likelihood that hazardous materials will enter environmental or public health exposure pathways such as sensitive areas (Puget Sound, wetlands, lakes, streams, etc.) and public water supplies. If reliance on remedial action by the responsible party would involve delays that would result in the release of hazardous materials to environmental and public health exposure pathways, Ecology would opt to undertake the cleanup through use of an on-call cleanup contractor. Ecology and TPCHD monitor cleanup activities and confirm the final disposition of recovered hazardous materials and contaminated environmental media.

5.2.2 Hazardous Material Spill Response - City of Gig Harbor

The city of Gig Harbor is not covered by a CEMP but is served by Fire Protection District #5 and the Pierce County fire dispatch center, which follow the procedures set forth in the Pierce County CEMP whether the release of hazardous materials occurs within the city of Gig Harbor or in unincorporated portions of the Gig Harbor GWMA. In addition, the response of Ecology and TPCHD to hazardous material releases is the same whether the release occurs within the city of Gig Harbor or in unincorporated areas.

5.2.3 Summary

In reviewing the hazardous material spill response program for the Gig Harbor GWMA with personnel from Pierce County DEM, Ecology, and TPCHD; consensus was reached that the existing program is capable of effectively addressing most risks to ground water associated with transportation-related spills of hazardous materials. However, a number of potential improvements were identified that could further reduce potential risks to not only ground water, but other environmental media as well. Those potential improvements are listed as follows.

Spill Reporting. While the hazardous material response program is effective in addressing spills that are reported, there is some question concerning whether all spills are actually being reported, particularly on relatively isolated rural roads. An ongoing effort is needed to inform trucking companies and truck drivers of spill reporting requirements and procedures.

Illegal Hazardous Waste Dumping. Since the spill program is a response program and not a surveillance program, the potential for illegal or "midnight" dumping of hazardous wastes exists. More comprehensive educational efforts are needed to provide public education concerning procedures to follow in the event that suspected illegal disposal activities are witnessed.

Agency Coordination. There is a need for continuing coordination between the initial spill response agencies and the agencies responsible for assuring actual cleanup and disposal of the spilled hazardous materials. Such coordination should help improve overall response capability and ensure that initial response measures that are undertaken to deal with acute public safety threats are consistent with the goals and objectives of longer term environmental cleanup activities undertaken as a result of a spill.

Identification of Sensitive Areas. Currently, there is no comprehensive catalogue of environmentally sensitive areas and wellhead protection areas for use by hazardous materials response personnel. A base map should be prepared and distributed to response agencies identifying important environmentally sensitive areas such as wetland systems, lakes, perennial streams, and sensitive ground water recharge areas, as well as public water system wellheads.

Highway Design Modifications. Over time, SR 16 and Pierce County roads will be upgraded or repaired. In addition, Pierce County Public Works has indicated that at least one new east-west roadway may be constructed in the Gig Harbor GWMA. There should be an ongoing program for installing hazardous materials spill containment facilities along roads that are reconstructed or constructed in the vicinity of environmentally sensitive areas or wellhead protection areas.

5.3 Issue Statement: Hazardous Material Spill Management

Review of the various aspects of the hazardous material spill response program elucidated a number of areas where improvements in program performance could be achieved. These areas of potential improvements include the following: spill reporting, illegal hazardous waste dumping surveillance, response agency coordination, identification of environmentally sensitive areas, and roadway design criteria.

5.3.1 Alternatives

Alternative 1. Take no action.

Alternative 2. Recommend a package of improvements to the existing response program for transportation-related releases of hazardous materials. Improvements include

- Industry and public education programs concerning incident reporting
- Enhanced coordination and communication between response agencies
- Identification of sensitive areas that might require extraordinary protection from the impacts of a transportation-related hazardous material spill
- Highway design modifications

5.3.2 Evaluation of Alternatives

Alternative 1. In the absence of action by the GWAC, the existing spill response program operated cooperatively by state and local agencies and Fire Protection District #5 would continue to effectively address most transportation-related releases of hazardous materials. However, selection of the no action alternative would forgo the opportunity to improve various aspects of the existing program relating to spill notification, illegal hazardous waste disposal, agency coordination, and the identification of environmentally sensitive areas. Unless such improvements are undertaken, no reduction can be expected in the current risk of environmental degradation, including ground water contamination, associated with transportation-related spills of hazardous materials.

Alternative 2. This alternative proposes a number of measures that are intended to improve the effectiveness of the existing program for addressing transportation-related hazardous material spills. The proposed improvements address incident reporting, illegal disposal, response agency coordination, identification of environmentally sensitive areas along transportation routes within the Gig Harbor GWMA, and highway design modifications.

Element 1: Incident Reporting. The hazardous material spill reporting and notification system developed by the Pierce County DEM is only effective if all releases of hazardous materials are reported. It is important that all transporters of hazardous materials understand the need for spill reporting and the proper procedures for reporting.

Drivers of trucks carrying large quantities of hazardous waste (more than 1,000 pounds) are required by the Washington state patrol to have special hazardous materials endorsements on their drivers licenses (Glass, 1990). To obtain this certification, the driver must complete a training program and pass a test demonstrating an understanding of hazardous materials spill reporting and response requirements. However, carriers of smaller quantities of hazardous materials are exempt from the licensing requirements and the associated hazardous materials training.

Under this alternative, the TPCHD, in cooperation with Ecology and the Washington state patrol, would implement a pilot hazardous material spill reporting and response program targeting potential hazardous materials carriers, particularly carriers that would typically handle relatively small quantities of hazardous materials.

Under the pilot program, an approximately 4-inch-by-8-inch, two-sided, hard paper pamphlet would be prepared containing concise information concerning the responsibilities of a carrier in the event of an incident involving the release of hazardous materials. After identifying carriers that frequently transport products in or through the Gig Harbor GWMA, TPCHD personnel would make contacts with the carriers and, if possible, individual drivers to disseminate the pamphlet and other information concerning spill notification procedures. In cases where direct contact with the carriers is not possible due to the location of the carriers offices (e.g., out-of-state firms), correspondence would be conducted through the mail.

It is recognized that this effort would not reach all potential carriers of hazardous materials. However, with cooperation from motor fuel and trucking industry organizations as well as drivers unions, distribution to a significant percentage of carriers should be possible.

Activities associated with this pilot project would be concentrated in its first 2 years of operation. After the initial 2-year period, a liaison would be maintained with industry groups and infrequent follow-up contacts with selected carriers would be made on request of Ecology and/or the Washington state patrol.

Element 2: Illegal Hazardous Waste Disposal. Because of the high cost of proper hazardous waste disposal, incentives exist for illegal or "midnight" dumping of hazardous wastes from trucks, particularly in rural areas. While law enforcement agencies within the Gig Harbor GWMA are cognizant of this potential problem, it is not possible to maintain continuous surveillance of roadways within the GWMA. As such, public assistance in identifying and reporting incidents that may involve intentional dumping of hazardous materials is of great importance in addressing this problem.

