

ORDINANCE NO. 702, 2000

An ordinance adopting a Capital Facilities Plan for the 560-acre community known as Carlsborg, in unincorporated Clallam County. The proposed Capital Facilities Plan (CFP) establishes goals and policies for the provision of infrastructure and governmental services necessary for the implementation of an Urban Growth Area (UGA) for Carlsborg. The CFP identifies infrastructure needed to serve the UGA over the next six and twenty years, estimates the cost of such infrastructure, and identifies funding sources adequate to fund the needed improvements. The CFP, in conjunction with ordinances adopting comprehensive plan policies and zoning regulations, are required by the Growth management Act, RCW 36.70A.070, for the designation of Carlsborg as an Urban Growth Area.

BE IT ORDAINED BY THE BOARD OF CLALLAM COUNTY COMMISSIONERS

Section 1 Purpose. The purpose of the Ordinance is adopt goals and policies that identifies and provides a six-year financing plan for public infrastructure and services necessary for the implementation of an Urban Growth Area for the 560-acre planning area known as Carlsborg. The proposed CFP has been developed in accordance with RCW 36.70A.070, the Growth Management Act, and addresses capital improvements and services associated with sewage disposal, potable water source, stormwater management, solid waste disposal, parks and recreation, law enforcement, fire protection, and transportation. The CFP also contains a finance chapter which assess costs for needed infrastructure and governmental services, and identifies sources of funding such improvements as needed over the next six years. The CFP is one of three separate legislative actions necessary to designate Carlsborg an UGA. Other legislative actions associated with the CFP include the adoption of Section C.C.C. 31.03.350 of the Sequim-Dungeness Regional Plan (Carlsborg Urban Growth Area Neighborhood), and adoption of Chapter 33.20 of the Clallam County Zoning Code to establish land use controls consistent with the CFP and Comprehensive Plan Amendment.

Section 2 Findings of Fact. The Clallam County Planning Commission recommends that the Board of Clallam County Commissioners find the following facts create a need for adopting an amendment to the Clallam County Comprehensive Plan, Title 31, Clallam County Code:

1. On July 1, 1990, the Washington State Legislature enacted legislation under RCW 36.70A, otherwise known as the Growth Management Act of 1990 (GMA). Among other objectives, the Act directed local jurisdictions to: 1.) encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner; and 2.) reduce the inappropriate conversion of undeveloped land into sprawling, low-density development (RCW 36.70A.020). To achieve these and other objectives, the Act required local jurisdictions to designate Urban Growth Areas (UGA) where urban level development is to occur, and outside of which development can only occur if it is not urban in nature. On October 9, 1990, the Board of Clallam County Commissioners committed to planning under the Act by adopting Resolution No. 138, 1990. On October 5, 1993, the Board of Clallam County Commissioners took the first step towards implementing the requirements of the GMA for the Carlsborg area by designating the community an interim Urban Growth Area (Resolution No. 180, 1993; Ordinance No's. 527 and 528, 1993.)
2. The Board of Clallam County Commissioners adopted an updated Comprehensive Plan in June of 1995 and readopted the plan under the authority of the Growth Management Act(GMA) in February of 1996. The plan, which includes the Sequim-Dungeness

Regional Plan, stated that the Carlsborg area should contain a mix of residential development at densities of one home per one-half acre and lower and commercial development.

3. The City of Sequim filed a petition in May, 1996, for review of the Clallam County Comprehensive Plan with the Western Growth Management Hearings Board. The petition requested that the Hearings Board determine whether densities of one home per acre or more and regional commercial developments located outside urban growth areas are consistent with the GMA.
4. The City of Sequim and Clallam County agreed to mediate the dispute before the Thurston County Dispute Resolution Center. Clallam County and the City of Sequim drafted a mutually acceptable Memorandum of Understanding during mediation that included the adoption of interim controls relating to the issues of the appeal that preserve options for the community and would be in the public interest. The Board of Clallam County Commissioners adopted the Memorandum of Understanding (MOU) with the City of Sequim on May 28, 1996 under Resolution 85.
5. Should the City of Sequim and Clallam County have failed to settle the petition before the Western Growth Management Hearings Board, it is possible that the Clallam County Comprehensive Plan, which represents the work of numerous citizens and an expenditure of over \$500,000 over five years, could have been declared invalid.
6. This MOU stated, in part, that the County would adopt interim land use controls as described in the MOU, pending "Final Resolution", which is described as "adoption by the County of permanent land use controls" consistent with the concepts of the MOU, or a mutually acceptable alternative consistent with the GMA.
7. The MOU further stated that "it is intended that these Interim Land Use Controls will remain in effect until replaced by permanent land use controls consistent with the above concepts, or a mutually acceptable alternative consistent with the GMA. One alternative that was discussed was the adoption of an Urban Growth Area in the Carlsborg area, consistent with the requirements of the GMA.
8. In order to maintain consistency with the Clallam County/City of Sequim Memorandum of Understanding, the Board of Clallam County Commissioners have enacted interim land use controls dating back to April 30, 1996, under the following ordinances: Ordinance 588, 1996; Ordinance 595, 1996; Ordinance 596, 1996; Ordinance 599, 1996; Ordinance 623, 1997; Ordinance 629, 1997; Ordinance 640, 1998; Ordinance 658, 1999; Ordinance 662, and Ordinance 674, 1999; Ordinance 682, 2000, and Ordinance 696, 2000. The earlier of these ordinances applied to Carlsborg, the unincorporated Sequim Urban Growth Area (UGA), and lands adjacent to the Sequim UGA. The County adopted final land use controls for the latter two areas, but to date has not adopted final land use controls for Carlsborg.
9. The current interim land use controls adopted under Ordinance 696, 2000, expire on February 18, 2001.
10. By action taken December 2, 1998, the Clallam County Planning Commission forwarded a recommendation to the Board of Clallam County Commissioners to support adoption of a Carlsborg UGA. The adoption of the proposed ordinance is necessary to maintain consistency with the MOU by adopting final land use controls for the Carlsborg planning area consistent with the guidelines of the MOU summarized in Finding #5.
11. In late 1996, the Planning Division of the Clallam County Department of Community Development began work on a Capital Facilities Plan (CFP) and environmental

assessment document for the possible establishment of a Carlsborg UGA. KCM, a Seattle consulting firm, was hired to assist in this effort and produced a draft CFP and environmental assessment, including multiple alternatives, dated October 1998. The recommendation of the County Planning Commission (Finding #9) was developed after consideration of the KCM Draft CFP, including the alternatives and environmental assessment, as well as the input obtained at public hearings. The Planning Commission rejected the sections of the KCM draft CFP which proposed alternatives for centralized sewer and water, and recommended: (1) that a decentralized approach to wastewater treatment and water supply be preferred over a centralized system (Decentralized system shall include single or multiple on-site supply and disposal systems that comply with County and State regulations, including substantial compliance with the State Antidegradation Policy.); (2) that existing water systems and sewer systems that are in substantial compliance with County and State regulations be allowed to continue; and, (3) that the County investigate other funding sources such as grants to offset whatever capital improvement expenditures may be needed; and, (4) development and implementation of a study to control nitrate loading attributed to both existing and new sources of nitrates, including continued use of on-site sewage systems, applicable to Carlsborg and other areas of Clallam County with documented elevated or rising nitrate levels. It was recommended that the program consider Appendix B [Continued Use on On-Site Sewage Systems] of the Carlsborg Capital Facilities Plan; the draft summary addendum (dated November 3, 1998) on wastewater options prepared by County staff; and research of other on-site or cluster-type wastewater facilities methods that more effectively remove nitrates.

12. In December, 1997, the Department of Community Development explored alternatives to achieving final resolution to the Carlsborg planning effort in response to changes in the GMA enacted under Engrossed Senate Bill No. 6094, 1997. The law offices of Hillis, Clark, Martin & Peterson were consulted with respect to utilizing an alternative designating the Carlsborg planning area an area of more intensive rural development as set forth in RCW 36.70A.070(5), as amended. The firm responded on January 7, 1998, with a memorandum generally addressing the questions and issues of the alternative designation. The response, as supported by Western Growth Hearings Board decisions that followed, indicated significant difficulty in designating the Carlsborg planning area an area of more intensive rural development. One primary conclusion of the opinion indicated that any boundary and land use designations would have to consider the character, distribution and intensity of development as it existed in 1990. It was determined that the alternative would fail to address several key planning issues in Carlsborg, including: a) failure to provide for a logical, cohesive boundary defining the extent of the planning area, b) failure to recognize lawfully established developments that occurred since 1990 in the planning area, c) failure to adequately address cumulative infrastructure needs of lawfully established developments within the limited planning area, d) failure to provide an alternative for locating regional commercial development between the cities of Port Angeles and Sequim, and therefore reduce uncontrolled sprawl along the Highway 101 Corridor, and e) failure to provide for the public health, safety and welfare through adequately addressing the above issues. Based on this determination, the County has pursued a UGA alternative that addresses the unique geographic, environmental and development characteristics of the Carlsborg community, while harmonizing the goals of RCW 36.70A.020.
13. Consistent with the recommendation of the Planning Commission, a Draft CFP for a Carlsborg UGA was developed for public review and comment. In its development, the Board directed Planning staff to make corrections to the original CFP Draft prepared by KCM, which were outlined in Ordinance 682, 2000. The Department of Community Development staff has substantially updated the previous draft CFP consistent with the direction of the Board and the recommendation of the Planning Commission. Because

the Planning Commission took action on the earlier draft of the CFP in 1998, the current draft will be reviewed by the Board of Commissioners at a duly advertised public hearing.

14. The Board of Commissioners and Planning Staff scheduled a public workshop to provide an update of the planning process and draft planning documents to the Carlsborg Community and interested persons. This workshop was held on July 13, 2000, at Macleay Hall, near the Carlsborg area.
15. In order to fully plan for and implement an UGA for Carlsborg, staff prepared a draft Comprehensive Plan Amendment and Zoning Amendment for review and recommendation by the Planning Commission to the Board of County Commissioners. The draft plans were developed consistent with the goals and policies contained in the Draft CFP. A duly advertised public hearing was held on August 16, 2000, at 6:30 P.M., in the Commissioners Meeting Room. A total of fifteen (15) citizens offered oral testimony on the proposed plans. Following the close of the public hearing, the Planning Commission took action to close the oral portion of the record, and keep the written portion open until August 23, 2000. By that day, a total of 67 letters of comment had been received by the Department of Community Development. All written comments that were timely received were forwarded to the Planning Commission for consideration.
16. A total of five (5) work sessions (August 30, 2000, September 6, 2000, September 13, 2000, September 20, 2000, and October 4, 2000) were held by the Planning Commission following the close of the public hearing in order to evaluate testimony and develop a recommendation to the Board of County Commissioners regarding the Draft Comprehensive Plan and Zoning Amendments. On October 4, 2000, the Planning Commission took action to forward a recommendation to the Board of County Commissioners to adopt the proposed Comprehensive Plan Amendment and Zoning Amendment, as edited by staff under the direction of the Planning Commission.
17. Consistent with Chapter 3.10, C.C.C., a legal notice of public hearing was transmitted to the Peninsula Daily News, a newspaper of local circulation for the August 16, 2000 public hearing. Notice of the hearing was published in said news paper on August 2, 2000. In addition, a one-page letter notifying area property owners of the public hearing was forwarded via the US Mail to all property owners within 600-feet of the exterior boundary of the proposed UGA, and all properties within the boundaries of the proposed UGA on July 31, 2000. Pursuant to RCW 36.70A.106(1), copies of the Draft CFP, Comprehensive Plan Amendment and Zoning amendment were forwarded to the Washington Department of Community, Trade and Economic Development (C-TED) on June 30, 2000. Copies were also sent to various state agencies as directed by C-TED for agency review on July 12, 2000.
18. The Draft CFP, Comprehensive Plan Amendment and Zoning Amendment were reviewed in accordance with the policies and procedures of the Washington State Environmental Policy Act (SEPA). Pursuant to WAC 197-11-510, the Responsible Official issued a Determination of Significance for the proposed plans on June 30, 2000. This threshold determination was published in a newspaper of local circulation on July 3, 2000. Copies of the DNS, Draft Supplemental Environmental Impact Statement (DSEIS), and draft plans were also forwarded to interested parties and agencies for review and comment pursuant to RCW 43.21C. The 30-day comment period closed on July 31, 2000. After review of pertinent comments, the Responsible Official issued the Final Supplemental Environmental Impact Statement (DSEIS) on August 8, 2000. No appeals have been filed with regard to this final determination.
19. Development of the proposed plans has been evaluated in accordance with the State Growth Management Act (GMA), as specified in RCW 36.70A.110 (Comprehensive Plans – Urban Growth Areas). Alternatives to the UGA designation were explored but did

not meet planning objectives and provide for the public health, safety and welfare (Findings #11). Given the thorough consideration of alternatives for the Carlsborg Planning Area, designation as an Urban Growth Area is consistent with RCW 36.70A.110(1) and (3).

20. The Comprehensive Plan Amendment, Capital Facilities Plan, and existing policies of the Clallam County Comprehensive Plan together address all required elements as enumerated under RCW 36.70A.070. Urban services identified under RCW 36.70A.030(19), have been provided for, including funding necessary to maintain adequate levels of service over the six year planning horizon.
21. In setting forth legislation for the Carlsborg UGA, the Board of County Commissioners recognizes the need to develop and implement land use policies and regulations that reflect historic and cultural values as well as the community's vision for future growth and development in the project area. To guide orderly development consistent with the community's vision as well as with County regulations, the Board finds that the creation of a Carlsborg Community Council would be consistent with these objectives. The purpose of such a council would be to provide a formal structure from which Carlsborg residents could work with the County to implement ideas, planning strategies and community projects. Such a structure would enable the community to monitor its experience as an Urban Growth Area and to respond to issues, problems and opportunities that may develop. The authority of the council would be advisory to the Planning Commission and the Board of County Commissioners.
22. The historic development patterns of the Carlsborg area have resulted in commercial and industrial developments locating adjacent to and within close proximity of residential properties. Conflicts have occurred resulting out of noise, light, fumes and other nuisances from commercial and industrial developments affecting nearby residents. While comprehensive zoning districts can reduce these impacts, the existing development pattern dictates that alternative strategies need to be developed to minimize the impacts of commercial and industrial developments on neighboring residential properties.
23. In setting forth legislation for the implementation of the Carlsborg Community as an UGA, the Board of County Commissioners recognize the long-standing urban character of development in the Carlsborg area. While maintaining consistency with the need to control urban sprawl as set forth under RCW 36.70B, the Board finds that allowing regional commercial development to occur within the limits of the natural and built environment will provide a viable alternative to commercial development pressures currently focussed on the Highway 101 Corridor between the cities of Port Angeles and Sequim. This alternative will assist the County in preventing continued commercial sprawl along the Highway Corridor. To further assist in this objective, the Board recognizes the need to allow flexibility in commercial development design and construction; provided, potential land use conflicts are mitigated or avoided altogether. Therefore, land use regulations shall allow a reasonable use of building space, within a reasonable level of lot coverage and structural height; provided further there shall be a heightened level of review and opportunity for public involvement in the permitting process for new commercial and industrial development within the UGA.
24. The Board of County Commissioners held a duly advertised public hearing on October 31, 2000, to receive public testimony on the recommendation of the Planning Commission as specified in Draft 5 of the Comprehensive Plan Amendment, Zoning amendment and CFP for the Carlsborg UGA. An extensive series of work sessions were held by the Board following the close of the public hearing to evaluate the public testimony received and initiate changes to the draft texts based on the public record. With regard to changes made to the proposed texts following the public hearing, the

Board finds that all changes are within the scope of the alternatives available to the public at the time of the public hearing, and/or within the range of alternatives considered in the Final Supplemental Environmental Impact Statement prepared for the subject legislation. Therefore, pursuant to RCW 36.70A.035(2)(b), further opportunity for public review and comment is not warranted.

Section 3 The additional section of the Clallam County Code establishing a Capital Facilities Plan to set forth the Carlsborg Urban Growth Area, is as follows:

CARLSBORG CAPITAL FACILITIES PLAN

December 5, 2000

Prepared by:
Clallam County Department of Community Development
Planning Division
223 East Fourth Street
Port Angeles, WA 98362-3098
(360)417-2321

And incorporating portions of Draft CFP dated October, 1998 prepared by:
KCM, Inc.
1917 First Avenue
Seattle, Washington 98101-1027
(206) 443-5300/Project #2667034

Carlsborg Capital Facilities Plan

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EXECUTIVE SUMMARY

The unincorporated community of Carlsborg includes approximately 560 acres along the State Route 101 corridor immediately west of the Dungeness River bridge (See Chapter 1, Figure 1-1). The Carlsborg planning area contains the village of Carlsborg, existing commercial uses along Highway 101, two industrial parks and a public school, along with various, moderate-to-high density residential uses, as well as vacant lands. The boundary of the planning area is consistent with the existing development patterns. At issue is which land use designation is appropriate for the Carlsborg planning area. This designation will need to meet three criteria:

1. To recognize existing development and neighboring land uses.
2. To allow continued growth in the community.
3. To comply with various state and local laws, while continuing to respect the character of the community of Carlsborg.

Brief History of Land Use in Carlsborg

Over the past several years, as a part of planning under the Growth Management Act in Clallam County, the possibility of designating either an urban growth area or rural center for Carlsborg was reviewed. To this end, on July 6, 1994, an appointed citizen committee (Carlsborg Task Force) submitted a report to the Clallam County Board of Commissioners. The report contained a statement of community vision for the Carlsborg area, which included "moderate urban growth centered along Highway 101, village type growth along Carlsborg Road, and maintenance of rural densities and open spaces outside the core area." The report went on to develop population and land use capacity projections, together with improvement options for water and sewer service, and open space. The Task Force concluded, however, that a consensus could not be reached as to whether Carlsborg should be designated a unique urban growth area (UGA) without first completing a capital facilities plan to evaluate public infrastructure needs and costs.

Clallam County adopted a comprehensive plan in June, 1995, which included a county-wide capital facilities plan and designated the Carlsborg area as a Rural Center rather than an Urban Growth Area. The County has been re-evaluating the adopted plan, as it applies to Carlsborg, in response to the City of Sequim's challenge to the Rural Center designation, as well as to citizen concerns regarding long-standing property rights and quality of life issues. The City of Sequim petitioned the Western Growth Management Hearing Board to determine whether the residential densities and commercial land uses allowed under the 1995 Plan for Carlsborg were appropriate outside urban growth areas. The petition also cited concerns that the County's capital facilities plan did not provide for adequate public facilities to support Carlsborg development.

In order to resolve the issue locally (and not through the State Hearings Board), the County signed a Memorandum of Understanding (MOU) with the City of Sequim in May of 1996. The County enacted an Interim Land Use plan consistent with the provisions of the MOU, which will remain in effect until replaced by a final land use plan consistent the Growth Management Act.

In 1997, the County prepared a draft CFP that included the construction of a sanitary sewer system for the Carlsborg planning area. The public comment received on that proposal was generally against the construction of a sewer. The Board of Commissioners then directed staff to analyze the potential for an urban growth area land use designation with a supporting capital facilities plan, which included the feasibility of allowing on-site sewage disposal systems instead of a sanitary sewer system. The Board

also directed staff to work with the Clallam County Planning Commission to develop, for public review and input, the necessary draft changes to the comprehensive plan and zoning code.

In order to designate the Carlsborg planning area as an Urban Growth Area, the Comprehensive Plan amendments, Capital Facilities Plan and Zoning Code amendments are currently open for public review and input.

Capital Facilities Plan

Clallam County is preparing a Capital Facilities Plan (CFP), Comprehensive Plan amendment and Zoning amendment to comply with comprehensive planning requirements as set forth in Washington's Growth Management Act, RCW 36.70(A). Capital facilities are the infrastructure and services needed to support growth and development, such as sewage treatment, water supply, roads, drainage control, parks, law enforcement, and emergency services. The Comprehensive Plan (also called a land use plan) contains goals and policies which govern land use decisions and development regulations for orderly growth. Zoning is the primary regulatory tool for implementation of these goals and policies. In order to ensure growth and development occurs within the financial and physical constraints of the community and natural setting, all three elements must be consistent with one-another.

The purpose of this Capital Facilities Plan (CFP) is to assess the public infrastructure needs within the Carlsborg project area that are consistent with the Clallam County Comprehensive Plan for the preferred land use alternative :Carlsborg Urban Growth Area. This CFP for the unincorporated community of Carlsborg complies with comprehensive planning requirements of the Growth Management Act (GMA). The CFP, one of six elements required for a Comprehensive Plan, must ,at a minimum, include:

- An inventory of existing capital facilities
- A forecast of future needs for such capital facilities
- Proposed locations and sizes of expanded or new capital facilities
- A six-year plan for financing such capital facilities
- A requirement to reassess the land use element if funding falls short of meeting capital facilities' needs and to ensure consistency between the land use element and the capital facilities element and associated financing plan [RCW 36.70A.070 (3)]

As noted above, the land use alternative that is examined in this CFP is the designation of Carlsborg as an Urban Growth Area utilizing on-site sewage disposal systems. Other land use alternatives that were reviewed are discussed in the environmental analysis for this planning effort, as required by the State Environmental Policy Act.

Methodology

The land use capacity analysis provides a forecast of population and development growth for Carlsborg. This information is necessary for planning for capital facilities needs. Planning for the adequate provision of capital facilities for the next 20 years in Carlsborg requires information on existing land uses and a forecast of future growth. To obtain this information, the Clallam County Department of Community Development (DCD) reviewed previous analyses that were prepared for this planning subarea and also conducted a land use capacity analysis.

The Carlsborg land use capacity analysis was conducted for the 20-year planning period (2000-2020). The analysis considers the existing (2000), 6-year (2000-2005) and 20-year (2000-2020) planning horizons. The land use capacity analysis is intended to comply with the data collection and analysis requirement of the Growth Management Act (GMA). Accordingly, the analysis focuses on:

- Identifying the location and distribution of existing land uses.
- Identifying the approximate acreage and range of density or intensity of existing land uses.
- Identifying vacant land.
- Estimating future population growth for the Carlsborg planning area.
- Projecting the build-out, or level of commercial, industrial and residential development likely to be experienced over the 20-year planning period.
- Analyzing the extent to which vacant land can support anticipated growth.
- Assessing whether the densities and distribution of growth contemplated in the Comprehensive Plan land use alternatives for the Carlsborg planning area can be achieved within the capacity of available land.

The GMA requires that level of service (LOS) standards are established for services provided by local jurisdictions as part of capital facility planning. LOS standards are criteria used for assessing needed improvements to current and future facilities. Thresholds, also called Levels of Service (LOS), are determined for each public service included in the CFP, and analyses are conducted through comparison of the LOS thresholds with existing facilities. LOS standards can also be developed for other capital facilities and applied as quantifiable measures of public facilities and services needed to serve present and future residents and businesses. Such standards define minimum levels of performance, or thresholds, that must be met by existing and new facilities. Meeting these thresholds achieves concurrency and avoids future conditions that could lead to under-served growth. A list of necessary upgrades is developed, which would be required to meet current facility needs, as well as the needs of projected growth. These facility needs primarily include:

1. Developing on-site sewage disposal design standards to address groundwater quality issues,
2. Extending PUD No. 1 water coverage throughout Carlsborg,
3. Transportation mobility of Highway 101, as well as circulation patterns and overall public safety.

The CFP also includes a 6-year finance plan for funding the required facility improvements. This plan examines various sources to develop a funding strategy to implement the CFP.

Alternatives Considered

Development of the draft Capital Facilities Plan, Comprehensive Plan amendment and Zoning amendment, required analysis of anticipated growth and development under the proposed UGA. Under the analysis of the SEIS, the County was obligated to evaluate anticipated environmental impacts associated not only with the proposed UGA, but also with alternatives to the proposal (WAC 197-11-430). The following land use alternatives form the basis of the analysis found in the SEIS, and provided the background necessary for developing the proposed draft land use legislation:

- Alternative 1 – The Carlsborg Urban Growth Area (UGA) Alternative: This is the preferred alternative that would designate the Carlsborg as an UGA. Adoption of this alternative would include the adoption of the policies and standards of the proposed Capital facilities Plan Comprehensive Plan amendment and Zoning amendment.
- Alternative 2 – The Rural Activity Center Alternative: This alternative would designate Carlsborg a Rural Activity Center based on land use policies similar to those adopted in 1996, under the Memorandum of Understanding (MOU) adopted jointly by the Board of County Commissioners and the City of Sequim. The primary concern with this alternative is the inherent difficulty in establishing consistency with the GMA.
- Alternative 3 – The “No Action” Alternative: This alternative Assumes that current interim land use controls and zoning designations would expire. Without specific guidance under existing interim ordinances, it is assumed that land use regulations would revert to those adopted in December, 1995, or regulations that pre-dated that adoption.

Recommendation

This CFP supports the designation of the Carlsborg planning area as an urban growth area (preferred alternative), consistent with the Growth Management Act and Clallam County Comprehensive Plan and summarizes the physical improvements that are necessary to support land use development within the proposed UGA designation. This CFP lists the following capital facility needs, along with their associated costs required for the proposed Carlsborg Urban Growth Area. The CFP also states that these facility needs will most likely be necessary for growth in the Carlsborg planning area regardless of the land use designation. Chapter 11 provides a funding strategy to address the costs.

Effect of Recommendation

Adoption of the proposed Carlsborg Urban Growth Area legislation will implement zoning and other land use controls that will guide future growth and development over the twenty year planning horizon. Allowed land uses and densities of those uses will occur within the capacity and limitations of the area. Infrastructure necessary to serve existing and future development will occur concurrently with that development, or be provided within the given six-year financial planning horizon. As development occurs and infrastructure is improved, existing problems such as congestion and water quality issues will be curtailed. The development of the plans will give the community a vehicle which enable them to monitor its success and provide feedback to the elected officials if issues arise requiring a change in strategy.

While the legislation will invoke certain costs to be borne on development and the community in general, the analysis shows that such costs are inevitable. By planning for such costs, more efficient use of development fees, community revenue and public funding can be guaranteed. Additionally, certainty can be guaranteed for the future of the Carlsborg area.

The following summarizes the infrastructure costs identified in the proposed Carlsborg Capital Facilities Plan:

Capital Facility Needs	Associated Costs – Six Year Planning Period	Funding Sources – Six Year Planning Period
Water (Chapter 4)	\$1,230,000	Various (see Chapters 4 and 11)
Transportation (Chapter 10)	\$879,000	Various (see Chapters 10 and 11)

CHAPTER 1. INTRODUCTION

Clallam County is preparing this Capital Facilities Plan (CFP) for the unincorporated community of Carlsborg to comply with Washington's Growth Management Act (GMA) comprehensive planning requirements. Capital facilities are the infrastructure and services needed to support growth and development, such as sewage treatment, water supply, roads, drainage control, parks, law enforcement, and emergency services. Renewing capital facility planning efforts in Carlsborg is in response to the City of Sequim's challenge of Clallam County's 1995 Comprehensive Plan and citizen concerns regarding long-standing property rights and quality of life issues.

The Carlsborg CFP assesses the capital facility needs over the next 20 years for the Preferred Alternative which would designate Carlsborg an Urban Growth Area (UGA) based on land use policies similar to those adopted for Carlsborg in the 1995 Clallam County Comprehensive Plan and implementing similar zoning districts. The boundaries of the individual zoning districts are relatively the same as the Interim Zoning Rules and zoning designations put into place in 1996, with a few exceptions. The Preferred Alternative proposes enhanced, individual, on-site sewage or community sewage systems and not a sewer treatment plant. Discussion specific to this issue is provided in Chapter 3 of this CFP and in greater detail under Appendix A.

The CFP is one of six elements required for a Comprehensive Plan under the GMA (36.70A.070 RCW). The CFP is an important component of the Comprehensive Plan because it serves as a critical link between land use and the infrastructure needed to support it. According to WAC Chapter 365-195 (Growth Management Act—Procedural Criteria) the CFP element should contain at least the following features [RCW 36.70A.070(3)]:

- An inventory of existing capital facilities
- A forecast of the future needs for such capital facilities
- Proposed locations and sizes of expanded or new capital facilities
- A six-year plan to finance such capital facilities
- A requirement to reassess the land use element to resolve funding shortfalls for capital facilities needs and to ensure consistency between the land use element and the capital facilities element and associated financing plan.

SETTING

The project area includes approximately 560 acres along the State Route 101 corridor immediately west of the Dungeness River bridge, as shown in Figure 1-1. This unincorporated area includes a mix of strip commercial activities, existing residential (single-family and mobile home parks) and industrial developments (Carlsborg Industrial Park and Idea Development), and several large retail warehouses (United Furniture Warehouse and Costco).

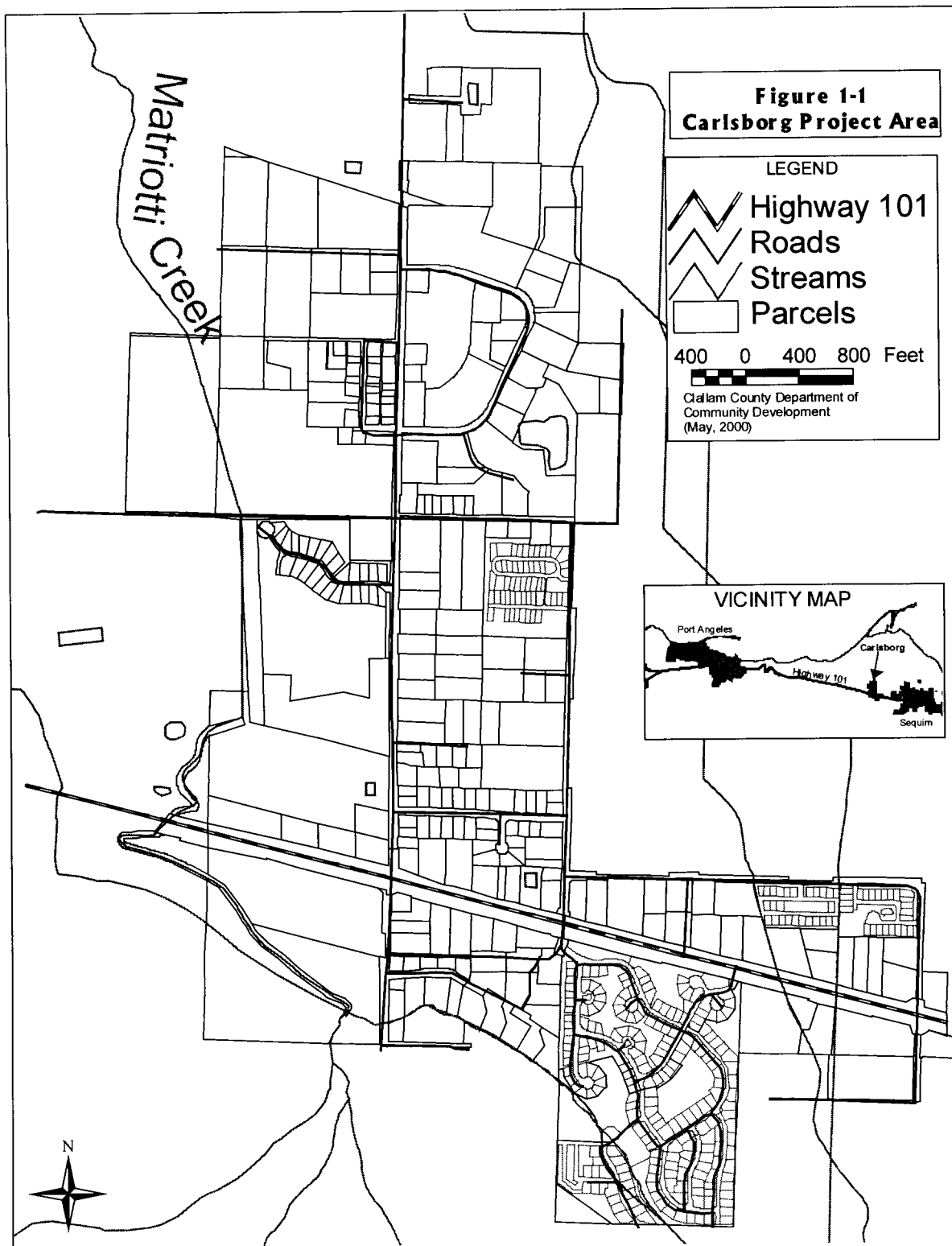
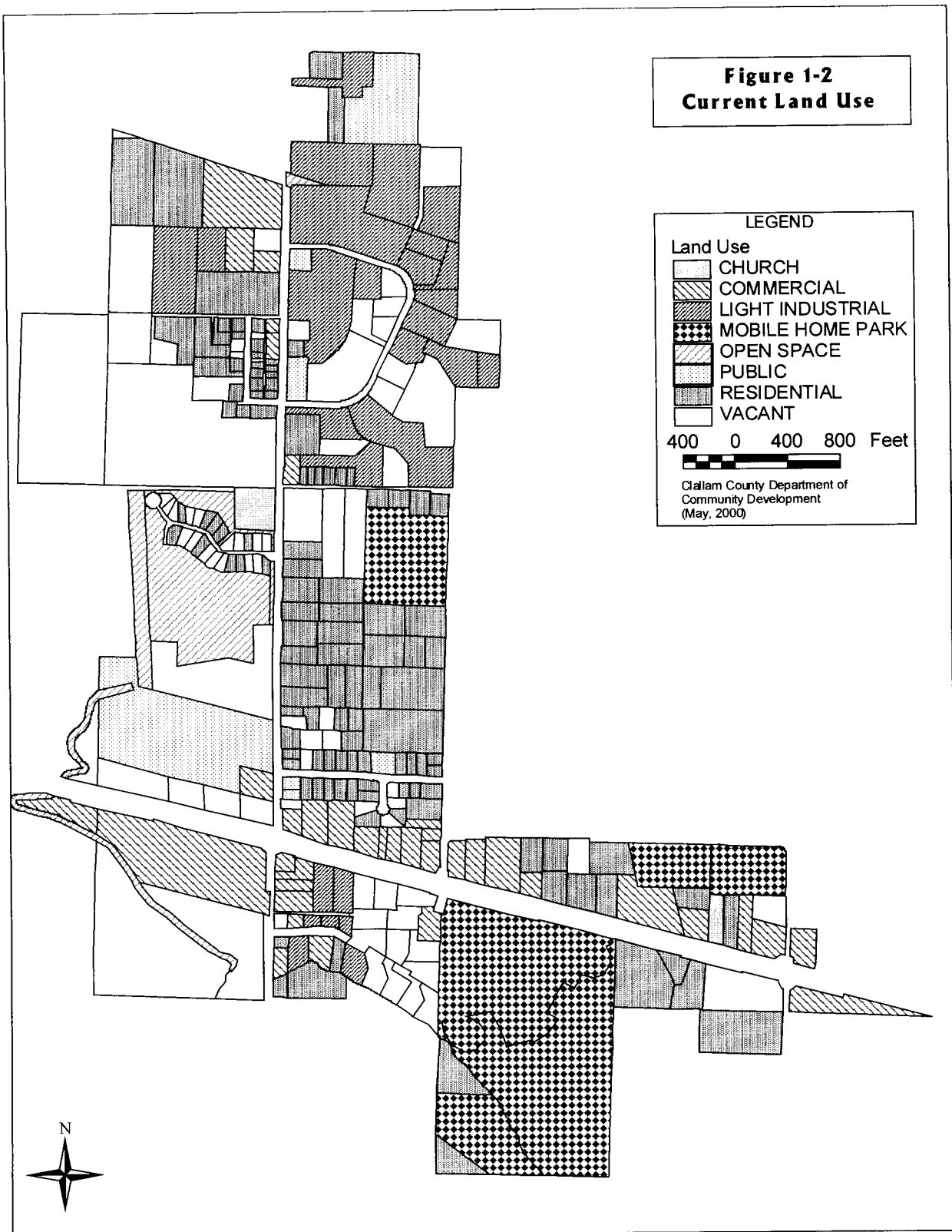


Table 1-1 summarizes the existing uses of land within the project area and Figure 1-2 depicts their locations. Please note that these figures differ slightly from the total acreage and number of parcels that are located within each zoning designation as provided in Chapter 2 - Background and Methods, as well as in Appendix A, Land Use Capacity Analysis. This difference is a result of use of the County's GIS system for statistical evaluation and is due primarily to the periodic inclusion of areas for streets and roads which are sometimes included in parcel acreage calculations.

**TABLE 1-1
EXISTING LAND USE IN CARLSBORG PROJECT AREA**

LAND USE	ACRES	NUMBER OF PARCELS
Residential		
<i>Residential</i>	100.2	120
<i>Mobile Home Park</i>	77	308
Total Residential	177.2	428
Industrial	64.6	24
Commercial	57	37
Total Comm/Industrial	121.6	61
School	19	1
Public	1.14	3
Utilities	9.5	3
Church	3.3	2
Open Space	26.8	7
Vacant	158.3	81
Total - Other	59.7	16
Roads	51.8	N.A.
TOTALS	568.6 Acres	583 Parcels



Population projections for Clallam County as a whole indicate that growth in the Carlsborg area will continue along historical trends. While much of the area has been developed, there are significant vested vacant lands awaiting development, as well as lands that could be redeveloped. (Vested lands are those lands with development permits pending or preliminarily approved but not yet constructed. Once a property is vested, it is unlikely the level of allowable development will change because property rights have already been conferred.)

Existing public and private infrastructure to support current development in Carlsborg is provided by the following public agencies, community systems, and private individuals:

- Streets and Roadways: Private roads, Clallam County and Washington State Department of Transportation (Highway 101)
- Sewage Disposal: individual on-site and community systems
- Water: on-site private wells, community groundwater systems, and Public Utility District (PUD) No. 1
- Solid Waste: Clallam County
- Parks and Recreation: Clallam County; Public School District
- Fire Protection: volunteer fire department
- Law Enforcement: Clallam County Sheriff
- Drainage/Stormwater: private, based on County design standards.

With growth over the next 20 years expected to add about 600 residents, and with mixed high-intensity commercial and industrial development that may occur in the Carlsborg area, there is a potential for significant environmental impact unless development is reviewed and completed appropriately. The Dungeness River is located just east of Carlsborg, and Matriotti Creek and associated wetlands are located within the project area. The majority of the Carlsborg project area and surrounding lands are designated by Clallam County as areas with critical recharging effects on aquifers used for potable water. The County has identified these areas and associated environmental concerns in its comprehensive plan and has policies to protect them from the impact of development.

GENERAL GOALS AND POLICIES

The success of land use planning efforts and the economic health of an area depend on capital facilities that are sufficient to support expected development. Deficiencies in capital facilities affect the health and safety of residents and the perception of community character and livability.

The Carlsborg CFP incorporates the following general goals and policies that apply to capital facilities planning as addressed in the County Capital Facilities Plan, included in the 1995 Clallam County Comprehensive Plan (Ordinance 573). These goals are general and describe a vision of the future for the Clallam County area. In meeting these goals, the Carlsborg CFP promotes that vision, as well as ensuring compliance with GMA.

1. Ensure that public facilities necessary to support development are adequate to serve the development at the time the development is available for occupancy

- and use, without decreasing current service levels below locally established minimum standards.
2. Encourage development in urban areas where adequate public facilities exist or can be provided in an efficient manner.
 3. Encourage the retention of open space, development of recreational opportunities, access to natural resource lands and water, and development of parks.
 4. Establish level of service (LOS) standards for public facilities.
 5. Prepare a six-year financial plan for any public facilities that need to be developed as a result of LOS requirements and projected changes in population. The six-year financial plan should be based on cost estimates for capital improvements identified in this plan.
 6. Allow private investment to assist in meeting LOS standards.
 7. Require that the costs of operation and maintenance are analyzed to ensure that future budgets will be able to maintain facilities.
 8. Coordinate the Capital Facilities Plan with other elements of the Carlsborg Comprehensive Plan.
 9. The Capital Facilities Plan should be coordinated and be consistent, where possible, with the plans and policies of other entities within the region.

COMPARISON OF PREFERRED ALTERNATIVE AND INTERIM RULES

In developing the legislation for designating Carlsborg as an Urban Growth Area, the County is making specific changes to land use policy effecting future growth and development in the area. Areas designated for residential, commercial, and industrial uses generally follow the same boundaries under both the preferred alternative and interim zoning. The difference between these two growth alternatives are the Comprehensive Plan land use designations and implementing land use controls (zoning) for residential lands and for commercial areas adjacent to Highway 101.

Residential lands are designated as Carlsborg Urban Residential (CR) under the preferred alternative and as Rural (R1) under interim rules. For residential uses, the primary difference between CR and R1 is the maximum allowable residential density. The maximum residential density is one dwelling unit per 21,780 square feet for the CR designation. In comparison, the maximum residential density for R1 is one dwelling unit per acre.

Commercial lands located adjacent to Highway 101 west of the Mill Road Intersection are designated as General Commercial (GC), with that portion east of Mill Road and north of Highway 101 being designated Carlsborg Commercial (CC) under the preferred alternative. The interim rules designates this entire area as Carlsborg Commercial (CC). The primary differences between the GC and the CC designations are the maximum allowable height, maximum size (square footage) of area of new commercial structures, and types of commercial uses allowed. Generally, the CC designation allows for small-scale, low impact types of commercial uses while the GC zone is designed for larger, more intensive commercial uses intended to provide region-wide goods and

services. More discussion and policies pertaining to the relation between land use and infrastructure needs are provided in the following chapters.

ORGANIZATION OF CAPITAL FACILITIES PLAN

Chapter 1 of this CFP provides introductory information, followed by background information and a general summary of methodology in Chapter 2. Chapters 3 through 10 address each kind of capital facility provided in Carlsborg. The discussion of each kind of public facility begins with an inventory of existing facilities. Standards are then established to evaluate the adequacy of the capital facility. Results of applying the standards are used to define current capital facility deficiencies and recommendations for future improvements. Where appropriate, planning level cost estimates are included for the identified improvements. Several appendices are also provided which include additional, supporting information for various chapters of the CFP.

The final chapter of the CFP is a finance plan that focuses on funding the improvements for the first six years of the planning period. This chapter presents the methodology used to develop the planning level cost estimates for improvements recommended in the individual chapters. These costs are integrated into summary tables for ease of comparison. In addition, specific revenue sources are identified that can be used to pay for needed improvements.

CHAPTER 2.

BACKGROUND AND METHODS

GENERAL METHODOLOGY

Overview

The purpose of the CFP is to document and compile all capital project improvement needs, costs, timing, and financing, including capital facilities identified in other Comprehensive Plan elements (such as the transportation element). By doing so, the CFP meets the following Growth Management Act requirements:

- Identifying existing public infrastructure needs for 6- and 20-year projection periods
- Establishing concurrency (i.e., the cost, timing, and financing of public infrastructure improvement needs to support future growth and development with no diminution of public infrastructure level of service to existing residents and users)
- Identifying the financing method (required for the six-year period from 2000 to 2006).

