

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED ORDER NO. 5-00-171
NPDES NO. CA0082660

WASTE DISCHARGE REQUIREMENTS
FOR
THE CITY OF BRENTWOOD
WASTEWATER TREATMENT PLANT
CONTRA COSTA COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. The City of Brentwood, (hereafter Discharger) submitted a Report of Waste Discharge, dated 2 March 1999, and applied for a revised, interim permit to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the City of Brentwood Wastewater Treatment Plant. This application included a request for additional disposal ponds, and a request to increase the permitted average dry weather flow from the secondary clarifiers to the effluent disposal ponds from 1.8 to 2.2 million gallons per day (mgd). The direct discharge to Marsh Creek from the groundwater extraction system will also be increased from 1.8 to 2.2 mgd. On 20 July 1999, the Discharger submitted another Report of Waste Discharge, and applied for a revised permit, which would include construction of new wastewater treatment facilities, and would increase the discharge of waste under the National Pollutant Discharge Elimination System (NPDES) to 4.5 mgd. Supplemental information to complete filing of the application was submitted on 18 October 1999, 18 January 2000, 17 February 2000, and today. This permit considered both applications.
2. The Discharger owns and operates a wastewater collection, treatment, and disposal system, and provides sewerage service to the City of Brentwood. The treatment plant is in Section 6, T1N, R3E, MDB&M, as shown on Attachment A, a part of this Order. The treatment plant is on property owned by the City of Brentwood. Treated municipal wastewater is discharged to on-site percolation ponds, and subsequently discharged via a groundwater extraction system to Marsh Creek, a water of the United States, at the outfall 001 and outfall 002. Discharge point 001 is at latitude 37 deg., 57 min., 37 sec., and longitude 121 deg., 41 Min., 24 sec. The Discharger has not used discharge point 001 during the term of the prior Order. The Discharger anticipates discharging from 001 only under emergency conditions. Discharge point 002 discharges percolated wastewater and groundwater to Marsh Creek, and is at latitude 37 deg., 57 min., 46 sec., and longitude 121 deg., 41 min., 01 sec. The Discharger has proposed constructing new wastewater treatment facilities, which upon completion will result in an additional discharge to Marsh Creek at outfall 003 at latitude 37 deg., 57 min., 46.10 sec., and longitude 121 deg., 41 min., 02.59 sec. Outfall 003 will be a direct discharge to Marsh Creek. Marsh Creek is tributary to the San Joaquin River/Delta, terminating near Big Break. The Discharger shall retain use of their existing 002 discharge point into Marsh Creek upon completion of the proposed new wastewater treatment facilities, until an Army Corp of Engineers (ACOE) permit is obtained. The Discharger's existing perimeter extraction pipe system will be abandoned as part of the new wastewater treatment facilities construction project.

This abandonment will eliminate the discharge of groundwater through outfall 002. Once an ACOE permit is obtained, the Discharger will construct new outfall 003 and cease discharge from outfall 002.

3. The existing wastewater treatment system consists of: primary treatment of a bar screen and comminutor; secondary treatment through extended aeration oxidation ditches; secondary clarification; filtration through percolation into groundwater; and discharge of commingled secondary effluent, and, groundwater to Marsh Creek via a groundwater extraction system. The secondary treated wastewater receives additional treatment through natural filtration through the underlying soil, which is equivalent to advanced treatment. Waste activated sludge is treated in an aerobic digester, dewatered on-site in sludge drying beds, and disposed of off-site. Site plan and process flow diagram for the existing facility are shown in Attachments B and C, respectively.

The existing permitted treatment capacity of the facility is 1.8 mgd. To accommodate increased flows until the new 4.5 mgd treatment facility is completed, improvements to the existing facility have been made to increase the capacity of the existing facility. These improvements include: installation of additional aeration equipment in both of the oxidation ditches; construction of an additional disposal ponds (Disposal Ponds No. 10, 11, 12, and 13); installation of a groundwater extraction well system around Disposal Pond No. 13; and installation of a belt filter press for sludge dewatering. With these improvements, the average dry weather capacity of the existing facility is 2.2 mgd. The 2 March 1999 Report of Waste Discharge describes the requested increased discharge from point 002 as follows:

Design Average Daily Flow:	2.20	million gallons per day (mgd)
Peak Wet Weather Flow:	3.0	mgd
Average Temperature (Influent):	69°F Summer; 64°F Winter	

<u>Constituent</u>	<u>mg/l</u>	<u>lb/Day</u>
BOD ¹	4.5	92
Total Suspended Solids	1.9	147

¹ 5-day, 20°C biochemical oxygen demand

4. The proposed 4.5 mgd treatment system will consist of screening, grit removal, oxidation and nitrification (by extended aeration activated sludge), denitrification (by anoxic basins), coagulation, tertiary treatment filtration, and disinfection, as shown in Attachment D (site plan) and Attachment E (process flow diagram). The disinfection process will use liquid hypochlorite, and the post-disinfection dechlorination process will use liquid bi-sulfite. The preferred method of disposal is reclamation, in which the treated effluent will be used for landscape irrigation. The treatment facility will also be capable of land disposal of secondary treated effluent to the percolation ponds, or direct discharge to Marsh Creek at a new point of discharge (003), located approximately 40 feet upstream of outfall 002. The Discharger shall continue discharge to Marsh Creek through outfall 002 on an interim basis until an ACOE permit is obtained, at which time a new outfall will be constructed and discharge through outfall 003 shall commence. The

proposed facility is planned to be operational in July 2002. The discharge criteria for this facility will be as follows:

Design Average Daily Flow:	4.5	mgd
Peak Wet Weather Flow:	10.00	mgd
Average Temperature:	72°F Summer; 64°F Winter	

<u>Constituent</u>	<u>mg/l</u>	<u>lbs/day</u>
BOD ¹	7	292
<u>Total Suspended Solids</u>	8	334

¹ 5-day, 20°C biochemical oxygen demand

5. The primary components of the new treatment facility will be constructed where percolation ponds No. 9 and 10 are located. To accommodate the wastewater flows during construction of the new treatment a temporary percolation pond (No.14) may be constructed. Upon completion of the new treatment facility, the temporary disposal pond will be decommissioned. Additional existing facilities that will be decommissioned include the headworks, oxidation ditches No.1 and 2, Secondary clarifiers No.1 and No.2, mixed liquor pump station, belt filter press, sludge holding ponds, and percolation ponds No. 9 through 13.
6. Disposal of the treated wastewater effluent from the existing treatment facility will continue to be to the existing disposal ponds, groundwater extraction system, and discharged to Marsh Creek via outfalls 001 and 002, until the new treatment facility is constructed. The City will cease discharging from outfall 001 once the new wastewater treatment plant is operation, by plugging the extraction pipe system. The City will plug the extraction pipe system tributary to outfall 002 but will continue to discharge effluent from the treatment process through outfall 002 until an ACOE permit is obtained.
7. The disposal methods from the new treatment facility will be accomplished in the following order of preference:
 - a. Effluent reclamation via unrestricted landscape irrigation, in accordance with Water Recycling Requirements (to be adopted separately), and a Master Reclamation Plan.
 - b. Limited land disposal of secondary treated effluent to the remaining effluent disposal pond no. 6, 7, and 8.
 - c. Direct discharge of tertiary treated effluent to Marsh Creek through existing outfall 002 on an interim basis until an ACOE permit is obtained, at which time outfall 003 will be constructed and discharge through outfall 003 will commence. Outfall 003 is located approximately 40 feet upstream of the existing discharge point 002.

The new treatment facility is designed to discharge either secondary or tertiary treated wastewater to disposal pond 6, 7 and 8. As part of a mitigation measure for flood control in Marsh Creek, disposal pond 6 is not to be used for disposal during the winter months, except in the event that Marsh Creek is at flood stage. Disposal pond 6 is to be used to temporarily store the treatment plant effluent until flows in Marsh Creek are reduced to sufficiently to accept the additional flow from the treatment plant.

8. The California Department of Health Services (DHS) has established statewide reclamation criteria in Chapter 3, Division 4, Title 22, California Code of Regulations, Section 60301, et seq. (hereafter Title 22) for the use of reclaimed water for food crop irrigation; fodder, fiber, and seed crop irrigation; landscape irrigation; and impoundment supply.
9. The chemical addition and filtration system for the new treatment system will be designed in accordance with DHS guidelines for tertiary treatment, using direct filtration technology. The entire treatment process will be designed as a Title 22 tertiary treatment process including monitoring, alarm, and redundancy features as required by Title 22 for this type of reclamation facility. The Discharger shall submit a Title 22 Engineers Report to DHS, and be issued a Water Recycling Requirements permit from the Board prior to using the Title 22 treated wastewater for off-site reclamation and reuse.
10. The proposed project is to be funded through the State Water Resources Control Board (SWRCB) State Revolving Fund Loan program. The City of Brentwood received funding approval on 30 June 1999.
11. The U.S. Environmental Protection Agency (EPA) and the Board have classified this discharge as a major discharge.
12. The Board adopted a Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve water quality objectives for all waters of the Basin. These requirements implement the Basin Plan. USEPA adopted the *National Toxics Rule* on 5 February 1993 and the *California Toxics Rule* on 18 May 2000. These Rules contain water quality standards applicable to this discharge. The State Water Resources Control Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan) which contains guidance on implementation of the *National Toxics Rule* and the *California Toxics Rule*.
13. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. In determining whether a discharge has the reasonable potential to contribute to an in-stream excursion, the dilution of the effluent in the receiving water may be considered where areas of dilution are defined. The available dilution may also be used to calculate protective effluent limitations by applying water quality criteria at the edge of the defined mixing zone. These calculations include receiving

water pollutant concentrations that are typically based on worst-case conditions for flow and concentration. EPA recommends that permit limitations be based on the lowest observed flow over a 10-year period. If limited or no dilution is available, the effluent limitations are set equal to the applicable water quality criteria which are applied at the end-of-pipe so the discharge will not cause the receiving stream to exceed water quality objectives established to protect the beneficial uses. Since the worst case condition has no dilution at the point of discharge, dilution was not considered in determining reasonable potential, and effluent limitations have been established in this permit as applicable water quality criteria 'end-of-pipe' limits.

14. Section 13263.6(a), California Water Code, requires that “the regional board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRA) indicate as discharged into the POTW, for which the state board or the regional board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective”. The Board has adopted a numeric receiving water objective for arsenic, barium, copper, cyanide, iron, manganese, silver, and zinc for the Sacramento-San Joaquin Delta in the Water Quality Control Plan for the Sacramento River and San Joaquin Basin (Basin Plan). As detailed elsewhere in this Permit, available effluent quality data indicate that none of these constituents have a reasonable potential to cause or contribute to an excursion above any numeric water quality objectives included within the Basin Plan or in any State Board plan, so no effluent limitations are included in this permit pursuant to CWC Section 13263.6(a).
15. The Basin Plan does not directly specify beneficial uses for Marsh Creek. However, Footnote 9 to Table II-1 of the Basin Plan states: “Per State Board Resolution No. 90-28, Marsh Creek and Marsh Creek Reservoir in Contra Costa County are assigned the following beneficial uses: REC 1 and REC 2”. State Board Resolution 90-28, entitled “*Approval of Revision (Editing and Updating) of the Water Quality Control Plan for the Sacramento River Basin (Basin 5A), Sacramento-San Joaquin Delta Basin (Basin 5B), and San Joaquin River Basin (Basin 5C)*”, approved a revised Basin Plan edition adopted by the Regional Board under Resolution 89-056, with several exceptions. State Board Resolution 90-28 states: “That the State Board...Disapproves the deletion of Marsh Creek and Marsh Creek Reservoir and their beneficial uses. These waterbodies and their beneficial uses are incorporated into Chapter II, Present and Potential Beneficial Uses.” Prior to the edition of the Basin Plan updated by the Regional Board under Resolution 89-056, the beneficial uses identified for Marsh Creek included water contact recreation (REC 1), non-contact water recreation (REC 2), warm freshwater habitat (WARM), wildlife habitat (WILD), and rare, threatened, or endangered species (RARE). For surface waters, the Fourth Edition of the Basin Plan states on page II-2.00: “In making any exemptions to the beneficial use designation of MUN, the Regional Board will apply the exceptions listed in Resolution 88-63.” Since the waters of Marsh Creek are suitable as a potential source of municipal and domestic supply (MUN), the beneficial use of MUN also applies.

16. The beneficial uses of the underlying ground water are municipal and domestic, industrial service, industrial process and agricultural supply.
17. Effluent limitations for **total coliform organisms** and **turbidity** are included in this Order. The beneficial uses of Marsh Creek include municipal and domestic water supply, and contact recreation. The ephemeral nature of the Creek indicates that little or no flow may be present for dilution of effluent. Because of these low flow conditions, and to adequately protect the beneficial uses of Marsh Creek, the wastewater must be disinfected and adequately treated to prevent the spread of diseases associated with wastewater pathogens.

The DHS recommends the wastewater be oxidized, coagulated and filtered and the effluent be disinfected such that the median MPN of total coliform organisms does not exceed 2.2 MPN/100 ml as a 7-day median for spray irrigation of food crops, parks, playgrounds, school yards and other areas of similar public access. Additionally, DHS recommends this same criteria for receiving waters with less than twenty to one dilution, and where most of the following conditions exist: (1) The discharge occurs in a residential area; (2) The discharge occurs in an area where there is ready access to the stream and exclusion of the public is not realistic; (3) There have been no historical attempts to post the stream to exclude the public, however, such attempts would likely be unsuccessful, since the stream is used by the public for recreational purposes; (4) The recreation potential, and current use, in the stream is high and justified; and (5) Public interest has been identified and the resident population wants or expects body contact recreation. These conditions are present in and along Marsh Creek, thus the DHS criterion applies to the discharge from this facility to Marsh Creek.

The prior Order established a limit of 23 MPN/100ml for total coliform organisms for the effluent discharged from outfall 002 to Marsh Creek. The existing treatment facility may be unable to reduce total coliform in the final effluent to the 2.2 MPN/100ml limit. However, the new treatment facility will be designed to meet the more restrictive limit. Included in this Order, under Provision H.2 is a time schedule for the discharger to meet the revised limits for total coliform organisms. In the interim the existing limit for total coliform will conform to the existing monthly median limit of 23 MPN/100ml.

18. Effluent limitations for **Dissolved Oxygen (DO)** and **Biochemical Oxygen Demand (BOD)** are included in this Order. For Marsh Creek the Basin Plan requires that the dissolved oxygen concentration shall not be reduced below 5.0 mg/l. Review of the monitoring data provided by the Discharger shows that there are times when the DO in Marsh Creek is below 5.0 mg/l upstream of the discharge from the treatment facility. Furthermore, monitoring of the indirect discharge of commingled effluent and groundwater from outfall 002 shows that the effluent discharge to Marsh Creek can cause the DO downstream of the discharge to be depressed below the level of the upstream DO.

As required by the prior Order, the discharger shall not cause the receiving water concentration to fall below 5.0 mg/l. Based upon limited flow, DO, and BOD data available, there are times when the DO in Marsh Creek, upstream of the treatment plant, falls below 5.0 mg/l. To insure that the discharge from the facility does not cause DO degradation in Marsh Creek, DO and

BOD effluent limits have been established for the discharge from this facility. To determine appropriate limits, a DO Sag analysis (Streeter-Phelps) was performed to determine the amount of BOD and DO that would be required in the effluent discharged into Marsh Creek to maintain a DO above 5.0 mg/l. The resulting analysis defined that the minimum DO in the effluent to be 5.5 mg/l, with a maximum BOD of 15 mg/l. The monthly average BOD limit of 7.0 mg/l was established using the statistical methodology recommended by EPA (ref. *Technical Support Document for Water Quality Based Toxics Control, EPA 1991*). Both BOD and DO limits are required for the discharge to insure the facility does not lower DO concentrations in Marsh Creek or violate the Basin Plan objective.

Establishment of these limits is based upon calculated values, using best professional judgment to determine the applicable constants and variables for worst-case conditions. Empirical analysis of the receiving water is required to confirm that these values are appropriate for this facility. Included in this Order, under Provision H.3, the Discharger shall develop a work plan, and conduct a study of the assimilative capacity of Marsh Creek for BOD and DO. Based upon the results of this study, this Order may be reopened to include revised effluent limitations for BOD and DO.

19. Effluent limitations for **chlorine residual** are included in this Order. The existing wastewater treatment facilities and groundwater extraction system do not incorporate chemical disinfection processes, however, the new facilities will include chlorination and de-chlorination facilities for disinfection of the treated effluent. Although the Basin Plan does not provide a numeric water quality objective for chlorine, the EPA has developed recommended ambient water quality criteria for chlorine to protect freshwater aquatic organisms. This criterion is used to implement the narrative toxicity objective of the Basin Plan. EPA's ambient water quality criteria for protection of aquatic life are 11 µg/l as a 4-day average (chronic) concentration, and 19 µg/l as a 1-hour average (acute) concentration for total residual chlorine. This permit contains effluent discharge limitations for total residual chlorine of 0.01 mg/l as a weekly average, and 0.02 mg/l as a one-hour average, based on the ambient criteria to protect aquatic life. The one-hour average limitation, rather than an instantaneous or daily maximum, will allow for continuous monitoring anomalies while protecting aquatic organisms against toxicity.
20. Receiving water limitations for **temperature** are included in this Order. The Basin Plan states that: "At no time shall the temperature of... WARM intrastate waters be increased more than 5°F above natural receiving water temperature". This Order contains receiving water limitations inclusive of the Basin Plan objectives. The existing discharge (002) temperature is buffered as it passes through the percolation ponds and commingled with groundwater before discharge to Marsh Creek. The new treatment facility will be discharging effluent directly from the treatment process to Marsh Creek via outfall 002 on an interim basis, then ultimately through outfall 003. Due to the seasonal changes in the receiving water flow and temperature, and that the discharge will no longer be buffered for temperature before discharge to Marsh Creek, the new treatment plant may have the potential to violate temperature objectives and receiving water limitations under various hydraulic and climatic conditions. As required by Provision H.3 of this Order, the Discharger shall develop a workplan, and conduct a study to evaluate facility alternatives that

mitigate adverse thermal impacts of the discharge, and achieve compliance with receiving water limitations.

21. Effluent limitations for **pH** are included in this Order. The Basin Plan provides that the pH (of surface waters) shall not be depressed below 6.5 nor raised above 8.5. The Basin Plan further provides that changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated WARM beneficial uses. Monitoring reports submitted by the City indicate that the effluent has the potential to be depressed below 6.5. Frequent low flow conditions in Marsh Creek also suggest the potential exists for changes in pH of the receiving water, between up and down gradient locations from the discharge, to be greater than 0.5 pH units. This Order includes effluent and receiving water limits for pH. Current scientific information indicates aquatic life is not adversely impacted by receiving water pH changes greater than 0.5 pH units, as long as the receiving water remains in the range of 6.5 to 8.5. Therefore, a 30-day averaging period was established for the 0.5 pH unit change standard.
22. Effluent limitations for **ammonia** are included in this Order. EPA has developed new ammonia concentration limits in the 1999 Update of Ambient Water Quality Criteria for Ammonia, which have been used as a means of deriving numeric limitations to protect receiving waters from toxicity as required in the Basin Plan's narrative standard prohibiting the discharge of toxic constituents in toxic amounts. The Discharger has not historically been required to monitor the plant effluent for ammonia. Additionally, federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above a narrative or numerical water quality standard. Until sufficient monitoring data is collected, the likely presence of total ammonia in the discharge presents a reasonable potential to exceed the EPA's 1999 update of ambient water quality criteria for the protection of fresh water aquatic life. Effluent limits for ammonia are variable, and are dependant on the temperature and pH of the effluent. The effluent limitations established by this Order for ammonia are provided in Attachments F and G.
23. Effluent limitations for **nitrates** are included in this Order. The Basin Plan requires that waters designated as a domestic or municipal supply shall not exceed the Maximum Contaminant Level (MCL), as specified in Title 22 of the California Code of Regulations (CCR). The MCL for nitrates, established by Title 22, is 10 mg/l (as nitrogen), 45 mg/l as NO₃. Effluent discharged to Marsh Creek currently consists of commingled wastewater and groundwater. Monitoring reports and supplemental information submitted by the City with the permit application indicate nitrate concentrations up to 28 mg/l (as NO₃) in the final effluent at discharge location 002. A thirty-day average concentration effluent limit of 10 mg/l for nitrates (as N), 45 mg/l as NO₃, has been included in this Order.

The prior Order did not include a finding to include a limit for nitrates. As this is a new finding and interpretation of the Basin Plan requirements for Marsh Creek as a potential municipal water supply, a time schedule for compliance with this limit is included in Provision H.2 of this Order.

24. Monitoring data for **mercury**, submitted as part of the Report of Waste Discharge, indicated that it was not detectable in the effluent being discharged to Marsh Creek. The adequacy of the data provided is questionable without implementing 'clean technique' for sample collection, handling and analyses. Subsequent to the submittal of the Report of Waste Discharge, the City provided analysis of a single sample using the 'clean technique'. The results of this single sample at the treatment plant discharge 002 showed the detectable level of mercury to be 0.015 µg/l. The current EPA Ambient Water Quality Criteria for continuous concentration of mercury is 0.77 µg/l (30-day average, chronic criteria), and the proposed California Toxic Rule Concentration is 0.050 µg/l (chronic criteria). Marsh Creek has been listed as an impaired waterbody pursuant to Section 303(d) of the Clean Water Act because of mercury. This listing is based on elevated levels of mercury in fish tissue. Because Marsh Creek has been listed as an impaired water body for mercury based on fish tissue impairment, the discharge must not cause or contribute to the increased mercury levels in the fish tissue.

The Board plans to adopt Total Maximum Daily Loads (TMDLs) for mercury and other metals in the Marsh Creek watershed by December 2011. When the TMDL is complete, the Board will adopt appropriate water quality based concentration and mass loading effluent limits for the discharge. Until the TMDL is completed and water quality based effluent limits are prescribed, an interim, performance based, mass loading limit will be prescribed.

This permit contains an interim performance-based effluent limit of 0.083 lbs/year for mercury. This interim mass limit was developed taking the results of the 'clean technique' effluent mercury concentration (0.015 µg/l) and applying that to the existing average daily flow of 1.8 mgd discharged to Marsh Creek for the year. This Order requires monitoring for mercury using 'clean technique', and allows the Board to reopen the permit to modify the interim effluent limits for mercury if it is determined to be necessary. In addition, Provision H.4. of this Order requires the Discharger is required to develop a program for identification and control of mercury discharged within the collection system.

In the event a TMDL is not adopted by 2012, and an extension of the schedule has not been granted by the USEPA, the Board will impose the following effluent limit. For mercury, the final effluent limit will be "no net loading" (No net loading means that the actual loading from the discharge must be offset by at least an equivalent loading of mercury through mass offset.) In the absence of a TMDL, any loading to the impaired waterbody has the reasonable potential to cause or contribute to an excursion of the narrative toxicity criterion.

Compliance with the final mercury limit will be required within 12 years. This limit will be either the Wasteload Allocation determined from an approved TMDL, or will be "no net loading". The permittee may achieve these limits through the following efforts:

1. reducing the effluent concentration below detectable levels through source control and treatment;
2. reducing loads through recycling/reclamation

3. reducing loads elsewhere in the watershed by an amount at least equivalent to the amount being discharged (in equivalent bioavailability) through an approved offset program; and/or
 4. end-of-pipe compliance with a site specific objective that is protective of the use being impaired.
25. The Basin Plan does not provide a numeric water quality objective for **aluminum**. However, Federal Regulations require that NPDES permit effluent limitations control all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above any State water quality standard, including any narrative criteria for water quality. EPA ambient water quality criteria was used as a means of deriving numeric limitations to protect receiving waters from toxicity as required in the Basin Plan's narrative standard prohibiting the discharge of toxic constituents in toxic amounts. The EPA has recommended, as a freshwater ambient water quality criteria for aluminum, a chronic, criterion continuous concentration (CCC) of 87 µg/l expressed in terms of total recoverable metal in the water column. In support of the July 1999 Report of Waste Discharge, the City collected samples for measurement of total and dissolved metals, including aluminum, from the current oxidation ditch under typical dry weather conditions. From this sampling effort, the total concentration for aluminum was reported as 92.4 µg/l. While it is likely that the proposed tertiary treatment processes will reduce metals concentrations in the final effluent, results of this limited sampling effort indicate that the discharge has the reasonable potential to exceed the EPA chronic criteria for aluminum, and a thirty-day average concentration effluent limit of 87 µg/l for aluminum has been included in this Order.
26. The Basin Plan does not include a numeric objective for **lead**. However, the CTR establishes ambient water quality criteria for priority toxic pollutants, including lead, in the State of California. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have reasonable potential to cause, or contribute to an in-stream excursion above the CTR standard. For lead, recommended EPA ambient water quality criteria are hardness dependent, and freshwater criteria are expressed as a function of hardness (mg/l) in the water column. The hardness of the existing effluent discharge typically exceeds 300 mg/l as CaCO₃. The hardness of the effluent will likely be altered over time with change in source water, and as a byproduct of tertiary treatment processes, including coagulation, and filtration. These changes will be beneficial to the achievement of salinity objectives, but may also result in increased metals related toxicity. At a water hardness of 150 mg/l, the EPA has recommended as a freshwater ambient water quality criteria for lead, a chronic, criterion continuous concentration (CCC) of 3.9 µg/l expressed in terms of a four-day average dissolved concentration. This criterion was originally developed using metals concentrations expressed as total recoverable metals. Since the dissolved fraction of metals more closely approximates the biologically available fraction, conversion factors were used to predict how different the criteria would be if they had been based on measurement of the dissolved concentrations in all of the toxicity tests. Conversion Factors (CF) have the effect of reducing water quality criteria concentrations. For lead, the conversion factor for both the acute and chronic criteria is hardness dependent, and is expressed as: $CF=1.46203-[\ln(\text{hardness})(0.145712)]$. For a hardness of 150 mg/l, the CF=0.732.

40CFR 122.45(c) requires that permit limits be expressed as total recoverable metal. A conservative assumption is that the metal concentration in the receiving water is biologically available to the same extent as during the toxicity testing which established the criteria. Therefore, the water quality criteria, expressed as dissolved metal, has been divided by the conversion factor for purposes of comparing with analytical results (for total recoverable metals) and for establishing an effluent limitation.

In 1996 and 1997 the City conducted an *Effluent and Receiving Water Quality Assessment*, which included monthly collection of samples for measurement of total metals concentrations, including lead. From the January 1997 round of sampling, the City reported a total lead concentration of 20 µg/l, and in August 1997 a total lead concentration of 68 µg/l was reported. Results of sampling demonstrate that the total recoverable concentration of lead in the effluent has exceeded the converted chronic criteria for protection of aquatic life in 2 of 13 samples. A chronic, 30 day average effluent limitation of 5.3 µg/l for total lead has been included in this Order based on the converted dissolved chronic criteria (3.9 µg/l / 0.732).

27. The Basin Plan does not include a numeric objective for **thallium**. However, U.S. EPA provides criteria in 40 CFR 131.36 which apply to specific States' designated uses, and which supersede any criteria adopted by the State (except when State regulations contain criteria which are more stringent for a particular use). For waters of the State defined as inland (i.e. all surface waters of the State not bays or estuaries or ocean) that include a MUN use designation, 40 CFR 131.36 has assigned criteria for specific pollutants, including thallium. The criteria provided for thallium, protective of human health for consumption of water and organisms, is expressed as a dissolved concentration of 1.7 µg/l. Additionally, the CA Department of Health Services has established a Primary Maximum Contaminant Level (MCL) for thallium of 2.0 µg/l. A conservative conversion factor of 1.0 has been used to translate dissolved to total metals. In the *Effluent and Receiving Water Quality Assessment* study performed by the City, 3 of the 13 samples collected exceeded 1.7 µg/l for total concentration of thallium. The maximum value for thallium from the monitoring data submitted was 3.1 µg/l. The total concentration indicates that the discharge has the reasonable potential to exceed the EPA criteria for human health through consumption of water and organisms and the MCL, and a chronic, thirty day average concentration effluent limit of 1.7 µg/l for thallium has been included in this Order to protect the potential MUN beneficial use of Marsh Creek.

A comparison of the thallium concentrations in the secondary effluent and in extracted groundwater (outfall 002) indicates that the thallium may be predominately from groundwater and not treated wastewater. Thallium is not expected to be a compliance problem when the new treatment facility is in operation.

28. The domestic water supply for the City of Brentwood is primarily from groundwater wells. The groundwater in this region is high in **Total Dissolved Solids** (TDS), which results in elevated levels of TDS in the wastewater. When a municipal water supply is mineralized, there is increased usage of water softeners, which further contributes to wastewater salinity. Since Dissolved Solids are not amenable to cost effective treatment, the Discharger is required to

develop and implement a *Salinity Source Control Program* to reduce the concentration of TDS in the discharge to Marsh Creek. For municipal and domestic supply beneficial uses, federal and state promulgated maximum contaminant levels (MCL's) are appropriate minimum water quality objectives. The CA Department of Health Services has established a Secondary maximum contaminant level (MCL) for EC ranging from 900 to 1,600 $\mu\text{mhos/cm}$.

As part of the *Salinity Source Control Program*, the discharger will be required to develop a workplan for salinity source control, implement the program, and prepare a study to show the effectiveness of the program. If all reasonable measures fail to meet the water quality objectives for discharges to surface waters, future Orders may include water quality based effluent limits for TDS. A time schedule is provided in Provision H.5 implementation of the Salinity Source Control Program.

29. The Basin Plan requires that all waters shall be maintained free of toxic substances that produce detrimental physiological responses in human, plant, animal or aquatic life. This Order updates the receiving water limit for **toxicity** to be consistent with the current Basin Plan for discharges to Marsh Creek from the existing discharge 002 and future discharge 003. The chronic toxicity testing which must be conducted to determine whether the effluent is contributing toxicity to Marsh Creek is updated to be consistent with EPA procedures. The testing shall be conducted as specified in EPA 600/4-91-002, or later amendment. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger shall be required to submit a work plan to conduct a toxicity reduction evaluation (TRE). This Order may be re-opened to include a chronic toxicity limitation and/or a limitation for the specific toxicant identified in the TRE.
30. Order No. 96-039 requires that the effluent discharged to Marsh Creek from this facility shall not exceed a monthly average concentration of 5.0 mg/l for BOD. This limit was established based upon the treatment system performance at the end-of-pipe discharge of the commingled secondary treated effluent and groundwater. The premise for establishing this was based on the performance capability of the treatment process, not a water quality based limit to be protective of the receiving water. The discharge concentration limit of 5.0 mg/l is reflective of a diluted discharge, and is not reflective of the level treatment provided by filtration through the soil underlying the existing disposal ponds.

The new treatment facility will materially and substantially change the treatment process of the existing facility. This facility will provide advanced tertiary treatment, which will produce a higher level of direct treatment, and a higher overall quality effluent from the facility. Analysis of the receiving water for allowable monthly average concentration for BOD from the treatment plant discharge was determined to be 7.0 mg/l. This limit is protective of the beneficial uses of Marsh Creek. Based upon these findings, increasing the average monthly concentration of BOD from 5.0 mg/l to 7.0 mg/l is allowable in accordance anti-backsliding exception provisions in 40 CFR 122.44(l).

31. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16. This Order provides for an increase in

the volume and mass of pollutants discharged. The increase will not have significant impacts on aquatic life, which is the beneficial use most likely affected by the pollutants discharged (BOD, suspended solids, chlorine residual, temperature, and metals). The increase in the discharge allows wastewater utility service necessary to accommodate housing and economic expansion in the area, and is considered to be a benefit to the people of the State. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge.

32. Storm water runoff from the wastewater treatment plant site is to be collected and discharged to the on-site disposal ponds.
33. The DHS has established statewide reclamation criteria in Title 22, CCR, Section 60301, et seq., for the use of reclaimed water, and has developed guidelines for specific uses.
34. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 208(b), 301, 302, 304, and 307 of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.
35. The discharge is presently governed by Waste Discharge Requirements Order No. 96-039, adopted by the Board on 23 February 1996.
36. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), requiring preparation of an environmental impact report in accordance with Section 13389 of the California Water Code.
37. The City of Brentwood prepared a Draft Environmental Impact Report (DEIR) to assess the potential environmental effects of the proposed long-term expansion of the City's wastewater treatment facilities, with discharge to Marsh Creek. The Final EIR (EIR) was completed in November 1998. In July 1999, the City completed a Mitigated Negative Declaration for the Conveyance of Raw Sewage to Iron House Sanitation District for the treatment and disposal of treated effluent on Jersey Island. The City received comments on both environmental documents. The EIR was certified on 24 November 1998, in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.), and the State CEQA Guidelines. Based upon the EIR, the project may significantly impact water quality by discharging conventional and non-conventional pollutants, or by adversely affecting receiving water characteristics.
38. The Board has considered the EIR, and these waste discharge requirements will mitigate or avoid the significant impacts on water quality by:
 - (a) Establishing effluent limits for conventional and non-conventional pollutants, including limits for pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard,

- (b) Establishing receiving water limits protective of beneficial uses and consistent with the Basin Plan,
- (c) Encouraging maximum reclamation of treated effluent via unrestricted landscape irrigation, conducted in accordance with Water Recycling Requirements, and a Master Reclamation Plan, and,
- (d) Requiring further study of pollutant and/or receiving water characteristics for which there is not enough information.

- 39. The Board has considered the information in the attached Information Sheet in developing the Findings of this Order. The attached Information Sheet is part of this Order.
- 40. The Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
- 41. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.
- 42. This Order shall serve as an NPDES permit pursuant to Section 402 of the CWA, and amendments thereto, and shall take effect upon the date of hearing, provided EPA has no objections.

IT IS HEREBY ORDERED that Order No. 96-039 is rescinded and the City of Brentwood, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

- 1. Discharge of wastewater at a location or in a manner different from that described in Findings No. 2 through 6 is prohibited.
- 2. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by Standard Provision A.13.

B. Effluent Limitations (to Marsh Creek):

- 1. Prior to 1 September 2002, effluent from discharge points 001, 002, the shall not exceed the following limits:

<u>Constituents</u>	<u>Units</u>	<u>Monthly Average</u>	<u>Weekly Average</u>	<u>Daily Maximum</u>
BOD ¹	mg/l	5 ²	7.5 ²	10 ²
	lbs/day	92 ³	138 ³	184 ³

Total Suspended Solids	mg/l	30 ²	45 ²	50 ²
	lbs/day	551 ³	826 ³	918 ³
Total Coliform Organisms	MPN/100ml	23 ⁴		500 ⁵

¹ 5-day, 20°C biochemical oxygen demand (BOD)
² To be ascertained by a 24-hour flow proportional composite
³ Based upon a pond system design treatment capacity of 2.2 mgd.
⁴ 7-Day Median based on previous seven daily sample results
⁵ Exceed no more than one time in any 30-day period

2. After the treatment plant expansion, or by 1 September 2002, effluent from discharge points 002 or 003 shall not exceed the following limits:

<u>Constituents</u>	<u>Units</u>	<u>Monthly Average</u>	<u>Weekly Average</u>	<u>Daily Maximum</u>
BOD ¹	mg/l	7 ²	12 ²	15 ²
	lbs/day	263 ³	450 ³	563 ³
Total Suspended Solids	mg/l	10 ²	15 ²	30 ²
	lbs/day	375 ³	563 ³	1126 ³
Total Coliform Organisms	MPN/100ml	2.2 ⁴	--	23 ⁵
Nitrates (as N)	mg/l	10	--	--
	lbs/day	375 ³	--	--
Nitrates (as NO3)	mg/l	45	--	--
	lbs/day	1689 ³		

¹ 5-day, 20°C biochemical oxygen demand (BOD)
² To be ascertained by a 24-hour flow proportional composite
³ Based upon a plant design treatment capacity of 4.5 mgd.
⁴ 7-Day Median based on previous seven daily sample results
⁵ Exceed no more than one time in any 30-day period

3. After the treatment plant expansion, or by 1 September 2002, the wastewater shall have advanced treatment, and be oxidized, coagulated and filtered, or equivalent, and the effluent shall not exceed the following limits at any time during the year:

<u>Constituent</u>	<u>Units</u>	<u>Monthly Average</u>	<u>Weekly Average</u>	<u>Daily Maximum</u>	<u>1-Hour Average</u>
Aluminum	µg/l	87	--	--	--
	lbs/day	3.27 ¹			
Ammonia	mg N/l	Attachment F	--	Attachment G	--
Chlorine Residual	mg/l	--	0.011	--	0.019
	lbs/day	--	0.41 ¹	--	0.71 ¹
Lead	µg/l	5.3	--	--	--
	lbs/day	0.20 ¹	--	--	--

Oil and Grease	mg/l	10	--	--	15
	lbs/day	375 ¹	--	--	563 ¹
Settleable Solids	ml/l	0.1	--	0.2	--
Thallium	µg/l	1.7	--	--	--
	lbs/day	0.064 ¹	--	--	--
Turbidity ³	NTU	---	---	5	2 ²

¹ Based on an average dry weather flow capacity of 4.5 mgd

² Daily Average

³ Turbidity shall not exceed 5 NTUs 5% of the time or 10 NTUs at any given time.

4. The interim mass effluent limit for mercury shall not exceed 0.083 lbs per twelve month on a running average, subject to the conditions stated below:
 - a) In calculating for compliance, the Discharger shall count all non-detect measures at one-half of the detection level and apply the monthly average daily flow. If compliance with the effluent limit is not attained due to the non-detect contribution, the Discharger will improve and implement available analytical capabilities and compliance will be evaluated with consideration of the detection limits.
 - b) Twelve month mass loadings should be calculated for each calendar month. For monthly measures, calculate monthly loadings using average monthly flow and the average of all mercury analyses conducted that month. The Discharger shall submit a cumulative total of mass loadings for the previous twelve months with each Self-Monitoring report. Compliance will be determined based on the previous 12-month moving averages over the previous twelve months of monitoring.
 - c) The final effluent limit, as defined in Finding No. 24, will become effective one year after establishment of a watershed mercury loading offset program has been approved by the Regional Board as a Basin Plan amendment and accepted by US EPA, whichever occurs last.
5. The dissolved oxygen concentration of the discharge shall not fall below 5.5 mg/l at all times.
6. The arithmetic mean of 20°C BOD (5-day) and total suspended solids in effluent samples collected over a monthly period shall not exceed 15 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (85 percent removal).
7. The discharge shall not have a pH less than 6.5 nor greater than 8.5.
8. Once the Wastewater Treatment Plant expansion is complete and certified by an appropriately licensed professional, the average dry weather discharge flow shall not exceed 4.5 mgd.

9. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

Minimum for any one bioassay - - - - - 70%

Median for any three or more consecutive bioassays - - - - 90%

10. After the treatment plant expansion, or by 1 September 2002, discharge from outfalls 001 and 002 will be terminated.

C. Discharge Specifications (Land Disposal):

1. Prior to 1 September 2002, the monthly average dry weather discharge flow to the disposal ponds shall not exceed 2.2 million gallons/day.
2. After 1 September 2002, land disposal will be limited to Disposal Ponds No. 6, 7, and 8. Disposal to the ponds shall not exceed the following:

Disposal Pond No.	Disposal Capacity Non-Winter¹ (mgd)	Disposal Capacity Winter² (mgd)
6	0.27	Restricted ³
7	0.22	0.22
8	0.18	0.18
Totals	0.67	0.40

¹ Non-Winter is defined as April 15 through October 15.

² Winter is defined as October 16 through April 14.

³ During winter months Disposal Pond 6 is reserved, and is only to be used in the event that Marsh Creek is at flood stage as defined by the Contra Costa Flood Control District.

3. Objectionable odors originating at this facility shall not be perceivable beyond the limits of the wastewater treatment facility property owned by the Discharger.
4. As a means of discerning compliance with Discharge Specification No. 2, the dissolved oxygen content in the upper zone (1 foot) of wastewater in ponds shall not be less than 1.0 mg/l.
5. The treatment facilities shall be designed, constructed, operated, and maintained to prevent inundation or washout due to floods with a 100-year return frequency.
6. The effluent discharged from the treatment facility to the disposal ponds shall not exceed the following limits:

<u>Constituent</u>	<u>Units</u>	<u>Monthly Average</u>	<u>Daily Maximum</u>
BOD ₅ ¹	mg/l	40	80
Settleable Solids	ml/l	0.2	0.5

¹ Five-day, 20°C biochemical oxygen demand (BOD₅)

7. Ponds shall not have a pH less than 6.5 or greater than 8.5.
8. Ponds shall be managed to prevent breeding of mosquitos. In particular,
 - a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.
 - b. Weeds shall be minimized.
 - c. Dead algae, vegetation, and debris shall not accumulate on the water surface.
9. Public contact with wastewater shall be precluded through such means as fences, signs, and other acceptable alternatives.
10. Ponds shall have sufficient capacity to accommodate allowable wastewater flow and design seasonal precipitation and ancillary inflow and infiltration during the non-irrigation season. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns. Freeboard shall never be less than two feet (measured vertically to the lowest point of overflow).
11. On or about **1 October** of each year, available pond storage capacity shall at least equal the volume necessary to comply with Discharge Specification C.10.

D. Effluent Limitations (Title 22 Reclamation):

1. The effluent from the treatment facility to the reclaimed water distribution system shall not exceed the following limits:
 - a. For irrigation of golf courses, cemeteries, freeway landscaping, landscapes in other areas, parks, playgrounds, schoolyards, non-restricted recreational impoundments, or other places where the public has similar access or exposure:

<u>Constituents</u>	<u>Units</u>	<u>Daily Average</u>	<u>Daily Maximum</u>	<u>7-Day Median</u>
BOD	mg/l	10	---	---

Total Coliform Organisms	MPN/100 ml	---	23	2.2 ¹
Turbidity	NTU	2	5 ²	--

¹ The median value is to be determined from the bacteriological results from the last 7 days for which analyses have been completed.

² Not to exceed 5 NTU's more than 5% of the time

- b. The delivery or use of reclaimed water shall be in conformance with the reclamation criteria contained in Chapter 3, Division 4, Title 22, California Code of Regulations (Title 22), or amendments thereto, for food crop irrigation; fodder, fiber, and seed crop irrigation; landscape irrigation; and impoundment supply.
 - c. The Discharger shall not spray irrigate reclaimed water during periods of precipitation and for at least 24 hours after cessation of precipitation, or when winds exceed 30 mph.
 - d. Storm water runoff from irrigation fields shall not be discharged to any surface water drainage course within 24 hours of the last application of reclaimed water.
2. Areas irrigated with reclaimed water shall be managed to prevent breeding of mosquitoes. More specifically,
 - a. Tail water must be returned and all applied irrigation water must infiltrate completely within a 48-hour period.
 - b. Ditches not serving as wildlife habitat should be maintained free of emergent, marginal, and floating vegetation.
 - c. Low pressure and unpressurized pipelines and ditches accessible to mosquitoes shall not be used to store reclaimed water.
 3. There shall be no irrigation or impoundment of reclaimed water within 150 feet of any domestic water well.
 4. All reclaimed water equipment, pumps, piping, valves, and outlets shall be appropriately marked to differentiate them from potable facilities, and these shall be of a type, or secured in a manner, that permits operation by authorized personnel only.
 5. Conspicuous warning signs indicating that reclaimed water is in use shall be posted at least every 500 feet, with a minimum of a sign at each corner of the parcels and at access road entrances.
 6. Supplementing reclaimed water by connection with a domestic drinking water source or irrigation or industrial wells requires an air gap separation device.

7. Application of reclaimed wastewater shall be at reasonable rates considering the crop, soil, climate, and irrigation management system. The nutrient loading of the disposal area, including the nutritive value of organic and chemical fertilizers, applied biosolids, and of the reclaimed water, shall not exceed the crop demand.
8. Neither the treatment nor the use of reclaimed water shall cause a pollution or nuisance as defined by Section 13050 of the California Water Code (CWC).
9. Reclaimed wastewater shall meet the criteria contained in Title 22, California Code of Regulations.
10. Water recycling and/or reclaimed wastewater disposal shall be conducted in accordance with Water Recycling Requirements approved by the Board.

E. Biosolids Discharge Specifications:

1. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner that is consistent with Title 23, California Code of Regulations, Division 3, Chapter 15, and approved by the Executive Officer.
2. Any proposed change in sludge use or disposal practice from a previously approved practice shall be reported to the Executive Officer and EPA Regional Administrator at least **90 days** in advance of the change.
3. Use and disposal of sewage sludge shall comply with existing Federal and State laws and regulations, including permitting requirements and technical standards included in 40 CFR 503.
4. If the State Water Resources Control Board and the Regional Water Quality Control Boards are given the authority to implement regulations contained in 40 CFR 503, this Order may be reopened to incorporate appropriate time schedules and technical standards. The Discharger must comply with the standards and time schedules contained in 40 CFR 503 whether or not they have been incorporated into this Order.
5. The Discharger is encouraged to comply with the “Manual of Good Practice for Agricultural Land Application of Biosolids” developed by the California Water Environment Association.

F. Receiving Water Limitations:

Receiving water limitations are site-specific interpretations of water quality objectives from applicable water quality control plans. As such they are required as part of the permit. However, a receiving water condition not in conformance with the limitation is not necessarily a violation of this Order. The Board may require an investigation to determine cause and culpability prior to asserting a violation has occurred.

The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 5.0 mg/l.
2. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.
3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.
4. Esthetically undesirable discoloration.
5. Fungi, slimes, or other objectionable growths.
6. The 30-day average for turbidity to increase as follows:
 - a. More than 1 Nephelometric Turbidity Units (NTUs) where natural turbidity is between 0 and 5 NTUs.
 - b. More than 20 percent where natural turbidity is between 5 and 50 NTUs.
 - c. More than 10 NTUs where natural turbidity is between 50 and 100 NTUs.
 - d. More than 10 percent where natural turbidity is greater than 100 NTUs.
7. The normal ambient pH to fall below 6.5 or exceed 8.5. The 30-day average change in pH shall not exceed 0.5 pH units.
8. The normal daily ambient temperature to increase more than 5°F.
9. Deposition of material that causes nuisance or adversely affects beneficial uses.
10. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations, Title 22; that harm human, plant, animal or aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.
11. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.
12. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.

13. Violation of any applicable water quality standard for receiving waters adopted by the Board or the State Water Resources Control Board or EPA pursuant to the CWA and regulations adopted thereunder, including the California Toxics Rule, may cause this permit to be reopened and additional receiving water limitations included or modified.
14. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

G. Groundwater Limitations:

1. The discharge, in combination with other sources, shall not cause the underlying groundwater to contain waste constituents in concentrations greater than background water quality at or beyond the point of compliance. Any incremental increase in total dissolved solids (TDS) or electrical conductivity (EC) waste constituent concentrations within the point of compliance, when compared to background, shall not exceed the increase typically caused by the percolation discharge of domestic wastewater and shall not cause or contribute to a violation of water quality objectives, unreasonably impact beneficial uses, or cause pollution or nuisance. For purposes of this limitation, the point of compliance shall be established based upon the City's report regarding the adequacy of the existing monitoring network, and the need for supplemental wells if needed. The point of compliance shall be established still within the boundary of property owned or controlled by the discharger.
2. Any increase in total coliform organisms shall not exceed a most probable number of 2.2/100 ml over any seven-day period.

H. Provisions:

1. The Discharger shall not allow pollutant-free wastewater to be discharged into the collection, treatment, and disposal system in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means rainfall, groundwater, cooling waters, and condensates that are essentially free of pollutants.
2. The Discharger shall meet the following time schedule for compliance with revised BOD, suspended solids, total coliform and nitrate limits established in B.2 of this permit. These limits are effective upon the construction and operation of the new 4.5 mgd treatment plant. The construction time schedule is as follows:

<u>Task</u>	<u>Date</u>
Construction Completion of WWTP	1 July 2002

Attain Operational Level	1 September 2002
Compliance with Revised Limits	1 September 2002

3. The Discharger shall conduct a *Effluent and Receiving Water Study* to validate the receiving water limits for DO and BOD established for this facility. At a minimum, this study shall evaluate seasonal flow, temperature, and DO and BOD of Marsh Creek and the treatment facility. The study will be conducted in two phases; the first phase will be completed prior to the operation and discharge from the new treatment plant; phase two of the study will be performed after the new treatment facility commences direct discharge to Marsh Creek at outfall 002 or 003. The first phase will be used to evaluate impacts the existing discharge has to the receiving water, and to predict what effects the future direct discharge will have. Phase two of this study is to validate the results predicted in phase one. To adequately perform this study, a flow monitoring station will be required on Marsh Creek. This study shall be accomplished in accordance with the following time schedule:

<u>Task</u>	<u>Date</u>
Submit Workplan and Time Schedule	1 October 2000
Complete Construction of Flow Monitoring Station on Marsh Creek	1 December 2000
Begin Phase One Study	1 March 2001
Complete Phase One of Study	1 April 2002
Submit Phase One Study Report	1 July 2002
Begin Phase Two Study	1 October 2002
Complete Phase Two Study	1 October 2003
Submit Phase Two Study Report	1 February 2004

4. Due to the listing of mercury on the California 303 (d) list as a pollutant causing impairment of Marsh Creek, the discharge must not cause or contribute to increased mercury levels in fish tissue to meet the requirements of the anti-degradation policy described in SWRCB Resolution No. 68-16 and the anti-degradation provision in 40 CFR 131.12 (a) (1). The City provided mercury analysis of a single sample using EPA Method 1631. The results of this single sample at the treatment plant discharge 002 showed the detectable level of mercury to be 0.015 µg/l. An interim mass limit for mercury has been set based upon this single sample. However, a more complete data set using 'clean' sampling techniques and analytical methods is necessary, at minimum, for the establishment of a baseline of mass loading from which to appropriately measure future reductions or offsets. Upon completion of **twelve (12) months** of monitoring after adoption of this Order, this permit may be reopened to include a revised interim mass limit for mercury. Also, within **twelve (12) months** of adoption of this Order, the Discharger shall develop a mercury source reduction workplan acceptable to the Executive Officer. The purpose of the workplan is to investigate the causes of, and identify corrective control actions to control mercury loadings. The workplan shall include, at a minimum: source reduction activities under the pretreatment program; a public outreach program to eliminate or minimize the use of mercury thermometers, discharge of amalgam from dental offices, and regarding proper collection and disposal

of fluorescent bulbs; and reductions in discharges to the river through reclamation of treated wastewater; preventative measures to minimize mercury discharges from new industry, commercial establishments and residential developments. The workplan will include a time schedule by which source control efforts identified in the approved workplan shall be implemented. Pretreatment related activities shall commence immediately upon approval of the workplan. The workplan shall become an enforceable part of the permit upon approval of the Executive Officer.

5. The Discharger shall develop and implement a *Salinity Source Control Program(SSCP)* to reduce the TDS in the effluent that will be discharged to receiving waters. The Discharger shall develop a workplan and implementation time schedule to reduce both the mass (lbs/day) and concentration (mg/l) of TDS in the treatment plant effluent. The Discharger shall submit a *Salinity Source Control Study*, summarizing the results and effectiveness of the SSCP. If significant progress is made with the program, the SSCP will continue. The SSCP shall be accomplished in accordance with the following time schedule:

<u>Task</u>	<u>Date</u>
Submit Workplan and Time Schedule	1 October 2000
Begin Implementation	1 December 2000
Complete Study	1 January 2004
Submit Study Report	1 March 2005

6. The Discharger shall submit a report regarding the adequacy of the existing monitoring network, and the need for supplemental wells if needed. This report shall include a proposal for point of compliance groundwater monitoring wells, which shall be located on property owned or controlled by the Discharger. The purpose of the report is to establish points of compliance to ensure that the land disposal of wastewater effluent from the facility is not negatively impacting groundwater elevation beyond the facilities property boundary, or the beneficial use of the groundwater. This *Groundwater Monitoring Network and Point of Compliance Report* shall be completed and submitted to the Board by **1 January 2001**.

If monitoring of the groundwater indicates that the discharge has caused an increase in constituent concentrations at the point of compliance, as compared to background, the Discharger will be required to conduct a study of the extent of groundwater degradation. If the study indicates the discharge has incrementally increased concentrations in groundwater, or caused significant impacts to the groundwater elevation beyond the facilities property boundary, enforcement actions may be pursued and/or this permit may be reopened and modified. For purposes of this Provision, points of compliance will be established as near to the discharge areas as practical, but shall not extend beyond property owned or controlled by the Discharger.

7. The Discharger shall submit to the Board on or before each compliance due date, the specified document or a written report detailing compliance or noncompliance with the

- specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Board by letter when it returns to compliance with the time schedule.
8. The Discharger shall conduct the chronic toxicity testing specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger initiate a Toxicity Identification Evaluation (TIE) to identify the causes of toxicity. Upon completion of the TIE, the Discharger shall submit a workplan to conduct a Toxicity Reduction Evaluation (TRE) and, after Board evaluation, conduct the TRE. This Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if the State Water Resources Control Board adopts a chronic toxicity water quality objective, this Order may be reopened and a limitation based on that objective included.
 9. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated 1 March 1991, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provisions."
 10. The Discharger shall comply with Monitoring and Reporting Program No. 5-00-171, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.
 11. When requested by USEPA, the Discharger shall complete and submit Discharge Monitoring Reports. The submittal date shall be no later than the submittal date specified in the Monitoring and Reporting Program for Discharger Self Monitoring Reports.
 12. This Order expires on **1 June 2005**, and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than 180 days in advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.
 13. Upon completion of the new facilities supporting a design average dry weather flow of 4.5 mgd, the Discharger shall enforce Pretreatment Standards including but not limited to:
 - a. Adopting the legal authority;
 - b. Enforcing Pretreatment Standards;
 - c. Implementing procedures to ensure compliance; and

- d. Providing funding and personnel for implementation and enforcement of the pretreatment program.

Prior to operation of the new 4.5 treatment facility, which is anticipated to be 1 September 2002, the Discharger shall have fully implemented all aspects of the pretreatment program.

14. Upon completion of the new facilities supporting a design average dry weather flow of 4.5 mgd, the Discharger shall implement its approved pretreatment program and the program shall be an enforceable condition of this permit. If the Discharger fails to perform the pretreatment functions, the Regional Water Quality Control Board (RWQCB) may take enforcement actions against the Discharger.
15. Upon completion of the new facilities supporting a design average dry weather flow of 4.5 mgd, the Discharger shall implement the necessary legal authorities, programs, and controls to ensure that the following incompatible wastes are not introduced to the treatment system, where incompatible wastes are:
 - a. Wastes which create a fire or explosion hazard in the treatment works;
 - b. Wastes which will cause corrosive structural damage to treatment works, but in no case wastes with a pH lower than 4.5, unless the works is specially designed to accommodate such wastes;
 - c. Solid or viscous wastes in amounts which cause obstruction to flow in sewers, or which cause other interference with proper operation or treatment works;
 - d. Any waste, including oxygen demanding pollutants (BOD, etc.), released in such volume or strength as to cause inhibition or disruption in the treatment works, and subsequent treatment process upset and loss of treatment efficiency;
 - e. Heat in amounts that inhibit or disrupt biological activity in the treatment works, or that raise influent temperatures above 40°C (104°F), unless the Regional Board approves alternate temperature limits;
 - f. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;
 - g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the treatment works in a quantity that may cause acute worker health and safety problems; and
 - h. Any trucked or hauled pollutants, except at points predesignated by the Discharger.

16. Upon completion of the new facilities supporting a design average dry weather flow of 4.5 mgd, the Discharger shall implement the legal authorities, programs, and controls necessary to ensure that indirect discharges do not introduce pollutants into the sewerage system that, either alone or in conjunction with a discharge or discharges from other sources:
- a. Flow through the system to the receiving water in quantities or concentrations that cause a violation of this Order, or
 - b. Inhibit or disrupt treatment processes, treatment system operations, or sludge processes, use, or disposal and either cause a violation of this Order or prevent sludge use or disposal in accordance with this Order.
17. To assure implementation of the pretreatment program is established to coincide with the completion of the new facility supporting a design average dry weather flow of 4.5 mgd, the Discharger shall comply with the following schedule.

<u>Task</u>	<u>Date</u>
Submit the results on an industrial users survey	1 July 2001
Submit an Inspection and Monitoring Program	1 July 2001
Submit specific effluent limitations (local limits) for the general prohibited pollutants which shall be incorporated into the pretreatment ordinance.	1 July 2001
Submit Legal Authority and Control Mechanism, Implementation document, an Enforcement Response Program, and a list of resource allotments for the program	1 January 2002
Submit proposed Pretreatment Ordinance for Executive Officer Approval	1 January 2002
Adoption and Implementation of Approved Program	120 days after approval

18. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of, or clearance from the State Water Resources Control Board (Division of Water Rights).
19. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

20. To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, address and telephone number of the persons responsible for contact with the Board and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

I, GARY M. CARLTON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 16 June 2000 and Revised on 26 January 2001.

GARY M. CARLTON, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. 5-00-171
NPDES NO. CA0082660

FOR
THE CITY OF BRENTWOOD
WASTEWATER TREATMENT PLANT
CONTRA COSTA COUNTY

INFLUENT WASTEWATER MONITORING

Samples shall be collected at approximately the same time as effluent samples and should be representative of the influent to the treatment plant for the period sampled. Influent monitoring shall include at least the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Flow	mgd	Meter	Continuous
20 ^o C BOD ₅	mg/l	24 hr. Composite	Monthly
Suspended Solids	mg/l	24 hr. Composite	Monthly
Specific Conductivity	µmhos/cm @25°C	Grab	Weekly

DISPOSAL POND INFLUENT MONITORING

Samples shall be collected at approximately the same time as effluent samples and should be representative of the influent to the disposal pond system for the period sampled. Influent monitoring shall include at least the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Flow	mgd	Meter	Continuous
20 C BOD ₅	mg/l	24 hr. Composite	Monthly
Settleable Solids	ml/l	24 hr. Composite	Monthly
Specific Conductivity	µmhos/cm @25°C	Grab	Monthly
pH	pH Units	Grab	Daily
Metals ^{1,2,3}	µg/l	Grab	Quarterly

¹ Shall include analyses for Aluminum, Arsenic, Boron, Copper, Lead, Mercury, Selenium, Thallium, and Zinc. Sampling shall be taken monthly for the first year in accordance with Provision H.3. of this Order.

² Use clean sample collection techniques and EPA Test Method 1669 or 1631, or later amendment for Mercury.

³ Use EPA Test Method 7742, or later amendment for Selenium.

DISPOSAL POND MONITORING

Each disposal pond shall be monitored as follows:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Dissolved Oxygen	mg/l	Grab	Monthly
Electrical			
Conductivity	umhos/cm	Grab	Monthly
pH	pH units	Grab	Monthly
Pond Freeboard	Feet	---	Monthly

EFFLUENT MONITORING

Effluent samples shall be collected downstream from the last connection through which wastes can be admitted into the outfall. Effluent samples should be representative of the volume and quality of the discharge from the treatment plant. Time of collection of samples shall be recorded. Effluent monitoring from discharge points 001 (when flowing), 002, and 003 shall include at least the following:

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Flow	mgd	Meter	Continuous
Chlorine Residual ⁶	mg/l, lbs/day	Meter	Continuous
Turbidity	NTU	Meter	Continuous ⁹
Dissolved Oxygen	mg/l	Grab	Daily
Electrical Conductivity	umhos/cm	Grab	Daily
pH	pH units	Grab	Daily
Temperature	°F	Grab	Daily
Ammonia (as N)	mg N/l	Grab	Weekly
Nitrates (as N)	mg N/l, lbs/day	Grab	Weekly
or (as NO ₃)	mg NO ₃ /l, lb/day	Grab	Weekly
Total Coliform			
Organisms	MPN/100ml	Grab	Weekly
20°C BOD ₅	mg/l, lb/day	24 hr. composite ¹	Weekly
Total Suspended Solids	mg/l, lb/day	24 hr. composite ¹	Monthly
Aluminum	µg/l, lbs/day	24 hr Composite ¹	Monthly
Lead	µg/l, lbs/day	24 hr Composite ¹	Monthly
Mercury ⁷	µg/l, lbs/day	Grab	Monthly
Other Metals ^{3, 4, 10}	µg/l, lbs/day	Grab	Monthly
Settleable Solids	ml/l	Grab	Monthly
Thallium	µg/l, lbs/day	24 hr Composite ¹	Monthly
Total Dissolved Solids	mg/l	Grab	Monthly
Bioassay ²	% survival	24 hr. composite ¹	Monthly ⁸
Diazinon ⁴	µg/l	24 hr Composite ¹	Quarterly
Chlorpyrifos ⁴	µg/l	24 hr Composite ¹	Quarterly

<u>Constituent</u>	<u>Units</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Standard Minerals ⁵	mg/l	Grab	Quarterly
Tributyltin	µg/l	24 hr Composite ¹	Quarterly
Priority Pollutants ⁴	µg/l	See Footnote 4	Semi-Annually

- ¹ The samples shall be flow proportional composite samples.
- ² The acute bioassays samples shall be analyzed using EPA/600/4-90/027F, Fourth Edition, or later amendment with Board staff approval. Temperature and pH shall be recorded at the time of bioassay sample collection. Effluent ammonia samples shall be collected at the same time samples are collected for bioassay tests. Test species shall be fathead minnows (*Pimephales promelas*), with no pH adjustment unless approved by the Executive Officer. Flow through bioassays are also acceptable.
- ³ Other metals shall include arsenic, boron, copper, iron, selenium, and zinc.
- ⁴ Discharger must submit report outlining sample collection, EPA test methods, and detection limits within 60 days of permit adoption for approval. Report all peaks identified by the EPA test methods.
- ⁵ Standard Minerals shall include calcium, magnesium, hardness, sodium, potassium, alkalinity, sulfate, and chloride.
- ⁶ Monitoring only required when chlorine is used in any part of the treatment or pretreatment system.
- ⁷ Using clean sample collection techniques and EPA Test Method 1669 or 1631, or later amendment.
- ⁸ Bioassay sampling will be quarterly until new treatment facility in constructed and in operation.
- ⁹ Turbidity sampling will be weekly until new treatment facility in constructed and in operation.
- ¹⁰ Use EPA Test Method 7742, or later amendment for Selenium.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed above with the exception of metals and priority pollutants, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge. In no event shall the Discharger be required to monitor and record data more often than twice the frequencies listed in the schedule.

RECLAMATION WATER MONITORING

Monitoring shall be conducted in accordance with Water Recycling Requirements approved by the Board.

RECEIVING WATER MONITORING

All receiving water samples shall be grab samples. Receiving water monitoring shall include at least the following:

<u>Station</u>	<u>Description</u>
R-1A	100 feet upstream of discharge location 002 or 003
R-2A	Flow Monitoring Upstream of discharge location 002 or 003. Location to be determined by Contra Costa Flood Control District.
R-3A	300 feet downstream discharge location 002 or 003
R-4A	Marsh Creek at the Delta Road bridge crossing

<u>Constituents</u>	<u>Units</u>	<u>Station</u>	<u>Sampling Frequency</u>
Flow ¹	ft ³ /sec	R-2A	30 min. interval
Dissolved Oxygen	mg/l	R-1A, R-3A, R-4A	Weekly
Electrical Conductivity	µmhos/cm	R-1A, R-3A, R-4A	Weekly
pH	pH Units	R-1A, R-3A, R-4A	Weekly
Temperature	°F (°C)	R-1A, R-3A, R-4A	Weekly
Turbidity	NTU	R-1A, R-3A, R-4A	Weekly
20°C BOD ₅	mg/l	R-1A, R-3A	Monthly
Total Coliform Organisms	MPN/100 ml	R-1A, R-3A	Monthly

¹ Flow monitoring of Marsh Creek shall commence in accordance with the time schedule in Provision H.3.

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions throughout the reach bounded by Stations R-1 through R-5. Attention shall be given to the presence or absence of:

- | | |
|---------------------------------|--|
| a. Floating or suspended matter | e. Visible films, sheens or coatings |
| b. Discoloration | f. Fungi, slimes, or objectionable growths |
| c. Bottom deposits | g. Potential nuisance conditions |
| d. Aquatic life | h. Flow |

Notes on receiving water conditions shall be summarized in the monitoring report.

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing toxicity to Marsh Creek. The testing shall be conducted as specified in EPA 600/4-91-002, or later amendment.

Chronic toxicity samples shall be collected at the discharge of the wastewater treatment plant prior to its entering Marsh Creek. 24-hour composite samples shall be representative of the volume and quality of the discharge. Time of collection samples shall be recorded. The effluent tests must be conducted with concurrent reference toxicant tests. Monthly laboratory reference toxicant tests may be substituted upon approval. Both the reference toxicant and effluent test must meet all test acceptability criteria as specified in the chronic manual. If the test acceptability criteria are not achieved, then the Discharger must re-sample and re-test within 14 days. Chronic toxicity monitoring shall include the following:

Species: Pimephales promelas, Ceriodaphnia dubia, and Selenastrum capricornutum
 Frequency: Four times per year
 Dilution Series:

	<u>Dilutions (%)</u>					<u>Controls</u>	
	<u>100</u>	<u>75</u>	<u>50</u>	<u>25</u>	<u>12.5</u>	<u>Creek Water</u>	<u>Lab Water</u>
% WWTP Effluent	100	75	50	25	12.5	0	0
% Dilution Water ¹	0	25	50	75	87.5	100	0
% Lab Water	0	0	0	0	0	0	100

¹ Dilution water shall be receiving water from Marsh Creek taken upstream from the discharge point. The dilution series may be altered upon approval of Board staff.

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the municipal water supply can be obtained. Water supply monitoring shall include at least the following:

<u>Constituents</u>	<u>Units</u>	<u>Sampling Frequency</u>
Electrical Conductivity ¹ @ 25°C	µmhos/cm	Quarterly
Total Dissolved Solids	mg/l	Quarterly

¹ If the source water is groundwater from more than one well, the EC shall be reported as a weighted average and shall include copies of supporting calculations.

GROUNDWATER MONITORING

Groundwater up gradient and down gradient of the domestic wastewater treatment facilities and disposal ponds shall be sampled **quarterly**. An adequate groundwater monitoring network shall be defined in accordance with Provision H.6 of this Order. Wells shall comply with requirements of the Department of Water Resources. The following constitutes the groundwater monitoring program:

<u>Constituents</u>	<u>Units</u>	<u>Type of Sample</u>
Elevation ¹	feet (MSL)	----
Specific Conductivity	µmhos/cm	Grab
Nitrates (as N)	mgN/l	Grab
Total Coliform Organisms	MPN/100 ml	Grab

¹ The elevation shall be used to calculate the gradient and direction of groundwater flow, which shall be reported with the monitoring report.

SLUDGE MONITORING

A composite sample of sludge shall be collected annually in accordance with EPA's *POTW Sludge Sampling and Analysis Guidance Document, August 1989*, and tested for the following metals:

Arsenic	Lead
Cadmium	Mercury
Chromium	Nickel
Copper	Zinc

Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

Within **90 days of the effective date of this Order**, the Discharger shall submit characterization of sludge quality, including sludge percent solids and quantitative results of chemical analysis for the priority pollutants listed in 40 CFR 122 Appendix D, Tables II and III (excluding total phenols). All sludge samples shall be a composite of a minimum of twelve (12) discrete samples taken at equal time intervals over 24 hours. Suggested methods for analysis of sludge are provided in EPA publications titled "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods" and "Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater". Recommended analytical holding times for sludge samples should reflect those specified in 40 CFR 136.6.3(e). Other guidance is available in EPA's *POTW Sludge Sampling and Analysis Guidance Document, August 1989*.

PRETREATMENT MONITORING

Effective **January 2003**, the Discharger shall submit annually a report to the Board describing the Discharger's pretreatment activities over the previous 12 months. In the event that the Discharger is not in compliance with any conditions or requirements of this Order, the Discharger shall include the reasons for noncompliance and state how and when the Discharger shall comply with such conditions and requirements. This annual report shall be submitted by 28 February.

REPORTING

Monitoring results shall be submitted to the Regional Board by the **first day** of the second month following sample collection. Quarterly and annual monitoring results shall be submitted by the **first day of the second month following each calendar quarter, semi-annual period, and year**, respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements. The highest daily maximum for the month, monthly and weekly averages, and medians, and removal efficiencies (%) for BOD and Suspended Solids, shall be determined and recorded.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

By **30 January of each year**, the Discharger shall submit a written report to the Executive Officer containing the following:

- a. The names, certificate grades, and general responsibilities of all persons employed at the WWTP (Standard Provision A.5.).
- b. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.
- c. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.6.).
- d. A statement certifying whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last revised and last reviewed for adequacy.

The Discharger may also be requested to submit an annual report to the Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

All reports submitted in response to this Order shall comply with the signatory requirements of Standard Provision D.6.

The Discharger shall implement the above monitoring program on the first day of the month following the effective date of this Order.

Ordered by _____
GARY M. CARLTON, Executive
Officer

26 January 2001 16 June 2000
(Date)

FACT SHEET

ORDER NO. 5-00-171
CITY OF BRENTWOOD
WASTEWATER TREATMENT PLANT
CONTRA COSTA COUNTY

General Background Information

The City of Brentwood is situated on the western edge of the San Joaquin Valley, approximately 50 miles east of San Francisco in Contra Costa County. Brentwood has historically been an agricultural community with approximately 60% of the presently incorporated area consisting of agricultural fields and vacant land. Approximately 29% of the incorporated area is single-family residences. Commercial development is concentrated downtown in a traditional-style central business district. The predominant surface water feature in the Brentwood area is Marsh Creek, a small stream that flows from Marsh Creek Reservoir in the Diablo Range eastward through the city.

The population of Brentwood was estimated at approximately 11,800 in 1997, however, substantial growth has recently occurred in the City of Brentwood service area, and is expected to continue. The current population is estimated at 20,050. The Association of Bay Area Governments projected that in the year 2010 Brentwood would have a population of approximately 43,000. The population is expected to increase to 100,000 after the year 2020. For planning purposes, the City has projected 550 new service connections will be added each year, until the ultimate build-out population of 100,000 is attained, with an associated wastewater flow of 10 million gallons per day (mgd).

Permit Application

The City of Brentwood currently operates its existing wastewater treatment facility under WDR Order No. 96-039 / NPDES No. CA0082660 issued by the Regional Water Quality Control Board - Central Valley Region 23 February 1996. The City submitted two permit applications for the treatment and disposal of their wastewater. Application No.1, dated 2 March 1999, requests re-issuance of a permit for the existing wastewater facility, and to increase the existing treatment capacity of the plant from 1.8 mgd to 2.2 mgd. Application No.2, dated 20 July, is a supplement to the Application No.1, which requests permitting of a new 4.5 mgd treatment facility that will be constructed to replace the existing treatment system at the site. The new 4.5 mgd facility will include full tertiary treatment capability for reclamation of the treatment plant effluent for use as recycled water for irrigation purposes. Until the new facility is constructed the existing facility will continue to operate. With interim improvements, the existing treatment facility will be increased to 2.2 mgd. Supplemental information to complete filing of the application was submitted on 18 October 1999, 18 January 2000, 17 February 2000, and today.

This Order encompasses the continued operation of existing wastewater treatment facilities, and the proposed expansion of the WWTP effluent discharge to 4.5 mgd. Updated effluent, ground and surface water receiving water limits are provided in this Order. This Order includes additional study requirements, and reopener provisions pertaining to several effluent constituents and effluent and receiving water characteristics.

Existing Wastewater Facilities

The City of Brentwood's wastewater treatment facilities comprise approximately 70 acres on the north side of the City of Brentwood, situated adjacent to Marsh Creek (Attachment A). As shown on Attachment B, the existing treatment process consists of influent screw pumps, one mechanical and one manual bar screen, a 12-inch parshall flume, two oxidation ditches, two secondary clarifiers, and aerobic

sludge digestion areas. Sludge drying beds for the facility accommodate approximately 0.75 mgd of sludge capacity on approximately 36,000 square feet of drying space. The facility effluent disposal system currently consists of eleven primary and two emergency use percolation ponds, and a perimeter groundwater extraction system which was installed as part of a 1988 expansion project. The disposal ponds are situated on the eastern portion of the City's property, and encompass approximately 18 acres. Treated effluent flows to the disposal ponds from the secondary clarifiers for evaporation and infiltration to groundwater.

Over time, as the flows to the treatment facility increased, the continued land disposal caused artificially high groundwater conditions on both the treatment plant site and adjacent properties. To contain the effects of the groundwater mounding to the treatment plant site, a groundwater extraction system was installed. The original groundwater extraction system consisted of a perforated pipe along the treatment plant property boundary which intercepted elevated groundwater before it migrated off-site. The commingled groundwater and infiltrated secondary effluent collected by the groundwater extraction system is then discharged into Marsh Creek via outfall 002 for disposal. As the flows to the plant increased additional percolation ponds were added, along with groundwater extraction wells to continue containment of the groundwater mounding to the site.

The groundwater extraction system consists of 12 extraction wells and a network of 8 to 12 inch piping which follows along the north, south, and east perimeter of the disposal pond area. The system collects commingled groundwater and infiltrated secondary effluent from the disposal ponds and discharges the water to Marsh Creek at two locations. The discharge points 001 and 002 are located at the southwest and northeast corners of the facility. The existing groundwater extraction system, which has been recently upgraded, is designed to contain the effects of wastewater flows from the percolation ponds of 2.2 mgd.

For the term of the existing permit the facility was rated at a capacity of 1.8 mgd. To increase the capacity of the existing treatment facility from 1.8 to 2.2 mgd several improvements to the existing facility were necessary. These improvements include installation of additional aeration equipment in the two existing oxidation ditches, construction of additional effluent disposal ponds (Disposal Ponds 10, 11, 12 and 13), installation of a groundwater extraction well system, installation of a belt filter press for sludge dewatering, and repair of soil subsidence around Oxidation Ditch No. 1. As of May 1999 all of the afore mentioned improvements have been made. A site layout showing these improvements is shown in Attachment B. These improvements are an interim solution to increase the capacity of the existing treatment plant until the new treatment facility can be constructed.

The City proposes to continue operation of the existing treatment plant and discharge to Marsh Creek in the same manner as prescribed in the existing permit, with the allowance for increasing the flow from 1.8 to 2.2 mgd. Operation of the existing treatment plant will continue until the new 4.5 mgd tertiary treatment plant is constructed and in operation. The City anticipates that the new facility to be completed and in operation by July 2002. When the new 4.5 mgd treatment facility plant is fully operational, the existing treatment system will be decommissioned, with the exception of the aerobic digester and percolation ponds 6,7, and 8, which will be incorporated into the new treatment facility.

Evaluation of Alternatives to Meet Future Wastewater Treatment and Disposal Needs

In August 1997 the City of Brentwood issued a *Wastewater Facilities Plan* to assess the current and future wastewater needs, and to evaluate wastewater treatment and disposal options to accommodate future growth. Based upon the alternative analysis in the report two alternatives were identified as essentially equal; surface water discharge to Marsh Creek and conveyance of the wastewater to Ironhouse Sanitary District for treatment and disposal. Environmental documents were prepared for both alternatives.

On 9 February 1999, after completing the environmental process for both alternatives, the Brentwood City Council selected discharge to Marsh Creek as the superior long-term alternative for implementation. This alternative includes full tertiary treatment of the wastewater to produce effluent suitable for unrestricted irrigation reuse, which will serve as the primary method of disposal. Excess treated wastewater, which cannot be utilized for reclamation, will be discharged either to land or to Marsh Creek.

Selected Alternative

The project selected for implementation will include new wastewater treatment facilities, which will be located at the site of the existing wastewater treatment plant (WWTP). The proposed site layout is shown as Attachment D. The proposed facilities will consist of influent pumps, screens, oxidation ditches, secondary clarifiers, tertiary filtration, disinfection, and improved sludge handling facilities. