

APPENDIX B

WASTEWATER RECLAMATION & REUSE REPORT

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PIERCE COUNTY WASTEWATER UTILITY UNIFIED SEWER PLAN

June 14, 2000

Introduction

The Wastewater Reclamation and Reuse Report documents how the Pierce County Unified Sewer Plan analyzes reclaimed water opportunities pursuant to the requirements of RCW 90.48.112. This report portrays how current treated wastewater reuse activities from the Chambers Creek Regional Wastewater Treatment Plant (WWTP), and summarizes existing reuse studies. The Unified Sewer Plan defers a new investigation of reuse opportunities at the Chambers Creek Regional WWTP until after the Unified Sewer Plan has been adopted and several prerequisite studies have been completed. Accordingly, this report describes the studies and reasoning for postponing a more detailed reuse analysis.

The Pierce County Unified Sewer Plan updates the sewerage general plan for the Pierce County Wastewater Utility. It identifies where future sanitary sewer service will be provided by the Wastewater Utility, the wastewater treatment plants (WWTPs) that will treat wastewater from the service areas, and the major conveyance facilities that will transport wastewater from the service areas to the WWTPs.¹ Although alternatives described and analyzed in the plan contain several wastewater treatment plants, the Pierce County Wastewater Utility has control over the operations of the Chambers Creek Regional Wastewater Treatment Plant (WWTP) only. Therefore, this report emphasizes wastewater reclamation and reuse at the Chambers Creek Regional WWTP while acknowledging the effect that construction of new WWTPs could have on the ability to reclaim and reuse wastewater in outlying areas not currently part of the Pierce County Wastewater Utility service area. Although wastewater reclamation and reuse are part of the objectives of the Unified Sewer Plan, they compete with other objectives such as consistency with the Pierce County Comprehensive Plan, making effective use of existing treatment facilities before constructing new ones, and maximizing cost-effectiveness. The Recommended Alternative in the Unified Sewer Plan does not contain new WWTPs.

Intended Activities to Reclaim & Reuse Treated Wastewater Which Are Common to Each Alternative Analyzed in the Final EIS

Wastewater reclamation and reuse features associated with wastewater treatment facilities proposed to be owned and operated by the Pierce County Wastewater follow:

- Continue to work towards water reclamation and reuse opportunities as described in the adopted *Chambers Creek Properties Master Site Plan, 1997*.
- Cooperate with water purveyors neighboring Pierce County-owned wastewater treatment plants to achieve wastewater reclamation and reuse.
- Investigate the economic feasibility of off-site reuse of treated wastewater from the

¹ Reclaimed water means effluent derived in any part from sewage that has undergone wastewater treatment. By definition, it has been adequately and reliably treated, so that as a result of that treatment, it is suitable for a beneficial use or a controlled use that would not otherwise occur and is no longer considered wastewater.

Chambers Creek Regional WWTP after adoption of the Unified Sewer Plan and after the opportunities for use of reclaimed wastewater per the Master Site Plan are known. [For the Decentralized to New WWTPs Alternative: Prepare a Water Reuse Plan for off-site reuse of treated wastewater associated with any new Pierce County-owned WWTP.]

The majority of the urban growth areas (UGA) lie within proximity of at least one existing WWTP. Potential exists at each WWTP for cost-effective wastewater reclamation and reuse projects. And the City of Tacoma, City of Sumner and Lakehaven Utility District have identified a number of projects within their own general sewer plans, facility plans and/or engineering reports.² However, the Pierce County Wastewater Utility has decision-making authority over only those treatment facilities owned by the Utility. Reclamation and reuse activities at the Tacoma Central WWTP and Sumner WWTP are beyond the scope of the sewerage general plan for the County Wastewater Utility.

Minimum Elements of a Reuse Evaluation for Sewerage General Plans

Minimum elements of a wastewater reuse evaluation for sewerage general plans are stated in the July 1999 Department of Ecology and Department of Health Guidance Document. Authority for the guidelines derives from 90.48.110 Revised Code of Washington (RCW). According to the Guidance Document, reuse evaluations must contain the following elements:

1. Identification of existing and future candidates and uses for reclaimed water.
2. A description of the general layout of a reclaimed water distribution system for the uses identified.
3. A map showing potential routes for trunk lines to provide reclaimed water to the uses identified.
4. A discussion of the ability of current treatment facilities and the additional level of treatment required to meet Class A, B, C and D treat wastewater standards.
5. Identification of the most likely candidates for actual construction and implementation.

Wastewater Reclamation & Reuse in Unified Sewer Plan Alternatives

No specific alternative was developed around the theme of wastewater reclamation and reuse. Alternatives evaluated in the Unified Sewer Plan are based on two attributes, service area and the treatment facilities where wastewater from the service areas would undergo treatment. Conceivably an early suggestion to formulate a preliminary service area/treatment option alternative around the concept of demand management could have included wastewater reclamation and reuse as a central element. But because demand management is a way of delaying the need for new facilities or delaying the consumption of resources, it was determined that demand management was part of each alternative. A similar rationale was applied to wastewater reclamation and reuse, air quality, and biosolids management as independent concepts.

² See the *Lakehaven Utility District Comprehensive Wastewater System Plan, 1999*; and the *Comprehensive Facility Plan Sumner Wastewater Treatment Facility, 1999*. Opportunities for wastewater reuse for the Tacoma Central WWTP are contained in the *Tacoma Public Utilities Water Reuse Feasibility Study, May 1994*.

Alternatives for the Unified Sewer Plan emerged from a process that started with identification of objectives (evaluation criteria). Key objectives were:

- Demonstrate consistency with the Pierce County Comprehensive Plan and the comprehensive plans of the cities and towns where the Pierce County Wastewater Utility provides service, and
 - Make sure that all of the Comprehensive Urban Growth Area (CUGA) is within the future service area of one of the sewer utilities operating in the County.
 - Analyze serving satellite urban growth areas if requested by the city or town.
- Build upon the long-term centralized regional approach contained in Utilities Element, Wastewater, Policy 14.7. This advocates using existing or planned treatment plant capacity before constructing new treatment facilities.
- Maintain consistency with the comprehensive sewer system plans of other sewer service providers.
- Maximize cost-effectiveness.
- Integrate solutions that help solve problems for water supply planning, groundwater management, and surface water management, such as aquifer recharge.

With the objectives in mind, project staff and the Ad Hoc Technical Advisory Committee (TAC) identified five service area/treatment facility alternatives, which were subsequently narrowed to four alternatives covered in the Final EIS. The four alternatives in the Final EIS were as follows:

No-Action Alternative: Infill of current service areas and continued treatment at the three WWTPs used by the Pierce County Wastewater Utility.

Decentralize to Existing Treatment Plants: A watershed-based alternative that adds service area from the CUGA but sends wastewater from the new service areas to the existing WWTPs used by the Pierce County Wastewater Utility.

Decentralize to New Treatment Plants: A watershed-based alternative that adds satellite urban growth areas identified by cities and towns and new service area from the CUGA. A new WWTP would be constructed on the Bonney Lake Plateau with discharge to the Puyallup River to service an expanded Lake Tapps service area. A new WWTP would be constructed with discharge to the White River to serve a portion of the City of Buckley, the Town of South Prairie, and the unincorporated community of Burnett. A new WWTP would be constructed in Roy with discharge to infiltration basins.

Centralized Treatment at the Chambers Creek Regional WWTP: Wastewater from all existing and new service areas would flow to the Chambers Creek Regional WWTP.

In the course of evaluating the service area/treatment plant alternatives, the degree to which an alternative lent itself to aquifer recharge (a form of reuse) was evaluated qualitatively. See the table entitled, *Evaluation of Unified Sewer Plan Alternatives – Wastewater Reclamation and Reuse*.

Recommended Alternative – A Hybrid: The recommended alternative is a hybrid of the original four alternatives with the following elements:

- Uses existing treatment facilities in the Pierce County Wastewater Utility system
 - Chambers Creek Regional WWTP for all service areas in the Chambers Creek-Clover Creek Drainage Basin. Pierce County owned and operated. Acceptance of wastewater from the City of Roy if Roy can secure financing, approval of a general sewer plan, and prepares a project-specific EIS.
 - Tacoma Central WWTP for service areas in the Hylebos Drainage Basin. Owned and operated by the City of Tacoma.
 - Sumner WWTP for service areas in the Lake Tapps Subbasin of the Puyallup River Drainage Basin. Owned and operated by the City of Sumner.
- No new WWTPs are proposed. The majority of the interceptor system for the Chambers Creek sewerage basin has been constructed. Many millions of dollars have been invested to convey wastewater in the existing service area to the Chambers Creek Regional WWTP. Moreover, the Pierce County Comprehensive Plan calls for efficient use of existing treatment facilities before constructing new facilities. The City of Buckley and Town of South Prairie each have their own wastewater treatment facilities. The unincorporated community of Burnett was awarded an EPA grant for design and installation of innovative on-site sewer systems. The on-site sewer systems have been installed and have solved the water quality problem that connection of the community to sanitary sewers was intended to remedy. The choice to not proceed with construction of new WWTPs with this update of the Pierce County Sewerage General Plan does not constrain the Wastewater Utility's ability to join in discussions about potential for new reclamation facilities and consider constructing new WWTPs in the future.

Consistency of Intended Activities with the Pierce County Comprehensive Plan - Centralized Treatment for the Chambers/Clover Watershed

Pierce County Comprehensive Plan Policy 19A.90.050, UT-S 14, 7, states "*Pierce County should continue to plan for capacity and facilities needed to serve the projected population within an Urban Growth Area, continuing to build upon the long-term centralized regional approach [emphasis added]. . . . Policy UT-S 15, 3, states "*Expand the Chambers Creek Wastewater Treatment Plant to meet needed capacities and to further reduce pollutants discharged to Puget Sound from the Chambers Creek-Clover Creek Sewer Basin.*" An alternative that included a new wastewater treatment facility within the Chambers Creek basin would be inconsistent with the Comprehensive Plan and therefore not be a reasonable alternative. Reasonable alternative is defined by WAC 197.11.440(5), which states "*Reasonable alternatives shall include actions that could reasonably attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation. (1) The word "reasonable" is intended to limit the number and range of alternatives, as well as the amount of detailed analysis for each alternative. . . . A sewerage general plan cannot amend comprehensive plan policies adopted pursuant to the Growth Management Act, RCW 36.70A.**

Table WRR-1. Evaluation of Unified Sewer Plan Alternatives – Wastewater Reclamation and Reuse

		Unified Sewer Plan Alternatives			
Unified Sewer Plan Alternatives Evaluation Criteria Related to Reuse	Recommended Alternative	No-Action	Decentralize to Existing Treatment Plants	Decentralize to New Treatment Plants	Centralize Treatment at Chambers Creek Regional WWTP
How well does the alternative lend itself to aquifer recharge?	Reuse of Wastewater at the Chambers Creek Regional WWTP. See the Reclamation and Reuse Features Common to All Alternatives.	Reuse of Wastewater at the Chambers Creek Regional WWTP. See the Reclamation and Reuse Features Common to All Alternatives.	Reuse of Wastewater at the Chambers Creek Regional WWTP. See the Reclamation and Reuse Features Common to All Alternatives.	Reuse of Wastewater at the Chambers Creek Regional WWTP A high potential exists for reclamation & reuse at each of the three new WWTPs, in light of the degree of wastewater treatment required to be permitted to discharge directly into the Puyallup River system. A new WWTP at Roy assumed to treat to sufficient water quality to permit groundwater infiltration via shallow ponds. See the Reclamation and Reuse Features Common to All Alternatives.	Reuse of Wastewater at the Chambers Creek Regional WWTP. See the Reclamation and Reuse Features Common to All Alternatives.

Table WRR-1. Evaluation of Unified Sewer Plan Alternatives – Wastewater Reclamation and Reuse

Unified Sewer Plan Alternatives Evaluation Criteria Related to Reuse	Unified Sewer Plan Alternatives			
	Recommended Alternative	No-Action	Decentralize to Existing Treatment Plants	Decentralize to New Treatment Plants
How does the alternative coordinate with and/or affect water supply planning?	<p>[Note: Applicable to all the alternatives.]</p> <p>Review of policies in the Pierce County Coordinated Water System Plan (CWSP) occurred for the Environmental Impact Statement for the Unified Sewer Plan Alternatives. The CWSP calls for water system plans of all public water systems to include an inventory of potential sources and uses for reclaimed sewage treatment plant effluent (wastewater). (Tacoma Public Utilities performed such an inventory in 1994.) Conservation Incentives include several opportunities for water reuse and recycling as an approach to reducing water demand. Potential program areas include: Reuse of reclaimed wastewater for the irrigation of public green space, industrial cooling, and power plant cooling; On-site wastewater treatment and recycling of effluent for non-potable uses in commercial buildings; and Utilization of gray water (bath, lavatory, and clothes washing water) for non-potable uses.</p> <p>Implementation of the Chambers Creek Properties Master Site Plan entails creation of a Pierce County Water Utility (created by Ordinance No. 99-134).</p>			

Existing and Future Candidates and Uses for Reclaimed Water from the Chambers Creek Regional WWTP

Table WRR-2. Summary of Candidates and Uses for Reclaimed Water

	Estimate of Volume of Reclaimed Water Required		Meets Water Quality standards for Use?
	Annual	Seasonal	
Industrial Process Water at Abitibi Consolidated, Inc. Paper Mill	<i>5 MGD possible if no cost to the mill. See section on the Stone Consolidated Mill.</i>	<i>Same as for Annual</i>	Yes, Chambers Creek produces Class D reclaimed water. Class D reclaimed water can be used for industrial process uses where there is no public contact
Irrigation of golf courses in the vicinity	<i>1.67 MGD See Tacoma Public Utilities Water Reuse Feasibility Study, 1994.</i>	<i>Same as for Annual</i>	No, Irrigation of areas of open public access requires Class A reclaimed water.
On-Site Irrigation	<i>Not known pending design details for golf course & other areas. See the section on the Master Site Plan below.</i>	<i>Same as for Annual</i>	Not known, Design details of Master Site Plan not determined.
Process Water at WWTP	<i>360 MG @ 1 MGD</i>	<i>N.A.</i>	Yes, Class D reclaimed water produced
Groundwater Recharge	<i>Wait for water supply results from Chambers-Clover Creek Basin Technical Assessment for aquifer information required to assess potential for recharge.</i>	<i>Same as for Annual</i>	No, Requires Class A reclaimed water

Table WRR-2. Summary of Candidates and Uses for Reclaimed Water

	Estimate of Volume of Reclaimed Water Required		Meets Water Quality standards for Use?
	Annual	Seasonal	
Streamflow Augmentation	<i>Wait for instream flow recommendations for salmon recovery. Currently in the hands of the DOE and the Puyallup Tribe</i>	<i>Same as for Annual.</i>	No, Requires Class C reclaimed water if no contact, Class A otherwise
Lake Augmentation	<i>See Lake Steilacoom Study. Wait for instream flow recommendations for salmon recovery.</i>	<i>Same as for Annual.</i>	No, Requires Class C reclaimed water if no contact, Class A otherwise
Wetlands Enhancement	<i>Must wait for Master Site Plan reclamation plan and instream flow recommendations for habitat enhancement.</i>	<i>Same as for Annual</i>	Yes, Class D reclaimed water for wetlands with no public contact.
Other Non-Potable Uses	<i>Identified during the pending Chambers-Clover Creek Basin Management Plan.</i>	<i>Same as for Annual</i>	N.A.

Wastewater Reuse Studies for the Chambers Creek Regional WWTP

Tacoma Public Utilities Water Division has performed two wastewater reuse studies. The first was a general investigation of reuse opportunities in the vicinity of the Chambers Creek Regional WWTP entitled, *Water Reuse Feasibility Study, May 1994*. It considered the three wastewater treatment plants in the Water Division's service area. The second study followed up on the general feasibility study. The 1997 *Stone Consolidated Mill Conservation and Water Reuse Assessment* concentrated on industrial reuse of treated wastewater at the paper mill across Chambers Bay from the treatment plant site.

Tacoma Public Utilities Water Reuse Feasibility Study, May 1994. The study developed and evaluated alternatives for treating and using reclaimed water for landscape irrigation and industrial processes within two miles of the Chambers Creek Regional WWTP. The study reported that treating and providing up to five (5) million gallons per day of reclaimed water to the Stone Consolidated paper mill in Steilacoom

for use in the papermaking process appeared to be a cost-effective option.

Stone Consolidated Mill Conservation and Water Reuse Assessment, April 1997.

In 1997, Tacoma Public Utilities conducted an assessment of ways to permanently decrease water use at the Stone Consolidated Mill through appropriate and cost-effective conservation, water recovery and/or water reuse measures, including conveyance of municipal reclaimed water from the Chambers Creek Regional WWTP to the mill. The assessment concluded that no adverse impacts on the mill or its wastewater discharge were anticipated with use of reclaimed water. However, none of the reclamation project scenarios using treated wastewater as water source appeared to be economically favorable compared to Tacoma Public Utility's estimated cost for the next new water supply. See the *Stone Consolidated Mill Conservation and Water Reuse Assessment, April 1997*.

Chambers Creek Properties Master Site Plan

The *Chambers Creek Properties Master Site Plan, 1997* and Final EIS incorporates several features related to wastewater reclamation and reuse. Two examples follow:

Area 1, North Area, incorporates a water reclamation area including approximately 40 acres of water reclamation ponds. The ponds will serve as water hazards for a golf course as well as being part of the water reclamation facilities. [*Chambers Creek Properties Master Site Plan, Page 39-40*]

The long-term plan for the two gravel mines is to use treated wastewater to irrigate planted areas such as, the golf course, buffer areas, and production nursery. [*Chambers Creek Properties Master Site Plan, Page 2*]

Construction of the wastewater reclamation ponds is not scheduled until sometime after year 2007. However, design of the golf course and water reclamation ponds is intended to occur before 2007. The water budget for irrigation and the reclamation capability of ponds and other facilities will not be known until design of the golf course and other site features is undertaken. An extract of relevant policies and an illustration of the adopted conceptual site plan is attached.

Current Use of Reclaimed Water for Treatment Plant Process Water

Currently the Chambers Creek Regional WWTP uses approximately one MGD of treated wastewater for plant operations and maintenance purposes. The reused treated wastewater is collected from the chlorine contact chamber into a reservoir where it is pumped throughout the facility and used for the following:

1. Seal water for pumps.
2. Process equipment cleaning.
3. Facility housekeeping.
4. Washdown of tanks when tanks are taken out of service.
5. Wash water at the Step Screens and grit washing ahead of the Step Screens
6. Landscape irrigation.

The current piping and pumping system limits further use of treated wastewater. Use cannot be expanded without an upgrade of these items.

Water Purveyors Neighboring the Chambers Creek Regional WWTP

Five water purveyors/utilities are located within one-half mile of the Chambers Creek Regional WWTP. Off-site reuse of reclaimed wastewater will be coordinated with these purveyors.

Pierce County Water Utility located on the Pierce County Chambers Creek Properties was created in 1999 with 22 million gallons per day in industrial water rights. Pierce County has applied to the Department of Ecology to convert the industrial water rights to municipal water rights. Pierce County is currently preparing a water general plan.

Tacoma Public Utilities, Water Division provides domestic water to the cities of Tacoma, University Place and parts of Lakewood. It provides potable water to the Chambers Creek Regional WWTP and Chambers Creek Properties. In 1994 the Tacoma Water Division issued a water reuse study that included the Chambers Creek Regional WWTP. A description of the water reuse study follows this section.

Lakewood Water District is located to the east and southeast of the Chambers Creek Regional WWTP. Some portions of the Chambers Creek Properties lie within the Lakewood Water District. The 1998 Lakewood Water System plan does not speak to wastewater reuse in its conservation chapter.

Town of Steilacoom Department of Public Works, Water Division service area lies across Chambers Bay from the Chambers Creek Regional WWTP. The Town's *Water System Comprehensive Plan, 1999* contains a chapter on conservation, but does not address wastewater reuse as a potential element of conservation.

Western State Hospital (DSHS) has wells that serve their properties, located on the historic Fort Steilacoom site. The hospital property is situated southeast of the Chambers Creek Regional WWTP, abutting Chambers Creek Canyon. Washington State owns the property that the hospital occupies, as well as Fort Steilacoom County Park and the County's Fort Steilacoom Golf Course.

Pending Chambers-Clover Watershed Technical Assessment & Watershed Management Plan

Augmentation of streams, lakes and wetlands in the vicinity of a WWTP is a potential use of reclaimed wastewater explored in reuse studies. Much of the information essential to examining the potential for stream flow augmentation, lake augmentation and wetlands enhancement will not be known until a technical assessment for the Chambers Creek-Clover Creek Watershed has been completed in 2001. The technical assessment will provide baseline information on water quantity and water quality, aquifer characteristics, annual water needs, water supply, and stream flows within the watershed, as well as fish and wildlife habitat needs and limiting factors. Conducting a new wastewater reuse study at the Chambers Creek Regional WWTP in advance of the technical assessment for the Chambers-Clover Watershed Management Plan could result in erroneous conclusions based on inadequate information.

In 1998, the State Legislature passed Engrossed Substitute House Bill (ESHB) 2514. ESHB 2514 created a grant program in support of watershed technical assessments and watershed plans that address protection and enhancement of fish habitat in watersheds that have aquatic fish species listed or proposed to be listed as endangered or threatened under the federal Endangered Species Act (ESA) and where there is evidence of an inability to supply adequate water for population and economic growth. The Tacoma-Pierce County Health Department

(TPCHD) will be overseeing the technical assessment for the Chambers-Clover Watershed. Pierce County Public Works and Utilities is a participant on the Planning Unit.

The Chambers-Clover Watershed Management Plan is scheduled to follow completion of the Technical Assessment. It will provide strategies to maximize existing water supplies in WRIA 12 including increasing water supplies through water conservation, water reuse, use of reclaimed water, aquifer recharge and recovery, additional water storage and water storage enhancements. Costs of securing new water supplies will be identified at that time. Pierce County Public Works and Utilities will be participating in development of the Management Plan.

General Layout of a Reclaimed Water Distribution System for Uses Identified

The Water Reuse Feasibility Study, 1994, Figure 3-1 illustrates golf courses, parks, cemeteries, schools, and industries in the vicinity of the Chambers Creek Regional WWTP. It shows a distribution pipeline that would be needed to deliver water to potential users within a mile of the WWTP. See the Tacoma Public Utilities, Water Reuse Feasibility Study.

Current Facilities and Class A, B, C, and D Reclaimed Water Standards

The Chambers Creek Regional WWTP produces Class D water for reuse purposes. Although water quality of the effluent is high, reuse standards mandate use of technology-based treatment process that includes coagulation and filtration. Neither coagulation nor filtration is currently employed at the Chambers Creek Regional WWTP. On-site irrigation can occur with Class D treated wastewater. Some potential for irrigation exists in areas away from or prior to public contact. (See the section on existing reuse studies and Attachment A.) These opportunities will be explored in the golf course and other design details of the Chambers Creek Properties Master Site Plan implementation and will be evaluated on the basis of cost-effectiveness of reclaimed water versus other water sources given the level of wastewater treatment required for the uses intended.

Treated wastewater would have to meet Class A water standards to meaningfully expand uses of treated wastewater beyond the existing on-site process and irrigation uses. The Master Site Plan contemplates water reclamation ponds as part of a golf course with finished water meeting Class A standards. Short of such an approach, the treatment process would have to add coagulation and filtration. Neither coagulation nor filtration is planned for the near-term needs of the treatment plant.

Most Likely Candidates for Actual Construction and Implementation

Until the instream flow requirements have been established for streams in the Chambers Creek – Clover Creek Drainage Basin and the ESHB 2514 Technical Assessment has been completed, a detailed assessment of water reuse is impractical. However, when the volume of wastewater has been identified by adoption of the Unified Sewer Plan and the Chambers-Clover Watershed habitat and water supply analyses are complete, Pierce County Wastewater Utility expects to collaborate with adjoining and nearby water purveyors to investigate reuse potential at the Chambers Creek Regional WWTP.

Draft objectives for the Chambers -Clover Management Plan³, which will build on ESHB 2514, includes water reuse and the use of reclaimed water in its objectives as follows:

- a. *Provide strategies to maximize existing water supplies in WRIA 12, which may include, but are not limited to, increasing water supplies through water conservation, water reuse, the use of reclaimed water, voluntary water transfers, aquifer recharge and recovery, additional water allocations, and additional water storage and water storage enhancements.* [emphasis added]

The other alternatives address the various factors that should be considered including current and future water demand, water needs for aquatic environments, cost and equity considerations, and funding needs and sources.

³ Based on the *Chambers Clover Management Plan Project Goals and Objectives for the Technical Assessment and for the Watershed Management Plan as approved at the April 2000 Planning Unit Meeting.*