The process for preparing a CFP involves a set of tasks analyzing facilities that support existing residential, commercial, and government activities, and a set of tasks identifying future public infrastructure needs based on the land use element and population projections in the comprehensive plan. Since the CFP is to support the County's GMA comprehensive plan, once completed it must be integrated into the comprehensive plan. The overall effort to prepare the CFP and integrate it into the County comprehensive plan may be summarized as follows:

- Develop an inventory of existing publicly owned facilities, based on existing data provided by the County.
- Determine the levels of service required for public infrastructure to support existing and future development in the area based on land use designations that allow urban development.
- Evaluate the capital improvement costs and timing of public infrastructure development.
- Prepare a finance plan that identifies the sources and revenues necessary to pay for the public infrastructure as it is needed in order to meet concurrency requirements.
- Prepare a supplemental environmental impact statement that evaluates the environmental consequences of the proposed infrastructure.
- Submit a completed capital facilities element that can be integrated into the Sequim-Dungeness Regional Plan.

Capital Facilities Analyzed

The following facilities are analyzed in this CFP:

- Water supply
- Wastewater treatment
- Stormwater Management
- Solid Waste Management
- Law Enforcement
- Fire Protection
- Parks and Recreation
- Streets and Roads.

LOS THRESHOLDS AND CONCURRENCY

The GMA requires that level of service (LOS) standards be established for services provided by local jurisdictions as part of capital facility planning. LOS standards are criteria used for assessing needed improvements to current and future facilities. LOS standards can also be developed for other capital facilities and applied as quantifiable measures of public facilities and services needed to serve present and future residents and businesses. Such standards define minimum levels of performance, or thresholds, that must be met by existing and new facilities. Meeting these thresholds achieves concurrency and avoids future conditions that could lead to under-served growth.

System needs and deficiencies in Carlsborg are identified for water, sewage disposal operation and maintenance, and streets and roads. This assessment of needs and deficiencies also includes the results of planning efforts by the County covering fire protection, law enforcement facilities, and solid waste facilities.

This LOS approach to defining facility needs must be flexible in order to reflect the County's objectives and goals and the project area's service needs. For the purposes of this study, LOS development includes any direct method that is employed to identify improvements needed for current and future residents and users. Different methods have been used to determine facility deficiencies and needs for each public infrastructure category studied.

LAND USE ALTERNATIVES

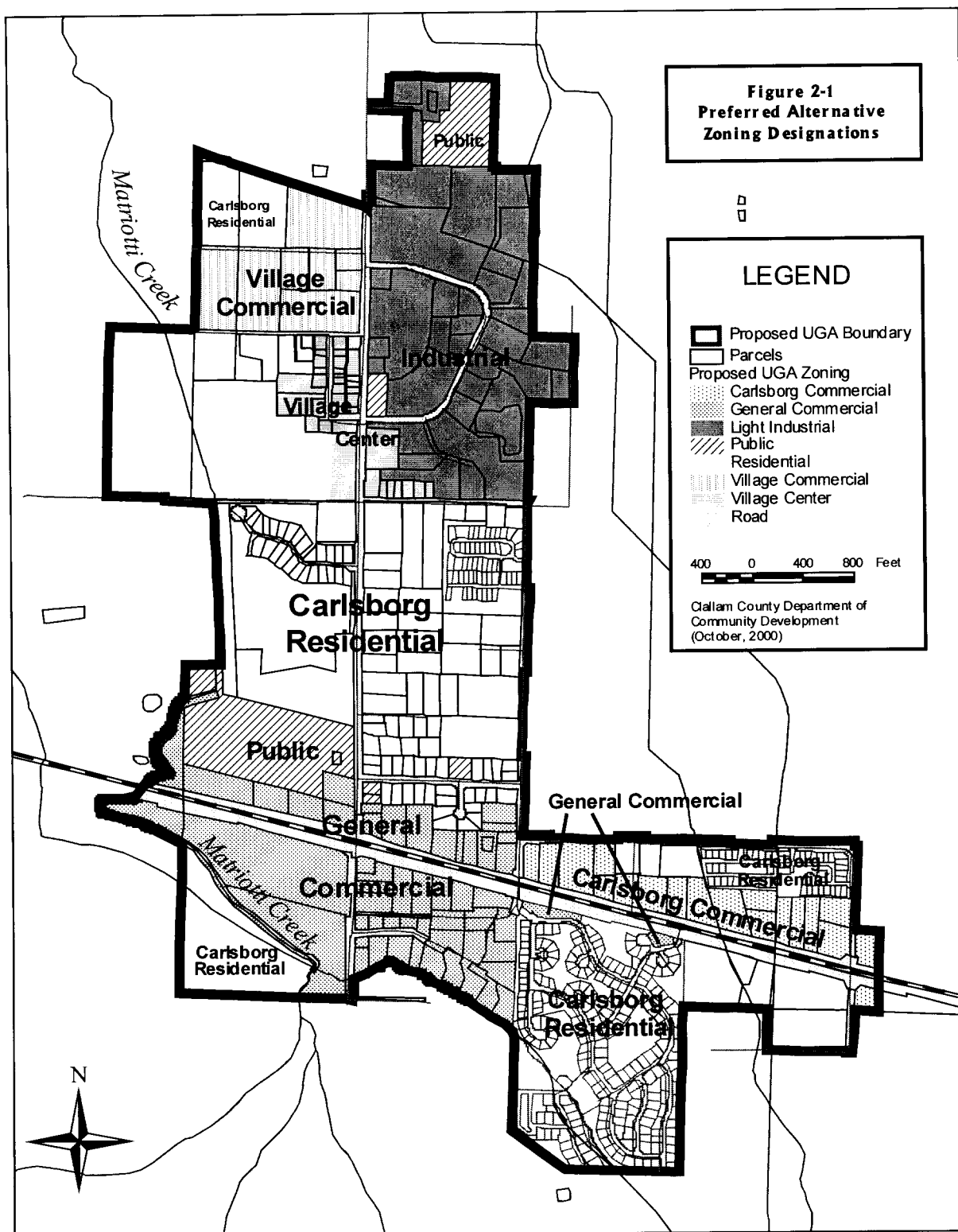
To ensure that the necessary infrastructure and services are provided to support growth, the capital facilities plan must be coordinated and consistent with the land use element of the comprehensive plan. The land use element designates the general distribution, location, and extent of uses of land. This study provides an analysis of capital facility plan alternatives for the Preferred Alternative. A description, comparison, and background of the Preferred Alternative follows.

Description of Land Use Alternative

Preferred Alternative—Carlsborg Urban Growth Area

Preferred Alternative establishes Carlsborg as an Urban Growth Area which allows on-site or community sewage disposal systems to be utilized instead of a sewer system. This alternative provides for a mix of residential, commercial, and industrial uses based on the following land use designations and subject to sewage disposal limitations. It should be noted that the Public land category is not listed below even though there are public lands within the planning area. For more information on the public land purpose, consult Title 33, Zoning Code.

1. **Carlsborg Urban Residential (CR).** The Urban Residential designation provides for areas of single and multi-family residential development that are generally free from encroachment of commercial and industrial activities. Home-based businesses and limited types of non-residential uses may be allowed where consistent with the character of the residential neighborhood. The maximum allowable residential density is two dwelling units per acre and the minimum lot size is 0.5 acres.
2. **Carlsborg Village Commercial (CV).** The Village Commercial designation provides for limited, low impact, commercial activities that generally require larger developable lots and do not depend on a location directly accessible and visible from State Highway 101. The minimum lot size is 0.5 acres.
3. **Carlsborg Village Center (CN).** The Village Center designation provides for a limited area of moderate-density residential development and low impact, neighborhood commercial activities within the historic town center of Carlsborg. The maximum density is two units per acre and the minimum lot size is 0.5 acres.
4. **Carlsborg General Commercial (CGC).** The Commercial designation provides for a wide range of moderate-scale commercial activities that provide for neighborhood, regional, and tourist-related goods and services for both residents and the traveling public. The size and scale of commercial structures should be generally limited to a single structure no larger than 20,000 square feet, and motels should generally contain less than 60 units. Residential development is prohibited in order to retain the limited amount of land available for commercial development along State Highway 101 between Port Angeles and Sequim. The maximum density is two units per acre and the minimum lot size is 0.5 acres.
5. **Carlsborg Industrial (CI).** The purpose of the Light Industrial designation is to allow for low nuisance, low intensity industrial uses. Residential development and certain types of commercial development (e.g., retail stores, lodging, grocery stores) are prohibited in order to retain the limited amount of land available for industrial development. The maximum density is two units per acre and the minimum lot size is 0.5 acres.
6. **Carlsborg Commercial (CC).** The purpose of the Carlsborg Commercial designation is designation is to allow a limited area of moderate-density residential development and low-impact, neighborhood commercial activities. The maximum density is two unit per acre and the minimum lot size is 0.5 acres.



Comparison of Land Use Alternatives

Figure 2-1 shows the land use designations for the Preferred Alternative. Table 2-1 contains the acreage and percent coverage of each comprehensive plan land use designation for the Preferred Alternative. Please note that the total acreages shown below are taken from the GIS data base, which may differ from the Clallam County Assessor's records. Public uses are not included in these calculations, which account for the total acreage being less than the 560-acre area within the planning boundary.

TABLE 2-1. LAND USE DESIGNATION AREAS		
Land Use Designation	Area (acres)	Percent Of Total Area
Carlsborg Urban Residential (CR)	275	49
Carlsborg Village Commercial (CV)	26	5
Carlsborg Village Center (CN)	10	2
Carlsborg Commercial (CC)	27	5
Carlsborg General Commercial (CGC)	71	13
Carlsborg Commercial (CC)	27	5
Roads and Open Space	73	13
Total	509	100

Residential lands designated as Urban Residential under the Preferred Alternative (Figure 2-1) allow up to two dwelling units per acre. In comparison, the maximum residential density for Rural (R1) lands under the Interim Rules is one dwelling unit per acre with a minimum lot size of 1 acre. Table 2-2 lists the allowed, conditional, and prohibited land uses for various zoning districts under the Preferred Alternative. The definitions of each of the uses listed in Table 2-2 follows Title 33, Zoning Code.

Commercial lands located adjacent to Highway 101 are designated either as General Commercial (GC) west of Mill Road or Carlsborg Commercial (CC) east of Mill Road. The primary differences between the GC and CC designation are the size and height of new commercial structures, and the type of commercial uses allowed. The differences in allowed or prohibited land uses are shown in Table 2-2 as follows:

Table 2-2 – Land Uses for the Preferred Alternative

Zoning District Use Table C.C.C. 33.20.040(A)	CR	CV	CN	CC	CGC	CI
Agriculture	A	A	A	A	A	A
Asphalt Plant	X	X	X	X	X	C
Bed and Breakfast	A	A	A	A	X	X
Business Park	X	A	A	A	A	A
Cemetery	C	C	C	C	X	X
Child Day Care Center	C	A	A	A	A	X
Church	C	A	A	A	A	X
Commercial Greenhouse	X	A (*)	A (*)	A (*)	A (*)	A (*)
Commercial Horse Facility	X	A	A	A	A	C
Commercial Storage	X	A (*)	C	A (*)	A (*)	A (*)
Duplex	A	A	A	A	X	X
Family Child Care Home	A	A	A	A	X	X
Gas Station	X	A (*)	A (*)	A (*)	A (*)	A (*)
Grocery Store	C	A (*)	A (*)	A (*)	A (*)	X
Group Homes (16 or fewer persons)	A	A	A	A	X	X
Group Homes (17 or more persons)	A	A	A	A	X	X
Home Based Industry	A	A	A	A	X	X
Home Enterprise	A	A	A	A	X	X
Indoor Shooting Range	X	X	X	X	C	X
Limited industrial Uses	X	X	X	X	X	A
Lodge	A	A	A	A	A	X
Medical Service Facility	C	A	A	A	A	C
Mobile Home Park	A	C	C	C	X	X
Motel	X	A	A	A	A	X
Multiple Family Dwelling	A	C	C	C	X	X
Outdoor Oriented Recreation Facility	C	A (*)	A (*)	A (*)	A (*)	X
Planned Unit Development	A	A	A	A	X	X
Professional Office	X	A	A	A	A	A
Race Track	X	X	X	X	X	X
Research Facility	X	C	C	C	A (*)	A (*)
Restaurant	X	A (*)	A (*)	A (*)	A (*)	C
Retail Use (Not Listed)	X	A	A	A	A	C
RV-Park	C	A (*)	A (*)	A (*)	A (*)	X
School	A	A	A	A	A	X
Single Family Dwelling	A	A	A	A	X	X
Tavern	X	A (*)	A (*)	A (*)	A (*)	X
Timber Harvesting	A	A	A	A	A	A
Tourist Shop	X	A	A	A	A	X
Vehicular Repair	X	A (*)	A (*)	A (*)	A (*)	A (*)
Veterinarian Clinic/Kennels	X	A (*)	A (*)	A (*)	A (*)	A (*)
Wholesale Commercial Use	X	X	X	C	A (*)	C
Wood Manufacturing	X	A (*)	X	A (*)	A (*)	A (*)
Wood Manufacturing, small scale	X	A (*)	A (*)	A (*)	A (*)	A (*)
Wrecking Yard	X	X	X	X	X	A (*)

A - Allowed Land Use C - Conditional Land Use X - Prohibited Land Use

(*) – NOTE: A conditional use permit is required for applicable uses when any portion of the subject parcel abuts residentially-zoned property. In addition to the criteria for review and approval specified under C.C.C. 33.27.040 (Conditional Use Permit), project review shall also include particular attention to the following to ensure adequate buffering and protection for residential uses: 1.) sound levels and time of day of anticipated sound impacts; 2.) objectionable odors; 3.) light and glare; and 4.) aesthetic impacts from buildings, parking, loading docks, storage areas, trash bins, and other operational or structural aspects of the development that could result in impacts to neighboring residences. The expansion of pre-existing uses subject to this requirement shall be exempt from the conditional use permit process; PROVIDED, the subject structure(s) in which the use occurs is not expanded by more than ten (10) percent within any three (3) year period, as measured by the exterior dimensions of the foundation of the enclosed structure(s).

Minimum Lot Size

The density for both CGC and CC lands is two units per acre and the minimum lot size is 0.5 acres, provided public health requirements for sewage disposal and public water can be met.

Size/Height of Structure

Uses under the GC designation are limited to a single structure no larger than 20,000 square feet and no higher than 50 feet. Under a CC designation, uses are limited to a single structure no higher than 25 feet and restricted to the following sizes: 10,000 square feet for neighborhood grocery stores, 3,000 square feet for restaurants, and 5,000 square feet for other uses.

Type of Commercial Use

The purpose of the GC designation is to allow a wide range of commercial goods and services to the entire region. For example, commercial operations between 5,000 and 20,000 square feet and motels with fewer than 60 units are allowed under the GC designation but prohibited under the CC designation. The purpose of the CC designation is to provide limited, low-impact, neighborhood commercial activities. Due to on-site sewage disposal system requirements, size and intensity of future uses may be limited.

To preserve commercial options, the GC designation prohibits non-commercial land uses such as single- and multi-family residential, mobile home parks, and home-based commercial businesses such as a bed and breakfast, home-based industries, and home enterprises. These uses are allowed under a CC designation. Table 2-2 above, compares the allowed, conditional, and prohibited land uses proposed for lands designated GC and CC under the Clallam County Zoning Code.

Selection of Carlsborg Land Use Alternative

The Preferred Alternative is based on the following policies, regulations, and land use actions:

- Growth Management Act of 1990
- Sequim-Dungeness Regional Plan (1995)
- Interim Land Use Controls (1996)
- 1996 Rezones and Docketed Comprehensive Planning and Zoning Issues

Growth Management Act

The designation of land uses related to either establishing Carlsborg as an Urban Growth Area or a Rural Activity Center (similar to Interim Rules) must be consistent with the Growth Management Act of 1990 (Chapter 36.70A, RCW). The GMA establishes minimum requirements for establishment of Urban Growth Areas (RCW 36.70A.110) and areas of more intensive rural development (RCW 36.70A.070) such as Rural Activity Centers.

Urban Growth Areas are those areas where "urban growth" shall be encouraged and outside of which growth can occur only if it is not urban in nature. In designating urban growth areas, the GMA requires that all incorporated areas be included within UGAs. Unincorporated areas may be designated as UGAs only if such areas are already characterized by urban growth. The Act defines urban growth as growth that: "makes intensive use of land for the location of buildings, structures, and impermeable surfaces... When allowed to spread over wide areas, urban growth typically requires urban governmental services. "Characterized by urban growth" refers to land having urban growth, or to land located in relationship to an area with urban growth so as to be appropriate for urban growth (RCW 36.70A.030 (17))."

The GMA allows Counties to designate limited areas of more intensive rural development, including necessary public facilities and services to serve such areas (Chapter 36.70A.070). Areas of limited more intensive rural development consist of the infill, development, or redevelopment of existing commercial, industrial, or mixed-use areas. In designating such areas, the GMA requires local jurisdictions to adopt measures to minimize and contain the existing areas or uses of more intensive rural development as appropriate. The Act defines "existing areas" as those that are clearly identifiable and contained and where there is a logical boundary delineated predominately by the built environment, but that may also include undeveloped lands. [RCW 36.70A 5 (d)(iv)]

1995 Sequim-Dungeness Regional Plan

The Preferred Alternative designates Carlsborg an Urban Growth Area. The decision of whether to designate Carlsborg an UGA was heavily debated during the development of the 1995 Clallam County Comprehensive Plan. Central to this debate was the fact that portions of the Carlsborg area already exhibited "urban type growth" such as along the Highway 101 corridor, within the industrial park, and in a number of residential developments. In addition, pre-1995 land use designations and zoning standards allowed for continued development of industrial, urban residential densities (2 to 4 dwelling units/acre), and large-scale commercial development over large areas.

Many area residents, however, were not in favor of a UGA designation. Residents feared that such a designation would ultimately destroy the area's "rural character" and require expensive urban services such as a sewage treatment plant. Others thought a designation of UGA was the only way to prevent the loss of long-standing property rights established in the early 1980s. As a compromise, the County designated Carlsborg a Rural Center within the 1995 Sequim-Dungeness Regional Plan (Ordinance 574, 1995). This designation resulted in a reduction of the maximum allowable residential densities in many areas, and limited the intensity and scale of commercial development. The most significant actions were as follows:

- Limiting the size and scope of commercial development along Highway 101 to single structures less than 20,000 square feet
- Redesignating approximately 130 acres of urban residential lands and two acres of commercial land to rural land designations
- Retaining approximately 179 acres of lands designated for lower density urban residential development (up to two dwelling units/acre)
- Redesignating approximately 23 acres of rural land to urban residential land. Almost 60 percent of this acreage, however, was located within the fully

developed Carlsborg Mobile Home Park, which has a gross density of over four dwelling units/acre

- Redesignating approximately 57 acres of moderate density urban residential lands to low density urban residential
- Redesignating approximately 15 acres of residential lands to commercial along Highway 101
- Redesignating approximately 16 acres of light industrial lands from industrial to low-intensity commercial lands
- Redesignating the 19-acre parcel associated with Graywolf School from commercial to urban residential.

The City of Sequim filed a timely appeal to the Western Growth Hearings Board that challenged whether the urban residential and regional commercial land uses allowed under the 1995 Plan were appropriate outside of urban growth areas. As a result of this challenge, the Carlsborg CFP assesses the public infrastructure and service needs to support growth similar to what was envisioned by the 1995 Comprehensive Plan under the Urban Growth Area alternative.

In selecting the Preferred Alternative, Clallam County reviewed the land use policies, designations, and development standards in existence prior to adoption of the 1995 Sequim-Dungeness Regional Plan. In the 1995 plan, the vision for Carlsborg was for moderate urban growth centered along Highway 101, village type growth along Carlsborg Road, and maintenance of rural densities and open spaces outside the core area (CCC 31.03.340). Secondly, the comprehensive plan provides policy guidance that directs Clallam County to plan for the City of Sequim to be the primary commercial and service area for the Sequim-Dungeness region (CCC 31.03.310 (13)). Unless Clallam County adopts another community vision and new policy direction for Carlsborg's role as a commercial center, consideration of the pre-1995 land use policies, designations, and development standards (e.g., zoning) would be inconsistent with the above stated vision and policy.

1996 Rezone and Docketed Items

In 1997, the Planning Commission recommended denial of a 1996 request to rezone a parcel directly east of Parkwood Mobile Home Park and adjacent to Highway 101 from urban residential to commercial. The Board of Clallam County Commissioners upheld the Planning Commission's recommendation. Although the site specific rezone was denied, the Planning Commission docketed the issue of expanding Highway 101 commercial for consideration in 1998. The Commission felt that expansion of Highway 101 commercial zoning had merit since the five parcels east of Parkwood that are located within the 1995 Carlsborg Rural Center were the only remaining lands not designated commercial. By docketing, the Commission concluded that any expansion of commercial zoning along Highway 101 should be done as part of the ongoing comprehensive planning efforts to adopt permanent Carlsborg land use controls.

In 1998, another request for a rezone was submitted and approved by the Somervilles (REZ98-0002). The request was to be removed from the Carlsborg planning area so that the land use designation of their adjacent properties was the same. In other words, the request constituted a 'down-zone'. The property is located in the southwest portion of the project area off of Brueckner

Road. The irrigation ditch/stream in this area borders the subject property on the northern property line and serves as a natural feature to separate the commercially-developed Carlsborg area from adjacent rural lands. Through this process, it was discussed whether or not the adjacent residential parcels to the west of Somerville property and south of the ditch/creek should also be residential and not commercial lands.

Project Area / Land Use Alternatives Boundary

The boundary is based on a slightly larger version of the Carlsborg Rural Center adopted under the 1995 Sequim-Dungeness Regional Plan (Ordinance 574, 1995). The lands added to the 1995 boundary include three parcels covering approximately 30 acres that are part of a contiguous ownership with land located within the 1995 designated Carlsborg Rural Center. Under the 1995 Plan, these three parcels were designated as Rural Lands. Lands proposed to be removed from the planning area include small acreages along the southern boundary lined.

Also analyzed was whether or not to continue past practices of placing two land use designations on one property. The result of this review was minor adjustments to the boundaries of either the project area to implement current policy which is to follow property lines, or natural features in land use designation boundaries whenever possible and practicable.

POPULATION AND GROWTH ASSUMPTIONS

The County has prepared population estimates for the Carlsborg area (see Appendix A). Existing population (2000) is estimated to be 857 people. Using an annual 2.72 percent population growth rate, the County estimates that Carlsborg will have 980 residents by 2005. By the end of the 20-year planning horizon, there will be approximately 1,465 residents. The 20-year population forecast for Preferred Alternative is approximately 27% higher than the projection for the current, interim rules.

A summary of projected growth for the 6-year, 20-year and build-out planning horizons is presented in Table 2-3. For more information, refer to Appendix A.

TABLE 2-3. LAND USE PROJECTED NUMBER AND TYPE OF NEW DEVELOPMENT SITES				
Land Use Total	Existing	6-Year (2000- 2005)	20-Year (2006- 2020)	Total Existing and Buildout (2020)
Urban Residential (CR)	475	42	98	615
Village Commercial (VC)	8	12	28	48
Commercial Center (CN)	26	3	0	29
General Commercial (CGC)	47	12	28	87
Carlsborg Commercial (CC)	20	12	28	60
Carlsborg Industrial (CI)	36	12	28	76
Totals	612	93	210	915
a. If vested property develops to existing density allowance				

Table 2-4 breaks down the anticipated types of development that will occur along Highway 101:

Table 2-4 Projected Number and Type of New Commercial Development Sites in the Highway 101 Corridor			
Land Use	Preferred Alternative		
	6 Year 2000-2005	20 Year 2006- 2020	Total 2000-2020
Fast Food/Restaurant	2	3	5
Gas Station/ Groceries	1	0	1
Motel	1	2	3
(less than 60 units)			
Retail/Tourist/ Food (10,000 -20,000 sf)	1	2	3
Retail/Tourist/ Food (5,000 -10,000 sf)	1	3	4
Retail/Tourist/ Food (< 5,000 sf)	1	5	6
Commercial Storage/ Professional Offices	1	3	4
Totals	8	18	26

RELATED PLANS

Previous studies have evaluated public infrastructure service needs and costs to support Carlsborg's future growth. Many of these studies were consulted in the process of preparing this CFP. A description of each is presented below.

1995 Clallam County Comprehensive Plan

The Clallam County Comprehensive Plan provides a guide for coordinated and orderly growth and development of the land and physical improvements in unincorporated areas of Clallam County. The Plan consists of a countywide Comprehensive Plan and four regional sub-area comprehensive plans: Sequim-Dungeness, Port Angeles, Straits, and Forks-West End. Carlsborg is within the Carlsborg Neighborhood planning area under the Sequim-Dungeness Regional Comprehensive Plan.

The comprehensive plan is adopted pursuant to the Clallam County Charter, the Growth Management Act of 1990 (Chapter 36.70A RCW) and the Planning Enabling Act (Chapter 36.70 RCW). Land use controls such as zoning must be consistent with the adopted comprehensive plan. Clallam County will have to amend the comprehensive plan and implementing land use controls based on the final land use designations adopted for the Carlsborg area.

1994 Clallam County Capital Facilities Plan (Existing)

The 1994 Clallam County Capital Facilities Plan (CFP) is an element of the Clallam County 1995 Comprehensive Plan. The 1995 comprehensive plan coordinates the land use element with the capital facilities and transportation elements. Capital facility improvements for roads and other transportation improvements are addressed under the transportation element within the countywide Comprehensive Plan and the four regional sub-area comprehensive plans. For non-transportation related facilities, the 1994 Clallam County Capital Facilities Plan is incorporated by reference into the 1995 Clallam County Comprehensive Plan (CCC 31.02.810).

The 1994 CFP is a 20-year plan with a 6-year financial element for construction and maintenance of the County's capital facilities. The County capital facilities covered in this plan include roads, sewer, general administration, courts, detention and corrections, law and justice, parks, recreation and open space, flood control devices, solid waste, and equipment maintenance facilities.

Carlsborg Comprehensive Sewer Study

The Carlsborg Comprehensive Sewer Study was completed in December 1994. The study was to provide Clallam County with an estimated project cost to complete improvements for a sewer system in Carlsborg. The study was initiated in response to community requests to explore alternatives for sewage disposal in light of high levels of nitrates found in groundwater. These high levels indicated that changes to traditional on-site wastewater treatment would be needed for long-term wastewater disposal in the Carlsborg area.

The Comprehensive Sewer Study focused on developing a realistic cost estimate for an off-site wastewater treatment facility. It included an engineering analysis of appropriate technology to address collection, treatment, and effluent discharge, and developed cost estimates to evaluate the feasibility of system implementation.

The information in this report serves as the basis for the sewer analysis in the CFP. The cost estimates are also used in the preparation of the finance plan. There are some significant differences, however, between the previous sewer study and the CFP. The most important difference is the size of the project areas. The sewer study analyzes a 650-acre urban growth area and a 3,100-acre ultimate sewer service area. The CFP analyzes a smaller 560-acre project area.

Carlsborg Task Force Report

The Carlsborg Task Force Report to the Clallam County Board of Commissioners was released on July 6, 1994. The statement of community vision for Carlsborg, addressed in this report, includes "moderate urban growth centered along Highway 101, village type growth along Carlsborg Road, and maintenance of rural densities and open spaces outside the core area." The report goes on to develop population and land use capacity projections, together with improvement options for water and sewer service and open space. The Task Force concluded that a consensus could not be reached as to whether Carlsborg should be designated a UGA, deferring that determination to a separate study.

Water System Plan for PUD #1 of Clallam County

The Water System Plan for Public Utilities District (PUD) #1 of Clallam County was prepared in August 1994. The study looked at the ability of the PUD to meet demand for potable water in Clallam County for 20 years, as required under GMA. The study also focused on issues such as water rights, water conservation, and water quality and treatment, especially in light of Department of Health regulations. Financial information was also included to ensure that the water plan would be adequately funded. The information in the Water System Plan served as the basis for the water analysis in the CFP.

Final Environmental Impact Statement for the Clallam County Comprehensive Plan

The Final Environmental Impact Statement (EIS) for the Clallam County Comprehensive Plan was completed in June 1995. This analysis of the expected environmental impact of implementing the Clallam County Comprehensive Plan also served as a source document for this analysis. The EIS focused on the effects of implementing the Comprehensive Plan, through changes in land use controls and Critical Areas ordinances, on each portion of the physical environment, such as water, air quality, and critical areas. Mitigation strategies were developed for any unavoidable adverse impact identified.

Supplemental Environmental Impact Statement

Once the Capital Facilities Plan has been completed, the County will need to prepare a Supplemental Environmental Impact Statement (SEIS) to address the potential environmental impacts from Carlsborg growth and development. This will be a supplement to the final EIS that has been adopted in 1995. The SEIS will analyze land use alternatives and identify mitigation strategies as well as unavoidable adverse impacts that may result from Carlsborg growth.

CHAPTER 3. ON-SITE SEWAGE DISPOSAL FACILITIES*

EXISTING CONDITIONS

All residences and businesses in the Carlsborg area are served by on-site sewage disposal systems. The State Department of Health defines on-site sewage systems as "integrated arrangements of components for a residence, building, industrial establishment or other place not connected to a public sewer system which: (a) convey, store, treat, and/or provide subsurface soil treatment and disposal on the property where it originates, upon adjacent or nearby property; and includes piping, treatment devices, other accessories, and soil underlying the disposal component of the initial and reserve areas" (WAC 246-272-00501). On-site sewage systems are further defined and regulated based on the number of connections and amount of wastewater flow they are designed to serve.

The Clallam County Department of Community Development estimates that community on-site sewage systems (serving two or more connections) associated with the following developments provide sewage disposal for 334 residential connections, or 78 percent of the total residential units in the project area:

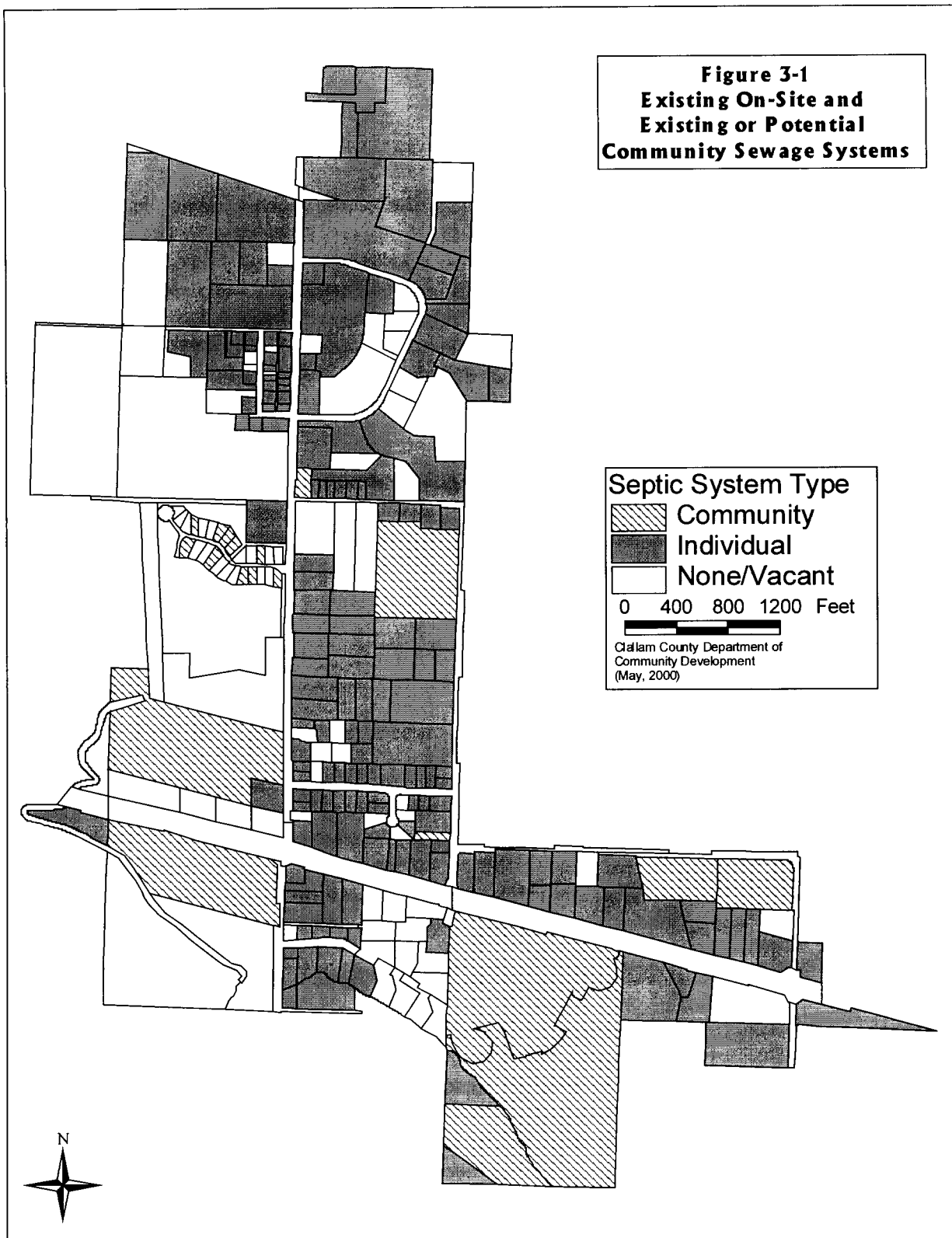
- Alta Vista
- Carlsborg Mobile Home Park
- Parkwood Mobile Home Park
- Green Acres I and II Mobile Home Parks.

Residential on-site systems are designed for wastewater flows of 120 gallons per day (gpd) per bedroom per Department of Health guidelines. The amount of wastewater flow generated from non-residential development varies considerably. Design flows for commercial and industrial development range from 100 to 7,000 gpd. The system serving Graywolf School is designed for 10,500 gpd. Figure 3-1 shows Carlsborg's distribution by parcel of individual and on-site sewage disposal systems, including commercial systems.

CONTINUED USE OF ON-SITE SEWAGE UTILITIES

Appendix B evaluates the potential for continuing to serve the Carlsborg area with on-site systems and provides a technical analysis of on-site sewage disposal system conditions and use in the area. The technical analysis presents information on groundwater quality, soils, and other data supplied by the County, along with an assessment of regulatory issues and preliminary alternatives for on-site sewage disposal. The analysis concludes that alternatives to the current practice of utilizing standard on-site sewage disposal systems are necessary to accommodate the wastewater disposal needs of current residents and businesses into the future, as well as the needs of future growth in the area, regardless of the densities allowed.

* Source – Portions of this text were provided by KCM, Inc., - Carlsborg Draft Capital Facilities Plan, October 1998.



The alternatives recommended include development of a public, off-site sewer system, or use of enhanced technology on-site sewage disposal systems that utilize denitrification processes. The recommendation to consider these alternatives for the Carlsborg area is based on the findings of the study, which conclude that increasing development (industrial, commercial, and residential) over the planning period on land with currently increasing nitrate levels in the underlying aquifer would increase groundwater degradation if alternatives to standard on-site sewage disposal systems are not implemented. The study concludes that some areas will be more vulnerable to degradation with increasing growth and development should on-site treatment continue under traditional on-site sewage disposal methods. The on-site wastewater treatment study suggests that on-site systems may continue to be used only if all the following conditions are met:

- The existing systems continue to function properly hydraulically.
- The County requires enhanced treatment technologies that achieve a substantial (minimum 50%) reduction in nitrate discharge for all new on-site septic systems and all replacements or repair of existing systems.
- The County implements strategies to reduce nitrogen loading from sources other than on-site sewage systems (e.g., fertilizers).
- There is a mechanism to ensure that operation and maintenance activities are performed (e.g., establishing a sewer utility district within which operation and maintenance of all on-site sewage systems would be performed through a public or quasi-public entity).

The recommendation to consider enhanced on-site sewage systems for this area is based on consideration of several factors. Consideration was given to the existing condition of the Carlsborg area, including: an analysis of the current condition of the underlying aquifer, current density and land use activities and their associated potential contribution to existing nitrate levels. This information was compared to the projected growth of the Carlsborg area under the preferred land use alternative, as well as Interim Rules and the ability of the enhanced systems to substantially reduce nitrate contributions to the aquifer from new development and existing development over time. This recommendation supports that use of enhanced treatment technologies can significantly reduce the rate of increase in nitrate levels and may reduce current levels in the area aquifer over time.

FUTURE NEEDS

Planning for on-site sewage disposal needs for the Carlsborg Area requires a somewhat different approach than that used under off-site sewage system options considered under previous studies for the area (Carlsborg Comprehensive Sewer Study, Parametrix, Inc., 1994). While it is essential to project what the ultimate capacity needs of an off-site facility will be at full development, planning for on-site septic systems require fewer land use assumptions to be made. Approximately 95% of the Carlsborg Planning Area is comprised of soils described as Type 1 (SCS Soil Survey for Clallam County, 1959). Environmental Health regulations prohibit the placement of on-site septic systems on parcels containing less than ½ acre (21,780 square feet) in areas classified as having Type 1 soils. This is permitted only when an approved off-site (public) water source is available to the development (WAC 246-272-20501). Therefore, the remainder of this analysis shall assume availability of a public water system and a minimum parcel size of ½ acre for all zones under the

Preferred Alternative. Continuing with the Interim Rules, or similar land use designations, will assume current zoning and no further requirements regarding public water systems. Development scenarios under this alternative will be determined by environmental health standards and existing zoning regulations.

In addition to establishing minimum acreage for utilizing on-site sewage disposal systems, State Health Law establishes a maximum septage volume generation standard for residential and commercial/industrial developments of 450 gpd per half acre lot with Type 1 soils (WAC 246-272-20501(2)(d)(I)). No development within the Carlsborg area containing Type 1 soils may exceed these thresholds if on-site septic disposal methods are to be utilized on minimum parcel sizes of ½ acre. Although other soil types do exist in the project area (approximately 5%), their infrequent occurrence does not make it practicable to allow zoning that permits a higher density than that permitted under State Health Law for Type 1 soils. Rather, development occurring on more suitable soils may benefit from development incentives such as use of traditional sewage disposal methods or increase in the intensity of the use of the property (i.e. higher commercial waste volume generated). Nevertheless, for on-site systems to function as a viable option in the Carlsborg Planning Area, development must be evaluated as to the volume of potential septage generated per half acre (or equivalent) in order to maintain consistency with State Environmental Health Law.

Controlling Nitrates

Appendix B provides a detailed analysis of the problem facing the Carlsborg area concerning increased levels of nitrates within area ground water, and what can be done in terms of enhanced technologies for on-site sewage disposal systems. The problem is that contaminants of concern, bacterial viruses and nitrogen, are not fully treated (removed) from wastewater in Type 1 and 2A soils (excessively coarse) with conventional gravity fed onsite sewage systems. While it has not been determined that septic systems are the main source of ground water contamination, it is with reasonable diligence that measures must be taken to ensure no further degradation occurs as a result of increase development of such systems. Furthermore, to the degree practicable, corrections should be made to standard sewage disposal methods to correct what contributions existing systems may have to the current problem. This becomes an essential component of the Capital Facilities Plan in the context of the State Antidegradation Law (WAC 173-200) under the Preferred Alternative. Figure 3-2 shows the estimated nitrate generation in pounds per day for projected development over the next twenty years under the land use alternatives utilizing traditional on-site sewage disposal technology:

Figure 3-2

Estimated Nitrate Discharge from On-Site Septic Systems from New Development
Without Denitrification Under the Preferred Alternative and Interim Rules

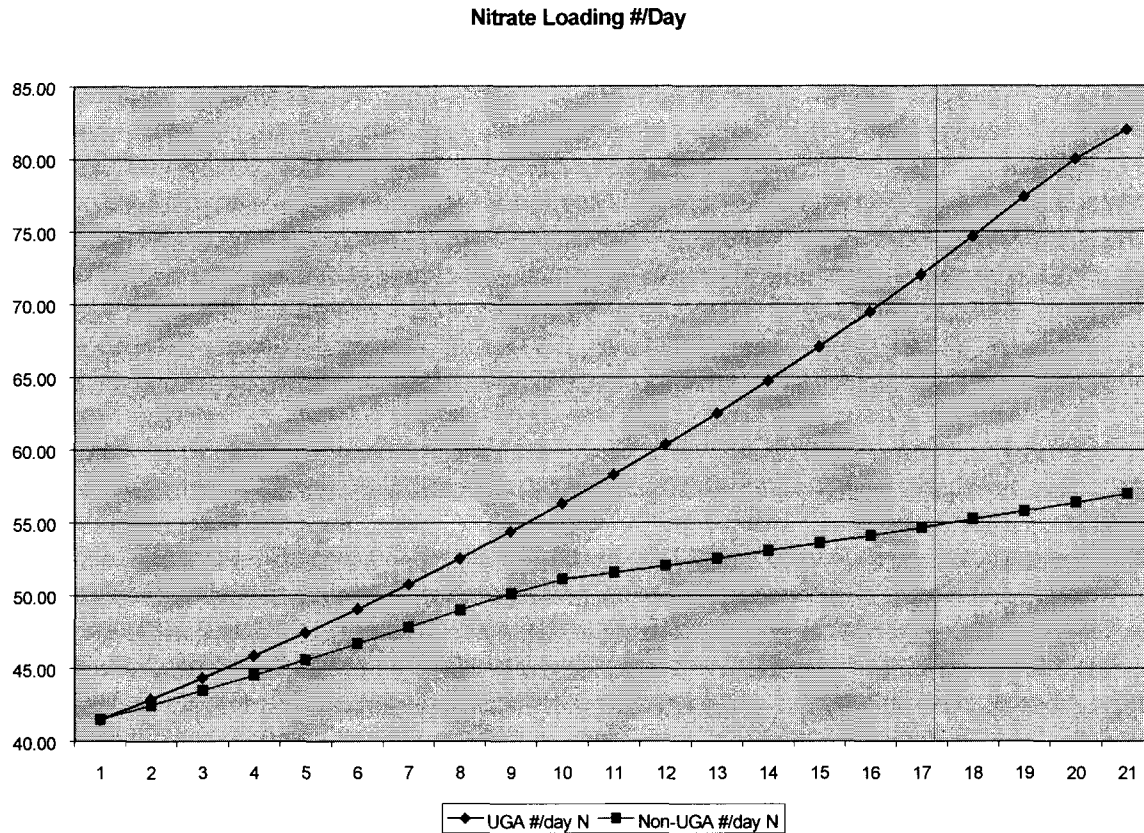


Figure 3-2 illustrates the anticipated increase of nitrate contribution to area ground water of 15.46 lbs. to 82.25 lbs. Daily, by development over the next twenty years utilizing traditional on-site sewage disposal systems under the preferred land use alternative, as well as Interim Rules. Although the exact level of nitrate loading occurring in the area aquifer from septic systems is not known, These percentages do indicate a substantial increase that may result in further degradation of the aquifer.

Further discussed under Appendix B are a variety of septic system designs that incorporate nitrification/denitrification steps in the processing of effluent. While some of these technologies are relatively new, many of them hold promise of reducing nitrate discharge to the ground water between 60% to 90% and more. However, given that these systems are relatively new, adequate testing has not been conducted that determines the duration for which such systems function at optimum level. The discussion under Appendix B concludes that a denitrification level of 50% reasonably allows for variation in effectiveness of various systems installed and takes into account a reasonable level of reduced effectiveness over time. While it is still essential to monitor the

effectiveness of enhanced treatment systems, establishing a denitrification level of 50% shall be used to determine whether a system is functioning adequately for the Carlsborg Planning Area under the Preferred Alternative, and shall form the basis for the remainder of this analysis.

In order to address the issue of increased nitrates appearing in area ground water, consideration must be given to existing systems as well as all new systems. While Appendix B has demonstrated that a 50% reduction in nitrate contribution is achievable with the use of enhanced technologies, continued degradation is likely, however occurring only at half the rate as would occur without their use. Table 3-1 shows the estimated waste water generation and associated nitrate generation for existing development, development at buildout, and development over the next 20 years, provided enhanced technology is utilized for all new development under the Preferred Alternative:

Table 3-1					
Volume of Waste Generated Daily and Associated Nitrate Utilizing Enhanced Treatment Processes					
For New Development under Preferred Alternative					
	Current Development	Year 2020 Preferred Alternative	Year 2020 Interim Rules	Buildout Preferred Alternative	Buildout Interim Rules
Residential	51,360	80,160	63,120	80,160	63,120
Non-Residential	31,500	83,700	50,400	179,550	179,550
Total Est. Nitrate/Day	41.49	61.73	56.95	65.01 extra #/day	121.50 extra #/day

Table 3-1 does demonstrate a significant reduction in nitrate contribution for the Preferred Alternative if enhanced treatment processes are implemented. Specifically, the contribution rate of 82.25 pounds per day is reduced to 61.73 at the end of the twenty-year planning period, representing an overall increase of 20.24 lbs. daily from current contribution levels. However, the Interim Rules is anticipated to generate only 15.46 lbs. of additional nitrate contribution at the end of the twenty-year planning period. In order for the Preferred Alternative to demonstrate greater protection of ground water resources, additional measures must be taken to reduce nitrate contributions.

All existing development within the Carlsborg Planning Area utilize on-site septic systems. Out of these, none have employed enhanced treatment that meet the 50% denitrification standard proposed under the Preferred Alternative. Achieving compliance with the 50% denitrification standard for these existing systems would significantly reduce nitrate contribution to area groundwater. If all existing and new systems were to meet this standard, nitrate contribution would be half what it is today, and only 99 % of the current level at 20 years for development

under the Preferred Alternative. However, ethical and legal considerations indicate that requiring upgrade of existing systems may only be feasible under limited circumstances.

Industry standards indicate an average annual failure rate of 2 to 5 % (WSDOH). Type 1 soils present a contributing factor in that failing septic systems on this type of soil do not always offer the same characteristic indicators of failing systems that occur on other soil types such as ponding. This indicates that a known failure rate closer to 2 % can be anticipated for the Carlsborg Planning Area. Currently, State Health Law requires that failing systems be repaired or replaced according to current environmental health standards. If this regulatory practice is applied to the 50% denitrification standard within the Carlsborg Planning Area, a conservative estimate of 33% of the existing systems will be up-graded within the twenty year planning period. Figure 3-3 shows a comparison between anticipated nitrate contribution increases over the next twenty years for new development under the preferred land use alternative, as well as interim rules, with enhanced treatment technologies required for new systems and all repairs or replacement systems under the Preferred Alternative.

Figure 3-3

Estimated Nitrate Discharge from On-Site Septic Systems with replacement Systems Utilizing Enhanced Treatment Systems under the Preferred Alternative

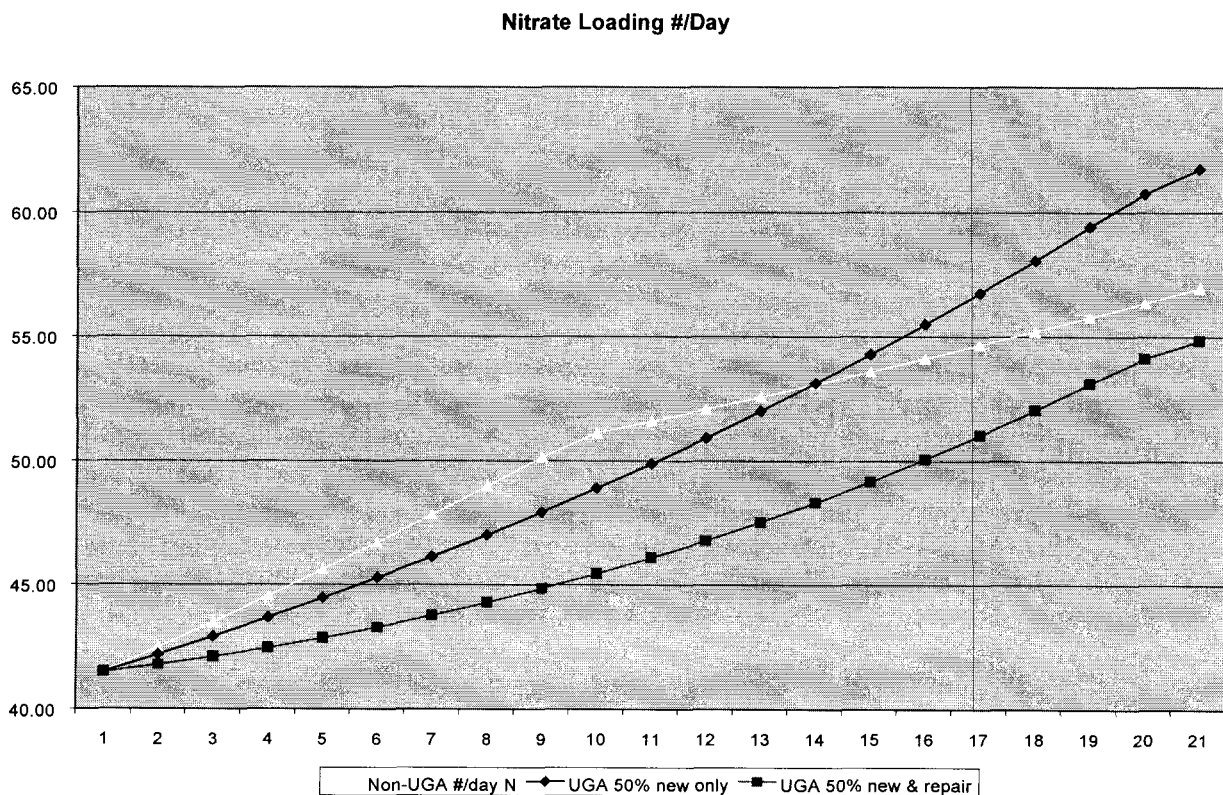


Figure 3-3 does illustrate that increases in nitrate levels attributed to on-site septic systems can be reduced from existing levels over the twenty year planning period for the Preferred Alternative if such systems are required for all new development and repairs or replacements to existing systems.

More importantly, this figure illustrates that requiring enhanced treatment for all new systems and all replacement systems will provide a greater level of ground water protection than that under the current interim rules.

Available Technologies/Enhanced On-Site Treatment Systems

To meet the challenge of removing a substantial and predictable level of nitrate and bacterial contaminants prior to discharge into the ground, consideration must be given to the latest technology available that has demonstrated reliable treatment of these biological and chemical contaminants. These systems are required to accomplish not only nitrate removal that meet the specific management needs of the Carlsborg Area under the Preferred Alternative, but also treat bacterial viral pathogens as well. The following standards are established by Washington State Department of Health for the treatment of septic waste:

***Treatment standard I:** A thirty-day average of less than 10 milligrams per liter of biochemical oxygen demand (five-day BOD5), 10 milligrams per liter of total suspended solids (TSS), and a thirty-day geometric mean of less than 200 fecal coliform per 100 milliliters. The thirty-day average is calculated based upon a "running" average.*

***Treatment standard II:** A thirty-day average of less than 10 milligrams per liter of biochemical oxygen demand (five-day BOD5), 10 milligrams per liter of total suspended solids (TSS), and a thirty-day geometric mean of less than 800 fecal coliform per 100 milliliters. The thirty-day average is calculated based upon a "running" average.*

In addition to showing promise of substantial nitrate removal, many enhanced technology systems have demonstrated the ability to meet or exceed treatment standard II. Enhanced treatment systems utilize aeration as a fundamental step in wastewater treatment. They consist of a remote blower, a tank containing bacterial growth media, an air distribution system, and a re-circulation system to facilitate removal of nitrogen.

As in a traditional septic system, the first compartment is utilized for separation and settling. The fluid then moves into the second compartment where it flows into the base of the tank. In this second compartment, compressed air from the blower is introduced – creating a vigorous movement of the effluent in an oxygen rich environment. The aerobic bacteria on the media exposed to this environment modify the dissolved nitrogen compounds into nitrates. The re-circulation system transfers the treated aerobic fluid back into the anaerobic wastewater of the initial holding tank. The anaerobic environment (oxygen reduced) of this holding tank, combined with necessary fuel in the form of organic carbon, allow anaerobic bacteria to convert the nitrates into nitrogen gas. The basic system has demonstrated consistent removal of over 50% of the nitrogen in wastewater.

OPERATION AND MAINTENANCE

In order for the benefits of enhanced on-site septic systems to be fully realized in the Carlsborg Area, careful monitoring of all systems is necessary. An effective Operations and Maintenance Program (O&M) would be required for the Carlsborg Area under the Preferred Alternative if on-site sewage disposal systems are preferred over a centralized sewer system.

WAC 248-272-15501 (1) states that the OSS (On-site Septic System) owner is responsible for properly operating and maintaining the OSS. This Subsection also establishes protocol for the local health officer concerning OSS operation and maintenance. Specifically, the local health officer shall monitor all OSS performance within *areas of special concern*. An area of special concern is defined by WAC 246-272 as "an area of definite boundaries delineated through public process, where a local health officer, or the department in consultation with the health officer, determines additional requirements for on-site sewage systems may be necessary to reduce potential failures, or minimize negative impact of on-site systems upon public health." Areas of special concern are further defined in Clallam County Health Regulation 4.020 (7) as "An area of definite boundaries established by the Clallam County Board of Health, where it has been determined that additional requirements for sewage systems may be necessary to reduce potential failures or minimize negative impact of on-site systems upon public health."

The Carlsborg Planning Area incorporates many characteristics that make it appropriate to manage as an area of special concern in the context of the on-site sewage disposal option. All of the area currently utilizes on-site sewage disposal systems. Much of the area is characterized by an urban density level of development (parcels < 1 ac.). The majority of the area (approx. 90 %) is underlaid by Type 1 soils. And the ground water in the area is experiencing elevated levels of nitrate pollution. In the context of the previous regulatory requirements, these factors support an on-site sewage disposal management strategy that treats the Carlsborg Planning Area as an area of special concern. This conclusion is further supported under the Preferred Alternative as the County would be taking action that would actually increase the density of the Carlsborg Planning Area from that which already exists.

Educate and Inform the Public

The most effective approach to gaining public acceptance of an O&M program is by educating OSS users about system function and maintenance. To achieve this, the following should be initiated by Clallam County:

1. Disseminate educational materials through targeted mailings.
2. Provide O&M workshops targeted to the area and types of OSS in use. workshops should be designed to provide basic information on how septic systems work, different types of systems and why systems need to be maintained. Follow-up workshops could introduce the enhanced nitrate treatment technology principles and provide information on daily operation and maintenance. There is also a need to hold workshops for the businesses in the area.
3. Provide ongoing education as a reminder service and as an introductory resource to new homeowners and business owners moving into the area.

Inspection and Monitoring Program

An inspection and monitoring program should be developed and include the following:

Existing Residential OSS:

1. Although an annual inspection is currently recommended for alternative systems as per Washington State guidelines adopted by the Board of Health, an annual inspection of such

systems in the Carlsborg planning area shall be required. Conventional systems should be inspected at minimum every three (3) years. The inspection criteria shall include information specified in WAC 246-272-21501 (3)(b);

2. The Environmental Health Division (EHD) should develop a process to notify existing OSS owners of the need for routine maintenance;
3. When the existing OSS fails:
 - a) If the soils are classified as excessively drained (Type 1 & Type 2A), the replacement system shall meet the current areas of special concern criteria (Treatment standard II and Min. 50% Nitrate reduction).
 - b) If the soils are classified as Type 2B or finer, enhanced treatment is not required.

Existing Commercial OSS:

1. An inspection should be required at minimum once per year and include criteria as specified in WAC 246-272-21501 (3)(b);
2. The Environmental Health Division (EHD) should develop a process to notify existing OSS owners of the need for routine maintenance;
3. When the existing OSS fails, the replacement system shall meet the current areas of special concern criteria (Treatment standard II and Min. 50% Nitrate reduction).

New OSS:

1. All new OSS shall meet treatment standard II as defined in WAC 246-272 and demonstrate a minimum 50% denitrification.
2. An inspection should be required as per manufacturer's recommendation or at minimum once per year. The maintenance inspection criteria shall include criteria as specified in WAC 246-272-21501 (3)(b) and the following test criteria:
 - a) Influent shall be tested for Ammonia, Nitrite, and Nitrate.
 - b) Effluent shall be tested for BOD5, TSS, Fecal Coliform, Ammonia, Nitrite, and Nitrate.
3. An Operation and Maintenance agreement shall be developed by the Designer of record, signed by the property owner(s), and submitted for the EHD review.
4. Any replacement OSS shall meet the current areas of special concern criteria.

Only individuals approved or designated by the local health officer shall conduct OSS inspections. The EHD shall establish and maintain a program to certify qualified individuals for the inspection and maintenance of OSS.

Information Tracking and Analysis

1. The EHD should develop a system to track the operation and maintenance activities within the Carlsborg Planning Area.
2. A detailed account of any maintenance activity and sample results shall be submitted to the EHD within 30 days of the system's inspection. Maintenance activity and sample results shall be reported on forms provided by the EHD.

3. The EHD shall review each submittal for compliance with the targeted treatment standards.

Evaluation

In order to determine if the O&M program is successful, the EHD will develop indicator parameters which should be tracked over time. Such indicators may include:

- Number of people attending O&M workshops
- Phone or mail-in surveys to determine effectiveness of the educational campaign
- Number of phone calls or personal contacts made regarding O&M activities
- Volume of septage pumped in the Carlsborg area
- Number of failing OSS reported and fixed
- Sample results from new denitrification systems.
- Reduction of Nitrate loading in groundwater

Policy/Regulation Development

The implementation of the O&M program will necessitate its incorporation into the County's on-site sewage code C.C.H.R., Chapter 4. Policies regarding O&M inspections, homeowner notification, enforcement, etc. established under this Capital Facilities Plan will also need to be implemented under County regulations, where applicable.

Enforcement

A successful O&M program includes an enforcement component. The ability to follow through with the established protocol can not be understated. The EHD and the County's Prosecuting Attorney's Office must receive the resources to develop the appropriate response to noncompliance.

Financial Barriers

The financial burden that the proposed technology for new and replacement OSS places on the individual homeowner is a considerable barrier to compliance. Financial incentives and/or subsidy assistance should be explored and implemented prior to the adoption of this plan.

Special Considerations

The Carlsborg Planning Area contains a wide range of land uses and associated parcels. Non-conforming lots (under ½ acre) need to have solutions built in. Waivers may be a possibility if space for septic is available. Community systems may also be explored as an option.

The discussion on enhanced on-site septic systems demonstrates great promise for substantial denitrification of treated wastewater under the Preferred Alternative. However, many of these

technologies are relatively new. Furthermore, it is the intent of this capital facilities plan to encourage the use of new technologies as they become available, provided they demonstrate substantial effectiveness at treating nitrates and biological contaminants. But because these technologies are new, data regarding the actual life-span of such systems is not readily available. Careful monitoring is therefore essential to facilitate better understanding of these limitations.

Project Costs

The following figures represent the estimated costs associated with the start-up and annual operation of the operations and maintenance program previously described in this Chapter:

Cost borne by the county:

Operation and Maintenance Specialist	\$45,968
Support Staff	\$38,000
Supplies	\$10,000
Indirect costs 25%	<u>\$20,992</u>
<i>Yearly County Costs</i>	<u>\$114,960</u>

Start up county costs:

Computer Equipment	\$6,000
Office Equipment	\$15,000*
Vehicle	<u>\$36,000</u>
	<u>\$57,000</u>

* Existing office equipment must be replaced with space efficient equipment in order to fit two additional staff members into currently cramped quarters.

Cost borne by the O&M service providers:

~ 500 hours/year staff time (PUD or certified professional) \$12,500

(500 hours was calculated at ~ 150 system inspection/year X 2 hours + additional support staff time and follow-up visits)

(Cost was figured at \$25/hour)

** Professional's generally charge \$100 -120 / inspection

Supplies	\$ 2,000
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Indirect costs 25% of salaries	<u>\$ 3,125</u>
Yearly O&M service providers Costs	\$17,625

CHAPTER 4. WATER FACILITIES

EXISTING CONDITIONS

The primary source of water for domestic, industrial, and commercial uses within the project area is groundwater. Irrigation water is another water source for some property owners. Existing water system facilities include the following:

- Clallam County Public Utility District #1 (PUD) Carlsborg Water System
- Public water systems (i.e., private systems with more than one service connection)
- Individual wells
- The Clallam and Cline irrigation ditches.

Figure 4-1 displays the existing water systems and their relationship to individual parcels within the Carlsborg Study Area.

Carlsborg Water System (PUD)

Clallam County PUD No. 1 operates several water districts throughout the County. The PUD completed a Water System Plan (PUD, 1994) for all its water districts in August 1994. There is one PUD water district operating in Carlsborg. Currently, the Carlsborg Water System serves 135 accounts—86 residential units and 49 commercial units. Residential accounts are primarily single-family residences and mobile homes. Commercial accounts include small retail outlets, manufacturing and warehouse retailing operations, and service shops. The existing service area boundary of the Carlsborg Water System overlaps a significant portion of the Carlsborg project area (see Figure 4-1).

The 1994 PUD Water System Plan contains policies that are reflected in the Comprehensive Plan (31.02.285(2) and 31.03.340(7), C.C.C.) declaring that the PUD intends to provide urban level of services within designated UGAs, including the Carlsborg area. Since Carlsborg is identified as an area partially served by the PUD, it would presumably be a candidate for service expansion.

The Carlsborg Water System currently contains three water supply wells with a combined capacity of 440 gallons per minute (gpm). The Carlsborg well located in the Carlsborg Industrial Park is 8 inches in diameter and 177 feet deep. A 10-hp submersible pump was installed in the well and is capable of providing about 320 gpm to a 10,000-gallon concrete tank adjacent to the well. The water is chlorinated prior to entering the tank. From the tank, the water is re-pumped directly to the distribution system or to two 150,000-gallon storage reservoirs on Frost Road. The pump station consists of two 30-hp pumps capable of supplying about 200 gpm each, or 320 gpm when operating together. The water distribution piping includes 10- to 12-inch PVC piping within a single pressure zone.

The second and third supply wells, with a capacity of 120 gpm, were originally part of a private system, formerly known as the Sequim Valley Tracts Water System. These wells are used as emergency standby at this time. The PUD has expressed interest in absorbing other private water systems within the Carlsborg project area, provided infrastructure is up-graded to PUD standards.

The PUD growth projections for the Carlsborg Water System looked at low-, medium- and high-growth scenarios. The water demand, based on the average over three years, was calculated to be 215 gpcd (gallons per capita per day); records indicate that peak day flows were 6 times higher than average day flows. The Plan speculates that the peaking factor will fall to between 2.5 and 4 as the system develops. The PUD Plan identified the need for constructing additional storage facilities to provide adequate fire flow volumes and maintain minimum pressures in the system. The additional storage is scheduled for construction after 2011.

The PUD design criteria used for determining facility needs are as follows:

- Reliability: Provide backup facilities to protect against failures of the following:
 - Power supply: 2 days
 - Treatment process (chlorination): 8 hours
 - Pumps, Motors: 3 days
- Supply Reliability
 - 49 in 50 years for household needs (80 percent of Average Day Demand (ADD))
 - 9 in 10 years, or 90 percent of total water demand
- Water Storage Requirements
 - Equalizing Storage—For diurnal domestic demands, 20 percent of Peak Day Demand (PDD).
 - Storage for Fire Flow:
 - 2,500 gpm for 2.5 hours = 0.38 million gallons (MG) for areas with commercial buildings
 - 1,000 gpm for 1 hour = 0.06 MG for residential areas
 - 500 gpm for 0.5 hours = 0.015 MG for rural residential areas
 - Emergency Storage:
 - 200 gallons per connection for multiple feed areas.
 - 600 gallons per connection for single feed areas with less than 100 connections.
 - 800 gallons per connection for single feed areas.
 - Inactive Storage—For standpipes and ground level storage. This can be as much as 50 percent of total storage capacity depending on tank level at which minimum pressures are reached.
- Pressure

- Normal pressure: 60 pounds per square inch (psi)
- Maximum pressure: 120 psi (provide pressure reducing valve if pressure exceeds 80 psi)
- Normal minimum: 30 psi
- Absolute minimum: 20 psi with a peak hour fire flow demand
- Fire Flow (6-inch minimum main size for fire flows)

	<u>Minimum</u>	<u>Goal</u>
Residential (Rural)	0	500 gpm
Residential	500 gpm	1,000 gpm
Commercial	1,000 gpm	2,500 gpm

Community Water Systems

Besides the PUD, a number of private community-based water systems exist within the Carlsborg project area. Three of these systems provide water service to approximately 300 mobile homes sites, or 80 percent of the developed residential lots within the Carlsborg project area. Figure 4-1 shows the service area boundaries of these systems.

Carlsborg Mobile Home Estates Water System

This community-based system provides potable water and irrigation water to the mobile homes in the park. No commercial users are served by this system. There are 51 homes in the park, and over 100 residents. The park has two wells, one for water and one for irrigation, both 110 feet deep. The drinking water system is a combination of gravity and pressure delivery systems. A 5½-horsepower pump fills a 15,000-gallon reservoir that flows by gravity through 2-inch supply lines to a pressure system. The water is pressurized to 50 pounds and then feeds into the park. The supply lines are 2-inch with ¾-inch spurs to each home site. The system is currently allocated through water rights for 90 gpm not to exceed 18 water acre-feet per year.

Parkwood Mobile Home Community Water System

This system serves the largest single, contained mobile home community in the Carlsborg area. It serves a total of 209 homes in the park with a total population of 373 residents. Also included are hookups to two commercial lots adjacent to the mobile home park, and a central activities building for use by park residents. The commercial lots are currently undeveloped. The system consists of two wells. Well # 1 is the primary service well – extending to a depth of 126 feet and producing a volume of 115 gpm. Well #2 extends to a depth of 70 feet and provides emergency water source at a rate of 100 gpm. A 55,000-gallon, reinforced concrete reservoir provides storage for the facility and creates substantial pressure for adequate system flow to park residents. The primary well is pumped by two parallel units, with a third pump operating the emergency source, well #2. Together at emergency capacity, all pumps produce a fire flow service of 500 gpm. The system includes backup generators to continue providing service during power outages. The system is currently allocated through water rights for 250 gpm, not to exceed 74-acre feet per year.

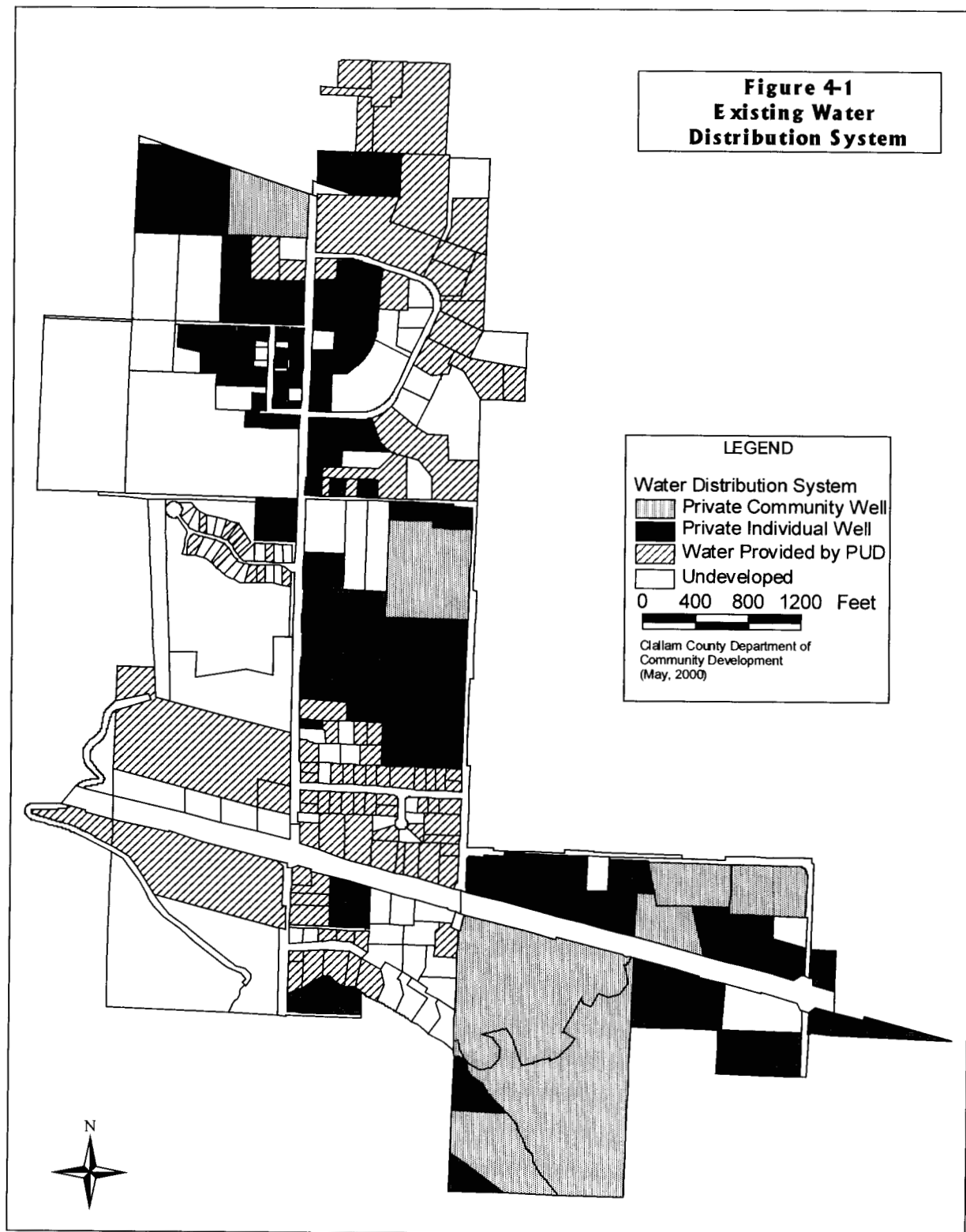
Green Acres Mobile Home Park Water System

Domestic water supply for the Green Acres Mobile Home Park is supplied through a community-based system consisting of two wells. One is about 100 feet deep; the other is slightly deeper. Water is pumped to two 1,200-gallon reservoirs and flows by gravity through 2-inch supply lines. The water distribution lines are pressurized to 50 pounds. About 49 residential units (50 to 100 residents) are served by the system; no commercial uses are served. The system is currently allocated through water rights for a total of 100 gpm, not to exceed 16.4-acre feet per year.

In addition to domestic water, irrigation water is provided through a ditch system. Irrigation water is pumped for use on about half of the park.

Kevca Water System – Rainbow's End RV Park

Domestic water supply for the Rainbow's End RV Park is supplied through the Kevca Water System, a privately owned and operated system that consists of one well about 187 feet deep. The well pump has a capacity of 60 gpm. The system serves one permanent residence and 37 non-residential (RV sites) connections. No other infrastructure information is currently available for this system. This system is allocated through water rights for 60 gpm, not to exceed 10-acre feet per year.



Individual Private Wells

Approximately 169 lots in the Carlsborg project area are currently served by individual wells. Lots served by private, individual wells are scattered throughout Carlsborg, and include lots within the PUD's Carlsborg Water System service area, as shown in Figure 4-1. Other private community systems do exist, but are generally too small (less than six connections) for consideration by this CFP.

LEVEL OF SERVICE

Chapter 2 of this CFP evaluates two potential land use alternatives for the Carlsborg Planning Area. The first alternative, being the preferred alternative, establishes an urban growth area limited by on-site sewage disposal limitations. The second alternative provides a basis for analysis if the existing interim land use controls were adopted as permanent standards for land use management of the area. Under existing interim controls, potable water provision is governed by the rules and procedures established by the State Health Code and/or the service provision policies of PUD No. 1 of Clallam County for LUD #10 (Carlsborg Water System). Development under the interim controls would continue according to these established rules and procedures. Planning for the capital facility needs for water service under the interim controls is unnecessary and beyond the scope of this Capital Facilities Plan. Therefore, the remainder of this Chapter will address water service needs under the preferred alternative only.

The 1994 Clallam County Capital Facilities Plan (Clallam County, 1994) does not establish LOS for water services because the County does not currently manage or operate any water systems. In the context of the Carlsborg planning area, this task involves three basic components: establishing policies that provide for the continued use of existing individual and community systems that demonstrate consistency with state health requirements, establishing LOS for new private water systems that ensure safe and adequate service and ease of transfer to a central provider, and establish policies for requiring hookup to a central service provider.

This Capital Facilities Plan allows for continued use of those existing private and public water systems that substantially meet or exceed State Health regulations for such systems. At present, individual water supplies must demonstrate that the well can pump a minimum of 800 gallons per day and comply with minimum water quality requirements for bacteria and nitrates. Private individual wells that meet or exceed these standards will be allowed to continue until the system can no longer demonstrate compliance with these minimum standards.

Public water systems must comply with design and water quality standards established by state law (Chapters 246-290 and 246-291 WAC). Public water systems that meet or exceed these standards will be allowed to continue until the system can no longer demonstrate compliance with these minimum standards.

Minimum lot sizes of ½ acre (21,780 square feet) will be allowed under the preferred alternative for commercial and residential designations. The reason for this standardized minimum parcel size is to ensure consistency with State Health Code for utilizing onsite sewage systems on Type 1 soils. However, this density is only achievable if community water systems are available to development (WAC 246-272-20501). There are two options for meeting this need: ensure a central water provider is available and adequate to serve the community, and allow for new private systems that

meet specified levels of service. While private systems can be managed for, the economic reality of such systems makes acquisition by a central provider likely. Therefore, any LOS established for private systems should take into consideration the operational and infrastructure needs of a central provider.

P.U.D. #1 of Clallam County already services a significant portion of the project area and is the logical ultimate water service provider for the Carlsborg community. The PUD published a Water System Plan in August, 1994. The plan provides specific detail on future facility needs assessment and financing. The Plan established design criteria for existing, expanding and new facilities operated by the PUD. Clallam County acknowledges this document and incorporates it herein by reference. Because PUD is anticipated to be the ultimate service provider, the infrastructure and cost analysis contained in this Chapter is based on PUD standards.

In order to provide for private systems that meet immediate service and safety needs of it's customers, as well as meeting minimum standards for efficient acquisition by the PUD, basic levels of service need to be established that ensure consistency with these objectives. In order to ensure minimum guidelines for water quality and wellhead protection, only those new systems that are approved according to state law as Group A water systems (fifteen or more connections) will be permitted to locate in the Carlsborg Planning Area, subject to the Level of Service (LOS) established below. Additional design and management criteria (types of LOS) may be established by the water system operator (i.e., PUD). The LOS standards that are used in this analysis are based on the PUD service area and design criteria listed below, on the recommendations in the 1994 Carlsborg Task Force Community Plan, and requirements established for fire flow under the Washington State Uniform Fire Code (1997). With respect to fire flow, the 1997 UBC requires 2,500 gpm over a 2.5-hour period capacity for service to commercial centers. However, if sprinkler systems are required in construction, this standard is reduced to 1,500 gpm over a 2-hour period. The design criteria can be applied as LOS thresholds since they are adequate to accommodate the demands of existing and anticipated growth under the preferred alternative.

The LOS thresholds for new community water systems for Carlsborg are as follows:

- Pressure
 - Normal pressure: 60 psi
 - Maximum pressure: 120 psi (with a pressure-reducing valve provided if pressure exceeds 80 psi)
 - Normal minimum: 30 psi
 - Absolute minimum: 20 psi with a peak hour fire flow demand
- Fire Flow (6-inch minimum main size for fire flows)

	<u>Minimum</u>	<u>Goal</u>
Residential	500 gpm	1,000 gpm
Commercial	1,000 gpm	1,500 gpm (with sprinkler systems required)
- Storage
 - 1,500 gpm for 2 hours = 0.18 MG for areas with commercial buildings
 - 1,000 gpm for 1 hour = 0.06 MG for residential areas

- Other Infrastructure
 - Meters installed
 - Chlorination Treatment, not to exceed 8 hours
 - Backup Power necessary to maintain full system operation

Another LOS standard may be necessary should groundwater quality continue to deteriorate in the project area. Wells experiencing nitrate levels exceeding 10 ppm may not be used for potable water sources. In such events, contaminated wells should be required to be appropriately treated or abandoned. Users of wells that have been abandoned should be required to hook up to the PUD system or other available, qualified community system.

FUTURE NEEDS AND FINANCING

In order to determine the future facility needs of the Carlsborg planning area and the associated costs required to meet those needs, information on projected development over the twenty-year planning period is essential. Chapter 2 of this Capital Facilities Plan provides a detailed analysis of the anticipated growth and development within the Carlsborg area under the proposed UGA alternative. Table 4-1 summarizes the existing and anticipated number of developments over the twenty-year planning horizon by land use type:

Table 4-1 – Growth Scenario Over Next 20 Years by Land Use Type

Type of Unit	Current (Yr 2000)	Six Year (2005)	Twenty Year (2020)
Commercial	36	79	181
Industrial	20	32	60
Residential	*469	511	651

* - Includes 307 mobile home spaces in existing mobile home parks.

The anticipated growth statistics show that development under the Carlsborg UGA will increase over-all by approximately 63% over the next twenty years. More specifically, an increase of 39% for residential development, 200% for Industrial development, and 403% for commercial development is anticipated, based on the growth rate projections found in Chapter 2 of this Capital Facilities Plan.

As stated earlier, the Carlsborg Water System currently serves 135 connections: 86 residential accounts, and 49 commercial/industrial accounts. While these service connections make up approximately only 26% of all existing development within the planning area, most future development is likely to connect to the PUD system. This means that water facilities must be sufficient to accommodate a 217% increase in residential connections, and a 378% increase in commercial/industrial connections over the twenty-year planning period.

While this Capital Facilities Plan requires mandatory connection to the PUD water system in the case of private system failure, such failures are not a common occurrence. Furthermore, it is

anticipated that with enhanced on-site sewage disposal technology, further nitrate loading in the area ground water will be minimized if not corrected, further reducing the likelihood of water system failure in the future. Therefore, this analysis will not consider additional connections resulting from private system failures. Table 4-2 shows the existing and projected number of connections to the PUD water system over the 20-year planning horizon.

Table 4-2 – Number of PUD Water Service Connections Over Next 20 Years

Type of Connection	Current (Yr. 2000)	Six Year (2005)	Twenty Year (2020)
Commercial/ Industrial	49	104	234
Residential	86	128	268

To specifically quantify the system needs over the six and twenty-year planning horizons, some assumptions must be made regarding the demand future development will have on the system. As discussed in Chapters 2 and 3 of this Capital Facilities Plan, use of on-site septic systems within the proposed UGA require specific limitations with respect to waste water generation and disposal. The maximum quantity of waste water discharged into Type 1 soils is 450 gallons per day per ½ acre (WAC 246-272-20521(2)(d)(I)). The Washington Department of Health recommends a correlation factor of two to one for potable water usage to waste water generation. This means that for every two gallons of potable water used, approximately one gallon of waste water is generated for most land use categories. This would translate into a maximum water usage for commercial and industrial land uses within the Carlsborg area of 900 gallons per half acre parcel. While some future uses may opt to utilize larger parcels, affording them the ability to generate larger volumes of waste, increases in water demand are likely to be offset by land uses with far less potable water requirements (i.e. commercial storage facilities). Therefore, for the purpose of this analysis, commercial and industrial developments will be assigned a potable water requirement volume of 900 gallons per day per connection.

State Health Department figures estimates average residential water usage at 120 gpcd. With an estimated residential occupancy of 2.35 persons per household, each residential unit can be estimated to have an average daily usage of 282 gpd.

Assessing future water system needs adequate to serve the Carlsborg UGA requires evaluation of all phases of the facility, including: supply source, storage and distribution. The remainder of this section will provide analysis of the improvements needed to meet acceptable levels of service for the anticipated development discussed above and the associated costs for the identified improvements.

Source and Supply

The design criteria require that the water system have enough source capacity to meet the peak day demand. The existing PUD well facilities have a capacity of 440 gpm. Non-PUD or private wells are not included in the analysis because they are currently unable to meet the design criteria. Specifically, all wells must supply 80 percent of the average day demand for 98 percent of the

time, and water systems must have the ability to provide two days of water supply during a power outage. None of the community water systems that have been studied meet all criteria.

The annual average peak day for the study area over the past ten years is 81 gpm, with the average in 1999 being 99 gpm (see Appendix C). The 1999 average appears to be more consistent with recent estimates arguably due to recent development trends, and is therefore a more appropriate number for the purpose of this analysis. It is anticipated that development over the next 20 years will increase usage by 217,824 average gpd, or 151 gpm. The PUD 1994 Water System Plan estimates that as residential density increases, the peak day factor will reduce to between 2.5 and 4, with a peak factor of 4 representing a conservative estimate. Given this factor of 4 and all other development assumptions made, it is estimated that the average peak day flow for the Carlsborg UGA will be 867 gpm. The source of supply is adequate for present and six year demands. While the system is adequate to provide average daily flows over the next 20 years, a shortfall in source of supply for meeting the peak day demand will occur approximately by the year 2007, and be deficient by 427 gpm by the end of the 20-year planning horizon.

Water Rights

Planning for water services adequate to meet the demand of development and growth over the next twenty years requires more than just planning for infrastructure needs. Water rights must also be secured in order to insure the PUD, or other service provider is allocated to withdraw the anticipated demand from ground water resources. Currently, the PUD is allocated through water rights for up to 440 gpm, not to exceed 465 acre feet per year for the Carlsborg service district (LUD 10). The above analysis shows that the average peak day flow requirement for the planning area to be approximately 867 gpm by the end of the twenty year planning horizon, making the system's water allocation rights deficient by 427 gpm.

The process of acquiring water allocation rights is lengthy and expensive. Furthermore, success is not guaranteed regardless of whether the applicant represents a private development or a public municipal service provider. Under such conditions, it is not practicable to plan for water rights acquisition, nor is it feasible to estimate the time and cost associated with such acquisition. Therefore, alternatives to this process should be explored, where feasible.

The PUD has expressed interest in acquiring private community systems that provide at least minimal infrastructure and service compatible with PUD's service standards. Four private systems have been identified in this Chapter that provide a combined total water allocation rights of 500 gpm. This existing capacity exceeds the anticipated twenty year deficiency by approximately 73 gpm. In order to avoid the lengthy and costly process of acquiring water rights, it appears to be a far better and more feasible alternative for the PUD to explore acquisition of existing systems and their allocated water rights in order to meet future system demand; although limitations on area of service may still need to be resolved.

Storage Requirements

The overall system storage requirements are calculated using the emergency, fire flow, and equalization storage elements discussed above. These elements would need to be adequate for the system to properly function during a power outage. The existing PUD storage facilities have a capacity of 300,000 gallons. The PUD storage facility is the only reservoir that can provide the

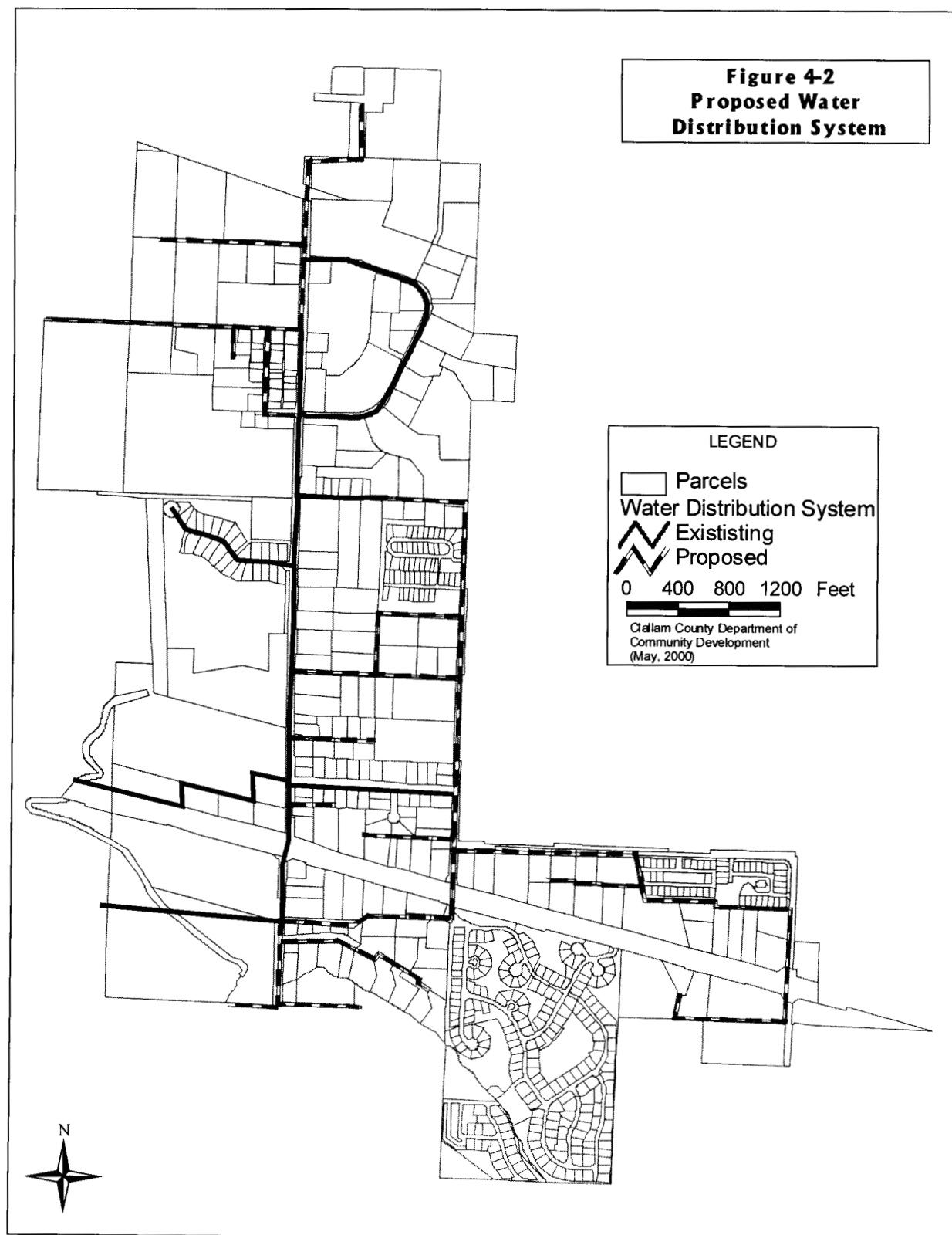
required system pressure without a booster pump since community system tanks are small and located at ground level. Table 4-3 shows the storage requirements and the storage deficits under the preferred alternative. It is expected that the maximum fire flow requirement will remain at 1,500 gpm per two-hour period in the future, provided sprinkler systems are required for new commercial construction. Emergency storage and equalization storage will increase with demand. Emergency storage for residential connections will utilize a standard 800 gallons per connection per the 1994 PUD Plan. However, because commercial and industrial uses are allocated for usage rate of 900 gpd, and the LOS requires a minimum two-day storage capacity for general use, the emergency storage requirement for commercial and industrial uses must be 1,800 gallons per connection. Table 4-3 illustrates the deficit in storage capability for the Carlsborg system over the 20-year planning horizon.

TABLE 4-3 STORAGE REQUIREMENTS/DEFICIT FOR THE CARLSBORG UGA (in gallons)		
	Requirement	Deficit
Existing	365,000	65,000
6-Year	553,000	253,000
20-Year	1,065,000	765,000

The existing storage deficit of 65,500 gallons under the preferred alternative would increase to 765,100 gallons over the 20-year planning period. These deficit calculations indicate the amount of additional storage needed to meet the PUD design criteria.

Distribution System Improvements

Figure 4-3 shows the distribution system improvements proposed to provide water service to the entire study area over the 20-year planning horizon. Table 4-4 shows the amount of pipeline, divided into the 6-year and 20-year planning periods for the Alternative 1. Much of the pipe in private water systems that would become part of the PUD service area would need major upgrades including replacement of existing pipelines with new 8-inch diameter pipelines. Among the reasons for these major



distribution improvements is the inability of the existing systems to meet fire flow criteria, the lack of looped systems, and the large number of dead-ends.

TABLE 4-4. WATER SYSTEM DISTRIBUTION PIPELINE (in feet)	
6-Year Improvements	6,000
20-Year Improvements	18,000

Project Costs

Project cost estimates include 5 percent for mobilization, 30 percent for construction contingency, 7.8 percent for Washington state sales tax and 20 percent for engineering. Land costs are estimated at \$30,000 per acre where required for wells or storage reservoirs. It is assumed that adequate groundwater supply exists within the study area and that no treatment of the groundwater will be required. The project costs for the proposed improvements are estimated for providing additional sources of supply, storage capacity, and distribution pipelines for both land use alternatives. It is assumed for the purposes of this analysis that the purchase of existing systems and facilities by PUD will cost essentially the same as constructing new facilities as a matter of fair market value. Therefore, no distinction is made between meeting projected demand through construction of new facilities verses acquisition of existing ones.

Existing

While the existing source of supply and distribution pipelines meet the level of service adopted by the PUD, the analysis above identifies a deficiency of 65,000 gallons in the existing storage capacity. It is estimated that a new 65,000-gallon storage facility could be built for approximately \$75,000.

The water system will be deficient in source of supply and storage capacity within the 6-year planning horizon and additional pipelines will be required to serve the commercial and industrial areas. This analysis projects that the following facilities will be built within the 6-year planning period:

- 6,000 feet of 8-inch pipeline
- One 150 gpm well (or equivalent)
- One 0.3 MG storage reservoir.

The additional facilities required for the preferred alternative for the 20-year planning period include the following:

- 18,000 feet of 8-inch pipeline
- One 350 gpm well (or equivalent)
- One 0.5 MG storage reservoir.

Typically, these improvements would be installed in advance of Development. Financing for such installation would likely utilize a local utility district process to extend the financing over a number of years. While it is the responsibility of Clallam County to identify funding sources for capital projects within the next six years, some of the improvements identified for the twenty-year planning horizon may require installation within the next six-years, requiring that funding sources be identified. More information and analysis on this issue is contained within chapter 11 of this CFP.

Table 4-5 shows the estimated project costs for the 6- and 20 year improvements. Please note the costs shown in Table 4-5 do not reflect operation and maintenance or financing costs such as interest on bonds. Please see Chapter 11 for more information.

TABLE 4-5. ESTIMATED PROJECT COSTS FOR THE 6 YEAR AND 20 YEAR IMPROVEMENTS FOR THE PREFERRED ALTERNATIVE				
Project	6 Year		20 Year	
	Construction Cost	Total Project Costs	Construction Cost	Total Project Costs
Pipelines ^a	\$238,200	\$410,966	\$760,200	\$1,311,573
Reservoir ^b	225,000	388,192	355,000	612,500
Well ^c	250,000	431,325	250,000	431,325
Total	\$713,200	\$1,230,483	\$1,365,200	\$2,355,398

(a) Pipeline Costs are estimated based on \$30 per foot if pipe installed and \$600 per connection for meter and service line

(b) Reservoir Costs are estimated at \$0.65 per gallon stored plus \$30,000 land acquisition

(c) Well costs are estimated based on \$100,000 for test well, \$120,000 for well equipment and building, plus \$30,000 for land acquisition (Geologic consulting and other potential costs associated with water rights acquisition is not reflected in this cost estimate).

Note: Total Project Costs include 5% mobilization & 30% contingency on construction cost plus 7.8% Sales Tax and 20% Engineering on construction cost + mobilization + contingency: Total Project Costs include only Sales Tax on Land Acquisition Costs

CHAPTER 5.

STORMWATER MANAGEMENT

EXISTING CONDITIONS

The soil classifications in the project area generally consist of moderate to highly permeable gravelly loam, sandy loam or silt loam which are considered moderate to excessively drained soils (U.S. Dept. of Agriculture, 1987).

Drainage facilities managed by Clallam County within the Carlsborg planning area are generally limited to drainage ditches and culverts that convey stormwater runoff from public roadways. The State and the County maintain infiltration basins within the project area, but the majority of County drainage facilities are maintained by the Clallam County Road Department. Other drainage facilities in Carlsborg are privately-owned and managed and include roadside ditches and culverts along private roads and drywells for roof runoff. In addition, there are several developer-installed drainage facilities including detention ponds, biofiltration swales, and infiltration basins.

Pursuant to Clallam County Code C.C.C. 3.31 – Drainage Plan and Road Approach Requirements, Clallam County requires that stormwater drainage plans be approved before other permits or approvals are obtained for development or activities that may affect stormwater runoff. Appendix E contains a copy of these guidelines. In addition, groundwater and surface water quality protection is addressed under the Critical Areas Code (C.C.C. 27.12) which specifies requirements for development activities proposed within 200-feet of a wetland or stream, or if located within a Critical Aquifer Recharge Area. The entire Carlsborg planning area is designated as a Critical Aquifer Recharge Area due to the occurrence of highly permeable soil types mentioned above that allow for recharge to underlying aquifers. C.C.C. 27.12 incorporates requirements from the 1992 Dept. of Ecology Stormwater Management Manual for the Puget Sound Basin. A summary of these requirements for development near critical areas is provided in Appendix C.

Also, Clallam County may require new development to address water quality concerns based on a probable significant environmental impact under the State Environmental Policy Act, RCW 43.21C, and Clallam County Environmental Policy Code, C.C.C. 27.01.

Clallam County has received a Centennial Clean Water Fund grant for development of a Stormwater Pollution Prevention Program. One of the elements of this stormwater program is the adoption of stormwater management controls that would apply to new or re-developments on unincorporated lands in Clallam County. These controls will cover erosion and sedimentation, water quality, design storms, and operation and maintenance similar to that required within or near critical areas, as previously described. Development of new County-wide regulations will be guided by the Department of Ecology's Stormwater Management Manual for the Puget Sound Basin (DOE 1992), as amended.

The Department of Ecology is also currently performing a Total Maximum Daily Load Study for Matriotti Creek. The purpose of the study is to determine sources of fecal caliform bacteria

contamination in Matriotti Creek and to develop strategies for reducing bacteria levels to more acceptable levels. Clallam County shall incorporate the recommendations of the Study, when complete, in the appropriate development regulations for the Carlsborg Planning Area

LEVEL OF SERVICE

The soils in the Carlsborg are well-draining and well suited to provide adequate infiltration for runoff from roads, driveways or other types of impervious surfaces. Adherence to the County's minimum standards for road sections and utility locations will adequately handle roadway runoff and any pre-treatment of runoff is required under C.C.C. 27.12, Critical Areas Code. These standards constitute the LOS for stormwater management in the Carlsborg planning area. These standards, described in detail in Appendix C, require that stormwater conveyances be designed to handle, at a minimum, either the 25-year frequency, 30-minute duration design storm, or 2-year, 24-hour storm (or equivalent).

As the Carlsborg area develops, the need for irrigation may become less and some ditches or laterals may be eliminated. Under these circumstances, irrigation facilities may need to be converted from open ditches to piped utilities wherever there is road construction, improvements, or repairs. Therefore, LOS for stormwater control would include conversion of irrigation ditches to piped utilities for all facilities within the Clallam County roadway right-of-way for all improvement projects. This type of conversion is currently underway in various parts of the Sequim-Dungeness valley.

FUTURE NEEDS AND FINANCING

There are currently no special facility needs for storm water control within Carlsborg. Consequently, there are no capital costs associated with improvements and no financing required for these facilities.

This may change in the future as the Carlsborg planning area develops and new requirements for stormwater management are adopted. The costs of stormwater control will rise, resulting in higher costs for roadway improvement projects.

Additional future costs are expected from the conversion of drainage infrastructure and piping of irrigation facilities to stormwater control facilities as development changes land use within the Carlsborg project area.

It is not possible to predict the magnitude of these increases until the development of new regulations is complete and the location of future development is identified. This issue should be considered when updating this CFP.

CHAPTER 6. SOLID WASTE SYSTEM

EXISTING CONDITIONS

Clallam County owns or manages three solid waste handling facilities, all of which lie outside the Carlsborg project area. The closest facility is Blue Mountain. These facilities and their capacities are shown in Table 6-1.

TABLE 6-1. SOLID WASTE FACILITIES		
Facility	Capacity (Tons/Year)	Operational Level (1994)
Blue Mountain Drop Box	4,680	766
Lake Creek Transfer Station	10,600	1,516
Clallam Bay Drop Box	3,120	113
Total	18,400	2,395
<i>SOURCE: Clallam County Capital Facilities Plan, 1994</i>		

The final waste disposal facility for County and Carlsborg solid waste is the City of Port Angeles Landfill. Solid waste from Carlsborg is taken either to the Blue Mountain Drop Box, approximately six miles west of Carlsborg, or directly to the landfill, by individuals or by contracted private waste disposal services. Recycling programs are available at both locations to reduce the volume of landfilled waste. Industrial and commercial facilities are currently served by private contractors, and wastes are disposed of at the landfill.

LEVEL OF SERVICE

The LOS threshold for meeting concurrency requirements for solid waste facilities within the Carlsborg is 4.03 pounds per person per day. This is based on the solid waste LOS in the Clallam County 1994 Capital Facility Plan and addresses only the transfer or temporary storage of solid waste. Final disposal is addressed in the County Wide Solid Waste Management Plan. Special industrial and commercial needs will have to be privately contracted to continue to meet County solid waste management goals.

FUTURE NEEDS AND FINANCING

Based on an LOS threshold of 4.03 pounds per person per day, 1.7 tons per day of solid waste will be generated by Carlsborg's 2005 projected population and 3 tons per day will be generated by the 2020 population. Capacity in existing County systems will be sufficient to handle this level

of waste. Consequently, no additional improvements are required or capital expenditures needed for solid waste.

CHAPTER 7. PARKS AND RECREATION

EXISTING CONDITIONS

Recreational facilities in the Carlsborg project area include playfields, playground equipment and Matriotti Creek Environmental Learning Center at the Greywolf Elementary School and the Olympic Discovery Trail. Clallam County is currently developing a new 155-acre park called "Robin Hill Farm County Park" approximately 1.5 miles west of Carlsborg. Figure 7-1 shows the location of recreational facilities in and near Carlsborg.

Greywolf Elementary School

Greywolf Elementary School recreation facilities include a 2-plus-acre playfield and a variety of playground equipment. The playfield is large enough to accommodate field sports such as baseball and soccer. The northwest corner of the school grounds is the site of the Matriotti Creek Environmental Learning Center (ELC). The ELC was constructed as part of a cooperative habitat restoration project coordinated by Clallam County to restore 1,550 feet of Matriotti Creek. The primary use of the ELC is the environmental education of Greywolf students, but the facility is open to the public. The ELC contains a bridge, an information kiosk, a stream gauge, and step areas designed for water quality monitoring.

Access to the school facilities by residential neighbors and schoolchildren to the west of Matriotti Creek is done via a foot trail and footbridge that is a part of the ELC.

Olympic Discovery Trail

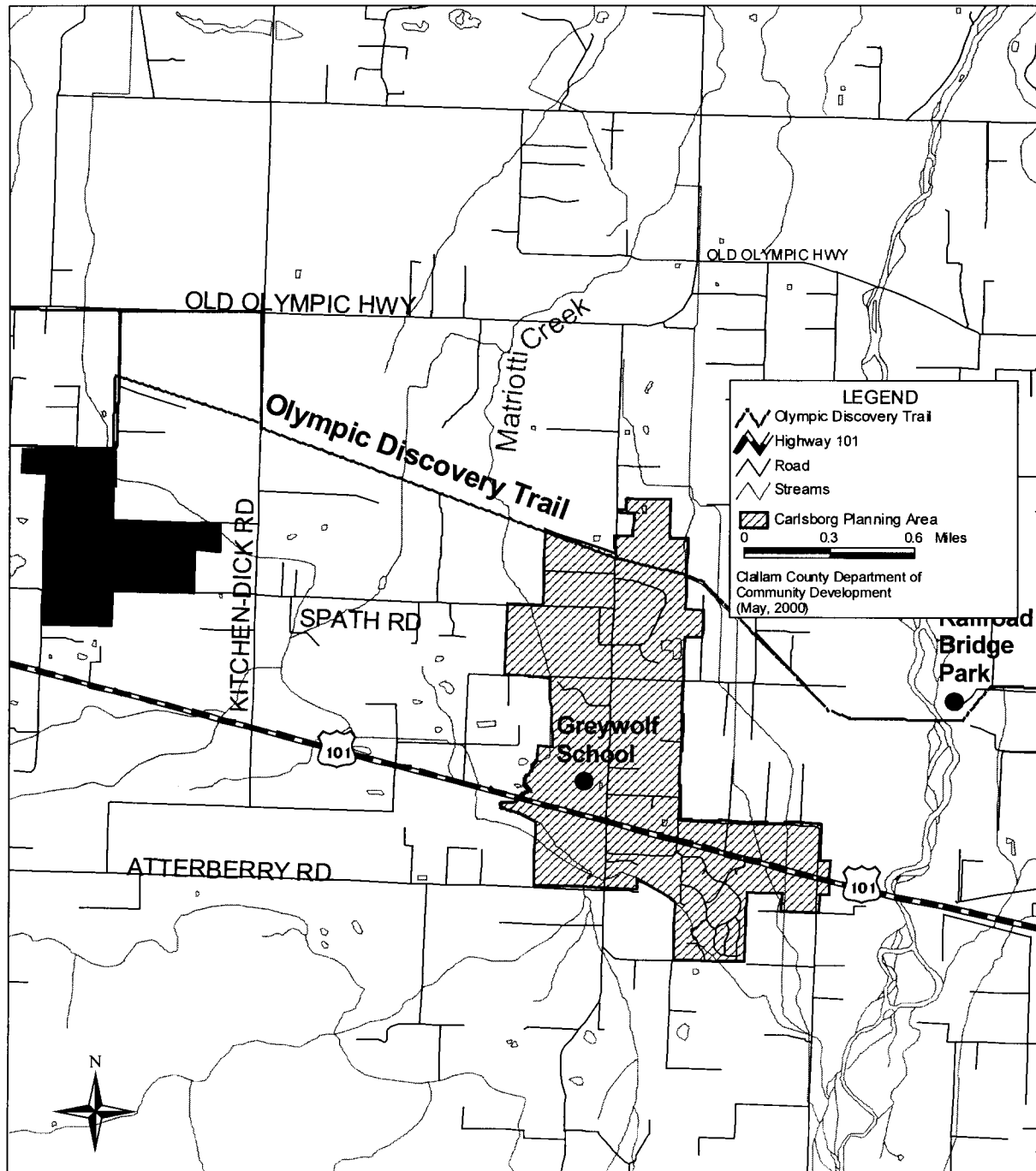
The Olympic Discovery Trail passes through the Carlsborg project area. The portion of the trail from Dungeness River, westerly to Kitchen-Dick Road is open for public use. Continuation of the Olympic Discovery Trail both westward to Port Angeles and eastward to Sequim is planned in the near future. The Olympic Discovery Trail is a non-motorized multi-user trail that, when completed, will span 52 miles in Clallam and Jefferson County, connecting the urban communities of Port Angeles, Sequim, and Port Townsend. The Trail accommodates multiple recreational users with its designed 10-foot-wide paved surface for bicycles, wheelchairs, pedestrians, and skaters, and a 4- to 6-foot-wide unpaved surface for horses and mountain bikes. The Olympic Discovery Trail is a cooperative effort by local government, non-profit trail groups, and private business supporters.

Robin Hill Farm County Park

Clallam County acquired a 155-acre parcel containing forest lands, open spaces, and wetlands as the future Robin Hill Farm County Park. Recreational uses proposed to be constructed by 2002 include access, parking, restroom facilities, pedestrian and



**Figure 7-1
Carlsborg Parks and
Recreation Vicinity Map**



equestrian trails, group picnic sites, a tot lot, bicycle/hiker campgrounds, a putting green, basketball and tennis courts, and sport fields.

LEVEL OF SERVICE

The LOS threshold for parks and recreation space for the Carlsborg project area is the County standard of 9.23 acres per 1,000 people. A suitable LOS threshold for recreational fields is 1 per 1,000 people. This threshold is based on park and recreation standards nationwide and meets or exceeds those used by some other urban growth areas in Clallam County.

FUTURE NEEDS AND FINANCING

Applying the LOS threshold standards to current conditions in Carlsborg, 9.23 acres of parks and open space and one recreational field will be needed between the 6- and 20-year planning horizons. This takes into consideration the expected increase in population over the next 20 years and the existing facilities previously discussed. The shortfall in acreage and lack of playfields is a direct result of the increase in population.

Residents of Carlsborg have access to large tracts of publicly owned land for recreation purposes, as well as to private forest lands that allow public access and private resorts. These resources, however, are not considered in this analysis because they are not permanent, publicly owned, County-managed facilities.

Discussions have been held regarding the possibility of a trail system along Matriotti Creek from the Greywolf school to the Olympic Discovery trail which perhaps, could also connect the historic, village of Carlsborg.

The 1994 Clallam County Capital Facilities Plan includes a parks and recreational facilities element. A list of system deficiencies, project and improvement needs, and costs has been developed for the entire County. In addition, real and potential funding sources are identified. No facility improvements are identified in the Plan for the Carlsborg area.

Improvements planned for the Robin Hill Farm indicate that the County recognizes the need for additional facilities over the planning period and is committed to maintaining the current LOS (Craig Jacobs, Director of Clallam County Parks, Fair & Building Maintenance Department 2 June 1997, personal communication). The Robin Hill Farm will be close enough to Carlsborg to meet the expected future needs of Carlsborg residents through the addition of park acreage and the construction of new playfields.

CHAPTER 8. LAW ENFORCEMENT

EXISTING CONDITIONS

According to Clallam County Sheriff Joe Hawe, the current law enforcement resources for the east end of the County, which includes Carlsborg, consist of three patrol cars per 8-hour shift, each containing one officer. Response times to reported incidents average about 15 to 20 minutes.

The County Sheriff's Department rents office space in downtown Sequim, within a few miles of Carlsborg. This will help maintain the existing response time in this area, even with projected growth.

The residents of Carlsborg are also served by regional law enforcement facilities, such as courts and corrections facilities. Long-range planning for these facilities is not appropriate for individual local jurisdictions, and is addressed in the 1994 Clallam County CFP. It should be noted that the Clallam County Comprehensive Plan does not require concurrency for law and justice facilities (CCC 31.02.820), exempting them from mandatory LOS-based analysis.

LEVEL OF SERVICE

The current level of service County-wide is about 0.78 officer per 1,000 population. The International Association of Chiefs of Police recommends a ratio of 2 officers per 1,000 population (Hawe, J., Clallam County Sheriff's Department, April 2000 personal communication). A ratio of at least 1 officer per 1,000 population is considered by County law enforcement officials to be a reasonable threshold LOS for the Carlsborg area.

FUTURE NEEDS AND FINANCING

The three patrol cars currently in use in the east county area must cover that entire portion of the County, leaving few resources (below LOS standards) to cover the Carlsborg area. This threshold will be difficult to attain, however, given recent trends toward cutting back on law enforcement services.

CHAPTER 9. FIRE PROTECTION

EXISTING CONDITIONS

Fire protection for the Carlsborg area is provided by the Clallam County Fire Protection District Number 3. The main station for District 3 is within the City of Sequim, with another station located in Carlsborg on the northeast corner of Highway 101 and Carlsborg Road. District 3 is currently an all-volunteer station. The current response time for the Carlsborg project area is 3 to 4 minutes (Lowe, T., May 2000, personal communication).

LEVEL OF SERVICE

The current fire protection response time for the Carlsborg area of 3 to 4 minutes should be maintained as the LOS threshold.

Chapter 4 of this Capital Facilities Plan requires that all new commercial and industrial development provide sprinkler systems for fire protection (Water Facilities, Page 4-7). This LOS was required in order to reduce additional facility needs and costs associated with providing fire flow through a centralized water system. This LOS standard also provides for the safety and protection of commercial areas within Carlsborg and is therefore incorporated herein as a LOS standard for fire protection.

FUTURE NEEDS AND FINANCING

According to Tom Lowe, the District No. 3 Fire Marshal (Lowe, T., May 2000, personal communication), the current 3- to 4-minute response time for the Carlsborg area should be maintainable even with the growth projected for the Carlsborg. One aspect in support of this assessment is that the all-volunteer station in Carlsborg may be receiving two full-time, independently funded emergency response staff within the next month. These additions to personnel will ensure quick response (and may initially improve response times) since there will be staff on duty 24 hours per day.

In addition, the requirement under Chapter 4 (Water Facilities) for sprinkler systems in all new commercial and industrial development will further reduce the need for emergency fire response from the local fire department.

CHAPTER 10. TRANSPORTATION SYSTEM

EXISTING CONDITIONS

Goals and Policies

Goals and policies have been established for all components of the transportation system in the Clallam County Comprehensive Plan. Some of the goals and policies prescribe actual projects, others address system needs, and others describe standards. Table 10-1 lists the transportation goals and policies pertinent to the Carlsborg project area, as well as the immediate vicinity. Please also refer to C.C.C. 31.03.350, Carlsborg Urban Growth Area, for additional policies.

TABLE 10-1.
SELECTED APPLICABLE GOALS AND POLICIES

Document	Policy Number	Subject
SDRP	1.d.	Prohibiting new access to Highway 101.
SDRP	1.e.	Bicycle facilities in Highway 101 corridor.
SDRP	1.f.	Pedestrian facilities in Highway 101 corridor at Carlsborg.
SDRP	1.g.	Transit facilities in Highway 101 corridor at Carlsborg.
SDRP	1.i.	Proliferation of stoplights on Hwy 101 should be discouraged
SDRP	4.	Improving circulation in Carlsborg area.
SDRP	5.	Improvement projects: Hooker Road south of Highway 101.
SDRP	10.	Encouraging non-motorized trail connecting Sequim and Carlsborg.
SDRP	11.	Requiring non-motorized facilities along Highway 101, County arterials and major collectors within urban areas.
SDRP	12.	Designated bicycle routes: Highway 101.
SDRP	14.	Park and ride lot and transit shelters in Carlsborg.
SDRP	17.	Minimum LOS of "C" for County roads.
SDRP	P43#17	Improvements to direct traffic to Carlsborg/Hooker Road
CP	1.e.	Street trees and pedestrian amenities along Highway 101 in urban areas.
CP	2.a.	Undergrounding utilities in the Highway 101 corridor (in conjunction with other improvements).
CP	2.b.	Landscaping in the Highway 101 corridor.
CP	5.c.	Design standards for County roads.
CP	6.b.	Access standards.

a. SDRP = Sequim-Dungeness Regional Plan; CP = Clallam County Comprehensive Plan

Roadway System

The roadway system in the Carlsborg planning area and immediate vicinity includes both public and private roads, as shown in Figure 10-1. Highway 101 runs east and west, essentially bisecting the Carlsborg project area. Carlsborg Road (which turns into Hooker Road just south of Highway 101) is the major north-south arterial. The only traffic signal intersection in Carlsborg is at Carlsborg Road and Highway 101. Mill Road parallels Carlsborg Road as another major collector. Taylor Cutoff Road is another collector road which intersects with Highway 101 at the southeast corner of the planning area. Other east-west roads in the area include Gupster and Runnion Roads, north of Highway 101, and Atterberry Road, south of Highway 101.

Other Systems

The Olympic Discovery Trail is a designated off-road bicycle facility serving Carlsborg and Highway 101 that has also been designated a bicycle route. Clallam Transit operates along Highway 101.

LEVEL OF SERVICE (LOS)

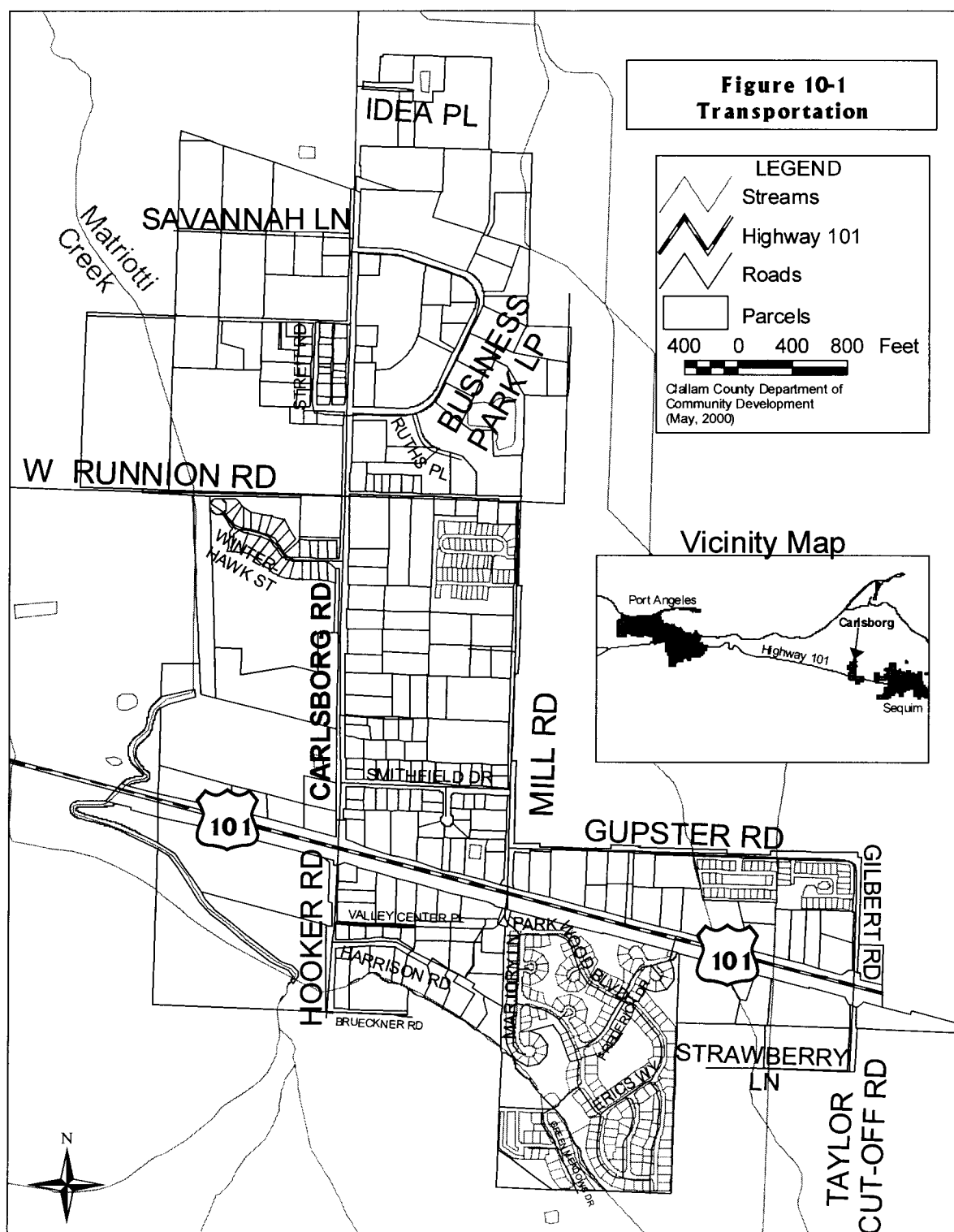
The minimum LOS established in the County-wide Comprehensive Plan for County roads is LOS "C." The LOS for state highways is LOS "D" for urban areas and tourist corridors, and LOS "C" for rural highways. The only required LOS threshold for traffic flow is LOS "C" for County roads and LOS "D" for the portion of Highway 101 through Carlsborg. Although the 1995 Comprehensive Plan finds that all County roads within the Carlsborg area will meet the minimum LOS "C" standard at buildout, it must be noted that the comprehensive plan buildout scenario only considered residential contributions to traffic growth. Highway 101 and roads accessing Highway 101 would also be strongly impacted by commercial and industrial growth. Maintaining a LOS "D" on Highway 101 and LOS "C" on roads accessing Highway 101 will be difficult after factoring in commercial and industrial growth buildout scenarios. Ensuring Highway 101 mobility is of paramount importance to maintain the long-term economic vitality of Carlsborg and the rest of Clallam County west of Carlsborg.

It should also be noted that the Clallam County Comprehensive Plan does not establish a LOS for intersections. To evaluate intersection service, a traffic study needs to be completed along with policy direction to prioritize the various solutions to address problem intersections. These solutions may range from limiting build-out and ultimately traffic flow by making certain land use designations, restricting turning movements at the intersection (e.g. right-turn only), re-routing of traffic flow, or installing traffic signals.

The Comprehensive Plan states that design standards for County roads should adhere to the standards set forth in the *City and County Design Standards*, adopted by the Washington Department of Transportation pursuant to RCW 35.83.030 and RCW 43.32.020. Design standards adopted by Clallam County include minimum roadway and lane width based on average daily traffic (ADT), as specified in Table 10-2. An advisory committee appointed by the Board of Clallam County Commissioners, called the Rural Road Standards Committee, is currently reviewing county road standards which may affect changes to design standards in the future.

TABLE 10-2.
CLALLAM COUNTY ROADWAY DESIGN STANDARDS

ADT	Roadway Width	Lane Width
< 150	20-24 feet	10 feet
150-400	24 feet	10 feet
401-750	26 feet	10 feet
751-1000	28 feet	10 feet
1001-2000	34 feet	11 feet
> 2000	40 feet	12 feet



FUTURE NEEDS AND FINANCING

It should be noted that many of the capital facility improvements which are listed in this plan may be needed regardless of the land use designation that is chosen for the project area. The 1994 County-wide Capital Facilities Plan is planned to be updated upon conclusion of the work of the Rural Roads Committee and possible subsequent adoption of new County road design and LOS standards by the Board of Commissioners. However, in order to meet the Growth Management Act, the capital facility needs have to be identified and funding adequate to meet those needs established, regardless of the land use alternative that is chosen (See Chapter 11-Financing).

Current road facilities within the Carlsborg planning area and immediate vicinity meet the minimum LOS threshold, based on traffic flow. Some capital improvements are needed to maintain the minimum LOS standard for public roads during the 20-year planning period. The future mobility of Highway 101 must be ensured through the appropriate provision of road improvements necessary for local traffic circulation, limiting direct access onto Highway 101, and controlling turning movements allowed onto Highway 101 from the County Road system. Specific transportation policies and standards (see Table 10-1) also need to be addressed in the future. Although the County is not required to provide a 6-year financing plan for these other policies, concurrency may be demonstrated through development conditions (see CCC 31.02.420(23)) that include the specific design standards promulgated by the County (see Table 10-2).

Existing County roads in the Carlsborg planning area and immediate vicinity are listed in Table 10-3. These roads are vital to the transportation network in the area; those which currently do not meet the minimum standard for roadway widths are indicated. Based on the minimum width requirements and the importance of the particular road to maintain safe roadways for current and anticipated traffic patterns, improvements to the following roads should be included in the Capital Facilities Plan: Atterberry Road; Hooker Road and Mill Road. The asterisk after the road name indicates that the roadway partially located within Urban Growth Area Boundary.

Roadway Name	ADT	Roadway Surface Width (feet)	Meets Width Standards
Atterberry Road	662 (1993)	20	No
Bennett Place	100	26	Yes
Carlsborg Road*	2432 to 3889	34	No
Runnion Road W.*	184	20	No
Runnion Road E.*	642	20	No
Gilbert Road	237	18	No
Gupster Road	281	18	No
Hooker Rd. (north)*	1678	22	No
Hooker Rd. (south)*	438	24	No
Mill Road	1049	18	No
Smithfield Drive	353	24 to 26	Yes
Spath Road*	406	18 to 22	No
Streit Road	152	20	No
Taylor Cutoff Road*	2047	26	No

The goals and policies in the 1995 Sequim-Dungeness Regional Plan (SDRP) identify the following projects in the study area:

- Road improvements necessary for local traffic circulation to serve commercial uses on HWY 101
- Road improvements necessary for local traffic circulation eliminating need for new Hwy 101 traffic signal
- Shoulder widening for bicycle use; bicycle storage facilities and transit shelters
- Sidewalks or paths on Highway 101, Carlsborg Road and along Matriotti Creek.
- Park-and-ride lot
- Transit shelters
- Hooker Road improvement project
- Trail for non-motorized users between Sequim and Carlsborg.

The goals and policies in the County-wide Comprehensive Plan identify the following projects in the study area:

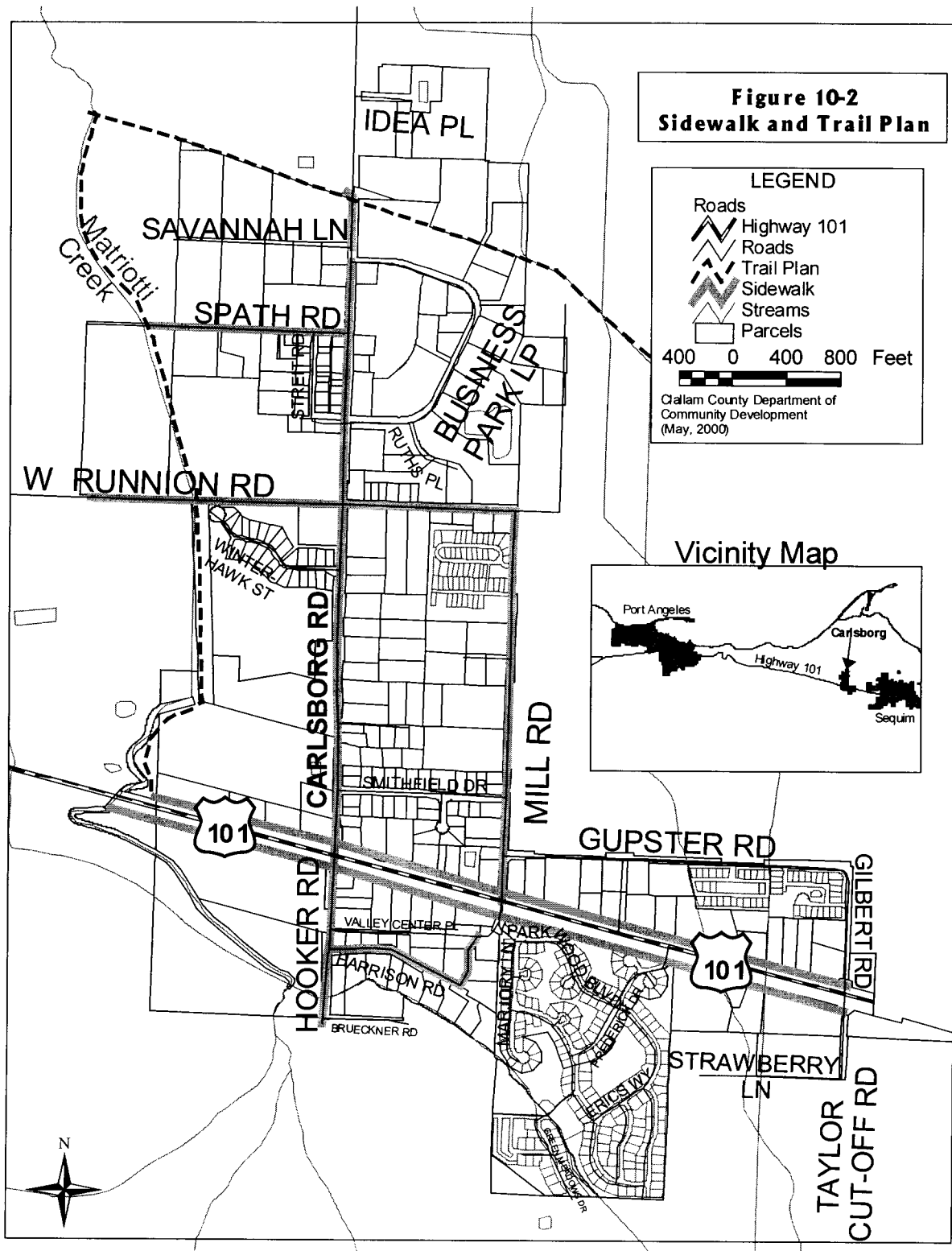
- Street trees and pedestrian amenities along Highway 101
- Landscaping in the Highway 101 corridor.

The Peninsula Regional Transportation Planning Organization (RTPO) plan does not show any road segments with LOS below C in this area and there are no projects within the planning area that are proposed based on LOS deficiencies.

Pedestrian facilities are required by the SDRP along Highway 101, County arterials, major collectors within urban growth areas or rural activity centers, and within walking distance of school facilities. This means that pedestrian facilities are required in a large part of the study area. A sidewalk/trail plan for the Preferred Alternative is shown in Figure 10-2. The design standards for new sidewalks adjacent to or within 500-feet of Highway 101 must meet *City and County Design Standards*, adopted by the Washington Department of Transportation pursuant to RCW 35.83.030 and RCW 43.32.020. The design standards for new sidewalk/trails in other areas of the UGA must comply with County standards which are being developed and will include a combination of paved/unpaved surfaces without curbs, as well as a determination if the facility is needed on one or both sides of the roadway.

To ensure timely and consistent development of pedestrian facilities, a Sidewalk and Trail Plan should be developed and adopted by Clallam County for the Carlsborg UGA within twelve (12) months of adoption of this CFP. For development occurring prior to the implementation of the Sidewalk and Trail Plan, all such proposals will be reviewed jointly between the Road Department and the Department of Community Development to ensure adequate right-of-way and sidewalk improvements have been provided for prior to building permit approval.

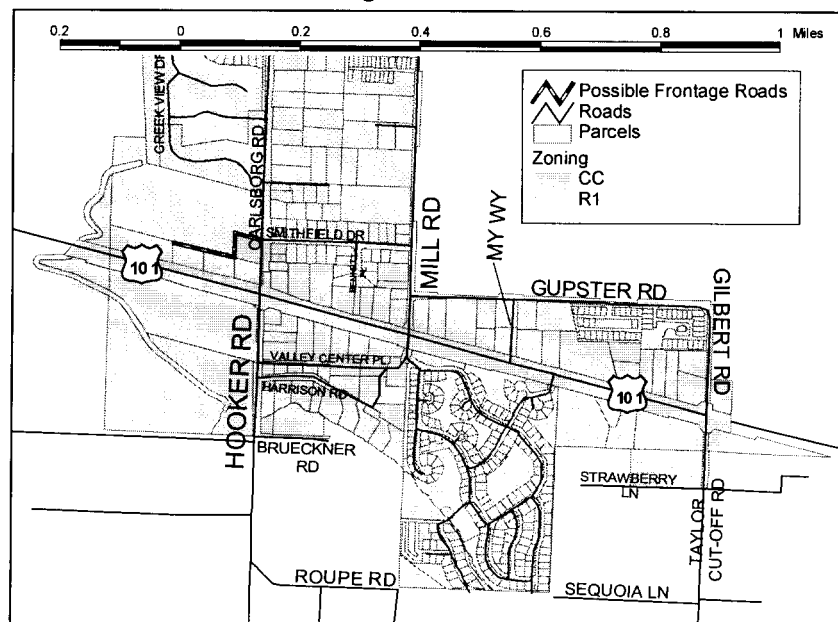
The Clallam County Comprehensive Plan contains policies for providing a park-and-ride, transit shelters, and bicycle storage transit support facilities within the Carlsborg project area. There are currently no transit-related facilities such as park-and-ride lots, transit shelters, or bicycle storage areas within the Carlsborg project area.



Maintaining Highway 101 Mobility through Access Control and Land Use Control

There are six intersections accessing Highway 101 in the Carlsborg planning area. Out of these, only the Carlsborg Road/Highway 101 intersection is controlled by a traffic signal. All six intersections are wholly or partially within a commercial zoning designation. Several methods are available to reduce the need to signalize the four intersections lacking a traffic signal. The most appropriate way to avoid the need for additional traffic signals at the unsignalized intersections is to minimize the number of locations and quantity of traffic ingress and egress onto Highway 101, and/or control the vehicular turning movements onto the highway. Traffic should be redirected, where feasible, to the existing traffic signal at the Carlsborg/Hooker Road and Highway 101 intersection through the use of special road improvements to facilitate local traffic circulation (Figure 10-3). This redirection of traffic to the signalized intersection would only be successful if motorists are not required to travel further than approximately ¼ mile. Additionally, mobility could be maintained on Highway 101 by limiting the cross-traffic turning patterns from the unsignalized intersections by making them controlled intersections that allow only right turn in-right turn out movements. Lastly, the potential intensity of future land uses could be limited in the area east of Mill Road in order to ensure that high traffic-generating land uses do not locate in an area where access to the existing signalized intersection is not feasible and where the addition of new traffic lights would decrease Highway 101 mobility. The following sections break down the appropriate methods to maintain Highway 101 mobility by geographic area and intersection along Highway 101.

Figure 10-3



North Side of Highway 101 - West of Carlsborg Road

Carlsborg Road is the only access onto Highway 101 for those commercially zoned parcels west of Carlsborg Road and North of Highway 101 in the planning area. An access road connecting to Carlsborg Road will be required at time of development for those commercial parcels south of Graywolf Elementary School and north of Highway 101, along an existing easement.

North Side of Highway 101 - East of Carlsborg Road to Mill Road

Many of the commercially-zoned parcels located on the north side of Highway 101, between Carlsborg Road and Mill Road have direct access onto the highway. The current acceleration/deceleration lane on the north side of Highway 101 between Carlsborg Road and Mill Road serves nearly the same function as a frontage road and provides an additional safety feature, which mitigates the high number of direct access points and high ADT generated in this area. A left turn lane is also provided for access to Hooker Road. Many of the parcels in this segment are currently high traffic volume generators (i.e., a grocery store, gas station, and restaurant). However, because many of the parcels are currently developed, a large increase in traffic from the existing uses during the 20 year planning period is unlikely. Commercial zoning of this area and its associated development under the preferred UGA alternative will require intersection improvements to Mill Road to control eastbound turning movements that impede the mobility of Highway 101.

Despite the additional traffic safety measures, the largest number of accidents on Highway 101 are at Carlsborg Road and Mill Road. From January 1, 1995 to December 31, 1999 Carlsborg Road averaged at least four accidents a year, while the Highway 101 and Mill Road intersection averaged at least 2.5 accidents per year. The majority of the accidents at the Highway 101 and Carlsborg Road intersection are rear-end collisions. The majority of accidents at the Highway 101 and Mill Road intersection are due to collisions involving cross traffic eastbound turning movements from Mill Road and cross traffic westbound turning movements from Parkwood. The latter indicates that there is a consistent danger with traffic attempting to merge onto Highway 101 from Mill Road. Preventing this traffic movement while directing this traffic to a lighted intersection would significantly reduce or eliminate this danger. The location of the largely undeveloped Valley Center Place, across from Mill Road, with direct access onto Highway 101, creates the possibility of an increasing accident rate at the Mill Road intersection. Accidents may increase as development of the currently vacant commercial lots occurs and more cars attempt the cross-traffic westbound turning movement from Valley Center Place.

North Side of Highway 101 - Mill Road to Gilbert Road

There are six parcels located between Mill Road and "My Way" (a private road) that have commercial zoning. Despite some of the parcels that also have access to Gupster Road, the majority directly accesses Highway 101. The ADT at Mill Road is influenced by the parcels to the North, beyond the commercial zoning designation, including the Carlsborg Mobile Home Park. There are twelve parcels and one mobile home park located between My Way and Gilbert Road. Ten of the parcels have commercial zoning designation, with most of them having direct access onto Highway 101. All but one of the commercially-zoned parcels between Mill Road and Gilbert Rd are currently developed.

Adoption of the Preferred Alternative would likely result in an increase in ADT over anticipated ADT generated under the existing, interim land use designations. The increased traffic may warrant the need for a study and/or a traffic signal at one or more of the three intersections (Mill Road, My Way, Gilbert Road) unless traffic to and from Highway 101 is directed to Carlsborg Road by road improvements that facilitate local traffic circulation. However, the development of a frontage road from this area to Carlsborg Road is not feasible due to the length of required travel distance. Another method to limit the increase in ADT at these intersections is to limit the intensity and type of commercial development in the area to those that do not produce a high ADT.

South Side of Highway 101 - Hooker Road to Parkwood Mobile Home Park

The development of Valley Center Place is likely to significantly increase the traffic at the intersection of Mill Road/Valley Center Place and Highway 101. There are currently 12 vacant, one-acre parcels, as well as several vacant office spaces for lease. One method to help control direct access onto Highway 101 is to require right turn in/right turn out at Valley Center Place onto Highway 101; thus restricting the turning movements at this intersection. Another method is to prohibit egress or exiting onto Highway 101 directly from Valley Center Place. This method would require residential traffic from Parkwood and commercial traffic from Valley Center Place to access Highway 101 via Valley Center Place and Hooker Road. The latter recognizes that there is a consistent danger with traffic attempting to merge onto Highway 101 from Mill Road. Preventing this traffic movement while directing this traffic to a lighted intersection would significantly reduce or eliminate this danger. The location of the largely undeveloped Valley Center Place creates the possibility of an increasing accident rate at the Mill Road intersection as the vacant, commercial lots become developed and more cars attempt the cross-traffic westbound turning movement from Valley Center Place. These changes would require Valley Center Place to be upgraded to meet County road standards and become a County road.

South Side of Highway 101 - Parkwood Mobile Home Park to Taylor Cut-Off Road

The Taylor Cut-Off and Highway 101 intersection is the second busiest intersection in the Carlsborg planning area. According to the "Manual on Traffic Control Devices" (U.S. Department of Transportation), the current peak hour trips on Highway 101 and Taylor Cut-Off Road warrants a study to determine if a traffic signal is needed to further improve the traffic flow. Additional traffic anticipated under the preferred alternative would further increase the need for a study.

There are five parcels between Taylor Cut-Off Road and Parkwood Mobile Home Park within the project area. The majority of these parcels are occupied with a residence. If the current residential land use designation remained for the five parcels and they were subdivided, the approximate, maximum additional residential traffic is estimated at 278 ADT.

If the five parcels at the southwest corner of Taylor Cut-Off were zoned commercial, and developed in low intensity commercial uses, they would generate an additional 356 ADT to the current 2,047 ADT, assuming the parcels did not subdivide. The maximum possible ADT for the five parcels at the southwest corner would be an estimated 4,172 to 5,568 additional ADT to the current 2,047 ADT if the parcels subdivided to 16 one-acre parcels, and converted to high traffic

generating, commercial uses allowed under the preferred alternative. These estimates assume that on-site sewage disposal and potable water requirements are not limiting factors. This ADT assumes the 16 commercial developments would include a restaurant, a gas station, auto repair, a lodge, a mid-size motel, an auto care shop and 9 mid-sized retail stores.

As shown above, intensive commercial zoning of these parcels would likely lead to the need for a traffic signal at the Taylor Cutoff Road intersection. It is not feasible to direct traffic to another intersection. Installation of a traffic signal at Taylor Cut-Off would be inconsistent with adopted planning policies because it would have a significant adverse impact on the traffic flow on Highway 101. An additional traffic signal would defeat one of the purposes of constructing the Sequim Bypass at an estimated cost of \$20 million, which was to increase mobility of Highway 101 in eastern Clallam County.

Regardless of the land use designations of the five parcels, the current ADT at the Taylor Cut-Off intersection may require optional traffic routes for homeowners that access Highway 101 by way of Taylor Cut-Off Road for westbound traveling. As noted above, increased land use intensity on these properties would trigger the need for a traffic study and alternatives to routing of traffic to avoid additional signalization along Highway 101.

Addressing regional transportation needs requires a regional traffic study that addresses current and projected ADTs, circulation patterns, options to improve circulation, and available funding to correct deficiencies which can be incorporated into new county-wide policies. The proposed designation of Carlsborg as an urban growth area would have impacts to the transportation system, as would increased population growth in Clallam County.

Transportation Improvement Plan/Capital Improvement Plan

Mill Road is the only road included in the funded portion of the current 6-Year Transportation Improvement Plan. The following three projects are partially located within the planning area and are included in the unfunded portion of the 6-Year road plan:

- Atterberry Road Widening and drainage
- East Runnion Road Widening
- Spath Road Widening

Future Conditions

Future growth and development in the Carlsborg project area will contribute to an increase in the traffic volumes on County roads under the preferred alternative, as well as the interim rules for the public roads in the Carlsborg project area. These public roads are major collectors for a regional transportation network and are located in an area of Clallam County with one of the highest rates of population growth. They will be affected by both the continued growth within the proposed UGA, as well as eastern Clallam County.

The RTPD plan will identify regional roadway needs based on increased volumes. Volumes also should be monitored to ensure that the roads listed in Table 10-3 continue to meet the appropriate width standards as ADTs increase.

As shown in Tables 10-4 through 10-6, many of the current or potential road deficiencies within the project area need to be improved within the first six years to support the UGA. In addition, many may not be completed due to their connection to regional transportation network needs or associated costs. Also, some of the improvements may be completed in whole or in part, by new development within the UGA. A program should be established to complete construction of these projects in the succeeding time period. New transportation facilities shall be constructed in accordance with the goals and policies of the Comprehensive Plan and Sequim-Dungeness Regional Plan.

TRANSPORTATION FACILITIES COSTS

Table 10-4 shows transportation facility improvements for the Carlsborg planning area for the six - year planning period under the Preferred Alternative. The estimated traffic improvements would be similar under the Preferred Alternative and the Interim Rules. However, as explained above, the traffic generated from the Preferred Alternative would be higher than what would occur under the existing rules. The six-year costs are estimated at \$879,000. Funding sources for these projects are difficult to identify, and are further discussed in Chapter 11.

Several of the transportation improvements listed in Table 10-4 are currently part of the unfunded portion of the County's Transportation Improvement Plan (TIP). These are lower priority projects that the County would like to fund, but for which no funding source has yet been identified. During discussions with Clallam County Engineer Steve Hauff (9 May 1997, personal communication), several sources of funding were identified, including Road Improvement Districts (RIDs) to pay for local improvements that benefit users who live adjacent to the proposed improvement, mitigation funds that developers would pay to finance identified transportation improvements, and state and federal funding sources (e.g., Public Works Trust funding, and Transportation Improvement Board funding), or combinations thereof. Those projects that are not within the six-year financing plan are still necessary and may be required through mitigation.

While the RID and mitigation funding sources are likely candidates to fund some of the transportation projects, qualifying for state and federal funding may require changes in the functional classification of the roadway. Another funding suggestion from Mr. Hauff would require the County to change the status of unfunded TIP projects in the Carlsborg area. By elevating the priority of transportation projects in the Carlsborg area, it might be possible to move them to the funded portion of the TIP. To do so, however, would require moving projects proposed outside of the Carlsborg planning area that are currently funded to the unfunded list. Funding sources will be needed to finance the identified transportation projects in order to comply with the six-year funding requirement which is further explained in Chapter 11 – Financing.

Table 10-5 lists transportation improvements associated with new development that requires completion or participation by adjacent property owners through private road construction, or by creating public roadways through the Road Improvement District Program. Clallam County shall condition new traffic-generating development adjacent to these improvement projects to complete, or contribute to their completion.

Table 10-6 lists transportation improvements that can be described as being a result of a combination of regional needs and UGA needs that are not anticipated to occur within the next six years. As stated previously, these improvements are directly or indirectly associated with

development in Carlsborg, regardless of the land use designation that is made. These improvements shall be considered necessary and Clallam County may condition new traffic-generating developments adjacent to these improvements to complete, or contribute to their completion, regardless of when the new developments occur.

Requiring improvements to transportation facilities through transportation funding programs, grants, improvement districts, or by mitigation or impact fees is key to addressing the growth of the Carlsborg community, as well as to maintain service levels of these significant regional transportation facilities. Required improvements to transportation facilities should be specified as both comprehensive planning policies and zoning standards to assure their completion.

Table 10-4 Transportation Capital Improvement Associated with the Carlsborg Planning Area For the Preferred Alternative	
Category	Six -Year Total
Improvement Projects	
Roadway Width Improvements	
Mill Rd./Smithfield Rd.-Runnion Rd. East**	\$242,000
East Runnion Rd./Carlsborg Rd. to Mill Rd*	\$150,000
"Right-in, Right-out" public road intersection improvements (Mill Rd., Valley Center, Gupster Rd., Taylor Cutoff Rd.)	\$100,000
Subtotal	\$492,000
Non-Motorized Improvements	
Sidewalks along SR 101 (both sides)	\$150,000
Sidewalk/trail according to plan	\$187,000
Landscaping along SR 101	\$50,000
Subtotal	\$387,000
Total Costs:	\$879,000
Identified Fund Source & Level	
County Road Fund	\$529,000
Mitigation for new development	\$350,000
Total Funding:	\$879,000
Cost/Finance Comparison	
Six Year Total Costs:	\$879,000
Six Year Total Finance:	\$242,000
Revenue/Cost Comparison	<00.0>
*Unfunded portion of Six-Year Road Plan / **Funded portion of Six Year Road Plan	

Table 10-5 Transportation Capital Improvement Costs Associated with Private Development For the Preferred Alternative	
Category	Total
Improvement Projects	
Roadway Width Improvements	
Construct Access Road onto Carlsborg Rd	\$140,000
Reconfigure Valley Center Place Rd as an Access road	\$150,000
Total:	\$290,000
Identified Fund Source & Level	
Road Improvement District/private development	\$290,000
Total:	\$290,000

Table 10-6 Transportation Capital Improvement Costs – Regional and UGA Needs For the Preferred Alternative	
Category	Total 2000-2020
Improvement Projects	
Roadway Width Improvements	
Atterberry Road widening within planning area	\$36,000
Spath Road (within Planning area)	\$249,000
Hooker Road widening within planning area	\$24,000
Circulation Improvements	
Road improvements necessary for local traffic circulation	\$500,000
Multi-modal Improvements	
Transit shelter	\$20,000
Park and Ride lot	\$200,000
Bicycle storage facilities	\$10,000
Trail along Matriotti Creek	\$200,000
Bicycle lane shoulder widening	\$300,000
Total	\$1,539,000
Fund Source & Level	
County Road Fund	\$0
Road Improvement District	\$0
Transportation Improvement Bond	\$0
Local Sales Tax	\$0
Real Estate Excise Tax	\$0
Mitigation for new development	\$0
Total:	\$0
Cost/Finance Comparison	
Twenty Year Total Costs:	\$1,539,000
Total Finance:	\$0
Revenue/Cost Comparison	< \$1,539,000 0 >

CHAPTER 11. FINANCE PLAN

INTRODUCTION

The previous sections of this capital facilities plan have assessed the need for capital facility improvements over 6 and 20-year planning periods. They also highlight the non-capital facility and regional capital facility costs that are either directly or indirectly related to the establishment of the Carlsborg Urban Growth Area under the Preferred Alternative. This includes the on-site sewage disposal operation and maintenance program, as well as regional transportation needs.

It should be noted that many of the capital facility improvements may be needed regardless of the land use designation that is chosen for the project area. The 1994 County-wide Capital Facilities Plan is planned to be updated upon conclusion of the work of the Rural Roads Committee and possible subsequent adoption of new County road design and LOS standards by the Board of Commissioners. Because this plan is dated, it cannot be completely relied upon for capital facilities planning for the Carlsborg planning area. Therefore, in order to meet the Growth Management Act, the capital facility needs for the Carlsborg planning area need to be identified and funding established, regardless of the land use alternative that is chosen for final land use controls.

The purpose of this section is to address financing for the capital facility needs that are directly associated with the Preferred Alternative. The Washington State Growth Management Act (GMA; RCW 36.70A.070) requires a capital facilities plan element to include: 1) the costs of capital facilities needs for the 20-year planning period and 2) "at least a six-year plan that will finance [identified] capital facilities within projected funding capacities and clearly identifies sources of public money for such purposes." Capital facility improvement demand for future residents and users is based on the County's growth forecasts for the Carlsborg project area as applied to the Preferred Alternative.

In order to meet the GMA requirement, capital facility costs for the 20-year horizon have been divided into six- and subsequent 14-year periods. However, this finance plan only focuses on the six-year period (2000-2005) based on anticipated improvements to these facilities for both existing and future residents and users.

Funding sources identified at this time for the facility improvements are primarily those that the County and PUD currently use to pay for capital improvements. The main sources of fund identification are the County's annual capital facilities finance plan and Transportation Improvement Plan (TIP) and the Clallam County PUD #1 finance structure. In addition, identification of potential funding also includes mitigation costs that are anticipated to be paid by new development (either independently financed and constructed or through a Road Improvement District program) and also grant funding opportunities.

If funding is inadequate to finance identified improvements given the current funding structure, adjustments will need to be made to bring the capital facility improvement costs into alignment with the funding levels. The County has three options to meet the capital improvement needs.

First, it can adopt new funding sources to pay for capital improvements. Second, it can modify the capital facility demand analysis (e.g., lower level of service standards, change population growth forecasts, land use designations). Third, it can adopt some combination of options one and two. Any option, however, will require acceptance by elected officials and policy decision-makers before it can be incorporated into the finance plan.

In addition to the need to ensure adequate funding levels for all capital facility improvements, the County will also need to formalize its relationship with other public agencies it will rely on to meet concurrency requirements. As an example, Clallam County PUD #1 has agreed in principle to provide both water supply and sewage disposal Operation and Maintenance (O&M) services to the project area. While the PUD is currently supplying water service to some of the area's residents, Chapter 4 describes the need for expansion of water service. However, the O&M Program is not a capital facility but is a necessary element in establishing the Carlsborg Urban Growth Area that will continue to rely on on-site sewage disposal systems.

The State of Washington recognizes these potential service and fund sharing opportunities, and has created a method to demonstrate service and fund adequacy. SSB 5038 creates a procedure for local government service agreements. One advantage of utilizing the provisions of SSB 5038 is the ability to share public services and financing through interlocal agreements between public jurisdictions and special purpose districts. This would allow the County to demonstrate the long-term provision for and financing of capital facility services to Carlsborg area residents and users.

This funding analysis assumes that new development (existing and future residential, commercial and industrial) in the project area will receive water service from PUD #1, or an approved alternative, as described in Chapter 4. It is important to recognize this assumption since capital improvement costs associated with the extension of utility services under a different set of service extension assumptions would result in a different cost calculation. It is likely that the costs associated with this assumption will be the highest, as it includes the most users in the capital facilities analysis. Under another assumption, such as excluding existing development or restricting utility service extension exclusively to industrial and commercial development, there would be fewer connections and utility capacity needs, and therefore lower capital facility costs.

SUMMARY OF CAPITAL FACILITY COSTS AND FINANCING

This section summarizes all capital facility improvements and funding. It covers the following seven capital facilities:

- Water supply
- Surface water drainage
- Solid waste collection
- Parks and recreation facilities
- Law enforcement facilities
- Fire protection
- Transportation.

In addition, it provides information on financing the O & M program, as well as discussion points on the regional transportation costs.

The financial analysis focuses on the six-year planning horizon (2000-2005), and fund sources and levels required to finance capital facilities improvements for existing and six-year development patterns. Facility improvements needed to meet development demand for 2006 to 2020 are not included.

The capital facility analysis identified two public services with existing or six-year capital improvement needs: water supply and transportation. The remaining public services evaluated (O & M program, drainage, solid waste, parks and recreation, law enforcement, and fire protection,) are adequately served by other funding sources (O & M program), or by existing service levels based on the level of service (LOS) thresholds. All eight public services, however, have been included in the analysis in order to maintain capital facility plan element uniformity.

Table 11-1 provides an overview of the finance plan for the capital facility needs for Crisborg over the six-year planning horizon under the Preferred Alternative.. Each of the eight public services is listed. Where capital facility improvements are needed to meet the existing and six-year level of service (LOS) demand as specified in chapters 3 through 10, the total six-year cost is identified. Similarly, six-year total finance levels are included where they have been identified for the capital facility improvement needs. Funding adequacy is determined by subtracting the cost from the identified finance level, and as been determined to be adequate for all six-year capital improvements.

A total improvement cost and financing level is included in Table 11-2 for regional and related capital facilities and services. While identification of these facility and service needs is not required under the GMA for the Preferred Alternative, Their inclusion in this document provides perspective on related facility and service issues that should be addressed for the region, as well as to provide distinction between those capital improvements that are necessary specifically as a result of the planned action. The total cost is subtracted from total finance/revenue category to ascertain overall funding adequacy. The overall funding adequacy calculation is somewhat deceptive, however, because the figures do not account for long-term debt retirement to pay off capital improvements and may also indicate a funding shortfall in the first six years when the capital cost of the project is incurred. The funding shortfall will be corrected over the term of the debt period as the capital cost of the project is amortized.

Table 11-1 Six Year Capital Facility Project Cost and Finance Levels Summary for the Preferred Alternative	
Capital Facility Need	Total Cost for 2000-2005
Water Supply Capital Facility Costs Finance Levels Funding Adequacy/(Deficiency)	 \$1,230,000 * -\$1,230,000 <\$0.00>
Stormwater Facilities Capital Facility Costs Finance Levels Funding Adequacy/(Deficiency)	 \$-0-
Solid Waste Collection Capital Facility Costs Finance Levels Funding Adequacy/(Deficiency)	 \$ -0-
Parks and Recreation Facilities Capital Facility Costs Finance Levels Funding Adequacy/(Deficiency)	 \$ -0-
Law Enforcement Facilities Capital Facility Costs Finance Levels Funding Adequacy/(Deficiency)	 \$ -0-
Fire Protection Capital Facility Costs Finance Levels Funding Adequacy/(Deficiency)	 \$ -0-
Transportation Capital Facility Costs Finance Levels Funding Adequacy/(Deficiency)	 \$879,000 \$879,000 <\$0.00>
Total Capital Facilities Costs/Funding Capital Facility Costs Finance Levels Funding Adequacy/(Deficiency)	 \$2,109,000 \$2,109,000 <\$0.00>

* - Actual funding to be determined by the Board of PUD Commissioners following their public review process, bond acquisition, and LUD formation.

Table 11-2 Six Year Project Cost and Finance Levels Summary for Related Costs under the Preferred Alternative	
Category	Estimated Total Costs for 2000-2005
On-Site Sewage Disposal Operation and Maintenance Program Agency/Service Provider Costs Finance Levels (Service/Inspection Fee Revenue) Funding Adequacy/(Deficiency)	 \$852,510 (not known) (not known)
Regional /Other Transportation Costs Capital Facility Costs	

Finance Levels Funding Adequacy/(Deficiency)	\$1,539,000 (not known) (not known)
Total Agency/Capital Facilities Costs/Funding Costs Finance Levels Funding Adequacy/(Deficiency)	\$2,391,510 (not known) <\$2,391,510>

The cost of providing capital facilities to the Carlsborg area could be described as nearly the same for both the Preferred Alternative and existing Interim Rules. The slight difference in cost is due to the growth and development assumptions, level of service standards, and demand for services that existing and future residents and users will have for the capital facilities, as listed below:

- Population and development forecasts are similar
- Level of service standards are identical
- The number of users of wastewater facilities is identical, although flow demand is slightly higher in the UGA Alternative
- Water supply costs vary only slightly based on different assumptions about the percent of residential users to be connected to the PUD water supply system (see appendices)
- Transportation improvement costs are identical.

WATER SUPPLY

Clallam County PUD #1 currently supplies water to some Carlsborg area users. The proposal under the Preferred Alternative is to expand the water supply service to all new development in the 2000-2005 period.

Chapter 4 fully describes the water service demand, as well as emergency storage needs for the Preferred Alternative. Table 11-3 lists development trends that are associated with the water service demand for the 20-year horizon. The costs of water service associated with serving anticipated development shown in Table 11-3 are not calculated in the terms of an Equivalent Residential Unit (ERU). Rather, costs are estimated using standard rates that differ between residential use and commercial/industrial use. Residential usage is estimated to be 182 gpd, based on the State Health Department average estimate of 120 gpcd, and an estimated population per household of 2.35 persons. In other words, 120 gallons per day per person, multiplied by 2.35 persons per household equals an average of 182 gallons per day per household. Commercial and industrial use is estimated to be 900 gpd. This figure is based on the maximum sewage disposal requirement of no more than 450 gpd per ½ acre lot for Type 1 soils. The State Health Department estimates a correlation of 2 to one for water usage vs. septic disposal rate. While the 900 gpd water usage estimate does represent the highest water usage allowed for ½ acre lots, it is anticipated based on existing parcel sizes that there will be enough commercial and industrial developments occurring on parcels larger than ½ acre, and therefore allowed to use more water than 900 gpd, to justify the high estimate. Table 11-3 – Growth Scenario Over Next 20 Years by Land Use Type

Type of Unit	Current (Yr 2000)	Six Year (2005)	Twenty Year (2020)
Commercial	36	79	181
Industrial	20	32	60
Residential	469	511	651

Capital improvements for water service will be provided by the PUD, outside of the administration of the County. While the County has identified capital improvements and estimated costs necessary to provide water service to the planning area, securing the funds necessary to provide the infrastructure will be the responsibility of the PUD through the LUD process. This will involve public hearings and ultimate service policy decisions to be made by the PUD's Board of Commissioners. As indicated under the *Summary of Capital Facility Costs and Financing* section of this Chapter, actual funding requires bond acquisition and retirement of that bond over a period of years. However, bond terms, amortization periods and actual facility improvements will be determined by the PUD through their public process.

Finance Structure Assumptions

All PUD water service costs will be paid by the PUD water customers within the Local Utility District (LUD) that the PUD would create to pay for water system expansion. Financing information in the water analysis is based on the PUD's established water rate schedule (adopted November 11, 1996). Some adjustments have been made to adapt the water rates to a larger service area. Should the PUD expand water service to the Carlsborg area under either alternative, additional modifications to the PUD's rate schedule may be required.

The following assumptions are used in the financing analysis:

- 20-year amortization LUD bond
- Interest rate of 5.65 percent per year (rate selected in early summer 1997)
- Single bond sale to pay for all water supply development costs (i.e., planning and engineering design, and construction)
- Utility bond retirement will begin as soon as possible after bond sale
- Water supply service will begin by the end of 2005.

Overall capital costs for expanding water supply will depend on the bond financing option chosen by the PUD, the utility bond amortization period, the PUD's bond rating, the bond market at the time of bond sale, the bond interest rate, and any other offsetting financing mechanism included in the financing but not considered in this analysis. This includes the PUD's ability to charge one-time connection fees and service fees. The one-time metering and installation costs are based on meter installation, inspection, and administrative costs to add new customers to the billing system. The Maintenance and Operation (M&O) costs are based on the cost of operating and maintaining the physical plant and pipelines, and the cost of the customer's water consumption. Water consumption costs are based on the total amount of water consumed in each customer class (e.g.,

residential, commercial, industrial), calculated in 100-cubic-foot increments. For these calculations, the commodity charge is \$1.11 per 100 cubic feet.

Financing water supply capital improvements is based on existing rate schedules the PUD uses to charge its customers, which consists of a service charge and a connection fee. Under normal circumstances, the service charge may also include debt financing charges. For this analysis, however, finance charges have been separated from the service charge in order to show the debt financing level. The service charge is the sum of fixed and variable rates. The fixed portion of the charge pays for M&O costs, while the variable portion of the charge covers commodity costs.

Preferred Alternative

Water supply capital facility costs for the Preferred Alternative are shown in Table 11-4. The 20-year total cost for water supply capital improvements is estimated to be \$1.2 million for the 6-year planning period. The cost of water supply capital improvements in this alternative is expected to be higher than for development under the Interim Rules because of a larger number of customers that will connect to the PUD. The costs do not include bond financing, maintenance and operation, and one-time connection/meter installation costs which should be included in the final CFP.

Table 11-4 Water Costs and Revenue Sources and Levels For the Preferred Alternative (2000-2005)	
Category	Six-year Total Cost Estimates
Improvement Projects Installed by 2005	
Pipelines (6000 feet, 8" pipe)	\$410,966
Reservoir (one .3 MG storage)	\$388,192
Well (One 150 gpm)	\$431,325
Storage facility (65,000 gallons)	\$75,000
Subtotal	\$1,230,483
Revenue Sources and Levels LUD or development-initiated	Not estimated

Total improvement costs and the revenues to fund the improvements are shown in Table 11-4. When all costs are included, the total six-year capital improvement costs are estimated to be \$1.2 million.

The funding of the facilities needs to be initiated between Clallam County and the Public Utility District, which should include current estimates of connection and installation fees and shown in the final CFP. Any funding shortfall is expected to be erased as debt is retired over the 20-year amortization period.

SURFACE WATER DRAINAGE FACILITIES

No six-year capital improvement project needs have been identified for surface water drainage.

SOLID WASTE COLLECTION FACILITIES

No six-year capital improvement project needs have been identified for solid waste collection.

PARKS AND RECREATION FACILITIES

No six-year capital improvement project needs have been identified for parks and recreation.

LAW ENFORCEMENT FACILITIES

No six-year capital improvement project needs have been identified for law enforcement.

FIRE PROTECTION FACILITIES

No six-year capital improvement project needs have been identified for fire protection.

TRANSPORTATION FACILITIES

Tables 11-5 show transportation facility improvements for the six-year period under the Preferred land use alternative. The six-year costs are estimated at \$879,000. The County Road Fund and mitigation fees have been identified as funding sources adequate to meet these costs. However, other funding sources for these projects may be available in order to defer financial burden and better address issues of cost equity. While some sources are difficult to identify, alternatives should be explored that include a combined effort between County Transportation Improvement Board funds, State Highway funds for projects associated with highway improvements, road improvement districts, and grant funds. In order to allow flexibility to incorporate alternative funding sources and to defer excessive financial burden on new development, this Capital Facilities Plan should allow for alternative funding sources, provided such funds are adequate to meet capital improvements needs.

Several of the transportation improvements listed in the tables are currently part of the unfunded portion of the County's Transportation Improvement Plan (TIP). As noted in Chapter 10, some of the improvements are regional needs and may or may not be directly triggered by development in the project area.

While the RID and mitigation funding sources are likely candidates to fund some of the transportation projects, qualifying for state and federal funding may require changes in the functional classification of the particular roadway identified for improvements. Another funding suggestion would require the County to change the status of unfunded TIP projects in the Carlsborg area. By elevating the priority of transportation projects in the Carlsborg area, such projects would be included in the funded portion of the TIP. Efforts to re-evaluate the TIP and raise priorities for Carlsborg transportation projects would be supported by the Comprehensive Plan policies for prioritizing UGA improvement projects (C.C.C. 31.02.285(1)).

Those projects that identified for the S.R. 101 corridor (i.e. sidewalks and landscaping along S.R. 101) present a unique challenge. Because these improvements involve the WSDOT right-of-way, County funds are not available for such projects. The County should work cooperatively with the WSDOT to pursue state highway funds for such projects. However, this also depends on the funding priorities of the WSDOT and therefore cannot be relied upon as the only funding source. Exploring grants is therefore the only other alternative available outside of requiring mitigation from new development to cover all remaining costs.

Table 11-5 Transportation Capital Improvement Associated with the Carlsborg Planning Area For the Preferred Alternative	
Category	Six -Year Total
Improvement Projects	
Roadway Width Improvements	
Mill Rd./Smithfield Rd.-Runnion Rd. East**	\$242,000
East Runnion Rd./Carlsborg Rd. to Mill Rd*	\$150,000
"Right-in, Right-out" public road intersection improvements (Mill Rd., Valley Center, Gupster Rd., Taylor Cutoff Rd.)	\$100,000
Subtotal	\$492,000
Non-Motorized Improvements	
Sidewalks along SR 101 (both sides)	\$150,000
Sidewalk/trail according to plan	\$187,000
Landscaping along SR 101	\$50,000
Subtotal	\$387,000
Total Costs:	\$879,000
Identified Fund Source & Level	
County Road Fund	\$529,000
Mitigation for new development	\$350,000
Total Funding:	\$879,000
Cost/Finance Comparison	
Six Year Total Costs:	\$879,000
Six Year Total Finance:	\$242,000
Revenue/Cost Comparison	<00.0>
*Unfunded portion of Six-Year Road Plan / **Funded portion of Six Year Road Plan	

TRANSPORTATION FACILITIES – REGIONAL NEEDS

Tables 11-6 shows transportation facility improvements for the six-year period for the Carlsborg UGA. The six-year costs are estimated at \$ 1,539,000. Similar to costs in Table 11-5, funding sources for the projects listed in Table 11-6 are difficult to identify. Table 11-7 indicates private development transportation costs of \$290,000 which are borne upon adjacent property owners or developers.

Several of the transportation improvements listed in the tables are currently part of the unfunded portion of the County's Transportation Improvement Plan (TIP). As noted in Chapter 10, some of the improvements are regional needs and may or may not be directly triggered by development in the project area.

Table 11-6 Transportation Capital Improvement Costs – Regional Improvements Needed Regardless of Land Use Choices		
Category		Total 2000-2020
Improvement Projects		
Roadway Width Improvements		
Atterberry Road widening within planning area		\$36,000
Spath Road (within Planning area)		\$249,000
Hooker Road widening within planning area		\$24,000
Circulation Improvements		
Road improvements necessary for local traffic circulation		\$500,000
Multi-modal Improvements		
Transit shelter		\$20,000
Park and Ride lot		\$200,000
Bicycle storage facilities		\$10,000
Trail along Matriotti Creek		\$200,000
Bicycle lane shoulder widening		\$300,000
Total		\$1,539,000
Fund Source & Level		
County Road Fund		\$0
Road Improvement District		\$0
Transportation Improvement Bond		\$0
Local Sales Tax		\$0
Real Estate Excise Tax		\$0
Mitigation for new development		\$0
Total:		\$0
Cost/Finance Comparison		
Twenty Year Total Costs:		\$1,539,000
Total Finance:		\$0
Revenue/Cost Comparison		< \$1,539,000 0 >

Table 11-7 Transportation Capital Improvement Costs Associated with Private Development For the Preferred Alternative	
Category	Total
Improvement Projects	
Roadway Width Improvements	
Construct Access Road onto Carlsborg Rd	\$140,000
Reconfigure Valley Center Place Rd as Access road	\$150,000
Total:	\$290,000
Identified Fund Source & Level	
Road Improvement District/private development	\$290,000
Total:	\$290,000

ON-SITE OPERATION AND MAINTENANCE PROGRAM

As described in Chapter 3, in order for the benefits of enhanced on-site septic systems to be fully realized in the Carlsborg Area, careful monitoring of all systems is necessary. An effective Operations and Maintenance Program (O&M) would be required for the Carlsborg Area under the Preferred Alternative if on-site sewage disposal systems are used instead of a centralized sewer system. Such a program would include the following elements:

- Educate and inform the Public
- Inspection and Monitoring Program
- Information Tracking and Analysis
- Evaluation
- Policy/Regulation Development
- Enforcement:
- Financial Barriers:

Project Costs

The following figures represent the estimated costs associated with the start-up and annual operation of the operations and maintenance program previously described in Chapter 3:

Cost borne by the county:

Operation and Maintenance Specialist	\$45,968
Support Staff	\$38,000
Supplies	\$10,000
Indirect costs 25%	<u>\$20,992</u>
Annual County Costs	\$114,960

Start up county costs:

Computer Equipment	\$6,000
Office Equipment	\$15,000*
Vehicle	<u>\$36,000</u>
TOTAL START UP COSTS	\$57,000

* Existing office equipment and office space needs to be addressed.

Cost borne by the O&M service providers:

~ 500 hours/year staff time (PUD or certified professional)	\$12,500
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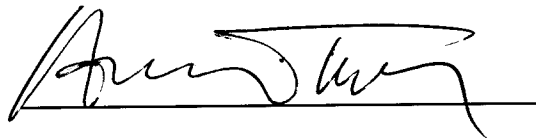
Supplies	\$2,000
Indirect costs 25% of salaries	<u>\$3,125</u>
Annual O&M Service Providers Costs	\$17,625

Section 4 The signed ordinance shall be recorded in the Auditor's Office.

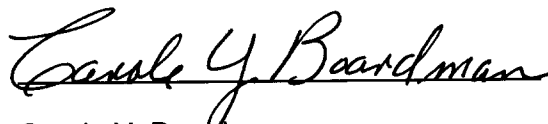
Section 5 This ordinance shall become effective ten (10) days after adoption.

PASSED AND ADOPTED this 5th day of December, 2000.

BOARD OF CLALLAM COUNTY
COMMISSIONERS



Howard V. Doherty, Jr., Chair



Carole Y. Boardman



Stephen P. Tharinger

ATTEST:



Trish Perrott, Clerk of the Board

Appendix A.
Land Use Capacity Analysis
Carlsborg Capital Facilities Plan

Appendix A

Land Use Capacity Analysis

Planning for the adequate provision of capital facilities for the next 20 years in Carlsborg requires information on existing land uses and a forecast of future growth. To obtain this information, the Clallam County Department of Community Development (DCD) reviewed previous analyses that were prepared for this planning area and also conducted a land use capacity analysis for the two land use alternatives listed below. Please note that the Preferred Alternative is the only land use alternative discussed in the CFP except for this Appendix. A second alternative, Alternative 2 – Interim Rules, is included in the land use capacity analysis for the purpose of depicting any difference between the projected build-outs of the two alternatives, as well as for use in the required environmental review of the proposed UGA (see Supplemental Draft Environmental Impact Statement):

- **Preferred Alternative** - Designates the Carlsborg Urban Growth Area with on-site sewage disposal systems
- **Alternative 2** – Continues with Interim Land Use Rules established in 1996

Refer to Chapter 2 of the Carlsborg Capital Facilities Plan for a complete description (including maps) of the Preferred land use alternative, including the individual land use designations that are proposed. For further information on the current, Interim Rules, contact Clallam County DCD.

The land use capacity analysis is intended to comply with the data collection and analysis requirement of the Growth Management Act (GMA). Accordingly, the analysis focuses on:

- Identifying the location and distribution of existing land uses.
- Identifying the approximate acreage and range of density or intensity of existing land uses.
- Identifying vacant land.
- Estimating future population growth for the Carlsborg planning area.
- Projecting the build-out, or level of commercial, industrial and residential development likely to be experienced over the 20-year planning period.
- Analyzing the extent to which vacant land can support anticipated growth.
- Assessing whether the densities and distribution of growth contemplated in the Comprehensive Plan land use alternatives for the Carlsborg planning area can be achieved within the capacity of available land.

The land use capacity analysis is organized based on Carlsborg land use designations proposed under the Preferred alternative with a comparison to the Interim Rules. This approach was selected because the land use designation boundaries generally correspond to the existing location of residential, commercial, industrial, and mixed use areas within the Carlsborg project area. The project area boundary was determined as a part of the agreement between City of Sequim and Clallam County to resolve a GMA appeal. The boundaries generally follow existing development patterns and land use designations. Clallam County will utilize existing zoning classifications specified in proposed Chapter 33.20, Zoning Code, which follows similar, existing land use classifications, for each designation within the project area.

The Carlsborg land use capacity analysis was conducted for the 20-year planning period (2000-2020). The analysis considers the existing (2000), 6-year (2000-2005) and 20-year (2000-2020) planning horizons. Data was assembled and analyzed in 1992, 1997 and 2000. The criteria and general methodology for conducting the land use capacity analysis are listed below and are further explained throughout this Appendix:

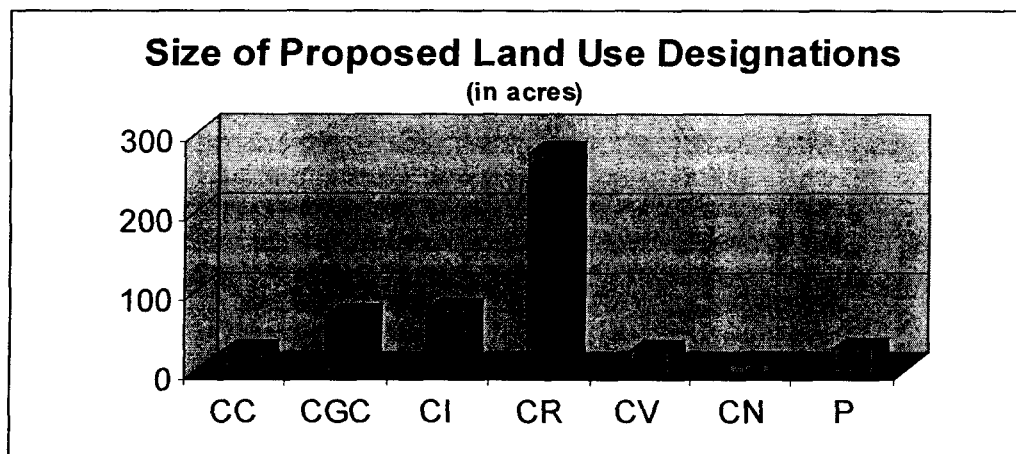
- Land Use Alternatives
- Population Growth
- Existing Land Uses
- Vested Lands

- Available Land Capacity
- Build-out Calculation Methods
- Growth Forecast

Land Use Alternatives - The comprehensive plan and zoning designations for Carlsborg guide the location and type of land uses that will occur within the 20-year planning period (See Figure A-1). Clallam County evaluated the location and size of land use designations, development trends for the project area, as well as eastern Clallam County, and allowable land uses (as specified in Title 33, Zoning Code) to develop assumptions regarding available land and forecasts of future growth patterns and uses. Any resulting assumptions from this process are specifically noted in each land use classification. Any references to possible modifications to boundaries and/or land use designations are further explained under each land use section.

The density allowed under for the Preferred Alternative follows general GMA guidelines for distinguishing between urban and rural lands, as well as adopted County-wide Planning Policies. Also considered were the limitations established by on-site sewage disposal regulations and the availability of public water. Based on these considerations, the maximum density, or minimum lot size for Preferred Alternative shall be 0.5 acres/unit. These requirements should be reflected in any subsequent comprehensive plan and zoning amendments.

Figure A-1 – Size of Land Use Designations of he Preferred Alternative.
(See Chapter 2 for descriptions of each zoning designation)



Population Growth - Based on 1980 and 1990 U.S. Census data, Clallam County estimated the 1990 Carlsborg project area population to be 655. Applying a linear projection rate of 2.72 percent that was specified for the Agnew-Carlsborg Sub-Area in the adopted County-wide Planning Policies, to the 1990 base population, Clallam County estimated the population for the interim land use designations that are currently in place. This resulted in an estimated population for 2000 (857 persons); 2005 (980 persons), and 2020 (1465 persons).

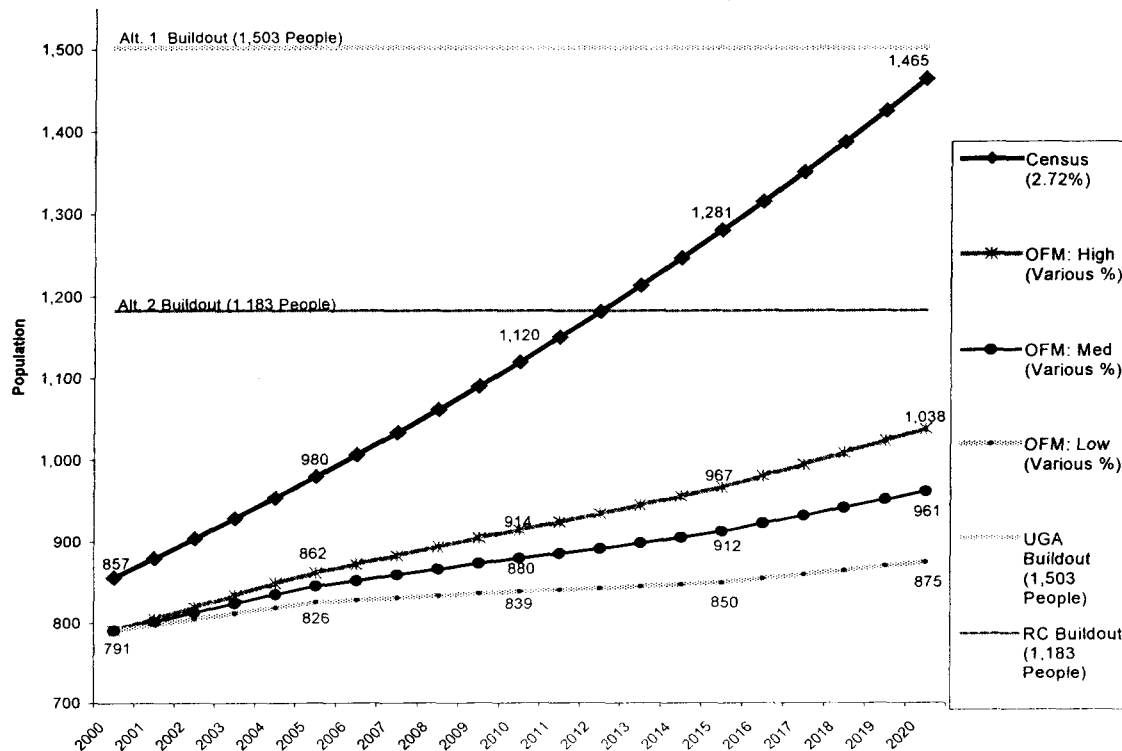
The various population projection estimates are shown in Figure A-2. Each projection is based on the population that was specified in the 1990 census and then incorporating different rates of growth. To comply with GMA requirements, OFM projections should be considered as a part of the GMA planning process such that the resulting population projections are not less than OFM projections – nor should they be significantly higher – in order to ensure that the preferred land use scenarios are adequate to support population growth, as well as economic needs of the region. The projected populations calculated under the various methods are very similar to each other and do not significantly exceed recent OFM projections for unincorporated Clallam County.

Clallam County used a residential occupancy figure for build-out projections for this project of 2.4 persons per residence. This figure is specified in County-wide planning policies and is slightly higher than the recent OFM rate for Clallam County of 2.24 persons per residence. Based on this chosen projection method, the population estimated at build-out for Preferred Alternative is 1503 persons in 2020. Population projections for the interim designations at build-out would be 1183 persons in 2020. As shown in Figure A-2, the build-out slightly exceeds OFM projections but is below the 2.72 linear projection rate that has been previously estimated for the Carlsborg-Agnew Subarea.

Other methods that were reviewed are further explained below:

- Another population forecast utilizes the most recent Washington State Office of Financial Management (OFM) which uses an average of 2.24 persons/household for unincorporated Clallam County. Using this method, it is estimated that the 2000 population for the Carlsborg project area under the current land use designations would be 791 persons, 2005 would be 862 persons and 2020 would be 1038 persons.
- Another population projection method further incorporates the 2.4 persons/household figure. Based on this method and adding the number of new housing starts within the project area to the 1990 base population results in the 2000 population estimated at 1027. The 6-year and 20-year estimates for each alternative can also be determined.
- The occupancy/vacancy rate for the project area was not incorporated in estimating the population growth projections.

Figure A-2. Carlsborg Population Projections

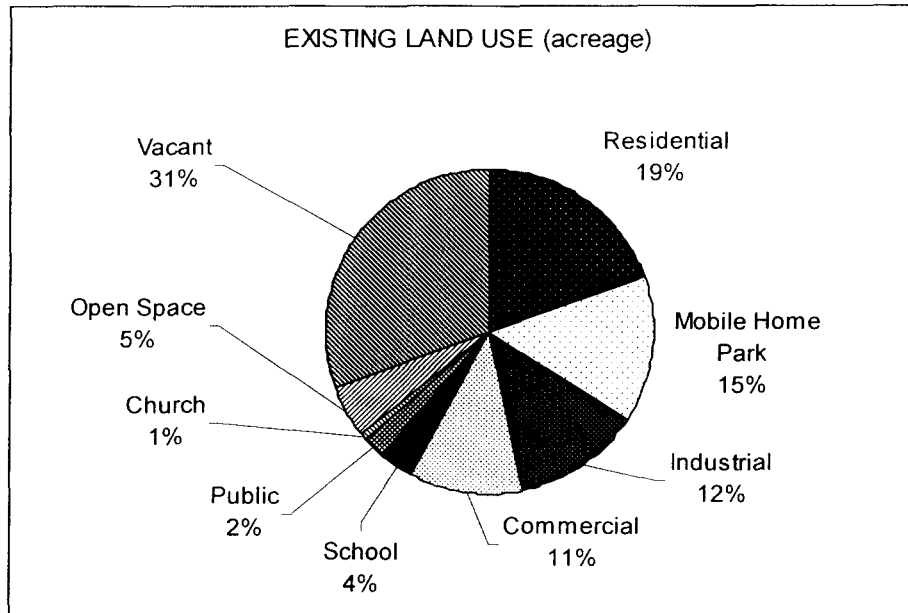


The 2000 census population estimate (857 people) is based on an annual linear growth rate of 2.72% from the 1990 census-population estimate of 655 people. The 2000 estimate (791 people) is based on the 1990 census for Carlsborg, multiplied by the growth rate of the County estimated by OFM.

Existing Land Uses - Clallam County inventoried the types of current land use and development for each parcel within Carlsborg by integrating the following existing data bases: (1) Carlsborg land use inventory conducted by DCD; (2) land use codes assigned for tax assessment purposes by the

Clallam County Assessors Department; and (3) DCD building permit information. The data was organized by parcel number and linked to mapped parcel boundaries using the County's geographical information system (GIS). A GIS is a computer system designed to capture, store, update, manipulate, analyze, and display geographically referenced information. DCD staff field verified discrepancies between the data bases. The Standard Industrial Land Use Classification system was also incorporated for coding land use types in previous analyses; however, this coding was not updated in all cases for this project. The results are shown in Figure A-3 below.

Figure A-3 – Existing Land Use



The average, or mean lot size was determined for residential, commercial and industrial land uses. These figures were determined based on the lot sizes within each zoning district and not by each category of land use (e.g. residential, commercial). Open space tracts were not incorporated into the calculation. For residential lands, the average lot size was 1.51 acres without mobile home parks incorporated into the calculation, and 0.55 acres including mobile home parks (calculation included the gross acreage of park, minus roads, and divided by the number of spaces for an average acreage per space for the particular park). For commercial zones (CC, RV and RC), the average lot size was 1.27, 0.20 and 3.22 acres, respectively. For industrial zones, the average lot size is 2.02 acres. See Table A-1.

Table A-1 Average Lot size for Residential, Commercial and Industrial Land Uses.

Current Zoning Designation	Average parcel Size (in acres)
Residential (R1)	1.51 – excluding mobile home park 0.55 – including mobile home parks
Commercial	CC – 1.27 RV – 0.20 RC – 3.22
Industrial	2.02

Vested Lands - Vested lands are lands with existing land uses, or those with permits to develop that are approved or pending approval. For example, Matriotti Meadows, a 34-lot subdivision (33 additional lots proposed) located southwest of Costco, has received preliminary plat approval from Clallam County. These 33 additional lots and other vested lands need to be considered in planning for capital facilities in Carlsborg. To identify vested lands, Clallam County reviewed land division (subdivisions and short plats), and other land use permit applications (See Table A-2). Vested lands were identified by parcel number and the information linked to mapped parcel boundaries using a GIS. Vested lands lose their status when an approved permit expires and development is not completed.

Table A-2 List of Vested Land Divisions.

Land Division Number	Number of additional lots proposed	Expiration Date	Tax Parcel Number/Location
LDV95-0088	33	1/30/01	043024428020/ SW of Costco
LDV96-0024	3	4/16/01	043022240050/ Hwy 101 and Matriotti Cr.
LDV96-0039	2	5/30/01	043015340000/ Spath Road
LDV96-0044	0 (alteration)	5/31/01	043023319000/ Hwy 101 and Gupster
LDV99-0023	2	8/25/04	043015400090/ Industrial Park

Available Land Capacity - Growth requires vacant land and land available for redevelopment (See Table A-3). The methodology for determining available land capacity for residential uses considered current development status, nonconforming lots and their respective sizes, maximum residential density, sewage disposal and potable water requirements, and minimum lot size set forth by zoning classifications or environmental health regulations. Similar factors were used to determine industrial and commercial land use capacity, but parcel location also played an important role. For example, commercial redevelopment was considered more likely under the Preferred Alternative where the parcel was located at a major intersection along Highway 101.

Review of the land use inventories for the City of Sequim (incorporated) and the unincorporated Urban Growth Area was also conducted (See Table A3).

Table A-3 Summary of Land Uses in Carlsborg Planning Area and Unincorporated Sequim Urban Growth Area.

Land Use Designation*	Existing Number of Parcels - Developed	Acreage	Existing Number of Parcels - Vacant	Acreage
Carlsborg Planning Area				
CR	126/434	203	41	72
CV	6	20	2	6
CN	26	10	3	3
CI	22	56	13	23
CGC	26	36	21	29
CC	19	26	1	1
TOTAL	225/533	351	81	134
Sequim Unincorporated Urban Growth Area (Land Use Inventory - Sequim Comp. Plan DEIS, 1995)				
Residential	749	1564	196	617
Commercial	12	23	3	28
Industrial	Not indicated	Not indicated	Not indicated	Not indicated

*Excludes roads, public lands, easements, and open space tracts.

**Higher figure includes mobile home park spaces

Build-out Calculation Methods To estimate potential build-out, Clallam County reviewed the assumptions made in previous reports for development trends, as well as recent trend analysis and the available land capacity described above. The key factors in determining potential build-out, as well as the land use scenarios for the Preferred Alternative could be described as physical restrictions of the individual property or the specific neighborhood such as on-site sewage disposal systems requirements. Examples include: 1) requirements for sewage disposal and potable water as specified in WAC 246-272 (a minimum lot size of 0.5 acres for an on-site system in Type 1 and 2A soils with community (off-site) water,) and 2) availability and cost for public water connections. The most common soil classification for the project area has been determined to be Type 1 soils which requires the lowest density for on-site calculations. As further described in Chapter 3 and Appendix B, an estimated 5% of the land area may contain Type 2 soils which would support higher densities; however, the location of parcels that contain this soil type was not investigated.

To calculate the potential build-out, Clallam County totaled the existing number of parcels, noted their individual acreage, and then determined how many were divisible under the maximum density (or minimum lot size) allowed. The total number of parcels that could be divided, along with the number of additional lots that could be created were added to the number of existing, undividable parcels for a total potential build-out. These calculations excluded public land uses (e.g. schools, utilities), open space tracts, for example, and are further described in each of the six land use categories.

Other methods that were considered but determined to be not as practicable as the preferred method described above include: 1) analyzing only the vacant parcels, and 2) total acreage of the project area divided by the density allowance for each designation. The former method ignored the potential of developed parcels of being further divided. The latter method assumed that the project area would be totally redeveloped within the 20-year planning period. Both of these methods were not supported by development trends in the project area.

The projected growth for the 6-year and 20-year planning periods are further explained for both the Preferred Alternative, as well as current zoning designations. These projections are based on minimum lot size required by on-site sewage disposal and potable water regulations and not the

potential number or intensity of future land uses that would be subject to on-site and potable water restrictions. See Table A-4 below.

Table A-4 Summary of Potential Additional Parcels

Land Use Designation	Potential Additional Parcels under the Preferred Alternative
Carlsborg Residential	231
Carlsborg Village Commercial	40
Carlsborg Village Center	3
Carlsborg Industrial	111
Carlsborg General Commercial	80
Carlsborg Commercial	26
Subtotal-Commercial and Industrial only	260
TOTAL	491

Growth Forecast - Planning for capital facilities for the Carlsborg planning area requires forecasting the type of growth anticipated. Growth forecasts are used to estimate wastewater flows, water needs, traffic volumes, parks and recreation needs, etc. The growth forecast is also used to analyze the extent to which land available for development or redevelopment can support anticipated growth. The residential growth forecast was based on the 6 and 20-year Carlsborg population forecast and a 2.4 persons per household. Commercial and industrial growth projections considered the past 10-year growth trends, both regional and local, and also assumptions on the type and location of future commercial/industrial uses.

The Carlsborg Task Force reviewed and assisted DCD in preparing previous editions of the land use capacity analysis. The Carlsborg Task Force is a voluntary committee made up of residential, commercial, and industrial property owners in Carlsborg as well as representatives from the City of Sequim and Clallam County Public Utility District. In addition, the Central Carlsborg Community Coalition, a volunteer group, also provided information and comments.

Analysis of development trends of residential, commercial, and industrial uses for the period of 1990 through 1999 for the project area was also taken into consideration. During this period, 77 new residential units were permitted (majority were located in residential zones) for an average during of 7.7/year over this ten-year period (peak years 1992-95). Also during this period, 33 permits for commercial or industrial projects were issued for an average of 3.3/year (peak years 1993, 1996-1998). These trends are further discussed under each zoning classification.

The development trends for the period 1995-1999 for the Carlsborg planning area, in the City of Sequim incorporated area) and the unincorporated Sequim Urban Growth Area were also reviewed to help determine growth forecasting, including the types of growth that are expected to occur. Table A-5 below provides the total number and sizes of new construction for the Carlsborg planning area, as well as both the unincorporated Sequim UGA and incorporated city limits for the period of 1995-1999. The type of commercial/industrial permit is based on Uniform Building Code categorization and generally includes retail, office, storage, or combinations thereof; they did not include churches or schools. The number of commercial/industrial permits proposed in the unincorporated parts of Clallam County that are outside of the UGA and the Carlsborg planning area were not investigated any further to determine the types of commercial/industrial development (see Table 5 -bottom row).

Table A-5 Summary of Development Trends in Eastern Clallam County

Sequim-Dung. Regional Planning Area		1995	1996	1997	1998	1999	5-Year Total	Annual Average for 5 year period
(City and unincorporated)	# of Building permits - Residential	329	330	300	326	343	1628	325.6
	# of Building permits - Commercial/Industrial	19	26	32	25	23	125	25
City of Sequim (incorporated)								
	# of Building permits - Residential	37	32	26	36	30	161	32.2
	# of Building permits - Commercial/Industrial	9	2	5	5	2	23	4.6
	Total sq footage - Comm.	14543	5407	3800	6216	9013	38979	7796
	Total sq footage - Ind.	17860	0	13408	7200	0	38468	7694
Sequim UGA (unincorp)								
	# of Building permits - Residential	14	33	24	18	22	111	22.2
	# of Building permits - Commercial/Industrial	0	1	0	0	1	2	1
	Total sq footage - Comm.	0	1740	0	0	3744	3744	2724
	Total sq footage - Ind.	0	0	0	0	0	0	N/a
Carlsborg Planning Area								
	# of Building permits - Residential	14	4	7	4	5	34	6.8
	# of Building permits - Commercial/Industrial	2	6	6	6	4	24	4.8
	Total sq footage - Comm.	4252	12692	13448	15810	5659	51861	10372.2
	Total sq footage - Ind.	0	28204	33543	5760	2499	70006	14001.2
Remaining Unincorporated Area								
	# of Building permits - Residential	264	261	243	268	286	1322	264.4
	# of Building permits - Commercial/Industrial	8	16	20	14	14	72	14.4

Assumptions can be made from the numbers provided in Tables A3, A4 and A5 about development trends in eastern Clallam County. Table A3 indicates that the Sequim unincorporated urban growth area has 3 vacant, commercially-zoned parcels totaling 28 acres, as compared to the Carlsborg planning area which has 35 vacant, commercial or industrial zoned parcels totaling 52 acres. Data from the incorporated areas of Sequim was not investigated.

The land use capacity analysis provides a forecast of population and development growth for Carlsborg. This information is necessary for planning for capital facilities needs. As with the Capital Facilities Plan, the land use capacity analysis will need to be periodically reviewed and updated.

The results of the 2000 analysis by land use designation for the Preferred Alternative, as well as Alternative 2 – Interim Rules are described in the remainder of this appendix.

UGA - Comprehensive Plan Designation	UGA - Zoning Designation	UGA - Zoning Symbol	Interim Zoning Symbol
Carlsborg Urban Residential	Carlsborg Urban Residential	CR	R1
Carlsborg Village Commercial	Carlsborg Village Commercial	CV	RC
Carlsborg Village Center	Carlsborg Village Center	CN	RV
Carlsborg General Commercial	Carlsborg General Commercial	CGC	GC
Carlsborg Commercial	Carlsborg Commercial	CC	CC
Carlsborg Industrial	Carlsborg Industrial	CI	I.I

Carlsborg Urban Residential Land Use Designation (CR) **[Interim Designation of R1]**

Lands targeted primarily for residential land uses within the Carlsborg project area total approximately 275 acres and are designated as Carlsborg Urban Residential under the Preferred Alternative. The distribution of existing land uses, including the acreage and number of parcels devoted to each use for residential land use designations are summarized in Table A-6.

The maximum density for Preferred Alternative is 0.5 acre/unit in order to meet environmental health regulations for on-site sewage disposal systems and potable water.

The maximum residential development potential (i.e. build-out) was calculated for each parcel utilizing the preferred method previously described. Approximately 11% of the parcels are currently vacant.

Matriotti Meadows, a 34-lot, single family residential development, has been granted preliminary plat approval by Clallam County; this approval expires in 2001. This subdivision is located on approximately 16 acres south of Costco between Highway 101 and Atterberry Roads. Actual home construction on individual lots cannot occur until the developer submits and Clallam County approves the final plat. The residential density approved for this preliminary plat is the same density as what would be allowed under Preferred Alternative (one dwelling unit per 0.5 acre).

Table A-6
Existing Uses of Land for Designated Urban Residential Areas

Existing Land Use	Land Use Code(s)	Acres	# of Parcels
Mobile Home Park	1500	77	308 spaces on 6 parcels
Residential (by parcel size)	1110, 1151, 1117, 1150		
< 1 ac.		24	59
1 to 4.8 ac.		43	24
>4.8 and < 19.6 ac.		15	3
>19.6 acres		0	0
Vacant (by parcel size)	9100		
< 1 ac.		8.8	31
1 to 4.8 ac.		17.4	7
> 4.8 ac. <19.6 ac.		8.7	1
>19.6 acres		37	2
Church	6911	2	1
Open Space Tracts	9400, 9390, 4830, 4840	27	N/A
Potential LDV	9100	16	33 additional
TOTALS*		275 Ac.	167/475 parcels/spaces

**Based on GIS-parcel data base. Does not reflect total acreage of roads and easements within the project area. The revisions in the above table include corrections such as split zoned parcels or land use code corrections as confirmed by site visits.*

Table A-7 presents the number of existing and potential residential dwelling units. It also shows the forecasted number of residential dwelling units for the 6 and 20-year planning horizons. The assumptions for forecasting potential residential dwelling units and the number of new residential units for the 6 and 20-year planning periods are listed below.

- ◆ The residential dwelling unit projections are based on the 6 and 20-year Carlsborg population forecast and a 2.4 persons per household occupancy. Based on population projections for 2020, an additional 173 units will be needed. This is based on divided the estimated population in 2020 (1465) by the number of persons per residential unit (2.4).
- ◆ All future residential growth within the UR land use designation will be residential and demand will follow development patterns of approximately 7 new residences per year.
- ◆ The projections shown in Table A-7 show that residential build-out is not expected during the planning period due to availability and attractiveness of residential lands in other parts of rural Clallam County. The boundaries of the project area, or the residential land use designation may or may not need to be re-visited in order to be better aligned with population forecasts as GMA requires that projections not be less than those of OFM (see population section).
- ◆ Although the majority of the western boundary of the proposed UGA follows Matriotti Creek, there are two parcels included in the proposed UGA that are located west of Matriotti Creek. These parcels are as follows: 1) Matriotti Meadows proposed subdivision (Tax parcel # 043024428020) located on a vacant, 16-acre parcel west of Matriotti Creek, and 2) the vacant 20-acre parcel off of West Runnion Road (Tax parcel #043015340000). The first parcel mentioned above has a proposed subdivision that expires in 2001 that has a density similar to what is allowed under the Preferred Alternative. The second parcel is also part of an approved short plat that expires in 2001 which includes contiguous property owned by the same family trust which abuts Carlsborg Road.
- ◆ The potential number of residential dwelling units is based on .5 dwelling unit/acre under the UGA growth Preferred Alternative.
- ◆ Future subdivision activity will most likely target existing lots (i.e., lot combinations were not considered).
- ◆ Accessory dwelling unit potential was not calculated.
- ◆ Currently classified open space tracts will remain in open space and were not included in build-out calculations, including Alta Vista PUD.
- ◆ Existing non-residential uses will not convert to residential uses.
- ◆ One preliminary-approved subdivision that is not yet final approved proposes 33 additional parcels which were incorporated in the build-out calculations (LDV95-0088-Matriotti Meadows).
- ◆ Most new residential growth will occur on existing or pending lots within subdivisions such as Alta Vista, Matriotti Meadows, and Sawby Acres.
- ◆ Mobile home figures assume that existing mobile home parks have residential units on each approved lot. The following is a breakdown of the number of lots for each current mobile home park within the Carlsborg Study area: 51 lots Carlsborg Mobile Estates; 23 lots Green Acres Mobile Home Park Div. I (Dungeness River Mobile Home Park); 26 lots Green Acres Mobile Home Park Div. II; and 208 lots Parkwood Mobile Home Park.

Table A-7
Residential Land Use Capacity and Growth Projects

Land Use	Build-out			Potential Build-out Projections		
	Existing (includes MHP spaces)	Potential	Build-out	2000-2005	2005-2020	20-year Total
Preferred Alternative	475	231	706	42	98	140
Alternative 2	475	106	581	42	64	106

Carlsborg Village Center Land Use Designation (CN) **[Interim Designation of Rural Village (RV)]**

Lands proposed for village type uses (i.e., mixed commercial/residential) total approximately 10 acres and are designated as Carlsborg Village Center under Preferred Alternative. The distribution of existing land uses, including the acreage and number of parcels devoted to each use, are summarized in Table A-8.

The lands under this designation are located along the west side of Carlsborg Road between Spath and W. Runnion Roads, as well as the southwest corner of E. Runnion Road and Carlsborg Road intersection. This area has not experienced any significant commercial growth activity over the past six years. Clallam County granted preliminary plat approval for a four lot short plat totaling 42 acres [Tax Parcels 043015(430000),(340000)]. Three of the four lots are located within the Rural Village land use designation and front on Carlsborg road. The average lot size of these three proposed parcels is 1 acre each [Note: the remaining 19-acre of this parcel is proposed to be designated CR and is included in that calculation.].

The maximum density, or minimum lot size, for Preferred Alternative is 0.5 acre/unit in order to meet environmental health regulations for on-site sewage disposal systems and potable water.

Table A-9 presents the number of existing and projected residential, mixed use, and commercial uses. It also shows the forecasted number of such uses for the 6 and 20-year planning horizons. The growth assumptions are listed below:

- ◆ The three acres of vacant land at the corner of Carlsborg and Runnion Roads that are a part of pending short plat (LDV96-0039) are the only lands available for major new commercial development during the 20-year planning period. It is likely that commercial development would occur on the lots fronting Carlsborg Road, and not residential uses.
- ◆ Redevelopment of existing residential and commercial uses is unlikely during the 20-year planning period given the: 1) established neighborhood character; 2) small parcel size, 3) numerous property owners; and 4) available vacant commercial land in other areas of the Carlsborg urban growth area and Sequim-Dungeness Regional planning area. However, it is likely that many of the residential land uses fronting on Carlsborg Road will convert to small professional offices and/or associated home based enterprises over the 20-year planning period.
- ◆ A small restaurant (< 3000 sq. ft.) will locate along Carlsborg Rd. within areas designated for commercial uses not associated with Highway 101 commercial areas. It will primarily cater to businesses and residents located north of highway 101 such as the Carlsborg Industrial Park.

Table A-8
Existing Land Uses for Designated Village Center Areas

Use	Land Use Code(s)	Acres	# of Parcels
Residential (by parcel size)	1110, 1151		
< 1 ac.		3.8	19
1 to 4.8 ac.		1.9	1
> 4.8 ac		0	0
Vacant (by parcel size)	9100		
< 1 ac.		.2	2
1 to 4.8 ac.		2.5	1
> 4.8 ac		0	0
Commercial	5392	1.4	3
Potential lots through LDV96-39	9100	3.0	3
TOTALS*		12.8 acres	29 Parcels

*Based on GIS-parcel data base. Does not reflect total acreage of roads and easements within the project area.

Table A-9
Village Center Land Use Capacity
(Same for both alternatives)

Land Use	Build-out			Potential Build-out Projections		
	Existing	Potential	Build-out	2000-2005	2005-2020	20-year Total
Residential	20	0	20	0	0	0
Commercial and Vacant	6	3 (LDV)	9	1	2	3

Carlsborg Village Commercial Land Use Designation (CV) **[Interim Designation of Rural Center (RC)]**

Lands designated Carlsborg Village Commercial under Preferred Alternative total 26 acres and are located along the north-side of Spath Road, west-side of Carlsborg Road, and south of the old railroad grade. The distribution of existing land uses, including the acreage and number of parcels devoted to each use, are summarized in Table A-10.

The maximum density, or minimum lot size, for Preferred Alternative is 0.5 acre/unit in order to meet environmental health regulations for on-site sewage disposal systems and potable water.

Three commercial businesses, one light industrial, and one office has developed over the past ten years within designated Carlsborg Village Commercial/Rural Commercial lands. The current uses include Graywolf Automotive and an adjacent commercial building, two 5,760 square foot commercial storage/office buildings (one with an adjacent light industrial use) and a 4,600 square foot office building.

Table A-10
Lands Uses for Village Commercial Areas

Use	Land Use Code(s)	Acres	# of Parcels
Commercial (by parcel size)	6411, 6370		
< 1 ac.		.7	1
1 to 4.8 ac.		3.3	2
> 4.8 ac		11	2
Vacant (by parcel size)	9100		
< 1 ac.		0.8	1
1 to 4.8 ac.		0	0
> 4.8 ac		5.1	1
Residential	1110	4.9	1
TOTALS*		25.8 Acres	8 Parcels

**Based on GIS-parcel data base. Does not reflect total acreage of roads and easements within the project area.*

Table A-11 presents the number of existing and projected commercial uses for designated Carlsborg Village Commercial lands. It also shows the forecasted number of such uses for the 6 and 20-year planning horizons. The growth assumptions for the Carlsborg Village Commercial land use designations are listed below.

- ◆ All new development will be commercial.
- ◆ The existing residential parcel will not experience conversion pressures during the six-year planning period, due to the availability of vacant commercial sites. It is likely that the 4.3 acre residential parcel will convert over the 20-year planning period because of its corner location.
- ◆ Future subdivision activity will most likely target existing lots; lot combinations were not considered.
- ◆ Commercial development will continue at rate similar to the past 6 years.
- ◆ New commercial growth between 2000-2005 will concentrate around Savannah Lane.
- ◆ Future growth will target commercial storage, professional offices, research facilities, and limited industrial uses in structures less than 6,500 square feet. Allowed land uses such as retail stores, restaurants, gas stations, grocery stores, tourist shops, and lodging will target commercial lands along Highway 101 during the 20-year planning period.
- ◆ Small restaurant (< 3000 sq. ft.) will locate along Carlsborg Rd. within areas designated for commercial uses not associated with Highway 101 commercial areas. It will primarily cater to businesses and residents located north of highway 101 such as the Carlsborg Industrial Park.

Table A-11
Carlsborg Village Commercial (VC) Land Use Capacity

	Build-out			Potential Build-out Projections		
	Existing	Potential	Build-out	2000-2005	2006 - 2020	20-year Total
Preferred Alternative	8	40	48	12	28	40
Alternative 2	8	15	23	6	9	15

Carlsborg Light Industrial Land Use Designations (CI) **[Interim Designation of Light Industrial (LI)]**

Lands designated for Light Industrial uses within the Carlsborg project area total approximately 79 acres and are located east of Carlsborg Road and north of E. Runnion Road. The distribution of existing land uses, including the acreage and number of parcels devoted to each use, are summarized in Table A-12.

Table A-12
Light Industrial Existing Land Uses

Use	Land Use Code(s)	Acres	# of Parcels
Residential (by parcel size)	1110, 1151, 1150		
< 1 ac.		.4	1
1 to 4.8 ac.		2.4	2
> 4.8 ac		0	0
Vacant (by parcel size)	9100		
< 1 ac.		3.8	5
1 to 4.8 ac.		13.6	7
> 4.8 ac		5.1	1
Light Industrial	6370, 3900, 6600, 3449, 6619, 5999		
<1.0 acre		.6	1
>1.0<4.8 acres		25.9	14
>4.8 acres		26.7	4
TOTALS*		78.4 Ac.	35 Parcels

**Based on GIS-parcel data base. Does not reflect total acreage of roads and easements within the project area.*

The majority of the lands designated for light industrial uses are contained either in the Carlsborg Industrial Park or the Dungeness Business Park. Development activity within the light industrial area for the past ten years is summarized below:

Carlsborg Industrial Park:

- 6 subdivisions have recently received final plat approval within the Carlsborg Industrial Park. These subdivisions have created 22 lots over approximately 32 acres. The average lot size of these 16 new lots is 1.28 acres. Clallam County has granted preliminary approval for a short plat application for Tax parcel #043015400090 which would create two additional parcels.
- 16 light industrial/commercial structures have been constructed within the LI zoning since 1990. These structures range in size from 2,880 to 21,043 square feet based on Clallam County Building Division records. The largest structures of , 21,000, 21,043, and 27,499 square feet have been constructed in the past 4 years. Seven of the structures were located within the Industrial Park.
- The Carlsborg Post Office was constructed on privately-owned, leased property in 1991 (2556 sq. ft.).

Dungeness Business Park:

- The Dungeness Business Park received final plat approval for a 12 acre Planned Unit Development in 1993. Phase 1 includes two home sites and a remodeled barn for the Idea Development Company. The residential lots are just over one acre each in size. The research facility is located on a 2.39-acre parcel and is 11,760 square feet in size. The remaining 7.51 acres of this Planned Unit Development is occupied by Clallam County P.U.D #1, Clallam operation facility which was constructed in 1997. The facilities include offices, warehouse, and equipment and truck bays totaling 27,499 square feet; a Public land designation may be warranted for this parcel.
- The northern 2.5 acres is occupied by a warehouse and storage facility.

Table A-13 presents the number of existing and projected industrial uses for designated Light Industrial lands. It also shows the forecasted number of such uses for the 6 and 20-year planning horizons. The growth assumptions for the Light Industrial land use designation are listed below.

- ◆ All new development will be industrial or allowed commercial uses.
- ◆ Existing residential land uses will not convert over the 20-year planning period. The residential and commercial uses along Runnion Road, east of Carlsborg (including carpet store) may warrant a Rural Village/Carlsborg Village Center designation instead of a Light Industrial designation under the Interim Rules.
- ◆ The 2000-2020 projections assume an industrial growth rate similar to the past 6 years growth of 2.0 new industrial units per year based on trends of 12 new units being constructed in the last 6 years.
- ◆ Based on trends, the past practice of dividing parcels 5 acres or larger into 3 to 5 smaller parcels for individual sale is likely to continue.
- ◆ The projected number of new industrial units exceeds the build-out projection for the number of industrial lots because it utilizes a 0.5 acre per unit density even though the likelihood of this size of lot will not be in demand within this planning period due to development trends. These projections also assume some of the new industrial development will occur as either major additions and/or redevelopment of existing industrial sites. This projection also considers that leasing of industrial sites will occur on some industrial lots.
- ◆ Growth Assumptions for 20-year planning period for the following 5 acre or larger parcels:
 - Parcel 043015419030 (8.1 acres). Current: Anjo landscaping. Future: Same as current use.
 - Parcel 043015410125 (4.5 acres) Current: Primo Construction. Future: Potential expansion and/or addition of 1 additional industrial site for sale or lease.
 - Parcel 043015530000 (7 acres). Current: PUD operation center employing approximately 20 people. Future: Same.
 - Parcel 043015400030 (8 acres). Current: 16,000 sq. ft. medical warehouse facility. Future: Expanded medical warehousing facilities associated with current business.
 - Parcel 043015400020 (5.1 acres). Current: 18,000 sq. ft. snowboard manufacturer. Future: Potential expansion of existing sports manufacturing operation.
 - Parcel 043015400000 (5.4 acres) Current: Manufacturer of fiberglass greenhouses. Future: Expansion or new industrial site development for lease or sale.
 - Parcel 043015400090 (5.3 acres). Current: Former mill pond site. This site also contains PUD well site. Future: A short plat has been approved to divide this parcel into two lots. The lot containing the mill pond is not likely to convert during the 20-year planning period due to the availability of other industrial lands within the Carlsborg area and the unknown costs of restoring the mill pond site. Restoration costs may include substantial fill of former mill pond location.
- ◆ The majority of future industrial development will consist of warehousing, manufacturing, and research in structures less than 20,000 square feet. On developed industrial parcels, future growth will be similar to the current industrial land uses on the parcel.

Table A-13
Light Industrial Land Use Capacity

	Build-out			Potential Build-out Projections		
	Existing Units	Potential New Lots	Lot at Build-out (projected)	2000-2005	2006-2020	20-year Total
Preferred Alternative	36	111	143	12	28	40
Alternative 2	36	37	79	12	25	37

Carlsborg General Commercial Land Use Designations (CGC) **[Interim Designation of General Commercial (GC)]**

Lands along Highway 101 west of Mill Road and also along Hooker Road between Highway 101 and Atterberry Road are designated as Carlsborg General Commercial. The General Commercial area totals approximately 71 acres. The majority of property fronts on Highway 101. The distribution of existing land uses, including the acreage and number of parcels devoted to each use are summarized in Table A-14.

The maximum density or minimum lot size, for Preferred Alternative is 0.5 acre/unit in order to meet environmental health regulations for on-site sewage disposal systems and potable water.

The Highway 101 commercial corridor has experienced significant growth over the past ten years with 112,443 square feet of commercial building space added. Commercial growth has ranged from a 140 square foot espresso stand to a 73,116 square foot retail store (Costco). New commercial growth that occurred over the past six years is listed below:

- United Furniture Warehouse (13,000 sq. ft.)
- Costco Store (73,116 sq. ft.) and Gas Station (72 sq.ft)
- Chevron Gas Station/Convenience Store (1,289 sq. ft.)
- Texaco Gas Station/Convenience Store/Taco Bell (3,752 sq. ft.)
- Sunny Farms Grocery Warehouse Expansion (3,880 sq. ft.)
- Valley Industrial Park Commercial Storage/Warehouse (3,840 sq. ft.)
- Espresso Stand (140 sq. ft.)
- Hooker Road Multi-business complex (7,760 sq. ft.)
- Shell Gas Station/Convenience Store (2,400 sq.ft)
- Conversion of a residence to business offices (1,777 sq. ft.)
- Remodel of existing retail store to a new Sunny Farms nursery/feed store

The County has granted preliminary plat approval for a 4-lot short plat fronting on Highway 101 southwest of Graywolf School and bordering Matriotti Creek. The average lot size of proposed lots 1-3 is .76 acres. The proposed fourth, 1.92 acre lot, borders Matriotti Creek.

Table A-14 - General Commercial Existing Land Uses

Use	Land Use Code(s)	Acres	# of Parcels
Residential (by parcel size)	1110, 1151, 1150, 1220		
< 1 ac.		.8	3
1 to 4.8 ac.		0	0
> 4.8 ac		0	0
Vacant (by parcel size)	9100		
< 1 ac.		9.2	11
1 to 4.8 ac.		11.7	9
> 4.8 ac		7.9	1
Commercial			
< 1 ac.	5530, 5530, 5400, 5810	8.7	14
≥1 ac. to 4.8 ac.	5100, 5711, 5511, 5591,	8.2	6
>4.8	5997, 6500, 6159, 6628, 6619	13.8	1
Industrial/Mixed Commercial	3300, various	5.3	7
TOTALS*		65 Acres*	47 Parcels

**Based on GIS-parcel data base. Does not reflect total acreage of roads and easements within the project area.*

Clallam County reviewed the development trends of the project area since 1990 which resulted in the determination of a growth rate of 2 new commercial businesses per year for commercial lands adjacent to Highway 101 which is depicted in Table A-15. This rate is based on the average commercial growth since 1990 for the commercial zoned areas adjacent to Highway 101 in Carlsborg. For the 20-year planning period, this means that 12 new commercial sites will be developed between 2000 and 2005 and 28 new commercial sites between 2006 and 2020. For the purposes of this analysis a commercial site is defined as:

"a single commercial structure larger than 1000 square feet and/or requiring more than 1/2 acre for facilities (e.g., parking areas, gas pumps). The maximum size of the structure shall be limited to the size restrictions imposed under each growth alternative. Multiple businesses could operate within a single structure on the commercial site. New commercial sites include redevelopment of existing residential or commercial uses."

It is expected with the completion of the Sequim bypass that an increase of commercial development within the Carlsborg area under both alternatives is likely. However, the actual economic impact of the bypass on the Carlsborg area will be heavily influenced by commercial development of the Sequim Urban Growth Area, and the ability of the City of Sequim to attract development.

Table A-15
Carlsborg General Commercial Land Use Capacity

	Build-out			Potential Buildout Projections		
	Existing Units	Potential Additional Lots	Lot at Build-out (projected)	2000-2005	2006-2020	20-year Total
Preferred Alternative	47	80	127	12	28	40
Alternative 2	47	18	65	12	28	40

Table A-16 presents a 6 and 20-year commercial growth forecast of specific land uses for Highway 101 commercially designated lands for both alternatives. The commercial growth assumptions for lands designated for commercial uses adjacent to Highway 101 are listed below:

- ◆ The potential size and intensity of land uses will be limited by on-site sewage disposal requirements as specified by state and local laws.
- ◆ All new development will be commercial.
- ◆ Residential and non-highway dependent, commercial developments fronting highway 101 will be primary targets for redevelopment, especially those located at major intersections.
- ◆ Most new growth will be tourist-oriented. Fastest growing sectors will be fast food/restaurant establishments and tourist shops.
- ◆ Vacant land fronting Highway 101 and redevelopment of the following intersections will be targeted: 1) NE and SW corners of Hwy 101 and Mill Rd.; and 2) Adjacent to the north side of Hwy 101 between Matriotti Creek and Carlsborg Rd.
- ◆ The two areas that are a part of Parkwood Mobile Home Park fronting Hwy 101 are not separate parcels but have had commercial designations under the Interim Rules and were listed as a part of the subdivision to have commercial use and storage areas for the park. These partial lots are proposed to be residential, similar to the rest of the Park.
- ◆ The construction of the Sequim Bypass is expected to result in redevelopment of residential and non-highway dependent commercial properties fronting highway 101.

- ◆ The following commercial sites are not expected to redevelop within the 20-year planning period: United Furniture Warehouse, Texaco Gas Station/Taco Bell, Pacific Commercial Refueling, Flippers, Sunny Farms, Olympic Boat Sales/Service, Chevron Gas Station, James Duff Contracting, Hooker Road multi-business complex (043022530010), Hooker Road commercial storage/offices (043022530100), Carlsborg Fire Station, and RV-Park. This is based on land use, location, and/or assessed value of existing improvements (i.e. >\$100,000).
- ◆ The western 2 acres of the 14-acre Costco development site which now consists of an overload parking lot and gas station is likely to redevelop within the 20-year planning period. It is expected that the Costco site could support 1-2 moderate size businesses or a multi-business complex. Any new commercial development on this site would likely be food oriented or retail businesses not competing for Costco's share of the market.
- ◆ Redevelopment involving lot combinations is likely under Alternative 1 in order to accommodate larger retail businesses and multi-business complexes targeting highway 101 traffic, especially to address on-site sewage disposal requirements. Redevelopment involving lot combinations will target intersections.
- ◆ Pressure for redevelopment of non-highway frontage residential and commercial sites is not expected to be significant during the 20-year planning period.
- ◆ The parcel (043023420150) on the SE corner of Hwy 101 and Taylor-Cut Off Rd, which currently is occupied by the Chevron Gas Station, is a split zone parcel under the current interim zoning. In this instance, the dual designation should remain to prevent further high intensity uses near the Dungeness River, as well commercial sprawl along the highway.
- ◆ The amount of existing and projected vacant lots is listed in Table A-16.
- ◆ All development of vacant lands will be commercial.
- ◆ Vacant parcels will develop as one commercial site. Exceptions to these commercial build-out assumptions for individual parcels are listed below.
 - Parcel number 043022240050 will develop as three commercial business sites under both growth alternatives. This site has received preliminary plat approval to create three additional parcels.
 - The approximately 15 acres within the Sequim Valley Center will be a primary target for larger commercial ventures such as motels and retail stores under Preferred Alternative. Construction of a 3,840 square foot commercial storage unit was completed along the southern boundary of the parcel. It is projected that additional commercial storage units may develop along the south boundary. The remainder of this parcel would be ideal for 1 to 4 moderate to large-scale commercial ventures depending on on-site sewage disposal limitations (e.g., motel, multi-business complex). The landowner recently received final plat approval for 13 lots on the 15 acre site. The 15 acre site includes the United Furniture Warehouse and a commercial storage building. The 13 lots are between 1 and 2 acres in size.
 - The vacant 6 acre parcel (043022428010) with approximately 3.6 acres of commercial zoning immediately south of Costco and north of Matriotti Creek was projected to have only 1 commercial business site due to development limitations of the site associated with environmental protection standards for Matriotti Creek.

Table A-16
6 and 20-year Growth Projection

Land Use	Preferred Alternative 2000 - 2005	Preferred Alternative 2006 - 2020
Fast Food/Restaurant (< 3,000 sq. ft.)	2	3
Gas Station/Groceries	1	0
Motel (60 units or less)	1	2
Retail/Tourist Shop/Food (10,000 to 20,000 sq. ft.)	2	2
Retail/Tourist Shop/Food (5,000 to 10,000 sq. ft.)	3	3
Retail/Tourist Shop/Food (< 5,000 sq. ft.)	1	5
Commercial Storage and Professional Offices	2	3
Totals	12	28

Table A-17
Vacant Land Projections

Land Use Alternative	Existing # of Vacant Lots	Projected # of Comm. Sites on Vacant Parcels at Build-out
Preferred Alternative	21	28
Interim Rules	21	10

Carlsborg Commercial Land Use Designations (CC) **[Interim Designation of Carlsborg Commercial]**

Lands along Highway 101 are designated as either General Commercial or Carlsborg Commercial. The Carlsborg Commercial can be described as the eastern portion of the Highway 101 commercial corridor the total land area of this designation is approximately 27 acres. The majority of property fronts on Highway 101. The distribution of existing land uses, including the acreage and number of parcels devoted to each use is summarized in Table A-18.

The maximum density or minimum lot size, for Preferred Alternative is 0.5 acre/unit in order to meet environmental health regulations for on-site sewage disposal systems and potable water.

The Highway 101 commercial corridor near the Carlsborg/Hooker Road intersection has experienced significant growth over the past ten years. The Carlsborg Commercial designation has not seen the same amount of growth

Clallam County has granted preliminary plat approval for a 4-lot short plat located at the northwest corner of Gilbert Road and Highway 101. The short plat reconfigures and consolidates the existing church facilities and marine upholstery business onto one lot, and creates three parcels along Gilbert Road ranging in size from .57 acres to 1.43 acres which are currently occupied by a RV sales facility or are vacant.

Table A-18
Carlsborg Commercial Existing Land Uses

Use	Land Use Code(s)	Acres	# of Parcels
Residential (by parcel size)	1110, 1151, 1150, 1220		
< 1 ac.		.4	1
1 to 4.8 ac.		9.7	7
> 4.8 ac		0	0
Vacant (by parcel size)	9100		
< 1 ac.		0	0
1 to 4.8 ac.		1.2	1
> 4.8 ac		0	0
Mixed Commercial/Residential	various		
< 1 ac.		2.4	3
> 1 acre		12	7
Church	6911	2.1	1
TOTALS*		27 Acres*	20 Parcels

**Based on GIS-parcel data base. Does not reflect total acreage of roads and easements within the project area..*

Clallam County reviewed the development trends of the project area since 1990 which resulted in the determination of a growth rate of 2 new commercial businesses per year for commercial lands adjacent to Highway 101 which is depicted in Table A-19. This rate is based on the average commercial growth since 1990 for the commercial zoned areas adjacent to Highway 101 in Carlsborg. For the 20-year planning period, this means that 12 new commercial sites will be developed between 2000 and 2005 and 28 new commercial sites between 2006 and 2020. For the purposes of this analysis a commercial site is defined as:

"a single commercial structure larger than 1000 square feet and/or requiring more than 1/2 acre for facilities (e.g., parking areas, gas pumps). The maximum size of the structure shall be limited to the size restrictions imposed under each growth alternative. Multiple businesses could operate within a single structure on the commercial site. New commercial sites include redevelopment of existing residential or commercial uses."

It is expected with the completion of the Sequim bypass that an increase of commercial development within the Carlsborg area under both alternatives is likely. However, the actual economic impact of the bypass on the Carlsborg area will be heavily influenced by commercial development of the Sequim Urban Growth Area, and the ability of the City of Sequim to attract development.

Table A-15
Commercial Land Use Capacity

	Build-out			Potential Buildout Projections		
	Existing Units	Potential Additional Lots	Lot at Build-out (projected)	2000-2005	2006-2020	20-year Total
Preferred Alternative	20	26	46	12	28	40
Alternative 2	20	4	24	6	14	20

The commercial growth assumptions for lands designated for commercial uses adjacent to Highway 101 are listed below:

- ◆ The potential size and intensity of land uses will be limited by on-site sewage disposal requirements as specified by state and local laws.
- ◆ All new development will be commercial.
- ◆ Residential and non-highway dependent, commercial developments fronting highway 101 will be primary targets for redevelopment, especially those located at major intersections.
- ◆ Most new growth will be tourist-oriented. Fastest growing sectors will be fast food/restaurant establishments and tourist shops.
- ◆ The construction of the Sequim Bypass is expected to result in redevelopment of residential and non-highway dependent commercial properties fronting highway 101.
- ◆ Redevelopment involving lot combinations is likely in order to accommodate larger retail businesses and multi-business complexes targeting highway 101 traffic, especially to address on-site sewage disposal requirements. Redevelopment involving lot combinations will target intersections.
- ◆ Pressure for redevelopment of non-highway frontage residential and commercial sites is not expected to be significant during the 20-year planning period.
- ◆ Redevelopment of residential parcels fronting Highway 101 will be highly dependent on development of adjacent corner locations since new commercial accesses directly to highway 101 will likely not be allowed.
- ◆ The parcel (043023420150) on the SE corner of Hwy 101 and Taylor-Cut Off Rd, which currently is occupied by the Chevron Gas Station, is a split zone parcel under the current interim zoning. In this instance, the dual designation should remain to prevent further high intensity uses near the Dungeness River, as well commercial sprawl along the highway.
- ◆ The amount of existing and projected vacant lots is listed in Table A-16.
- ◆ All development of vacant lands will be commercial.

Appendix B.
Carlsborg On-Site Sewage System Needs Assessment and
Recommendations

Carlsborg Capital Facilities Plan

CARLSBORG ON-SITE SEWAGE SYSTEM NEEDS ASSESSMENT AND RECOMMENDATIONS

1.0 INTRODUCTION

The Carlsborg area is being considered by Clallam County for designation as an Urban Growth Area (UGA) under provisions of the state Growth Management Act (Chapter 36.70A RCW). The area is currently characterized by a mix of residential, commercial, and industrial land uses served by a combination of individual and community on-site sewage systems.

The purpose of this technical analysis is to assess whether it would be appropriate for some or all of the existing development within the Carlsborg area to remain served by on-site sewage systems, and whether on-site sewage technologies could support any future development within the Urban Growth Area, either on an interim or permanent basis. NOTE: A significant portion of the information contained in this Appendix was derived from a technical memorandum prepared by Derek Sandison, M.S., R.S., of Adolfson and Associates, Inc. (November 6, 1997).

On-site sewage system suitability is dependent on factors such as the natural susceptibility of underlying ground water to contamination and contaminant loading, which is a function of on-site sewage system density as well as the treatment efficiency of on-site sewage systems and surrounding soils. These factors are discussed in more detail below.

Additionally, in assessing the suitability of on-site sewage system use, applicable health and water quality standards must be considered including:

- Clallam County Health Regulation Chapter 4 and Chapter 246-272 WAC, On-Site Sewage Systems Rules and Regulations of the State Board of Health; and
- The state's antidegradation policy as enunciated in Chapter 90.54 RCW, the Water Resources Act of 1971, and Chapter 173-200, the state Ground Water Quality Standards.

2.0 BACKGROUND

The following information is offered to provide context for discussions concerning nitrate impacts to ground water associated with on-site sewage systems and means of controlling or otherwise mitigating those impacts. This information addresses the role of various nitrogen compounds in the nitrogen cycle, public health and environmental concerns associated with nitrate, and regulatory thresholds for nitrate-nitrogen concentrations in water supplies.

2.1 Nitrogen Cycle/Nitrate Formation

Molecular nitrogen (N_2) is a gaseous element that makes up about four-fifths of the volume of the earth's atmosphere. Nitrogen is continuously cycled in the environment, undergoing many oxidation and reduction reactions and transformations (Hausenbuiller, 1978).

Reduced forms of nitrogen include ionic ammonia or ammonium (NH_4^+); gaseous ammonia (NH_3); and the amino radical ($-NH_2$) of amino acids, proteins, and similar organic compounds. Oxidized forms of nitrogen include two negatively charged ions, nitrite (NO_2^-) and nitrate (NO_3^-), and three gaseous forms including nitrous oxide (N_2O), nitric oxide (NO), and nitrogen dioxide (NO_2).

Nitrogen contamination of ground water, usually from nitrates, occurs when excessive quantities of soluble nitrogen in soil are leached by precipitation or irrigation to an underlying aquifer. Nitrogen is introduced to soils through biological fixation by soil organisms, deposition of human and animal waste products, decaying plants, and application of fertilizers.

Nitrogen in decaying plants and human and animal wastes is usually in the form of organic nitrogen (e.g., amino acids) and ammonia. Over time, organic nitrogen is converted to ammonia through the process of hydrolysis. Ammonia may return to the atmosphere via volatilization, or can enter the soil solution as ammonium where it will either be assimilated by plants or converted to nitrate by soil bacteria.

Nitrate is also subject to plant uptake; however, unless a process called denitrification occurs, excess amounts of this highly mobile ion can be leached to underlying ground water. Denitrification, the bacterial transformation of nitrate to nitrogen gas and nitrous oxide, occurs under anoxic conditions; thus, it is usually necessary for leached nitrates to migrate through a saturated zone in order for the denitrification process to operate. In addition, sufficient organic carbon must be available to fuel the denitrification process. Such conditions are not universally present in soils; therefore, soils in which those conditions are absent represent a relatively high risk of nitrate contamination of underlying ground water.

Nitrogen introduced to soil from fertilizers can be in several different forms including ammonium, urea ($CO(NH_2)_2$), and nitrate. Fertilizer ammonium and urea follow a transformation pathway similar to that described above for nitrogen released from decaying plants and human and animal wastes. Like other forms of organic nitrogen, urea is transformed in the soil environment to ammonia and, under aerobic conditions, to nitrate. Nitrogen in fertilizers that are composed of nitrate salts is immediately available for leaching to underlying ground water.

2.2 Health and Environmental Concerns Associated with Nitrate

There are two potential public health hazards associated with consumption of drinking water containing high concentrations of nitrate. Nitrate is the indirect causative agent of methemoglobinemia, a disorder that reduces the oxygen-carrying capacity of hemoglobin in the blood of infants under six months of age. Infant methemoglobinemia, also referred to as "blue babies disease," is currently considered the most significant health concern posed by elevated nitrate in water supplies and is the basis for the drinking water maximum contaminant level that has been established for the compound (discussed in more detail below) (Freshwater Foundation, 1995).

In addition, the National Research Council has indicated a potential link between consumption of nitrates and formation of carcinogenic nitrosamines in the human body (Frimpter et al., 1990). Some studies have suggested that exposure to high levels of nitrate and nitrite may be correlated with high incidences of stomach and esophageal cancer; however, the results are inconclusive (Gosselin et al., 1997; Freshwater Foundation, 1995). Since the average American adult consumes approximately 100 milligrams of nitrate-nitrogen per day from food and processed beverages, nitrate intake from drinking water should be considered additive to these other sources when calculating possible cancer risk (ibid).

Nitrate contamination of ground water may be of general environmental concern as well. It has been demonstrated that elevated nitrate levels in ground water may be an indicator of the presence of other, more toxic contaminants (Frimpter et al., 1990). Thus, in a sense, nitrate concentrations in ground water can be viewed as a barometer of overall water quality conditions.

Additionally, surface waters that receive discharge from nitrate contaminated ground waters may be subject to eutrophication, accelerated algae and aquatic plant production stimulated by increased loading of nutrients.

2.3 Regulatory Thresholds for Nitrate

Because of the aforementioned health concerns, the U.S. Environmental Protection Agency has established a maximum contaminant level (MCL) for nitrate-nitrogen in drinking water of 10 milligrams per liter (mg/l). The State of Washington recognizes the federal MCL for nitrate; however, because the state has embraced an "antidegradation policy," the 10 mg/l MCL is not viewed as a level up to which contamination may be allowed (Washington Department of Ecology, 1996). The antidegradation policy prohibits those acts that would cause or tend to cause water quality degradation that is detrimental or injurious to public health, or to existing or future beneficial uses of water resources. Under the antidegradation policy, the quality of receiving waters should be maintained as close as possible to natural, background levels (ibid).

2.4 Nitrogen Concentrations in Ground Waters of the Carlsborg Area

The principal ground water quality concern in the Carlsborg area is nitrate contamination, which has been documented in area ground waters since at least the early 1980s. Tests conducted on 16 wells in the Carlsborg area in 1980 by the U.S. Geological Survey indicated that nitrate levels ranged from undetectable to about 2.5 mg/l (Soule, 1991). Based on the results of that testing, the Washington Department of Health (then DSHS) suggested that a north-south trending nitrate "hot spot" had developed in the Carlsborg area between Runnion and Woodcock Roads and Carlsborg and Heath Roads. The nitrate contamination may be attributed to a combination of dairy and beef cattle as well as on-site sewage systems.

The Clallam County Department of Community Development conducted a number of sampling projects in the Carlsborg area during the early to mid-1990s, with the most extensive monitoring effort occurring in September 1993. The results of these projects were summarized in a document produced by the Sequim-Dungeness Ground Water Committee and Clallam County Department of Community Development entitled *Sequim-Dungeness Ground Water Protection Strategy* (1994):

The range of [nitrate-nitrogen] concentrations [in the Carlsborg area] has risen from 1980 and is now from undetectable to over 10 ppm. The median for all wells . . . has also risen since 1980 and is 1.5 ppm. All wells tested along Carlsborg Road, regardless of depth, currently show greater than 1.0 ppm [nitrate-nitrogen], and often greater than 2.0 ppm. Some wells show greater than 4.0 ppm. Without information on well depth, it is not possible to accurately delineate "hot spots" for particular depth zones Regardless of the location of hot spots, it is not difficult to conclude that ground water quality has been degraded, and is now worse than it was 10-15 years ago. (Note: ppm is an abbreviation for parts per million, a unit of measurement that is essentially equivalent to milligrams per liter.)

A map demonstrating the location of wells that were monitored and corresponding nitrate concentrations from 1980 testing and 1990-1994 testing is contained in the document. The highest nitrate levels are generally associated with wells installed in areas occupied by highly permeable soils referred to by the U.S. Natural Resources Conservation Service (formerly the Soil Conservation Service) as Carlsborg series soils; however, the correlation is not absolute.

The Sequim-Dungeness Ground Water Protection Strategy document (ibid) interpreted the significance of nitrate-N levels in ground waters of the Carlsborg area as follows. Levels that exceed 1 mg/l indicate "unnatural" accumulations. Those exceeding 3 mg/l indicate moderate degradation, while levels over 5 mg/l represent advanced degradation.

The observed ground water quality degradation is likely to have resulted from:

- Poorly constructed wells located in close proximity to a nitrogen source such as a barn or cesspool;
- Regionalized nitrate contamination associated with multiple non-point sources (on-site sewage systems, livestock waste, and fertilizer practices); or
- A combination of the above (Soule, 1991).

Based on the data cited above, it can be concluded that, in general, ground waters of the Carlsborg UGA are susceptible to contamination from overlying land use activities. While historically, livestock may have represented the most significant source of nitrogen in the Carlsborg area, land use in the area has evolved to the point where residential, commercial, and institutional land uses predominate, and on-site sewage systems serving such development represent the most significant probable sources of nitrogen.

3.0 CONSTRAINTS TO ON-SITE SEWAGE DISPOSAL SYSTEM USE

On-site sewage systems are a potential source of nonpoint contamination of surface and ground water. Contaminants associated with domestic wastewater discharges to on-site sewage systems typically include bacteria, viruses, phosphorous, and nitrogen. Each contaminant has unique mechanisms associated with its attenuation and, in general, impacts from such contaminants can be largely mitigated through application of proper siting, design, construction, and maintenance criteria and practices. However, nitrogen is the only one of these contaminants for which dilution is commonly used as a means of controlling nonpoint contamination because of the inability to achieve adequate levels of nitrogen removal through conventional on-site sewage treatment processes.

In the hydrogeologic setting of the Carlsborg area, nitrogen contamination of ground water is especially problematic. Therefore, this technical memorandum shall focus on constraints to the use of on-site sewage systems associated with nitrate contamination of underlying ground waters and evaluate solutions through the application of best available technology.

3.1 Nitrogen Loading from On-Site Sewage Systems

Nitrogen is considered one of the most significant ground water contaminants associated with domestic wastewater since it can be highly resistant to removal from mechanisms present in the soil profile. The estimated load of nitrogen in domestic wastewater is 11.2 grams per capita per day, or 27 pounds per year for a family of three (Siegrist et al., 1977; Gold et al., 1990). The principal sources of nitrogen in domestic wastewater are feces and urine, which contain ammonia as well as organic nitrogen in the form of urea, uric acid, undigested proteinaceous materials, and

bacterial cells (Siegrist and Jenssen, 1989). Treatment of nitrogen in on-site sewage systems involves a variety of complex interactions including nitrogen retention, transformation, and removal during percolation of domestic wastewater through soil (ibid).

According to Wilhelm et al. (1994), conventional on-site sewage systems (e.g., septic tanks and drainfields) typically develop two oxidation-reduction (redox) zones, or sites of microbially catalyzed redox reactions involving organic carbon and nitrogen in wastewater. The first zone consists of the anaerobic environment of the septic tank where the concentration of dissolved oxygen is very low and that of organic matter is high. Microorganisms in the septic tank oxidize organic matter and produce carbon dioxide, methane, and the reduced nitrogen ion ammonium. Approximately 80 percent of the total nitrogen contained in septic tank effluent is in the form of ammonium; the remaining 20 percent is organic nitrogen (ibid).

The second redox zone is the aerobic environment of the soils surrounding the drainfield (or other form of subsurface absorption system). In this zone, microorganisms oxidize organic carbon to carbon dioxide and transform ammonium to the intermediate product nitrite, which is then converted microbially to nitrate. This process is known as nitrification. Nitrification occurs in the soil sediments directly below the drainfield within a few hours after exposure to oxygen. After 24 inches (60 centimeters) of migration through an unsaturated, medium textured soil, about 80 percent of the total nitrogen in percolating septic tank effluent is transformed to nitrate (Johnson and Atwater, 1988).

In a well aerated soil, oxidation of ammonium is almost complete and the formation of nitrate, the end product of this reaction, is a consequence of a properly functioning conventional on-site sewage system (Wilhelm et al., 1994). As will be discussed in considerably more detail below, denitrification, the bacterial reduction of nitrate to nitrogen gas and nitrogen oxide gases, requires the presence of a third redox zone, an anoxic zone. Anoxic conditions are best maintained in saturated or near saturated sediments with limited oxygen diffusion. With a conventional on-site sewage system, the anoxic zone would need to be present at a sufficient depth below the drainfield or other subsurface absorption system to allow for nitrification of the percolating wastewater. As noted previously, an approximately 24-inch unsaturated zone is needed to promote effective nitrification, thus an anoxic zone would need to occur at a depth of about 36 (90 centimeters) inches below ground surface. In addition, for denitrification to occur, organic carbon would need to be available to serve as an energy source to drive the denitrification reaction. Organic carbon can be supplied by a combination of soil organic matter, the breakdown of vegetation growing over the on-site sewage system, and/or carbon supplied by septic tank effluent.

Generally, with the exception of highly stratified soils, a third redox zone is not well expressed in most soils. Additionally, because of the depth of typical conventional on-site sewage systems, even if a third redox zone were present, sufficient organic carbon is often not available to fuel the denitrification reaction. Denitrification rates in conventional on-site systems ranges from 0 to about 35 percent (Eastburn and Ritter, 1984). Some researchers indicate that in coarse textured

soils, similar to those occupying much of the Carlsborg area, essentially no denitrification occurs. In such soils, the only mechanism available for significantly lowering nitrogen content of percolating wastewater is dilution with uncontaminated precipitation and ground water (Walker et al., 1973). Thus, in areas with coarse textured soils where conventional on-site sewage systems are widely used, significant local ground water contamination can be anticipated, unless enhanced denitrification systems are implemented (ibid).

As will be discussed below in the subsection 3.4, Enhanced Treatment Technologies, modifications can be incorporated into the designs of on-site sewage systems to improve performance in soils with a low potential for denitrification.

3.2 Denitrification Potential of Carlsborg Area Soils

As previously noted, nitrogen tends to be resistant to removal from mechanisms present in the soil profile (Brown et. al., 1977). This is most commonly a problem where septic tank effluent is discharged to highly permeable, coarse textured soils. Nitrogen is most effectively controlled in highly stratified, fine to medium textured soils (Siegrist and Jenssen, 1989).

There are three principal soil types in the Carlsborg area: Carlsborg gravelly sandy loam, Dungeness silt loam, and Puget silt loam. These soils and their nitrogen removal capability are described below.

Carlsborg series soils are deep, somewhat excessively drained soils that are formed in alluvium. These soils occupy a substantial majority of the Carlsborg area. The profile consists of very gravelly sandy loam, extremely gravelly loamy sand, and extremely cobbly loamy sand overlying deposits of extremely gravelly sand. The permeability of these soils is rapid, and the available moisture holding capacity is low. This soil is considered to have severe limitations for use of on-site sewage systems because of inherent inability to retain and treat contaminants, including nitrates (Soil Conservation Service, 1987).

Dungeness series soils are very deep, well drained soils that are formed in alluvium. They occupy some of the southeastern portions of the Carlsborg area where, because they are intricately intermingled with Carlsborg soils, they are mapped together as a "complex" consisting of roughly 50 percent Carlsborg soils (described above), 30 percent Dungeness soils, and 20 percent miscellaneous soils. The profile of Dungeness soils tends to be highly stratified, consisting of silt loam, very fine sandy loam, and silty clay loam overlying deposits of fine and medium sand. Permeability of Dungeness soils is moderate and the available moisture holding capacity is high. The Natural Resource Conservation Service (formerly Soil Conservation Service) considers Dungeness series soils to offer few limitations in general to the use of on-site sewage systems. However, with regard specifically to nitrate, while the relatively high degree of stratification and finer texture suggest that Dungeness soils provide a greater level of nitrogen removal than Carlsborg soils, there is still a potential for nitrate from on-site sewage systems to

contaminate ground water underlying conventional on-site sewage systems for reasons outlined in subsection 3.1 above.

Puget series soils are very deep, poorly drained soils formed in alluvium and occupying low terraces and flood plains. They occupy some of the western portions of the Carlsborg area. In profile, these soils consist primarily of silty clay loam to a depth of more than 60 inches. Permeability is moderately slow and available water capacity is high. A winter water table is present in the soil between 48 and 60 inches below ground surface and the soil is subject to occasional flooding. Puget soils pose severe limitations to the operation of on-site sewage systems use because of slow permeability and wetness. However, because of their slow permeability, they represent a relatively low risk of nitrate contamination to underlying ground water.

3.3 Past and Current On-Site Sewage Disposal Practices

Prior to 1995, systems installed on most sites within the Carlsborg area were conventional gravity fed systems (septic tanks and drainfields). The primary exception were some sites occupied by soils that were then referred to in the State Board of Health on-site sewage regulations as "Type 1" (gravel, coarse sands, and/or cobbles), soil conditions typified by the Carlsborg series soils described above. Between about 1985 and 1995, sites of less than one acre with Type 1 soils that were served by public water supplies, and those of less than two acres served by private (individual) wells, were required to employ sand lined trenches with pressure distribution to improve the treatment efficiency for bacteria and nitrates. In addition, one large mobile home park installed aerobic treatment devices in-line ahead of pressure distribution sand lined trenches (Benefield, 1997).

Since 1995, all systems installed in Type 1 soils (redefined as Type 1A soils under new State Board of Health regulations), regardless of lot size, have been required to include sand filtration and pressure distribution of effluent (or an equivalent level of treatment). This is usually accomplished through use of some form of single pass filter, most commonly the sand lined trenches as discussed previously. Although single pass filters have demonstrated as much as a 60 percent reduction in total nitrogen (Long, 1994), typical removal rates are generally much lower, usually less than 30 percent (Siegrist and Jenssen, 1989).

Denitrification in sand lined trenches and similar open bottom sand filters is dependent on the particle size of the sand filter media being sufficiently different than the particle size of the underlying native soil to create tension saturation and concomitant anoxic conditions at their interface. In addition, organic carbon must be available to drive the denitrification reaction. Since most of the organic carbon in wastewater is consumed in the pretreatment device (e.g., septic tank) and in passage of the wastewater through the sand lined trenches or sand filter, substantial organic carbon must be available within the native soil and associated residual vegetation in order to fuel denitrification reaction (Wilhelm et al., 1994).

Thus, existing on-site sewage systems serving residential and non-residential facilities in the Carlsborg area are likely to exhibit relatively low nitrogen removal efficiencies without use of enhanced treatment technologies.

3.4 Enhanced Treatment Technologies

To overcome the inherent nitrogen removal deficiencies of conventional on-site sewage systems, the design of on-site sewage systems can be modified to include a relatively simple biological nitrification/denitrification step prior to soil infiltration (Siegrist and Jenssen, 1989). A number of different design configurations can be employed; however, to be effective, each configuration must create the conditions necessary to encourage denitrification, specifically: conversion of most of the nitrogen load to nitrate followed by exposure of the nitrate to anoxic conditions in the presence of abundant organic carbon.

As previously noted, most of the nitrogen present in effluent from properly functioning, conventional on-site sewage systems installed in well aerated soils will ultimately be converted to nitrate. Nitrate in percolating wastewater can be reduced through two pathways:

- Assimilatory nitrate reduction, reduction of nitrate to ammonium for cellular synthesis in higher green plants and some microorganisms; and
- Dissimilatory reduction, denitrification to molecular nitrogen and nitrous oxide by bacteria catalyzed by the dissimilatory reductase enzyme (Focht and Chang, 1995).

Because the subsurface absorption components of conventional on-site sewage systems are usually installed too deep in the soil profile for assimilatory reduction by plants to have a significant impact on nitrate-nitrogen concentrations, removal of nitrogen from percolating wastewater must be accomplished through the process of dissimilatory reduction or denitrification. Otherwise, nitrate is free to migrate to underlying ground water.

There are three general environmental requirements for dissimilatory reduction of nitrate to occur:

- Bacteria that are capable of producing the reductase enzymes must be present;
- Energy sources to needed to fuel the reduction reaction must be available; and
- Oxygen, which tends to repress enzyme formation, must be limited or eliminated (Eastburn and Ritter, 1984).

Dissimilatory reduction involves three types of biological reactions:

- Aerobic, heterotrophic oxidation of organic matter - In this reaction, aerobic bacteria use oxygen as the terminal electron acceptor in oxidation of organic matter. This reaction provides energy that is used to increase the size of bacterial populations.
- Autotrophic nitrification - In this reaction, nitrifying bacteria oxidize ammonium ions released by heterotrophic reactions. Nitrifying bacteria are usually the limiting organism in the dissimilatory reduction process because they are the slowest growers.
- Heterotrophic denitrification - In this reaction, denitrifying bacteria oxidize organic matter using nitrate as a terminal electron acceptor. Most of the nitrate is converted to nitrogen gas, which serves as the main nitrogen sink (Rittman and Langeland, 1985).

The nitrification reaction is actually a two step process, first ammonium is converted to nitrite, nitrite is then transformed into nitrate. The bacteria responsible for the conversion to nitrite are principally *Nitrosomonas*, but also *Nitrococcus*, *Nitrospira*, and *Nitrosolobus*. *Nitrobacter* is the most common bacteria associated with the transformation to nitrate; however, *Nitrospira*, *Nitrococcus*, and *Nitrocystis* can also be involved (Eastburn and Ritter, 1984).

Denitrification can result from a wide range of heterotrophic bacteria including *Pseudomonas*, *Archromobacter*, *Alcaligenes*, *Bacillus*, and *Hyphomicrobium*. Most of these organisms function as facultative denitrifiers, that is, they will preferentially use oxygen as a terminal electron acceptor during the oxidation of organic matter (respiration) (ibid). Only under anoxic conditions will nitrate serve as a terminal electron acceptor in lieu of oxygen. Dissolved oxygen levels above about 0.2 mg/l in solutions will generally prevent use of nitrate as a terminal electron acceptor (Focht and Chang, 1975). Some researchers have concluded that oxygen blocks denitrification reactions by inhibiting production of nitrate reductase enzymes (Rittman and Langeland, 1985).

Denitrification of the nitrate present in wastewater requires at least equal amounts or parts of organic carbon (Wilhelm et al., 1994). Higher levels of organic carbon relative to nitrate may help ensure efficient denitrification. Warnok and Biswas (1981) found that a carbon to nitrogen ratio of 4:1 resulted in a denitrification rate of 95 percent.

Temperature is also a factor in nitrification/denitrification reactions. Optimal temperatures for nitrification range from 86 to 97 degrees Fahrenheit (F) (30 to 36 degrees centigrade (C)). Denitrification is optimal at 149 to 158 degrees F (65 to 70 degrees C). Thus, most nitrification/denitrification reactions occur at suboptimal temperatures. Since nitrification results from highly specialized organisms of narrow species diversity, it is more sensitive to temperature

than denitrification, which results from organisms of broad species diversity (Focht and Chang, 1975). Nitrification/denitrification reactions are adversely affected when wastewater temperatures fall below 59 degrees F (15 degrees C) (Focht and Chang, 1975). The minimum temperature at which nitrification/denitrification reactions in wastewater will occur is between 36 and 41 degrees Fahrenheit (2 and 5 degrees C) (Eastburn and Ritter, 1984).

Each of the alternative systems or combination of alternative systems described below involves a nitrification/denitrification step. Their descriptions in this analysis does not represent approval for or otherwise offer guarantee that such systems would operate as claimed by the manufacturer under all situations. Furthermore, their appearance in this analysis does not limit the county's consideration to these systems only, as there are and will continue to be other systems that meet or exceed the target treatment level of greater than 50% denitrification. They are presented merely as examples of current available technologies that may meet the treatment needs of the Carlsborg area. The actual nitrogen removal efficiency of such systems would need to be monitored under the environmental conditions of the Carlsborg area, but all should be capable of consistently achieving well above a 50 percent reduction in nitrogen loading. Comparative costs for the systems are provided in below in Table 1.

Recirculating sand filter. This system consists of a multiple pass filter with sand and gravel media constructed within a flexible membrane-lined pit or concrete container. In this type of a system, nitrate rich sand filter effluent is mixed with fresh sewage from the septic tank in a recirculation vessel. The mixture is recirculated several times through the sand filter prior to being discharged to a subsurface absorption system. Septic tank effluent provides the organic carbon and low oxygen concentrations necessary to promote denitrification of the nitrate in the sand filter effluent.

Such systems are capable of achieving nitrogen removal rates as high as 70 to 80 percent (Long, 1974). Typical performance is probably closer to 40 to 60 percent total nitrogen removal capability on an annualized basis (Loudin et al., 1984); although some researchers indicate that typical performance could be as low as 30 percent (Siegrist and Jenssen, 1989).

Because recirculating sand filters are typically constructed above ground with an open top, they can be temperature affected. Lamb et al. (1987) found that while mean annual nitrification performance of a recirculating sand filter was 66 percent, nitrification dropped to as low as 24 percent during winter months when effluent temperatures were as low as 36.9 degrees F (2.7 degrees C). The impaired nitrification performance would obviously reduce the potential of such systems to denitrify.

Several modifications of the recirculating sand filter system described above have been tested and found to provide high levels of denitrification. Sandy et al. (1987) recycled recirculating filter effluent back to the septic tank and found that total nitrogen removals of 83 to 90 percent could be achieved. Piluk and Hao (1989) increased the size of the standard recirculating vessel

to provide substantially longer denitrification reaction time, resulting in about a 70 percent removal of total nitrogen, even during winter months.

Biomicrobics/FAST – This system consists of a two-chambered tank that utilizes a combination of attached and suspended bacteria growth in a combination of oxygen rich and oxygen reduced environments for various stages of sewage treatment. In this system, effluent is collected and settled in the first compartment of the underground tank. Ammonia is converted to ammonium, carbon dioxide and methane gas. Next, pre-treated effluent migrates to a second chamber, consisting of an active aeration unit and an outer oxygen reduced zone. Organic carbon is oxidized into carbon dioxide and Ammonium is transformed into nitrite and then nitrate from the action of aerobic bacteria and the oxygen rich environment. After this portion of the process, treated effluent migrates to the outer portion of the active chamber, where dissolved oxygen is low. Organic carbon is present from separation chamber and fuels the denitrification process, which transforms nitrate into nitrogen gas and nitrogen oxide gas. The treated wastewater is then ready for dispersal.

This type of system is capable of achieving nitrogen removal rates of 70 to 73 percent. Because of the below-ground construction, this system does not appear to be adversely affected by varying temperatures such as in winter months. The FAST system also incorporates a Fixed Activated Sludge Treatment, which ensure the presence of nitrifying and denitrifying bacteria even following low flow periods. Essentially, aerobic and anaerobic bacteria are affixed to a film surrounding the aeration unit. During low-flow periods, aerobic bacteria are able to consume anaerobic bacteria – ensuring maintenance of necessary populations of slower-growing aerobic bacteria for when flows return to normal. The Biomicrobics/FAST system has been approved by the State Board of Health as meeting Treatment Standard 1 and 2 requirements. However, additional treatment steps are necessary in order to meet pathogen removal requirements.

TRD System – This system processes primarily treated effluent from the septic tank through a batch sequence reactor process in an on-going (recirculating) cycle. The batch sequence reactor treats the effluent with a settling agent that initiates “flocculation” or separation where the heavier solids sink to the bottom of the reaction chamber. These heavier solids are treated through aeration that causes aerobic bacteria to digest the sludge – producing nitrates as a byproduct. Once processed, the digested sludge is then pumped back into the septic tank where organic carbon combines with anaerobic conditions to allow treatment of nitrates into nitrogen gas. The regular sludge cycling coupled with regulated settling gives the TRD system the ability to treat up to 90% and more of the nitrogen present in the effluent.

The costs of enhanced denitrification systems average considerably higher than conventional septic systems. Table 1 represent average costs associated with various enhanced system technologies currently on the market.

TABLE 1
ENHANCED TREATMENT TECHNOLOGIES
COMPARATIVE COSTS

Type of System	Capital Cost (Design, Materials, Installation, and Inspections)	Operation and Maintenance Cost (Annual)
Split Flow Intermittent Sand Filter w/ Anaerobic Vessel (gravity SSAS)	\$11,250	Labor - \$150 Energy - \$60
Non-water carried toilet w/ graywater disposal systems	\$10,000	Labor - \$75 Energy - up to \$30
Recirculating Sand Filter (gravity SSAS)	\$12,250	Labor - \$150 Energy - \$60-\$120
Aerobic Treatment Unit w/ Extended Aeration/Cycled Aeration (gravity SSAS)	\$7,750	Labor - \$200 Energy - \$35
Reactive Porous Media Barriers (pressure SSAS)	\$8,500	Labor \$150 Energy - \$60

The above figures represent the cost of known enhanced denitrification systems that meet or exceed a 50% removal of all nitrogen from effluent. They represent the cost of the entire system, including drainfield. The actual cost for retrofitting an existing drainfield with an enhanced denitrification pre-treatment unit would be considerably less.

4.0 REGULATORY CONSTRAINTS

4.1 Chapter 246-272 WAC and Clallam County Health Regulation Chapter 4

Revised On-Site Sewage Systems Rules and Regulations of the State Board of Health (Chapter 246-272 WAC) became effective in January 1995. The Clallam County Board of Health amended Clallam County Health Regulation Chapter 4 to adopt the new state rules and regulations by reference. The portions of the revised regulations that are most pertinent to the Carlsborg Capital Facilities Plan are those addressing minimum lot size requirements/density limitations and performance standards for treatment.

Minimum Lot Size Requirements. The new regulations made few changes to minimum lot sizes requirements that had been in place since 1984. For sites served by public water supplies, minimum lot sizes range between 12,500 square feet and 21,780 square feet, depending upon soil conditions. For sites served by individual wells, minimum lot sizes range from one acre to two acres. This results in a maximum allowable development density under the state regulations of 3.5 units per acre, with a limit of two units per acre for sites with Type 1 soils, defined as "very gravelly coarse sands or coarser, or extremely gravelly soils." Again, Type 1 soils are typified by the Carlsborg series soils. Maximum density for Puget series soils would be 2 units per acre, provided soil conditions are not too saturated to preclude use of on-site sewage systems entirely. Dungeness series soils could likely support maximum densities between 2.4 and 2.9 units per acre.

Because the Carlsborg series soils predominate approximately 95% of the study area, and elevated nitrates have already been documented in the area, it will be assumed for the purposes of this evaluation that all soils within the study area are Type 1 soils. Thus, land uses should be limited to a permissible density of two units per acre.

Treatment Performance Standards. One of the most significant modifications to the state on-site sewage regulations were requirements for installation, under certain defined circumstances, of systems capable of achieving what are referred to in the regulations as "Treatment Standard 1" and "Treatment Standard 2." To meet Treatment Standard 1, a system must be capable of attaining a thirty-day average of less than 10 mg/l biochemical oxygen demand (5-day BOD), 10 mg/l total suspended solids (TSS), and a thirty-day geometric mean of less than 200 fecal coliform per 100 milliliters (ml). Treatment Standard 2 requires a thirty-day average of less than 10 mg/l 5-day BOD, 10 mg/l TSS, and a thirty-day geometric mean of less than 800 fecal coliform per 100 ml.

Treatment Standard 1 typically applies to nonconforming repairs of existing systems. The requirement for Treatment Standard 2 applies to new on-site sewage systems installed in:

- Type 1 soils (e.g., Carlsborg series), and
- Any soil where a minimum two-foot vertical separation between the bottom of a subsurface absorption system and an underlying water table or impervious layer cannot be maintained (e.g., Puget series in some cases).

To achieve Treatment Standard 1 and Treatment Standard 2, Washington Department of Health (DOH) approved alternative systems must be employed. Of the alternative systems approved for use by DOH, including proprietary devices, only stratified sand filter systems are capable of meeting both Treatment Standard 1 and Treatment Standard 2 without disinfection. Other types of systems, including recirculating sand filters and a variety of aerobic treatment units, can achieve Treatment Standard 1 and Treatment Standard 2 only if the effluent from such systems is disinfected prior to discharge to a subsurface absorption system.

Intermittent sand filters can meet Treatment Standard 2 without disinfection. Sand lined trenches with pressure distribution of effluent, systems commonly required by Clallam County Department of Community Development in the Carlsborg series soils, can also meet Treatment Standard 2 without disinfection.

It is worth noting that the DOH performance standards do not address treatment of nitrogen or nitrates; although, as noted previously, sand lined trenches should represent an improvement in nitrogen removal over conventional on-site sewage systems.

4.2 Chapter 173-200 WAC/Ground Water Quality Standards

The state of Washington's Antidegradation Policy is briefly described in Chapter 90.54 RCW, Water Resources Act of 1971. However, in Chapter 173-200, the state Ground Water Quality Standards, it is described in greater detail. Determination of compliance with the Antidegradation Policy is based on the following standards:

- Contaminants proposed for entry into ground water must be provided with all known, available, and reasonable methods of prevention, control, and treatment (AKART) prior to entry;
- Degradation of ground water that would interfere with or become injurious to beneficial uses is prohibited; and
- Water that is of higher quality than the criteria established under the ground water quality standards will not be allowed to be significantly contaminated unless such contamination is deemed an overriding consideration of the public interest.

The final standard is most problematic with respect to the Carlsborg area. The "criteria" established under the ground water quality standards for nitrate is the drinking water MCL of 10 mg/l. The common interpretation of this standard is that the criteria or MCL must not be viewed as the level up to which nitrate contamination can be allowed to occur. Rather, levels of nitrate should be maintained as close as possible to natural, or pre-development, levels (Department of Ecology, 1996).

In general, many portions of the study area ground water has experienced some level of nitrate loading indicating varying degrees of degradation beyond that which naturally existed prior to current development levels. While WAC 173-200-050(3)(b)(ii), does not allow areas with elevated background levels of nitrate to be construed to allow continued pollution of the resource, it does limit enforcement of the anti-degradation policy to the elevated levels. This means that, provided there is no substantial increase in nitrate loading resulting from the proposed action, the UGA alternative will comply with the state's anti-degradation policy.

Since adoption of the Ground Water Quality Standards in 1990, the Department of Ecology (Ecology) has undertaken a number of initiatives in an attempt to define conditions under which on-site sewage systems could be used in a manner that would be compatible with the provisions of the Ground Water Quality Standards. In 1992, Ecology conducted generic analyses of ground water quality impacts using a computer solute transport model. The results of this exercise, as reported in: *Ground Water and On-Site Sewage Disposal Systems: Establishing Density Criteria to Protect Water Quality* (Kimsey, 1992), indicated that limiting density of residential on-site sewage systems (or non-residential equivalents) to one per acre should serve as an acceptable threshold for compliance with the Ground Water Quality Standards in most geohydrologic settings.

Applied to the Carlsborg planning area, this information provides additional direction for the use of on-site sewage systems. Specifically, if land uses are allowed at a density of two units per acre, then a denitrification treatment standard of 50% removal of all nitrates would be necessary to meet the same level of impact conventional systems would have on the project area at a density of one unit per acre. Furthermore, existing levels of nitrate contribution will be substantially reduced in future development and curtailed in existing development as current systems upgrade with the enhanced denitrification systems. Over the twenty year planning horizon, the net result will be no substantial increase in nitrate loading beyond that which currently exists. More-over, many of the approved systems identified indicate a denitrification level much higher (up to 90% and more) than the 50% standard applied to land use densities of two units per acre. Therefore, compliance with the state anti-degradation policy will be met.

5.0 NEEDS ASSESSMENT

An important factor in evaluating the need for on-site wastewater facilities is the Growth Management Act (GMA) (Chapter 36.70A WAC). If the study area is characterized as an Urban

Growth Area under GMA, then it is incumbent upon the county to ensure provision of urban levels of utility services. Thus, assessment of on-site sewage system adequacy, as well as the need for supporting services, goes beyond simple consideration of whether use of such systems is consist with the minimum density requirements found in health codes (Chapter 246-272 WAC).

Future development that will continue to be served by on-site sewage disposal systems must not only comply with minimum health codes, but must also provide for adequate protection of ground water quality. The use of enhanced denitrification technologies that remove an absolute minimum of 50% nitrates is only one part of this effort. The adequacy of such systems will need to be ensured through proper installation, operation and maintenance. It is recommended that an operation and maintenance program is established under the authority of the Capital Facilities Plan that provides specific protocol for: public education and training for proper systems operation, inspection and monitoring of enhanced treatment systems by authorized personnel, Information tracking and analysis for the evaluation of program effectiveness and reporting, further development of policies where needed, and enforcement.

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Appendix C.
Drainage Plan Guidelines
Carlsborg Capital Facilities Plan

Stormwater Management in Clallam County

- Minimum Requirements -

(Required by Chapter 27.12, Clallam Co. Critical Areas Code, Chapter 3.31, Clallam Co. Code and also Chapter I-2 of Dept. of Ecology Manual, 1992)

May 8, 2000

OVERVIEW

This summary highlights stormwater management requirements for new development activities (or re-development) proposed near or within a critical area, such as a wetland, stream, marine shoreline, geologic hazard area, or critical aquifer recharge area. These requirements are a result of Clallam County adopting the 1992 Dept. of Ecology Stormwater Management Manual in December of 1999 as it applies to developments near critical areas. ***'Development' includes clearing and grading associated with site preparation, road building, driveway construction, placement of structures, etc.*** For more information about what constitutes a critical area, please consult the county ordinance or contact county staff.

This summary helps to determine whether or not the proposed development exceeds certain thresholds that would then trigger which stormwater management requirements would need to be incorporated with the proposed development.

WHY DO WE HAVE THESE REQUIREMENTS?

Stormwater management laws and guidelines adopted by the State or Federal agencies were put in to effect to decrease the pollution of waterways from runoff. One example is the 1991 Puget Sound Water Quality Management Plan which requires all counties and cities within the Puget Sound drainage (includes part of Clallam Co.) to control runoff from new development and re-development, including regulations that:

- Control off-site water quality and quantity (...in other words, keep the stormwater on the site);
- Use source control best management practices (...how to keep the stormwater on the site);
- Use treatment best management practices (... how to keep the stormwater clean)
- Use effective treatment by considering storm size and storm frequency (...proper estimates of potential quantity of runoff)
- Use of infiltration methods (with cautions) to replenish aquifers (... such as drywells, infiltration trenches)
- Protect stream channels and wetlands (...by controlling quantity and quality of stormwater runoff)
- Control erosion and sediment (...utilizing the above)

Examples of negative impacts of stormwater runoff to aquatic areas for salmon include too much sediment from eroding stream banks entering the water. Nutrients or pollutants from use of fertilizer, animal wastes or other products are then carried with runoff into streams that support endangered fish. The recent Endangered Species Act listings of several salmon species in Clallam County specifies that stormwater management is a key to salmon habitat recovery and sustaining healthy salmon populations. Also, negative stormwater impacts may be contributing to the declining water quality of Dungeness Bay and associated shellfish bed closure.

STORMWATER MANAGEMENT REQUIREMENTS

Proposed new developments or re-developments within the jurisdiction of the Critical Areas Code that meet certain thresholds are specified in the flow chart (see last page).

If a property contains, or is within 200 feet (regulatory jurisdiction) of one of the following types of critical areas AND the development thresholds are met, Clallam County shall determine what stormwater requirements apply to the proposal. Clallam County will add conditions to approved development permits that these requirements are completed prior to site preparation, construction or final approval, depending on the type of proposed development. In the case of building permits, when erosion and sediment control measures are required, they shall be installed prior to approval of any required footing inspection.

- *Wetlands*
- *Landslide hazards*
- *Frequently-flooded areas*
- *Type 1-5 streams, marine waters and lakes*
- *Erosion hazards*
- *Critical Aquifer Recharge areas*

Please note that the terminology used in this summary follows the state guidelines to avoid confusion. An example would be the categorization of developments – called “Small, Medium and Large Parcels” – which do not necessarily imply small, medium or large acreages where developments are proposed.

CATEGORIES OF DEVELOPMENT	THRESHOLDS
Small Parcel (Single family residences, additions duplexes, driveways, clearing, grading or road building) (See pages 3-4 for details)	≤5,000 square feet of impervious surface, or ≤20,000 square feet of land disturbing activities, such as clearing and grading
Medium Parcel & Redevelopment (Single family residences, additions, duplexes, multifamily residential, commercial and industrial projects, clearing, grading or road building) (See pages 5-8 for details)	≥5,000 square feet of impervious surface, or ≥20,000 and <1.0 acre of land disturbing activities, such as clearing and grading
Large Parcel & Redevelopment (Single family residences, additions, duplexes, multifamily residential, commercial and industrial projects, clearing, grading, road building) (See pages 9-13 for details)	≥5,000 square feet of impervious surface, or ≥1.0 acre of land disturbing activities, such as clearing and grading

SMALL PARCEL
STORMWATER AND EROSION CONTROL REQUIREMENTS FOR
DEVELOPMENT WITHIN THE CRITICAL AREAS CODE
JURISDICTION
May 8, 2000

REQUIREMENTS APPLY TO:

- ◆ Individual single-family residences, additions, duplexes, or clearing , grading or driveway construction that create:
 - ≤5,000 square feet of new impervious surface area, or
 - ≤20,000 square feet of land disturbance

There are three sets of requirements, I, II and III, that need to be met:

I. DRAINAGE REQUIREMENTS BY CLALLAM COUNTY ROAD DEPARTMENT:

- ◆ Submit a Drainage Plan for a drywell or an alternative method to capture stormwater; the Drainage Plan can be completed by the landowner, contractor, or civil engineer (contact Road Dept. for additional information).
- ◆ In some instances the Drainage Plan shall be completed by a licensed engineer.
- ◆ All Drainage Plans must be approved by the Road Department before building permit issuance or land use permit approval

II. SMALL PARCEL EROSION AND SEDIMENTATION CONTROL PLAN—The following Minimum Requirements #1-5, need to be specified on either the **permit site plan, or a **separate erosion and sediment control plan**. The plan can be completed by landowner, contractor or licensed engineer. Note: One or more of the following requirements may be waived by the Administrator upon determination that the proposal will not affect the critical area.**

Requirement #1 – Construction Access Route

- ◆ Use quarry spall for access drive to reduce mud tracking onto public roadways
- ◆ Access drive dimensions are to be 12" height, 20' width, 50' length
- ◆ Limit site access to one route

Requirement #2 – Stabilization of Graded Areas

- ◆ Soils are not to be exposed more than 2 days from 10/1 to 4/30
 - this requirement depends on the weather and can be waived by Clallam County if rainfall is not expected
- ◆ Soils are not to be exposed more than 7 days from 5/1 to 9/30
 - this requirement depends on the weather and can be waived by Clallam County if rainfall is not expected
- ◆ Use straw mulch or vegetation to stabilize exposed soils

Requirement #3 – Protection of Adjacent Properties

- ◆ Adjacent properties shall be protected from sediment deposition using Best Management Practices.

Requirement #4 – Maintenance

- ◆ All Erosion and Sediment Control Best Management Practices (BMPs) shall be regularly inspected and maintained.

Requirement #5 – Other BMPs (Best Management Practices) may include the following, depending on the site and proposal

- ◆ Leaving trees, shrubs and groundcover on site is the most cost-effective BMP for controlling runoff and erosion. Clear only the areas needed. For best results, retain at least 65% of original vegetation. Limit earth work to dry season. Minimize the amount of impervious surface.
- ◆ New development shall utilize BMPs to minimize stormwater quantity and quality impacts to critical areas, both during and following construction.
- ◆ See Small Parcel Requirements handout for a list of possible additional BMPs

III. ADDITIONAL REQUIREMENTS IF DEVELOPMENT IS WITHIN 200 FT OF ONE OF THE FOLLOWING CRITICAL AREAS (include these considerations on the 'Small Parcel Erosion and Sedimentation Plan)

Wetlands

- ◆ Maintain buffer specified by CAO
- ◆ Stormwater runoff from new development shall not significantly change the rate of flow, nor decrease the water quality of wetlands

Streams, Marine Areas, Lakes and Wildlife Habitat Conservation Areas

- ◆ Maintain buffer specified by CAO
- ◆ Preserve natural flood control, stormwater storage and drainage or stream flow patterns
- ◆ Control siltation, protect nutrient reserves and maintain stream flows and stream quality for fish and marine shellfish
- ◆ Prevent turbidity and pollution of streams and fish or shellfish bearing waters
- ◆ Preserve and protect habitat adequate to support viable populations of native wildlife in Clallam County

Erosion Hazard

- ◆ Follow Requirements I and II above.
- ◆ In some cases, an engineered drainage and erosion control plan may be required

Landslide Hazard

- ◆ Maintain buffer specified by CAO
- ◆ A geotechnical report must be submitted to the Clallam County Administrator for a new development
- ◆ Surface drainage shall not be directed across the face of a landslide hazard area. If there is no alternative to discharge across a landslide area, stormwater runoff shall be collected above the face of the landslide hazard area and directed across the face of the hazard within a tight line drain and provided with an energy dissipating device at the outlet
- ◆ Pre-existing lots or land divisions for which a geotechnical report has been prepared may be considered compliant with CAO

Critical Aquifer Recharge Areas

- ◆ New agricultural activities or hobby farms shall use best management practices concerning animal keeping, animal waste disposal, fertilizer use, pesticide use, waste water applications, irrigation and stream corridor management and seek the technical assistance of the Clallam Conservation District and WSU Cooperative Extension Agent

MEDIUM PARCEL
STORMWATER AND EROSION CONTROL REQUIREMENTS FOR
DEVELOPMENT WITHIN THE CRITICAL AREAS CODE
JURISDICTION
May 8, 2000

REQUIREMENTS APPLY TO:

- ◆ Individual single-family residences, additions, duplexes, multifamily residential, commercial and industrial projects, clearing, grading, or driveway or road building, that create:
 ≥5,000 square feet of new impervious surface area, or
 ≥20,000 square feet and <1 acre of land disturbance

PLEASE NOTE: The 1971 Pre-Developed flow shall be used in the Hydrologic Analysis for Part II.

There are three sets of requirements, I, II and III, that need to be met:

I. SMALL PARCEL EROSION AND SEDIMENTATION CONTROL PLAN-- The following **Minimum Requirements #1-5**, need to be specified on either the **permit site plan**, or a **separate erosion and sediment control plan**. The plan can be completed by landowner, contractor or licensed engineer. Note: One or more of the following requirements may be waived by the Administrator upon determination that the proposal will not affect the critical area.

Requirement #1 – Construction Access Route

- ◆ Use quarry spall for access drive to reduce mud tracking onto public roadways
- ◆ Access drive dimensions are to be 12" height 20' width 50' length
- ◆ Limit site access to one route

Requirement #2 – Stabilization of Graded Areas

- ◆ Soils are not to be exposed more than 2 days from 10/1 to 4/30
 -this requirement depends on the weather and can be waived by Clallam County if rainfall is not expected
- ◆ Soils are not to be exposed more than 7 days from 5/1 to 9/30
 -this requirement depends on the weather and can be waived by Clallam County if rainfall is not expected
- ◆ Use straw mulch or vegetation to stabilize exposed soils

Requirement #3 – Protection of Adjacent Properties

- ◆ Adjacent properties shall be protected from sediment deposition using Best Management Practices.

Requirement #4 – Maintenance

- ◆ All Erosion and Sediment Control Best Management Practices (BMPs) shall be regularly inspected and maintained.

Requirement #5 – Other BMPs (Best Management Practices) may include the following, depending on the site and proposal

- ◆ Leaving trees, shrubs and groundcover on site is the most cost-effective BMP for controlling runoff and erosion. Clear only the areas needed. For best results, retain at least 65% of original vegetation. Limit earth work to dry season. Minimize the amount of impervious surface.
- ◆ New development shall utilize BMPs to minimize stormwater quantity and quality impacts to critical areas, both during and following construction.
- ◆ See Small Parcel Requirements for a list of possible additional BMPs

II. LARGE PARCEL STORMWATER QUALITY CONTROL PLAN--Minimum Requirements #2-11 (to be completed by a civil engineer licensed in the State of Washington)

Requirement #2 – Preservation of Natural Drainage Systems

- ◆ Maintain natural drainage patterns and discharge at the natural location to the maximum extent practicable.

Requirement #3 – Source Control of Pollution

- ◆ Apply source control BMPs to all projects to the maximum extent practicable.
- ◆ Select, design, and maintain according to an approved manual.
- ◆ An adopted and implemented basin plan may be used to tailor BMPs to a specific basin; source control BMPs are always required for every site.

Requirement #4 – Runoff Treatment BMPs

- ◆ All projects shall provide stormwater treatment.
- ◆ Treatment BMPs should be sized to capture and treat the 6-month, 24-hour return period storm
- ◆ Infiltration shall be emphasized wherever it is appropriate.
- ◆ Direct discharge of untreated stormwater to ground water is prohibited.
- ◆ Select, design, and maintain BMPs according to an approved manual.
- ◆ Treatment BMPs shall not be built within a natural vegetated buffer except for necessary approved conveyance systems.
- ◆ An adopted and implemented basin plan may be used to tailor BMPs to a specific basin.

Requirement #5 – Streambank Erosion Control

- ◆ Applies in addition to MR #4 if there is direct or indirect discharge to a stream (large water bodies, regional detention, and streams with >1000 cfs.)
- ◆ Control streambank erosion by limiting the peak rate of runoff to 50% of the existing condition 2-year 24-hour design storm, and maintaining the existing condition peak runoff rate for the 10-year and 100-year, 24-hour design storms.
- ◆ Infiltration shall be emphasized wherever it is appropriate.
- ◆ Select, design, and maintain BMPs according to an approved manual.
- ◆ Treatment BMPs shall not be built within a natural vegetated buffer except for necessary approved conveyance systems.
- ◆ An adopted and implemented basin plan may be used to tailor BMPs to a specific basin.

Requirements #6 – Wetlands

- ◆ Applies in addition to MR #4 if there is direct or indirect discharge to a wetland.
- ◆ Discharges to wetlands must be controlled and treated to the extent necessary to meet the state surface water and ground water quality standards.
- ◆ Discharges to wetlands shall maintain the hydroperiod and flows of existing site conditions to the extent necessary to protect the characteristic uses of the wetland.
- ◆ Wetlands created for mitigation cannot be used for stormwater treatment.
- ◆ Constructed wetlands must be built on a non-wetland site and managed for stormwater treatment.
- ◆ Treatment BMPs shall not be built within a natural vegetated buffer except for necessary approved conveyance systems.
- ◆ An adopted and implemented basin plan may be used to tailor BMPs to a specific basin.

Requirement #7 – Water Quality Sensitive Areas

- ◆ If a local government determines that the Minimum Requirements do not provide adequate protection of sensitive areas, more stringent controls shall be required to protect water quality.
- ◆ Treatment BMPs shall not be built within a natural vegetated buffer except for necessary approved conveyance systems.
- ◆ An adopted and implemented basin plan may be used to tailor BMPs to a specific basin.

Requirement #8 – Off-Site Analysis and Mitigation

- ◆ All development projects shall conduct an analysis of off-site water quality impacts resulting from the project and shall mitigate those impacts. The analysis shall extend a minimum of ¼ mile downstream and shall evaluate and mitigate for existing or potential impacts including but not limited to excessive sedimentation,, streambank erosion, discharges to ground water contributing or recharge zones, violations of water quality standards and sills or discharges of priority pollutants.

Requirement #9 – Basin Planning

Note: This requirement may be different because the intent of this one is to give local governments the flexibility to use basin plans to modify the other MRs. In other words, don't be surprised if it includes a list of adopted and implemented basin plans, for example.

- ◆ Adopted and implemented basin plans can be used to modify the MRs provided that the level of protection for surface or ground water achieved by the basin plan will equal or exceed that which would be achieved by the MRs otherwise.
- ◆ Basin plans shall evaluate and include as necessary retrofitting of BMPs for existing development and/or redevelopment.

Requirement #10 – Operation and Maintenance

- ◆ An O&M schedule shall be provided for all proposed facilities and BMPs and the party(ies) responsible for O&M shall be identified.

Requirement #11 – Financial Liability

- Performance bonding or other appropriate financial instruments shall be required for all projects to ensure compliance with these standards

III. ADDITIONAL REQUIREMENTS IF DEVELOPMENT IS WITHIN 200 FT OF ONE OF THE FOLLOWING CRITICAL AREAS (include these considerations on the 'Small Parcel Erosion and Sedimentation Plan' and the 'Large Parcel Stormwater Quality Control Plan')

Wetlands

- ◆ Maintain buffer specified by CAO
- ◆ Stormwater runoff from new development shall not significantly change the rate of flow, nor decrease the water quality of wetlands

Streams, Marine Areas, Lakes and Wildlife Habitat Conservation Areas

- ◆ Maintain buffer specified by CAO
- ◆ Preserve natural flood control, stormwater storage and drainage or stream flow patterns
- ◆ Control siltation, protect nutrient reserves and maintain stream flows and stream quality for fish and marine shellfish
- ◆ Prevent turbidity and pollution of streams and fish or shellfish bearing waters
- ◆ Preserve and protect habitat adequate to support viable populations of native wildlife in Clallam County

Erosion Hazard

- ◆ Follow Requirements I and II above.
- ◆ In some cases, an engineered drainage and erosion control plan may be required

Landslide Hazard

- ◆ Maintain buffer specified by CAO
- ◆ A geotechnical report must be submitted to the Clallam County Administrator for a new development
- ◆ Surface drainage shall not be directed across the face of a landslide hazard area. If there is no alternative to discharge across a landslide area, stormwater runoff shall be collected above the face of the landslide hazard area and directed across the face of the hazard within a tight line drain and provided with an energy dissipating device at the outlet
- ◆ Pre-existing lots or land divisions for which a geotechnical report has been prepared may be considered compliant with CAO

Critical Aquifer Recharge Areas

- ◆ New agricultural activities or hobby farms, shall use best management practices concerning animal keeping, animal waste disposal, fertilizer use, pesticide use, waste water applications, and stream corridor management and seek the technical assistance of the Clallam County Conservation District and Cooperative Extension Agent

Frequently-Flooded Areas

- ◆ Land disturbing activities are prohibited within floodways unless certification by a civil engineer licensed by the State of Washington is provided demonstrating that such activities shall not result in more than a one-foot increase in flood levels during the occurrence of the base flood discharge. In the designated frequently-flooded area, the cumulative effect of any land disturbing activity, where combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than one foot at any point. Certification by a civil engineer licensed in the State of Washington who is qualified for flood assessment is required unless the Administrator determines that sufficient information is available to determine compliance.

LARGE PARCEL
STORMWATER AND EROSION CONTROL REQUIREMENTS FOR
DEVELOPMENT WITHIN THE CRITICAL AREAS CODE
JURISDICTION
May 8, 2000

REQUIREMENTS APPLY TO:

- ◆ Individual single-family residences, additions, duplexes, multifamily residential, commercial and industrial developments, clearing and grading, or driveway or road building that create:
 ≥5,000 square feet of new impervious surface area, or
 ≥1 acre of land disturbance

Note: >5 acres requires a Washington Dept. of Ecology General Permit to Discharge Stormwater

PLEASE NOTE: The 1971 Pre-Developed flow shall be used in the Hydrologic Analysis for Parts II and III.

There are three sets of requirements, I, II and III, that need to be met:

I. LARGE PARCEL EROSION AND SEDIMENTATION CONTROL PLAN--ESC

Requirements 1-15 (to be completed by a civil engineer licensed in the State of Washington)

ESC Requirement #1 – Stabilization and Sediment Trapping

- ◆ From 10/1 to 4/30, unstabilized not more than 2 days.
- ◆ From 5/1 to 9/30, unstabilized not more than 7 days.

ESC Requirement #2 – Delineate Clearing and Easement Limits

- ◆ Mark clearing limits, easements, buffers, sensitive areas, trees and drainage courses.

ESC Requirement #3 – Protection of Adjacent Properties

- ◆ Adjacent properties shall be protected from sediment deposition.

ESC Requirement #4 – Timing & Stabilization of Sediment Trapping Measures

- ◆ Construct sediment trapping BMPs first; must be functional before land disturbing activities take place.
- ◆ Stabilize in accordance with ESC Requirement #1.

ESC Requirement #5 – Cut and Fill Slopes

- ◆ Design and construct to minimize erosion.
- ◆ Stabilize in accordance with ESC Requirement #1.

ESC Requirement #6 – Controlling Off-site Erosion

- ◆ Protect downstream properties from erosion due to increases in volume, velocity and peak flow rate of stormwater runoff from the site

ESC Requirement #7 – Stabilization of Temporary Conveyance Systems

- ◆ Prevent erosion from the expected velocity of flow from the developed condition 2-year, 24-hour storm.
- ◆ Outlets, etc. must be stabilized to prevent erosion.

ESC Requirement #8 – Storm Drain Inlet Protection

- ◆ Runoff must be treated to remove sediment before entering an inlet.

ESC Requirement #9 – Underground Utility Construction

- ◆ Where feasible, do not open up >500 ft. of trench at one time.
- ◆ Where possible, excavated material shall be placed on the uphill side of a trench.
- ◆ Trench dewatering must discharge into a sediment trap or pond.

ESC Requirement #10 – Construction Access Routes

- ◆ Minimize the transport of sediment onto paved roads.
- ◆ When it occurs, clean the road daily.
- ◆ Do not use street sweeping until sediment has been cleaned up first.

ESC Requirement #11 – Removal of Temporary BMPs

- ◆ Remove within 30 days of final site stabilization or after they are no longer needed.
- ◆ Remove or stabilize trapped sediment.
- ◆ Disturbed soil areas resulting from removal shall be permanently stabilized.

ESC Requirement #12 – Dewatering Construction Sites

- ◆ Dewatering devices shall discharge into a sediment trap or pond.

ESC Requirement #13 – Control of Pollutants Other Than Sediment on Construction Sites

- ◆ Handle and dispose of these pollutants in a manner which will not cause contamination of stormwater.

ESC Requirement #14 – Maintenance

- ◆ Maintain and repair all ESC BMPs as needed to assure continued performance of their intended function
- ◆ Conduct maintenance and repair in accordance with an approved manual.

ESC Requirement #15 – Financial Liability

- ◆ Bonding or other appropriate financial instruments shall be required for all projects.

II. LARGE PARCEL STORMWATER QUALITY CONTROL PLAN—The following Minimum Requirements #2-11 are required to be completed by a licensed, civil engineer**Requirement #2 – Preservation of Natural Drainage Systems**

- ◆ Maintain natural drainage patterns and discharge at the natural location to the maximum extent practicable.

Requirement #3 – Source Control of Pollution

- ◆ Apply source control BMPs to all projects to the maximum extent practicable.
- ◆ Select, design, and maintain according to an approved manual.
- ◆ An adopted and implemented basin plan may be used to tailor BMPs to a specific basin; source control BMPs are always required for every site.

Requirement #4 – Runoff Treatment BMPs

- ◆ All projects shall provide stormwater treatment.
- ◆ Treatment BMPs should be sized to capture and treat the 6-month, 24-hour return period storm
- ◆ Infiltration shall be emphasized wherever it is appropriate.

- ◆ Direct discharge of untreated stormwater to ground water is prohibited.
- ◆ Select, design, and maintain BMPs according to an approved manual.
- ◆ Treatment BMPs shall not be built within a natural vegetated buffer except for necessary approved conveyance systems.
- ◆ An adopted and implemented basin plan may be used to tailor BMPs to a specific basin.

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- ◆ Applies in addition to MR #4 if there is direct or indirect discharge to a stream (large water bodies, regional detention, and streams with >1000 cfs.)
- ◆ Control streambank erosion by limiting the peak rate of runoff to 50% of the existing condition 2-year 24-hour design storm, and maintaining the existing condition peak runoff rate for the 10-year and 100-year, 24-hour design storms.
- ◆ Infiltration shall be emphasized wherever it is appropriate.
- ◆ Select, design, and maintain BMPs according to an approved manual.
- ◆ Treatment BMPs shall not be built within a natural vegetated buffer except for necessary approved conveyance systems.
- ◆ An adopted and implemented basin plan may be used to tailor BMPs to a specific basin.

Requirements #6 – Wetlands - Applies in addition to MR #4 if there is direct or indirect discharge to a wetland.

- ◆ Discharges to wetlands must be controlled and treated to the extent necessary to meet the state surface water and ground water quality standards.
- ◆ Discharges to wetlands shall maintain the hydroperiod and flows of existing site conditions to the extent necessary to protect the characteristic uses of the wetland.
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Requirement #7 – Water Quality Sensitive Areas

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Requirement #9 – Basin Planning

Note: This MR may be different because the intent of this one is to give local governments the flexibility to use basin plans to modify the other MRs. In other words, don't be surprised if it includes a list of adopted and implemented basin plans, for example.

- ◆ Adopted and implemented basin plans can be used to modify the MRs provided that the level of protection for surface or ground water achieved by the basin plan will equal or exceed that which would be achieved by the MRs otherwise.
- ◆ Basin plans shall evaluate and include as necessary retrofitting of BMPs for existing development and/or redevelopment.

Requirement #10 – Operation and Maintenance

- ◆ An O&M schedule shall be provided for all proposed facilities and BMPs and the party(ies) responsible for O&M shall be identified.

Requirement #11 – Financial Liability

- ◆ Performance bonding or other appropriate financial instruments shall be required for all projects to ensure compliance with these standards.

III. ADDITIONAL REQUIREMENTS IF DEVELOPMENT IS WITHIN 200 FT OF ONE OF THE FOLLOWING CRITICAL AREAS (include these considerations on the Large Parcel Stormwater Quality Control Plan)

Wetlands

- ◆ Maintain buffer specified by CAO
- ◆ Stormwater runoff from new development shall not significantly change the rate of flow, nor decrease the water quality of wetlands

Streams, Marine Areas, Lakes and Wildlife Habitat Conservation Areas

- ◆ Maintain buffer specified by CAO
- ◆ Preserve natural flood control, stormwater storage and drainage or stream flow patterns
- ◆ Control siltation, protect nutrient reserves and maintain stream flows and stream quality for fish and marine shellfish
- ◆ Prevent turbidity and pollution of streams and fish or shellfish bearing waters
- ◆ Preserve and protect habitat adequate to support viable populations of native wildlife in Clallam County

Erosion Hazard

- ◆ Follow Requirements I and II above.
- ◆ In some cases, an engineered drainage and erosion control plan may be required

Landslide Hazard

- ◆ Maintain buffer specified by CAO
- ◆ A geotechnical report must be submitted to the Clallam County Administrator for a new development
- ◆ Surface drainage shall not be directed across the face of a landslide hazard area. If there is no alternative to discharge across a landslide area, stormwater runoff shall be collected above the face of the landslide hazard area and directed across the face of the hazard within a tight line drain and provided with an energy dissipating device at the outlet
- ◆ Pre-existing lots or land divisions for which a geotechnical report has been prepared may be considered compliant with CAO

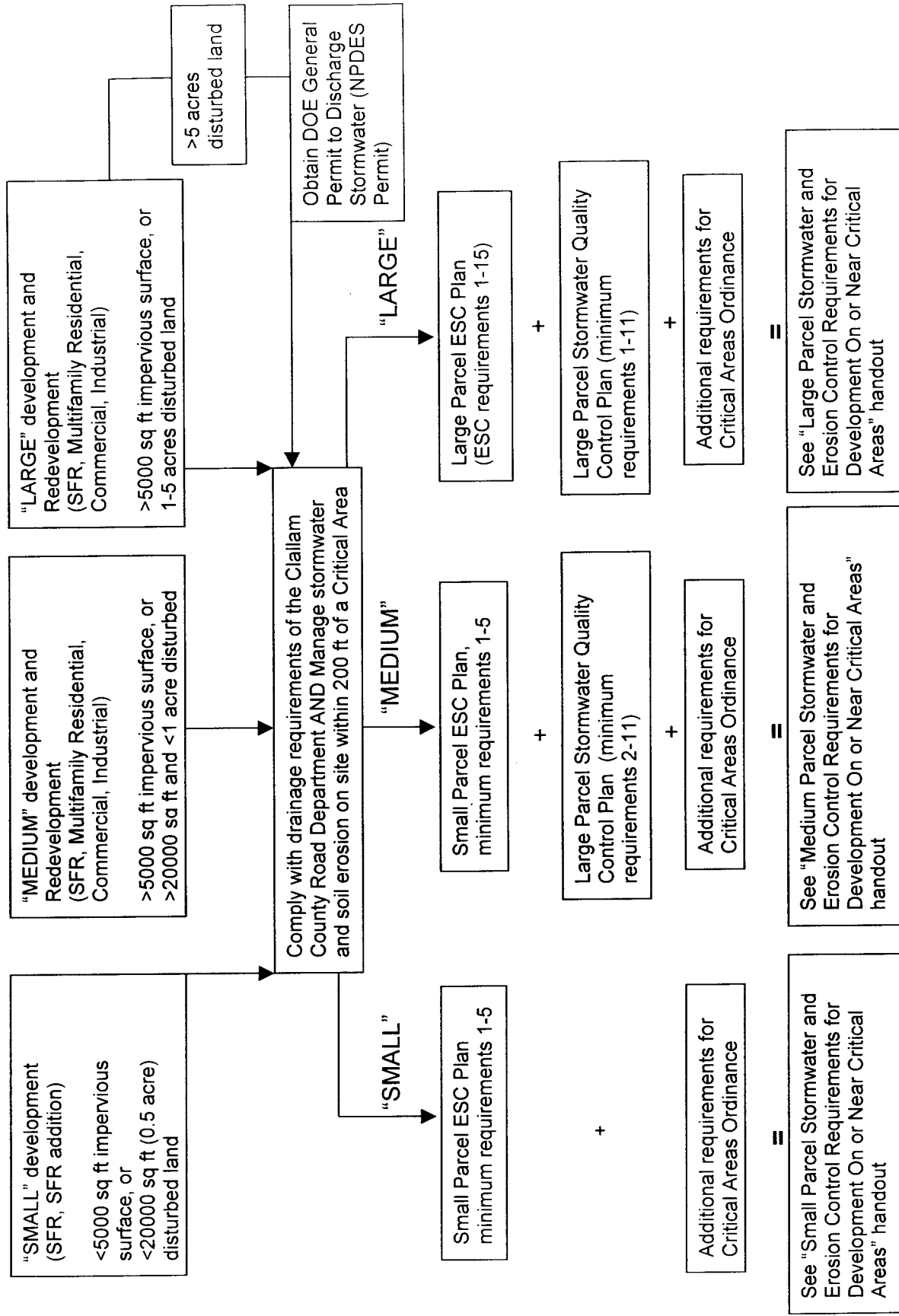
Critical Aquifer Recharge Areas

- ◆ New agricultural activities or hobby farms, shall use best management practices concerning animal keeping, animal waste disposal, fertilizer use, pesticide use, waste water applications, and stream corridor management and seek the technical assistance of the Clallam County Conservation District and Cooperative Extension Agent

Frequently-Flooded Areas

- ◆ Land disturbing activities are prohibited within floodways unless certification by a civil engineer licensed by the State of Washington is provided demonstrating that such activities shall not result in more than a one-foot increase in flood levels during the occurrence of the base flood discharge. In the designated frequently-flooded area, the cumulative effect of any land disturbing activity, where combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than one foot at any point. Certification by a civil engineer licensed in the State of Washington who is qualified for flood assessment is required unless the Administrator determines that sufficient information is available to determine compliance.

CLALLAM COUNTY STORMWATER AND EROSION CONTROL REQUIREMENTS WITHIN CAO JURASDICTION 5/8/00



LEGEND: ESC= erosion and sedimentation control
 NPDES= National Pollution Discharge Elimination System
 CAO= Critical Areas Ordinance
 BMP= Best Management Practice (for stormwater and erosion control)
 DOE= Washington Department of Ecology
 SFR= Single Family Residential

CLALLAM COUNTY DRAINAGE PLAN GUIDELINES FOR ENGINEERED SYSTEMS

Clallam County considers the following information to be the minimum necessary to be included in an Engineered Drainage Plan:

1. The plan must investigate and detail the pre-development stormwater drainage routes onto and off of the property and the rates of flow in each. This is best summarized by a plot plan showing pre-development flow routes onto and off of the property and the volume of flow in each one.
2. The plan must analyze and detail the post-development stormwater drainage routes onto and off of the property and the rates of flow in each. This is best summarized by a second plot plan showing post-development flow routes onto and off the property and the volume of flow in each one.
3. Increases in the rate of stormwater runoff in any route must not exceed 10% based on a natural and undisturbed pre-development condition. On occasion, the County may require that increases be limited to 0% if local conditions warrant. The County would prefer a 0% increase in all cases.
4. The stormwater runoff control systems must be shown in detail with supporting calculations.
5. The stormwater that runs onto the property must be routed around the stormwater control system or the stormwater control system must be designed to handle the flow. This is to prevent overloading the system with flows not intended for it.
6. The system must incorporate some mechanism to visually indicate a system failure.
7. The system must be designed to be as maintenance free and durable as practical.
8. The design shall utilize prudent engineering practices.
9. The plan shall include a statement to the effect: "This plan, if constructed as designed, will result in no new stormwater runoff routes from the property and the rate of runoff in each route will not increase by more than 10% (or 9% if so required)."
10. The plan must be stamped and signed by a licensed civil engineer.

The County's design storm is the 25-year frequency, 30-minute duration storm. All systems are to be designed to control this storm as a minimum. However, designers are encouraged to design their systems for a more intense event since the 25-year, 30-minute storm criteria may not provide adequate downstream protection in some cases.

Systems utilizing outfalls shall either have the discharge rate equal to a two-year storm based on pre-development conditions or shall have staged outfall structures designed to release runoff at the pre-development rates for a series of rainfall events.

We will also need a statement from the engineer stating that he has inspected the installation/construction of the designed system (IAD letter), and that it is constructed as designed. If the system has been modified, the engineer is to provide the County with as-built changes and a new statement as outlined in item 9 above.

These guidelines are subject to revision. The engineer should verify that he has the most current guidelines before proceeding with a design.

Please address questions or comments to Ray Bradford 360-417-2530.

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Appendix D.
Transportation System Analysis
Carlsborg Capital Facilities Plan

Appendix D

Transportation System Analysis

The following is an analysis of the possible increase in Average Daily Trips (ADT) and electric traffic signal (stop lights) in the Carlsborg Area, as discussed in Chapter 10.

There is currently a traffic signal at the intersection of the Hooker Road/Carlsborg Road and Highway 101 intersection. The 1998 traffic count on Highway 101 at Taylor Cut-Off Road intersection is 20,000 average daily trips (ADT) on the Westerly side of Taylor Cut-Off Road and 22,000 ADT on the Easterly side of Taylor Cut-Off Road, (Washington State Department of Transportation, 1998 Annual Traffic Report). The peak hour trips is calculated by multiplying the ATP by 15% ("Trip Generation", Institute of Transportation Engineers, 5th Edition, 1991). Using the previous number, the peak hour trips for on Highway 101 on the Westerly side and Easterly side of Taylor Cut-Off Road is 3,000 and 3,300 peak hour trips, respectively. The most recent ADT count for Taylor Cut-Off Road, 0.65 miles south of Highway 101, was 2,047 ADT in 1995(Clallam County Roads Department, Traffic Count Station #150, May 9 to May 16, 1995). Therefore, the estimated peak hour is 307 trips for Taylor Cut-Off Road. According to the U.S. Department of Transportation, when the peak hour trips increase to 420 for a major street with 2 or more lanes (Highway 101), or 105 for a minor one lane street (Taylor Cut-Off Road) in an area with a population of less than 10,000, the intersection has met one of the 11 warrants for a stoplight ("Manual on Uniform Traffic Control Devices", U.S. Department of Transportation, Federal Highway Administration, 1998 Edition). The U.S. Department of Transportation further states the following:

"The satisfaction of a warrant or warrants is not in itself justification for a signal. Information should be obtained by means of engineering studies and compared with the requirements set forth in the warrants. The engineering study should indicate the installation of a traffic signal would improve the overall safety and/or operation of the intersection. If these requirements are not met, a traffic signal should neither be put into operation nor continue operation (if already installed)." ("Manual on Uniform Traffic Control Devices", U.S. Department of Transportation, Federal Highway Administration, 1998 Edition).

The first warrant, peak hour trips, has been met by the current traffic patterns at this intersection. Any further increase in traffic at this intersection would further necessitate a study for the installation of a traffic signal. Increased development that may occur along Taylor Cut-Off (0.10 miles south of Highway 101) is beyond the Carlsborg planning area, but is likely to occur with the current zoning regulations in place for the area. This will result in increased traffic at the subject intersection. However, zoning changes in the Carlsborg planning area adjacent to the intersection could have a significant impact on the intersection.

Changing the zoning designation Easterly of Taylor Cut-Off Road, and adjacent to the South side of Highway 101 from Rural (R1), to Carlsborg Commercial (CC) or General Commercial (GC) would allow commercial development that is not currently allowed

under the interim zoning. The additional commercial development would not be allowed to access directly onto Highway 101 due to the Class II Control Access designation by WSDOT for this section of the highway (WAC 468-52 and written correspondence, Vicki Steigner, Development Reviewer, Washington State Department of Transportation, January 22, 1997.) Therefore the traffic from the commercial development would have to access the highway from Taylor Cut-Off Road. The total amount of traffic increase for the next 20 years would depend on the type of commercial development that located on the parcels.

Tables 10-4 and 10-5 below analyze the potential additional ADT that would be directed onto Taylor Cut-Off with the three potential zoning designations for the five parcels (totaling approximately 16 acres). A single family dwelling unit produces 9.63 average daily trips (ADT) ("Trip Generation", Institute of Transportation Engineers, 1991, 5th Edition). Calculating the total potential ADT due to commercial development is more difficult. The range of possible commercial developments results is a range of possible ADT. Therefore "general office buildings" are used as an example, which produces 246 ADT per 10,000 square feet ("Trip Generation", Institute of Transportation Engineers, 1991, 5th Edition).

Table E-1 Commercial Development

	Carlsborg Commercial (CC)	General Commercial (GC)	Rural (R-1)
Potential Additional Parcels	16 (Minimum lot size of 1 Acre)	32 (Minimum ½ Acre per Environmental Health)	16 (Minimum Density of 1 sf unit per acre)
Additional Office Square Footage	48,000 to 160,000 square feet	320,000 to 640,000 square feet	Generally Prohibited
Church – 9.23 per 1,000 square feet	Not specified	Not specified	Not Specified
Fast food restaurant – 786 per 1,000 square feet	48,000 square feet 37,728 ADT	640,000 square feet 503,040 ADT	Prohibited Use
Nursery – 36 ADT per 1,000 square feet	80,000 square feet 2,880 ADT	640,000 square feet 23,040 ADT	Not Specified
Medical-Dental Office Building – 34 ADT per 1,000 square feet (4.46 peak)	80,000 square feet 2,720 ADT (357 peak)	640,000 square feet 21,760 ADT (2,856 peak)	Not Specified
Automobile Care Center – 15.86 ADT per 1,000 square feet (no peak available)	80,000 square feet 1,269 ADT	640,000 square feet 10,150 ADT	Prohibited
Gas station/ convenience store – (82.02 peak per 1,000 square feet)	80,000 square feet 6,562 peak trips	640,000 square feet 52,483 peak trips	Prohibited
Lodge – 46.9 ADT per 1,000 square feet (3.75 peak)	80,000 square feet 3,752 ADT (300 peak)	640,000 square feet 30,016 ADT (2,400 peak)	Not Specified
Motels – 10.19 per room	N/A	60 room max. per parcel	N/A
Estimated Additional Office ADT	1,180 to 3,936 ADT	7,872 to 15,744 ADT	N/A

Table E-2 Residential Development

	Carlsborg Commercial	General Commercial (GC)	Rural (R-1)
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	(CC)		
Estimated Add. Peak Hour Trips	177 to 590	1,180 to 2,362	N/A
Maximum Add Single-Family Dwelling units	32 (one SFD unit per ½ Acre)	Prohibited	16 (one SFD unit per Acre)
Estimated SFD add. ADT	308 ADT	N/A	154 ADT
Estimated Add Peak Hour Trips	46	N/A	23

There were 42 accidents on Highway 101 in the Carlsborg area in the last four years. The attached facsimile lists the accidents in Carlsborg from January 1, 1995 to December 31, 1999.

Table E-3 below lists the accidents in Carlsborg, or the immediate vicinity, for 1999.

Road Name	Mile Post	Intersection Mile Post	Intersection Road	Date
Carlsborg Rd	0.000	N/A	N/A	5/28/1999
Carlsborg Rd	0.510	0.89	E. Runnion	11/15/1999
Carlsborg Rd	0.690	N/A	N/A	6/7/1999
Carlsborg Rd	1.260	N/A	N/A	11/22/1999
E. Runnion Rd	1.140	0.000	N/A	9/17/1999
Gilbert Rd	0.500	N/A	N/A	9/8/1999
Hooker Rd	0.600	N/A	N/A	11/14/1999
Hooker Rd	0.100	N/A	N/A	1/14/1999
Taylor Cutoff	0.160	N/A	N/A	1/4/1999

Land Use Assumptions Utilized to Generate ADT at Taylor Cutoff Intersection

If the five parcels at the southwest corner of Taylor Cut-Off were zoned commercial, and developed in low intensity commercial uses, they would generate an additional 356 ADT to the current 2,047 ADT, assuming the parcels did not subdivide. This ADT assumes the five commercial developments would include the following uses:

- one 1,000 square feet nursery (36 ADT per 1,000 square feet),
- one 2,000 square feet auto repair shop (15.86 ADT per 1,000 square feet),
- one 20 room motel (10.19 ADT per room),
- one 1,000 square feet church (9.23 per 1,000 square feet),
- one 2,500 square feet Medical-Dental office (34 ADT per 1,000 square feet).

The maximum possible ADT for the five parcels at the southwest corner would be an estimated 4,172 to 5,568 additional ADT to the current 2,047 ADT if the parcels subdivided to 16 one-acre parcels, and converted to high traffic generating, commercial uses allowed under the preferred alternative. These estimates assume that on-site sewage disposal and potable water requirements are not limiting factors. This ADT assumes the 16 commercial developments would include:

- One 2,000 square foot restaurant (786 ADT per 1,000 square feet),
- one 3,000 square foot gas station (546.8 ADT per 1,000 square foot)
- one 2,000 square feet vehicle repair shop (15.86 ADT per 1,000 square feet),
- one 3,000 square feet lodge (46.9 ADT per 1,000 square feet),
- one 60 room motel (10.19 per room),
- one 2,000 auto care sales shop (47.91 ADT per 1,000 square feet),
- nine additional 2,000' square foot retail stores (4.46 ADT to 82.02 ADT per 1,000 square feet).