In the past Ecology has received reports of illegal dumping of hazardous wastes within the Gig Harbor GWMA; however, the reports provided by witnesses did not provide sufficient information to identify and support prosecution of the responsible parties (Oberlander, 1990). A program is needed that will educate the public concerning what to do and what not to do in the event that an incident of potential illegal disposal of hazardous wastes is witnessed.

Under this alternative, instructions regarding recording of license plate numbers, lettering, or special insignias on the truck, any other distinguishing characteristics of the truck, a description of the driver,

and the time that the incident occurred would be placed on printed educational materials. The printed materials would also provide phone numbers to call if a suspected illegal hazardous waste disposal incident is observed. The printed educational materials would be distributions to schools, community groups, and business organizations. A discussion of procedures to follow in the event of suspected illegal disposal of hazardous waste would also be added as an element of the Gig Harbor GWMA speakers bureau.

A majority of the costs associated with this effort would be incurred during the initial preparation, printing, and distribution of the educational materials. Costs for long-term maintenance of the program would be nominal.

Element 3: Response Agency Coordination. Response to transportation-related releases of hazardous materials involves a complex decision-making process. Immediate concerns over safety of the on-scene personnel, as well as nearby motorists and residents, must be addressed rapidly. When making decisions concerning acute safety issues, such as the risk of fire and explosion, the initial response personnel may have little time to consider the longer term goals and objectives for site cleanup and prevention of contaminant entry into environmental and public health pathways (e.g., wetlands, streams, or the soil column).

Thus, it is important that the agencies concerned with longer term environmental and public health issues, such as Ecology and TPCHD, cooperatively develop spill management strategies with initial response agencies in advance of a serious spill. Under this alternative, the TPCHD, in consultation with Ecology, would increase the level of communication and joint spill response planning with Fire Protection Districts within Pierce County. TPCHD would consult with fire protection district personnel and, on occasion, attend drill night meetings at various fire stations to provide up-to-date information concerning spill cleanup and to develop coordinated strategies for responding to different hazardous material spill scenarios. Implementation of this program could be facilitated by the Pierce County Fire Chiefs Association.

Since there are 26 different Fire Protection Districts within Pierce County, coordination with every district is probably not feasible. However, the program could focus on

- Fire Protection Districts that have designated themselves the Incident Command Agency for their jurisdiction under authority of RCW 70.136

- Fire Protection Districts that are located in either the Gig Harbor or Clover/Chambers Creek GWMAs

- Fire Protection Districts with major commercial transportation corridors located within their boundaries

The effort outlined above would involve a relatively intensive 2-year pilot project during which most of the cooperative planning between Ecology, TPCHD, and the Fire Prevention Districts concerning spill response strategies would occur. After completion of the pilot project, program maintenance would be limited to several meetings each year with the Pierce County Fire Chiefs Association, maintaining occasional contacts with key response personnel at various Fire Prevention Districts, and relaying information concerning innovations in hazardous materials spill cleanup techniques.

Element 4: Sensitive Areas Maps. When responding to spills of hazardous materials, Incident Command Agencies, Ecology, and TPCHD need to be aware of the proximity of the spill to areas of special environmental sensitivity so that remedial actions can be properly designed and the urgency of response actions can be accurately determined. Information concerning most classes of sensitive areas have been collected by a variety of county agencies but have never been compiled in a single database or base map.

For instance, the Pierce County Planning and Land Services Department has conducted inventories of wetlands, streams, lakes, and commercial shellfish-growing areas within the Gig Harbor GWMA. The TPCHD has located the sites of all public water system wells that have been registered with the Washington State Department of Health (DOH) and has identified the most sensitive ground water recharge areas within the Gig Harbor GWMA.

Under this alternative, the Pierce County Planning and Land Services Department, the Pierce County Surface Water Management Utility, and the TPCHD would collaborate in the preparation of a sensitive areas

map of the Gig Harbor GWMA. The map would identify the presence of wetlands over 1 acre, bodies of water that are protected under the Shoreline Management Act, commercial shellfish growing areas, vulnerable ground water recharge areas, and locations of all Group A public water system wells. Additional information may be placed on the map provided that the usefulness of the map will not be diminished by presence of so much detailed information that the map becomes difficult to read and interpret.

If possible, the map should be prepared on the CAD system of the Pierce County Utilities Department and the Regional Water Association to facilitate relatively simple, periodic updates. Periodic updates will be necessary to identify the locations of new public water system wells and wetlands that were omitted during the initial inventory.

The sensitive areas map would be provided to state and local hazardous materials spill response agencies for use when determining appropriate response procedures. Maps prepared under this program would serve as a template for development of similar maps in other portions of the county.

Element 5: Highway Design Modifications. Under this alternative, the WDOT and the Pierce County Public Works Department would be requested to modify highway and roadway design criteria to maximize the level of protection afforded to ground water in areas designated in the Gig Harbor GWMA as being particularly sensitive to contamination. This could include construction of special storm water conveyances and collection facilities that ameliorate runoff quality and provide spill containment. In addition, ground water or vadose zone monitoring devices could be installed to detect the presence of highway-related contaminants.

It is anticipate that such design improvements would be incorporated into any new highway construction projects and major reconstruction projects within the Gig Harbor GWMA.

Funding. The successful implementation of the five elements of Alternative 2 described above can be accomplished within a 2-year period provided adequate funding is available. Estimated costs for implementing the five elements are $52,500. This amount far exceeds the financial resources available to the TPCHD to implement spill response programs. Financial assistance must be obtained through the Centennial Clean Water Fund (CCWF) matched by agency in-kind services and other contributions.

5.3.3 Preferred Alternative

Recommend a package of improvements to the existing response program for transportation related releases of hazardous materials. Improvements include

- Development and implementation of industry and public education programs concerning incident reporting
- Facilitation of enhanced coordination and communication between response agencies
- Identification of sensitive areas that might require extraordinary protection from the impacts of a transportation-related hazardous material spill
- A recommendation that the WDOT and the Pierce County Public Works Department incorporate spill containment provisions into highway and roadway design specifications

5.3.4 Rationale

The GWAC recognizes that the existing program for response to transportation related spills of hazardous materials is reasonably effective in protecting ground water quality. However, the improvements enumerated in the preferred alternative will significantly enhance the ground water protection aspects of the spill response program.

5.3.5 Implementation Plan

Implementation Actions.

Action (Responsible Party)	Target Date
Prepare grant application and submit to Ecology (TPCHD)	First grant funding cycle after certification of Program by Ecology

Funding Plan. A CCWF grant will be necessary to support any significant level of improvement over existing spill response efforts. Estimated total costs for implementation of the improvements proposed under the preferred alternative are $52,500. Of that amount, 75 percent or $39,375 would need

to be supplied by the grant while 25 percent or $13,125 would be local match. To obtain adequate match, a number of agencies may need to directly participate in the project including the TPCHD, Fire District #5, Pierce County Fire Chiefs Association, Pierce County Surface Water Management, Pierce County Planning and Land Services Department, and the DEM.

As pointed out in the discussion of the five elements of the preferred alternative, the majority of the costs associated with each element will be incurred during the 2-year grant period. Program maintenance and operation requirements beyond the initial grant period will likely be within the existing capabilities of the TPCHD, provided the health department's emergency response program receives consistent funding from the Tacoma-Pierce County Board of Health. Funding for ongoing spill response activities could be augmented if an Aquifer Protection Area ballot issue is successful.

The availability of funding will dictate the level of effort involved in the preferred alternative.

5.4 References

Baroga, Rico; Personal Communication, Tacoma-Pierce County Health Department, September 1990.

EMCON Northwest, Inc., May, 1992. Gig Harbor Peninsula Ground Water Management Program Task 5 Hydrogeologic Evaluation Report with Robinson and Noble, Inc. prepared for Tacoma-Pierce County Health Department.

Glass, Sgt. Roy; Personal Communication, Washington State Patrol, Olympia, September 1990.

Limotti, Brian; Letter to Derek Sandison, Washington Department of Transportation, July 13, 1989.

Lokey, Bill; Personal Communication, Pierce County Department of Emergency Management, September 1990.

Mitchell, James; Personal Communication, Pierce County Public Works Traffic Division, June 1989.

Oberlander, Jim; Personal Communication, Department of Ecology, Olympia, September 1990).

Oregon Department of Transportation; *1987 Truck Accidents in Oregon - Statistics and Summary*, Oregon Public Utility Commissioner, 1988.

Pierce County; *Pierce County Comprehensive Emergency Management Plan*, Department of Emergency Management, Undated.

Pierce County; *Pierce County Population Report, Northwest Plan Area*, Department of Planning and Natural Resource Management, 1988.

Puget Sound Council of Governments; *Population and Employment Forecasts*, June 1988.

U.S. Department of Transportation; *National Transportation Statistics Annual Report*, June 1985.

Washington Utilities and Transportation Commission; *Summary and Analysis Heavy Truck - Hazardous Materials Accidents* 1986, 1987.

Water District 105; *Water District 105 Aquifer Protection Study*, Prepared by CWC-HDR, Robinson & Noble, Adolfson and Associates, 1987.

6 HAZARDOUS MATERIALS: COMMERCIAL SMALL QUANTITY GENERATORS - HOUSEHOLD HAZARDOUS WASTE ISSUE PAPER

6.1 Problem Statement

There are approximately 60 commercial establishments within the Gig Harbor GWMA that may use, store, or dispose of hazardous materials. These establishments can release hazardous materials to the environment through improper hazardous waste management practices, accidental spills, and improper chemical use or handling practices.

The commercial establishments that are present within the Gig Harbor GWMA include 12 service stations, 8 automotive repair shops, 7 aviation maintenance and service facilities, 6 construction companies, 5 landscaping firms, 4 dry cleaners, 4 utility maintenance or storage facilities, 2 printers, 2 paint supply stores, and 2 agricultural supply dealers.

At least one type of hazardous material is associated with the normal operations of each type of potential small waste generator listed above. For example, automotive repair shops typically handle large quantities of solvents and oil-based products containing volatile organics such as benzene, phenols, chlorinated ethylenes, toluene, and methylene chloride. Dry cleaners use solvents and cleaning solutions containing chlorinated ethanes and ethylenes, especially tetrachloroethylene. Paint supply stores may deal with products containing heavy metals, phenols, and toluene. When these materials are spilled or are discarded because their usefulness has diminished due to age or use (e.g. spent solvents), they become a hazardous waste.

Hazardous wastes can be introduced to the environment, including ground water, in a number of ways. Since about half of the potential commercial small quantity waste generators in the GWMA are not served by a public sewer system, hazardous wastes can be discharged to septic systems through sinks, toilets, or floor drains. Inadvertent or intentional discharges to storm water disposal systems represents another release mechanism.

Small quantities of hazardous wastes that are discarded along with normal solid waste refuse can be placed in landfills and contribute to leachate contamination of underlying ground water. Finally, hazardous wastes that are deposited on exposed ground surfaces can eventually migrate with recharging precipitation to ground water.

Households are also a source of hazardous wastes because a number of common indoor and outdoor household products contain hazardous materials. Those products include cleaning solutions, paints, paint thinners, antifreeze, and pesticide formulas for lawns and gardens. Hazardous materials released through improper use or disposal of household products can enter ground water through storm water dry wells, septic systems, or migration through the soil column from the ground surface.

6.2 Existing Programs

6.2.1 Commercial Hazardous Wastes

The regulatory program that serves as the basis for hazardous waste control efforts is the federal RCRA. Ecology enforces regulations that have been developed by EPA under the RCRA program. Ecology also enforces its own hazardous waste regulations: the state Hazardous Waste Management Act (RCW 70.105) and the Dangerous Waste Regulations (WAC 173-303). WAC 173-303 is somewhat broader in scope than the federal RCRA regulations.

The RCRA identifies approximately 400 specific substances as hazardous wastes. Substances may also be designated hazardous wastes under RCRA if they exhibit any of the following characteristics:

- Ignitability - can create fires under certain conditions
- Corrosivity - acidic or basic materials and those capable of corroding metals
- Reactivity - unstable under normal conditions and can create explosions or toxic fumes if mixed with water
- EP Toxicity - harmful or fatal if ingested or absorbed, as determined by a laboratory procedure called the Extraction Procedure (EP) toxicity test (Ecology, 1990)

In addition to the substances that are designated hazardous waste under RCRA, WAC 173-303 designates substances as hazardous wastes if they exhibit any one of three other characteristics:

- Carcinogenicity - causes cancer in animals, or in some cases, humans
- Persistence - contains halogenated hydrocarbons and/or polycyclic aromatic hydrocarbons, which do not break down easily
- Toxicity - causes a certain percentage of aquatic or terrestrial organisms to die in laboratory tests (ibid)

As a result of the more restrictive state definition, there are many wastes that are considered hazardous by Washington that are not by EPA or other states.

Facilities that generate more than 220 pounds (about 25 gallons) of hazardous wastes per month are regulated under the RCRA and the state program, although the federal program places greater inspection emphasis on generators of over 2,200 pounds of hazardous waste per month. Certain wastes, including some pesticides and wastes containing dioxin, are so acutely hazardous that they are regulated under the Ecology program at levels of generation of only 2.2 pounds per month. Ecology refers to these as extremely hazardous wastes.

Even though the state and federal programs are primarily oriented towards regulation of waste management practices, because they employ a "cradle to grave" approach to waste management, facility inspections carried out under these programs often involve review of overall hazardous material use and storage at a regulated facility. Under a "cradle to grave" system of waste management, producers of regulated wastes are required to account for hazardous wastes from their time and place of generation to their point of ultimate disposal.

Generators of less than 220 pounds of hazardous waste per month are conditionally exempt from the RCRA and state hazardous waste regulations.

According to Ecology regulations, generators of less than 220 pounds of hazardous waste are exempt if they comply with the following conditions:

- Appropriately designate their waste
- Either treat or dispose of dangerous waste on site or ensure delivery to an off-site permitted hazardous waste facility or legitimate recycling facility
- Submit an annual report to Ecology

Unfortunately, Ecology has no ongoing program for inspecting facilities or monitoring compliance among the conditionally exempt generators. Based on surveys conducted by TPCHD, conservatively, at least 33 percent of the conditionally exempt generators are not in compliance with the Ecology hazardous waste requirements (Sherman, March 1991).

When dealing with some organic chemical wastes, such as spent dry cleaning solvents that may be harmful to human health in drinking water at levels of only a few parts per billion, 220 pounds of hazardous waste can be a substantial quantity if it is introduced into an aquifer system.

Many of the commercial establishments in the Gig Harbor GWMA that are likely to use hazardous materials and dispose of hazardous waste fall into this conditionally exempt category known as small quantity hazardous waste generators.

In past years, the only active program intended to control releases of hazardous materials from commercial small quantity generators has been the sewer pretreatment program conducted by the city of Gig Harbor as required under the federal Clean Water Act. However, the pretreatment program applies only to the sewered portions of the Gig Harbor GWMA and is limited in scope to primarily preventing releases of contaminants to the public sewer system.

6.2.2 Remedial Response

Both EPA and Ecology maintain programs to deal with releases of hazardous materials to ground water after they have occurred. These programs are the EPA Superfund Program and the Ecology Toxics Cleanup Program. Both programs attempt to require cleanup of ground water contamination problems by the party responsible for the release of the contaminants. If the responsible party is unwilling to accept responsibility for the release of contaminants, either EPA or Ecology can undertake the

cleanup and recover its costs from the responsible party at a later date. If a responsible party cannot be identified, EPA or Ecology will generally undertake cleanup at its own expense.

Such remedial actions are usually very expensive and can be undertaken only after a release of hazardous waste has been detected. Detection of small quantities of hazardous wastes in ground water can be extremely difficult. A number of organic chemicals are harmful to human health at levels far below the point at which they can be detected in drinking water by smell or taste. Routine testing of drinking water for the presence of organic chemicals is generally only conducted by the larger public water systems in the Gig Harbor GWMA.

6.2.3 Household Hazardous Waste

Like commercial small quantity waste generators, household hazardous waste generators have not been adequately addressed by existing regulatory programs. Many products that are commonly found in the home, such as paints, paint thinners, solvents, cleaning compounds, and lawn and garden pesticides contain hazardous substances. Yet the most common disposal method for unwanted or spent household chemical products is either to include them in household garbage or to pour them down the drain.

6.2.4 Local Hazardous Waste Management Plan

Recognizing the deficiencies in programs intended to assure proper handling and disposal of commercial and household hazardous wastes, the TPCHD developed a plan for management of the generation and disposal of such wastes. The plan, the Tacoma-Pierce County Local Hazardous Waste Management Plan, has been adopted by the Pierce County Council and the legislative jurisdictions of all incorporated communities within the county. The Local Hazardous Waste Management Plan is being implemented cooperatively by the TPCHD and the Solid Waste Division of the Pierce County Utilities Department.

The local Hazardous Waste Management Plan calls for the implementation of programs designed to educate both commercial and household generators of hazardous waste concerning the types of products that represent a risk to the environment and proper methods of storage, use, and disposal of those products. In the case of commercial small quantity waste generators, the plan recommends providing workshops, printed materials, and on-site consultation with businesses to disseminate

information regarding hazardous material handling as well as hazardous waste reduction, separation, recycling, pretreatment, and disposal options. To support the educational activities, Ecology has provided TPCHD with a Hazardous Waste Implementation Grant. Among the tasks of the grant are creation of a hazardous waste information "hot line" and development of a Tacoma-Pierce County Business Guide regarding hazardous waste disposal practices.

Concerning household hazardous waste generators, the plan establishes household hazardous waste collection days and ultimately provides for the creation of permanent collection sites. The Solid Waste Division of Pierce County Utilities has scheduled two household hazardous waste collection events next year and plans to develop a permanent household hazardous waste collection program or facility in 1993. The Solid Waste Division and TPCHD are collaborating on the development of a number of waste oil collection centers, including one to be located in the Gig Harbor GWMA.

Success of the plan rests on the willingness of Pierce County and local governments to implement the recommendations of the plan and to provide a stable funding base. Near term, many of the activities and programs recommended through the Local Hazardous Waste Management Plan will be largely funded through a Coordination/Prevention Grant from Ecology. However, longer term, a significant local source of funding will need to be identified.

One of the primary recommendation of the Local Hazardous Waste Management Plan is to increase the tipping fee at local solid waste facilities and dedicate revenues generated by the fee increase to the support of hazardous waste management activities. To date, the solid waste facility tipping fees have not been increased to serve that purpose.

6.3 Issue Statement: Hazardous Waste Management

In past years, there was no mechanism for ensuring proper hazardous waste disposal practices at commercial establishments that are conditionally exempt from state and federal hazardous waste management regulations. Similarly, there was no ongoing program to ensure proper disposal of household hazardous waste.

In response, the TPCHD drafted the Tacoma-Pierce County Local Hazardous Waste Management Plan to address both conditionally exempt commercial small quantity hazardous waste and household hazardous waste generators. For protection of ground water quality, it is essential that the programs and activities recommended through the plan be fully

implemented and an adequate, stable source of funding be established to support those programs and activities.

6.3.1 Alternatives

Alternative 1. Take No action.

Alternative 2. Urge the city of Gig Harbor and Pierce County to support full implementation of the recommended elements of the Tacoma-Pierce County Local Hazardous Waste Management Plan, including establishment of an adequate local source of funding.

6.3.2 Evaluation of Alternatives

Alternative 1. Failure of the GWAC to support the Tacoma-Pierce County Local Hazardous Waste Management Plan would not necessarily adversely affect the implementation of the recommended elements of that plan. However, if the relationship between proper hazardous waste management and the protection of the Gig Harbor GWMA's ground water resources is not underscored, chances of successful implementation and funding of the plan's recommended elements could be diminished.

If the recommended elements of the draft Tacoma-Pierce County Local Hazardous Waste Management Plan are not implemented and properly funded, the ground water resources of the Gig Harbor GWMA will continue to be exposed to a risk of contamination from the improper disposal of commercial small quantity hazardous waste and household hazardous waste.

Alternative 2. Improper commercial and household hazardous material and hazardous waste management practices represent a significant threat to ground water quality in the Gig Harbor GWMA. To deal with this threat, the Tacoma-Pierce County Local Hazardous Waste Management Plan recommends development and implementation of a number of programs that are intended to reduce the potential for hazardous material spills and to encourage proper hazardous waste management practices in commercial facilities and households.

If the recommended commercial and household hazardous waste management programs are to be effectively implemented, stable sources of funding must be identified. A number of options for funding of the recommended programs are identified in the plan. Those options include,

among others, increasing the solid waste tipping fees for both the City of Tacoma and Pierce County solid waste facilities. To date, solid waste tipping fees have not been increased to accommodate implementation of the Local Hazardous Waste Management Plan.

6.3.3 Recommended Alternative

Urge the city of Gig Harbor and Pierce County to support full implementation of the recommended elements of the Tacoma-Pierce County Local Hazardous Waste Management Plan, including establishment of an adequate local source of funding.

6.3.4 Rationale

The Gig Harbor GWAC supports full implementation of the Tacoma-Pierce County Local Hazardous Waste Management Plan and recognizes its importance as an integral part of ground water protection and management programs within Pierce County. If ground water protection and management efforts are to be successful, stable sources of funding must be developed for such endeavors as the implementation of commercial and household hazardous waste management programs.

6.3.5 Implementation Plan

Implementation Actions.

Action (Responsible Party)	Target Date
Prepare GWAC policy statement supporting full implementation and funding of Local Hazardous Management Program for submittal to Pierce County Council and City of Gig Harbor (TPCHD, GWAC)	Within 90 days after certification of Program by Ecology

Funding Plan. Funding options for support of the programs and activities recommended under the Local Hazardous Waste Management Plan were enumerated within that plan. The Local Hazardous Waste Management Plan has been adopted by the Pierce County Council and the councils of all incorporated communities within the county.

6.4 References

Sachet, Jim; Department of Ecology, Memo to Elizabeth Phinney concerning CCC Basin GWMA, December 3, 1990.

Sherman, John; Personal Communication, Tacoma-Pierce County Health Department, September 1991.

Sherman, John; Personal Communication, Tacoma-Pierce County Health Department, February 1991.

Sherman, John; Tacoma-Pierce County Health Department, Memo to Jane Hedges, September 18, 1990.

Tacoma-Pierce County Health Department; *Tacoma-Pierce County Local Hazardous Waste Management Plan, Draft*, October 1989.

7 UNDERGROUND STORAGE TANKS ISSUE PAPER

7.1 Problem Statement

Underground chemical storage tanks represent one of the most significant potential threats to ground water in the Gig Harbor GWMA. Leakage from underground storage tanks is often difficult to detect and relatively small amounts of some compounds can have serious impacts on ground water quality. For instance, it has been calculated that a 1-gallon leak of gasoline can render 1 million gallons of ground water unpalatable for as long as several decades (Ecology, 1989). A hole as small as 0.25 inch can result in the release of up to 930 gallons of gasoline in one day or 28,000 gallons in a month (ibid).

According to Ecology records, at least 104 underground storage tanks ranging in size from 500 gallons to 20,000 gallons are in operation at 41 sites within the Gig Harbor GWMA. This number does not include home heating oil tanks. The 104 tanks hold a variety of petroleum products including leaded and unleaded gasoline, diesel fuel, lubricating oil, fuel oil, and waste oil.

The count of underground tanks in the Gig Harbor GWMA provided by Ecology is probably low since its database did not contain records of several commercial establishments that would be expected to operate underground storage tanks. Those establishments include at least three gas stations that normally have from three to six underground storage tanks each, several aviation maintenance facilities at the Tacoma Industrial Airport, and a number of automotive repair shops.

Prior to the mid 1980s, there were virtually no controls over underground storage tank construction practices. Installation of single-walled steel tanks without cathodic protection devices was common. Leakage as a result of corrosion of such single-walled tanks often begins after as little as 15 years of operation.

Although precise information concerning the age and composition of the 104 underground storage tanks identified in the Ecology database is not available, as many as 45 of the tanks may have been in operation for 15 years or longer. Several tanks within the GWMA have been operated for more than 30 years.

7.2 Existing Programs

7.2.1 Underground Storage Tank Management

Federal Program. Federal regulations (Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks, 40 CFR 290 Part 280) have been developed by the U.S. Environmental Protection Agency (EPA) under Subtitle i of the Resource Conservation and Recovery Act (RCRA). The EPA regulations contain requirements for

- Proper underground storage tank design
- Overfill protection
- Tank inventory monitoring
- Financial responsibility
- Leak detection
- Leak reporting
- Remedial action
- Tank removal

EPA lacks sufficient resources to carry out a program for direct enforcement of these regulations. However, the EPA regulations contain provisions for delegation of the federal Underground Storage Tank (UST) Program to the states.

State Program. The 1989 Washington State Legislature passed Engrossed Substitute House Bill 1086 (RCW 90.76), which directed Ecology to develop a program designed, operated, and enforced in a manner that meets the requirements for delegation of the federal UST Program under RCRA. RCW 90.76 provided Ecology with authority to adopt rules for management of all

underground storage tanks that are governed under the EPA regulations. Accordingly, Ecology adopted the state Underground Storage Tank Regulations (WAC 173-360) in November 1990. These comprehensive regulations incorporate the essential aspects of the federal UST Program.

As with the EPA program, direct enforcement of the Ecology regulations is constrained by available resources. The Ecology program is supported by annual underground storage tank fees charged to tank owners. RCW 90.76 restricted annual tank fees to $60 per tank in both 1990 and 1991. The annual fee will increase to $75 per tank after 1991.

The limitations presented by the restrictions on annual tank fees are reflected in the nature of inspection and field verification efforts carried out by Ecology under WAC 173-360. Ecology is unable to implement a traditional inspection program with a specific schedule and a required number of inspections and subsequent enforcement actions (Ecology, 1990). By utilizing data supplied by tank owners and operators whenever possible and targeting tanks for inspection that represent the highest risk to public health and environmental quality, the Ecology program is reducing the extent of labor-intensive field inspections (ibid). Examples of high risk tanks would be relatively old systems, those containing highly toxic materials, and those located in the immediate vicinity of a public water supply well.

To implement its program Ecology began adding additional personnel to the regional offices in September 1989. By July 1992 it is anticipated that three to four Ecology staff members will be assigned to the underground storage tank program in the Southwest Region office (Lufkin, 1989). Ecology's Southwest Region includes Pierce County and 11 other counties: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Skamania, Thurston, and Wahkiakum.

Local Programs. Under RCW 90.76 Ecology is encouraged to delegate portions or all of the state program responsibilities to cities, towns, or counties. Ecology must be satisfied that a city, town, or county requesting delegation can demonstrate adequate enforcement capability, has sufficient resources and expertise to implement the program, and possesses the ability to levy civil penalties (Ecology, 1990). Once program responsibilities have been delegated, the annual fees collected by Ecology will be apportioned between Ecology and the city, town, or county assuming responsibility for the program or a portion of the program. Ecology must retain a sufficient portion of the fees necessary for operation of the state program.

A supplementary local fee, not to exceed 50 percent of the state fee, can be assessed in portions of the state that are designated Environmentally Sensitive Areas by Ecology. Environmentally Sensitive Areas are geographic areas that possess physical characteristics that make them especially vulnerable to releases from underground storage tanks. Under RCW 90.76, local underground storage tank regulations that are more stringent than those contained in WAC 173-360 can be implemented, subject to approval by Ecology, in an Environmentally Sensitive Area.

A city, town, or county can request Ecology to designate an area within its jurisdiction as an Environmentally Sensitive Area. If a single Environmentally Sensitive Area is located within more than one political jurisdiction, such as two different cities or one city and a county, the jurisdictions can jointly request that Ecology designate the area as sensitive.

An area can qualify as an Environmentally Sensitive Area in one of two ways. First, if an area has already been granted special environmental status under another state or federal statute or regulation for the purpose of protecting ground water or surface water from pollution, it will, upon request from the appropriate local jurisdiction, be approved as an Environmentally Sensitive Area. Special environmental status includes the following:

- A geographic area overlying an aquifer identified as the primary source of supply for public water systems
- Portions of a Critical Water Supply Service Area overlying an aquifer for which the Coordinated Water System Plan established pursuant to RCW 70.116 has identified a need for a ground water management program
- A geographic area overlying an aquifer designated as a Sole Source Aquifer by the EPA
- An area designated a certified GWMA under WAC 173-100
- An area designated as an Aquifer Protection Area under RCW 36.36 (WAC 173-360-520)

If an area has not been granted special environmental status under another state or federal statute or regulation, the local government jurisdiction applying for the Environmentally Sensitive Area designation must demonstrate that ground water is vulnerable to pollution because of site-specific hydrogeologic characteristics (WAC 173-360-520).

Specific application procedures and minimum data requirements necessary for Ecology consideration of an Environmentally Sensitive Area designation request are outlined in WAC 173-360-530. Ecology has not been requested to designate the Gig Harbor GWMA as an Environmentally Sensitive Area under RCW 90.76.

An Environmentally Sensitive Area designation under authority of RCW 90.76 is not synonymous with an Environmentally Sensitive Area designation under WAC 197-11-908 of the State Environmental Policy Act (SEPA); although, a single area could be designated as an Environmentally Sensitive Area under both RCW 90.76 and SEPA. Designation under ESHB 1086 affects only the construction and operation of underground storage tanks while designation under SEPA can affect a much broader range of land-use activities.

7.2.2 Leaking Underground Storage Tanks

In addition to the programs already discussed, there are programs in existence at both a federal and state level intended to assure cleanup of releases of contaminants from underground storage tanks. Section 205 of the Superfund Amendments and Reauthorization Act of 1986 created an Underground Storage Tank Trust Fund intended to pay for the cleanup of releases of hazardous substances, including petroleum products, from underground storage tanks. The fund, administered by the EPA Office of Underground Storage Tanks (OUST), is making available a total of $500 million over a 5-year period ending in 1992. The life of this fund was recently extended by Congress for an additional 5 years.

The fund is intended to support cleanup of leaking underground storage tanks in cases where no financially solvent owner/operator can be identified, where the owner/operator refuses to properly respond to the problem, or where an imminent hazard to public health or the environment exists. The fund also provides financial assistance to state governments for development of state leaking underground storage tank response programs.

Ecology received assistance from the fund to develop this state's Leaking Underground Storage Tank (LUST) Program, which was finalized in September 1989. Ecology currently uses money from the fund to offset salaries and related expenses for the state LUST Program.

Releases of hazardous substances from underground storage tanks in this state are currently addressed by Ecology through oversight of voluntary cleanup actions by tank owners or through enforcement actions under the Model Toxic Control Act. In cases where a financially solvent

owner/operator cannot be identified or is unwilling to undertake appropriate cleanup actions, Ecology will directly undertake the cleanup of a site. Funding for the Ecology LUST Program cleanup activities is available through the state's Toxics Control Account. If a financially solvent responsible party can be identified, Ecology will seek to recover costs incurred in any cleanup action.

7.3 Issue Statement: Underground Storage Tank Leakage

Leakage of hazardous substances from USTs represents one of the most significant potential threats to ground water in the Gig Harbor GWMA. In order to effectively manage that risk, an UST program should be implemented with a field surveillance element that is adequate to verify compliance.

7.3.1 Alternatives

Alternative 1. Take no action.

Alternative 2. Request that Pierce County and the City of Gig Harbor apply to Ecology for delegation of the responsibility for enforcement of the Ecology UST program to the TPCHD under provisions of WAC 173-360-500.

Alternative 3. Request that Pierce County and the City of Gig Harbor apply to Ecology for designation of the Gig Harbor GWMA as an Environmentally Sensitive Area under provisions of RCW 90.76 and WAC 173-360. The designation will facilitate the development of a local UST management program within the Gig Harbor GWMA to be administered by the TPCHD.

7.3.2 Evaluation of Alternatives

Alternative 1. Ecology is implementing an underground storage tank program in Pierce County under authority of RCW 90.76 and WAC 173-360. Thus, even in the absence of local action, some degree of protection from improper operation of USTs will be provided. However, the no action alternative is unlikely to provide the level of protection offered by either of the two action alternatives.

The Ecology Underground Storage Tank (UST) program does not provide the site specific level of control over UST management practices that would

is administering a statewide program, its resources are divided among 39 counties.

Rather than rely on labor intensive routine field surveillance, the Ecology UST program depends largely on information supplied by tank owners and operators for verification of compliance with the Ecology regulations. Field surveillance is limited to underground tanks that represent the highest risk to public health and environmental quality.

Preventing contamination of ground water from the operation of underground storage tanks may require a more comprehensive management program than that currently employed by Ecology.

Alternative 2. Under this alternative, Pierce County and the city of Gig Harbor will request that Ecology delegate responsibility for enforcement of the state UST program regulations (WAC 173-360) to the TPCHD. Through its involvement in the South Tacoma Ground Water Protection District UST Management Program, TPCHD has developed the administrative structures and assembled the trained staff necessary to operate an effective UST program. The already experienced TPCHD staff administering Ecology's comprehensive UST program regulations should result in a high level of protection for ground water, if funding is available to support an adequate level of field surveillance.

If Ecology delegates responsibility for the UST program to TPCHD, the standard underground storage tank annual fee of $60 per tank ($75 in 1992) will be apportioned between Ecology and TPCHD. While the amount to be retained by Ecology has not yet been determined, it is likely to be a significant portion of the standard fee (Bolender, 1991). Thus, on a per-tank basis, TPCHD will be forced to operate an intensive UST program with fewer resources than are available to Ecology for operation of the less intensive statewide program.

Even if all the revenues generated from annual tank fees in the Gig Harbor GWMA were allocated to TPCHD, they would not provide sufficient funding to properly maintain a local UST program. Only if the Gig Harbor GWMA is designated an Environmentally Sensitive Area under RCW 90.76, as recommended in Alternative 3, will a mechanism be available for increasing the UST annual fee to an amount that would place operation of a local program within the realm of economic feasibility.

Alternative 3. This alternative is similar to Alternative 2 but has one important distinction: Pierce County and the city of Gig Harbor will request that Ecology designate the Gig Harbor GWMA as an Environmentally Sensitive Area under RCW 90.76. Because the Gig Harbor GWMA meets several of the criteria enumerated in WAC 173-360-510 for designation of an Environmentally Sensitive Area, it should automatically qualify for designation. WAC 173-360-510 states that areas that have been granted special environmental status under another state or federal statute or regulation for the purpose of protecting ground water or surface water from pollution, will, upon request from the appropriate local jurisdiction, be approved as an Environmentally Sensitive Area. A number of categories of special environmental status are identified in WAC 173-560, including the following, which apply directly to the Gig Harbor GWMA:

- A geographic area overlying an aquifer identified as the primary source of supply for public water supply systems

- A portion of a Critical Water Supply Service Area (CWSSA) overlying an aquifer for which the Coordinated Water System Plan established pursuant to RCW 70.116 has identified a need for a ground water management program

- An area designated as a certified GWMA under WAC 173-100

An Environmentally Sensitive Area designation under RCW 90.76 will allow an additional local annual tank fee of up to 50 percent of the standard fee to be assessed against each UST. Thus, an additional $37.50 per tank per year can be assessed after 1991.

However, because annual tank fees must be shared with Ecology, sources of funding in addition to the annual tank fee will need to be identified if an effective local UST program is to be developed. These sources of funding include a CCWF grant, a hazardous materials site fee, and potentially, a construction permit fee for installation of new USTs.

A CCWF grant will be necessary for the planning and development of the local program. Planning and development will involve a number of labor-intensive activities, including preparing the local UST ordinance, developing best management practices, conducting inventories of all existing USTs, and performing educational activities aimed at informing UST owners of their responsibilities under the local program. The amount of grant funding that will be necessary to initiate the local underground storage tank program cannot be estimated until the scope of the local program has been more clearly delineated. Because of difficulties in identifying sufficient local

resources to match grants, TPCHD will request that Ecology reduce the match requirement to 25 percent.

Hazardous materials site fees will be established similar to those already in place within the South Tacoma Ground Water Protection District. The site fees are intended to offset costs associated with TPCHD activities to manage or regulate hazardous materials practices at commercial, industrial, and institutional facilities. The fees apply to sites or facilities where significant amounts of hazardous materials are used, stored, or handled and are not levied specifically against USTs.

A fee for the construction or installation of new underground storage tanks will be established to offset costs incurred by TPCHD in reviewing plans and conducting on-site inspections associated with the construction or installation of new underground storage tanks. On a time-and-material basis, an average of about $300 to $350 is being expended by TPCHD for plan review and on-site inspection of each new UST in the South Tacoma Ground Water Protection District. It is likely that the construction fee will be established at approximately $350.

Should levels of funding available from the maximum annual tank fee, CCWF grant, hazardous materials site fees, and fees for new USTs prove to be insufficient, TPCHD will elect not to undertake the UST program.

It should be noted that local fire authorities have limited authority for regulation of USTs under Article 79 of the Uniform Fire Code. Article 79 includes requirements for secondary containment, cathodic protection, and integrity testing for new tanks. In addition, it allows fire authorities to require testing of existing tanks if there is reasonable cause to believe that a leak exists. In developing the UST program for the Gig Harbor GWMA, TPCHD should collaborate with Pierce County Fire Protection District Number 5 to eliminate duplicative program elements.

7.3.3 Preferred Alternative

Request that Pierce County and the city of Gig Harbor apply to Ecology for designation of the Gig Harbor GWMA as an Environmentally Sensitive Area under provisions of RCW 90.76 and WAC 173-360. The designation will facilitate the development of a local UST management program within the Gig Harbor GWMA to be administered by the TPCHD.

7.3.4 Rationale

The GWAC concluded that there is ample justification for implementation of a more comprehensive UST program within the Gig Harbor GWMA than is currently offered by the state of Washington. The preferred alternative exercises the option of developing a local UST program and maximizes the availability of resources to support that program.

7.3.5 Implementation Plan

Implementation Actions.

Action (Responsible Party)	Target Date
Prepare draft resolutions for Pierce County and Gig Harbor Councils requesting Ecology to designate the GWMA as an Environmentally Sensitive Area under RCW 90.76 (GWAC, TPCHD)	60 days after certification of Program by Ecology
Prepare and submit Centennial Clean Water Fund grant application to Ecology (TPCHD)	First grant funding cycle after certification of Program by Ecology
Develop, implement UST Program (TPCHD)	Contingent on two previous actions and the availability of adequate funding

Funding Plan. Funding for the preferred alternative will be needed from a variety of sources, including the maximum annual tank fee allowed under RCW 90.76, a CCWF grant, hazardous materials site fees (approximately $100 per site), and fees for construction of new USTs (approximately $350 per tank).

The amount of grant funding that will be necessary to initiate the local UST program cannot be estimated until the scope of the local program has been more clearly delineated. Because of difficulties in identifying sufficient local resources to match grants, TPCHD will request that Ecology reduce the match requirement to 25 percent.

Should the aforementioned funding sources be unavailable, TPCHD will elect not to undertake the UST program and the no action alternative will become the preferred alternative by default.

7.4 References

Barreca, Jeanette; Personal Communication, Department of Ecology LUST Program, September 1991.

Bolender, Wendy; Personal Communication, Department of Ecology, March 1991.

Department of Ecology; Draft Local Program Delegation Guidelines, May 16, 1990.

Department of Ecology; Memo Regarding Local Delegation of UST Program (To: Local Officials, From: Underground Storage Tank Section), November 9, 1989.

Department of Ecology; *A Report on Underground Storage Tanks*, Prepared by Thom Lufkin, February 1987.

Lufkin, Thom; Personal Communication, Department of Ecology, Olympia, 1989.

Washington State House of Representatives, *Final Bill Report SHB 1086*, 1989.

7.5 Laws and Regulations

Model Toxic Substances Control Act (Initiative 97).

RCW 90.76, Underground Storage Tank Management Act, Engrossed Substitute House Bill (ESHB) 1086; 1989 Washington State Legislature.

Resource Conservation and Recovery Act Subtitle i, 40 CFR 290 Part 280, Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks, Environmental Protection Agency.

Substitute House Bill (SHB) 1180, 1989 Washington State Legislature.

Superfund Amendments and Reauthorization Act of 1986, Section 205.

Uniform Fire Code, Article 79, International Conference of Building Officials and Western Fire Chiefs Association, Whittier California.

WAC 173-360, Underground Storage Tank Regulations, November 1990.

Washington Administrative Code (WAC) 197-11; State Environmental Policy Act Rules, April 1984.

Pierce County Ordinance #88-134; Underground Storage Tanks.

8 ON-SITE SEWAGE DISPOSAL ISSUE PAPER

8.1 Problem Statement

8.1.1 Scope

Outside of the portion of the Gig Harbor Ground Water Management Area (GWMA) that is served by the City of Gig Harbor sewer system, disposal of wastewater is accomplished through the use of on-site sewage systems. An on-site sewage system is typically composed of a septic tank and a gravity fed drainfield. Such a system is often referred to as a conventional on-site sewage system. Some newer systems incorporate enhanced treatment technology such as uniform pressure distribution of effluent and sand filtration. The mound/fill system is an example of this type of enhanced treatment technology.

Extrapolating from 1986 Pierce County Utilities Department estimates, roughly **9,000** individual on-site sewage systems are in operation within the Gig Harbor GWMA (Pierce County, 1986). A majority of these systems serve single family residences on suburban or rural parcels. The total population of the unsewered portion of the Gig Harbor GWMA is approximately **25,000**. Commercial and institutional (e.g. schools) developments in the unsewered portion of the Gig Harbor GWMA are also served by on-site sewage systems.

When properly sited, designed, and constructed, on-site sewage systems can represent a satisfactory long-term form of wastewater disposal. However, when misused, such systems can adversely affect both surface and ground water quality. Contaminants present in domestic (residential or equivalent) septic tank effluent include bacteria, viruses, nitrates, and phosphates. Nitrates are generally considered the most significant contaminant found in domestic wastewater because of their resistance to removal by treatment mechanisms normally associated with percolation through the soil profile. Abnormal levels of nitrates in ground water are an

indicator of nonpoint pollution from sources such as on-site sewage systems.

The effect of domestic septic tank effluent on ground water should be most profound where sewage from a number of residences is collected and disposed of in a community on-site system. Community systems are also used to serve shopping centers, institutions, or recreational areas. Community systems concentrate wastewater in a relatively small disposal area increasing the likelihood of adverse impacts on underlying ground water.

In addition to the contaminants normally found in domestic wastewater, effluent from on-site sewage systems serving commercial and institutional facilities can be a significant source of volatile and semi-volatile organic compounds. These compounds are ingredients in many solvents, degreasers, and paint products. In general, volatile and semi-volatile organic compounds are not effectively degraded or adsorbed during migration through coarse textured soils such as sands or gravelly sands (Wilson et. al., 1981). Thus, if such compounds are intentionally or inadvertently discharged to an on-site sewage system, they may migrate to ground water.

8.1.2 Soil Conditions and Treatment Efficiency

Ground water contamination from on-site sewage systems generally results from the proliferation of gravity fed systems in coarse textured soils such as gravelly sands. Effluent travel time through coarse textured soils can be too rapid for treatment mechanisms to effectively remove or attenuate contaminants prior to their reaching underlying ground water. The potential for ground water contamination is particularly high, where coarse textured soils overlie an unconfined, permanent aquifer.

Small areas of coarse textured soils are encountered in some portions of the Gig Harbor GWMA. The Soil Conservation Service (SCS) has separated these soils into two series, Everett and Neilton. Everett and Neilton series soils are formed in coarse gravelly outwash. On-site sewage systems installed in Everett and Neilton series soils do not effectively immobilize or attenuate contaminants unless efforts are undertaken to increase the treatment efficiency of such systems. Where Everett and Neilton soils are located over an unconfined aquifer, there is a relatively high potential for adverse impacts on ground water quality associated with the use of conventional on-site sewage systems.

However, deep coarse textured soils such as Everett and Neilton soils are not widely distributed in the Gig Harbor GWMA. Roughly 80 percent of the Gig Harbor GWMA is covered by shallow soils that are underlain by a relatively impervious substratum such as a hardpan or clay (USDA-SCS, 1979). Soils of this nature include those of the Harstine, Kitsap, and Bow series. In such soils, the potential for vertical migration of effluent to ground water is substantially reduced. Instead, there is a high potential for horizontal migration of effluent across the surface of the relatively impervious substratum. The horizontally migrating effluent can be released to surface water systems through roadcuts, springs, or exposed banks.

By far the most prevalent soil series in the unsewered portion of the Gig Harbor GWMA is a medium textured sandy loam known as Harstine series. These soils occupy about 60 percent of the Gig Harbor GWMA. Harstine soils are underlain by sandy glacial till. Glacial till, commonly known as hardpan, is an unsorted, unstratified, glacial drift consisting of a mixture of gravel, sand, silt, and clay. The till is a highly compacted material that is weakly cemented in places.

The glacial till generally restricts the vertical or downward movement of septic tank effluent and precipitation. A perched water table develops on the surface of the till during the winter rainy season. Poorly treated effluent can move laterally with the perched water table and be released to surface water drainage courses or directly to surface water bodies such as lakes, streams, or Puget Sound. On-site sewage systems installed in these soils must be carefully designed to maximize the separation between the drainfield trench bottom and the seasonal water table.

The Kitsap and Bow series soils are formed principally in clayey lake deposits. The substratum of both of these soils is highly resistant to the downward percolation of effluent and precipitation. As with the Harstine series, the primary concern associated with on-site sewage system use in Bow and Kitsap soils is the potential for lateral migration of effluent that could result in surface water contamination.

The only other soil that occupies appreciable amounts of developable lands within the Gig Harbor GWMA is the Indianola series. The Indianola series is composed of loamy sands which overlie a deep medium sand subsoil. In spite of its rapid permeability, the Indianola series is considered to be well suited for domestic on-site sewage disposal (USDA-SCS, 1979). The medium sand texture and the unsaturated soil depth of over 60 inches make Indianola soils highly effective in attenuating most domestic wastewater contaminants. However, due to the resistance of nitrate to

removal from percolating effluent, development densities must be regulated to prevent a buildup of nitrate in underlying ground water.

Instances of ground water contamination associated with the operation of on-site sewage systems have not been documented in the Gig Harbor GWMA. However, the sporadic occurrence of wells with slightly elevated nitrate levels in a north-south trending band that roughly coincides with the urbanized State Route 16 Corridor, suggests a possibility that on-site systems or some other nonpoint source of nitrogen may be locally affecting ground water quality. Currently, however, there are no indications of any GWMA-wide impacts.

8.2 Existing Programs

Regulatory responsibility for on-site sewage disposal system use in the Gig Harbor GWMA is divided among the Department of Ecology (Ecology), the Washington State Department of Health (DOH) (formerly the Department of Social and Health Services [DSHS]), and the Tacoma-Pierce County Health Department (TPCHD). Primary jurisdictional authority is apportioned among each of these departments based upon on-site sewage system capacity.

8.2.1 Systems Greater Than 14,500 Gallons Per Day

Ecology is responsible for the largest on-site sewage systems, those with common point wastewater flows of 14,500 gallons or more per day. Ecology's regulations governing submission of plans and reports for construction of wastewater facilities, WAC 173-240, have virtually precluded the use of such systems since 1983. WAC 173-240-035 states that:

> "Domestic wastewater facilities utilizing subsurface sewage treatment and disposal, as defined in WAC 173-240-020(5), are prohibited except under those extraordinary circumstances where no other reasonable alternatives exist".

WAC 173-240-035 also requires public ownership, operation, and management of such systems.

If a project proponent can demonstrate that no other alternative to a 14,500 or more gallons per day system exists and that public management services are available, Ecology will require the preparation of a thorough engineering report for the proposed system. The engineering report must demonstrate that through a combination of natural attenuation of pollutants and treatment technology, operation of the system will not adversely affect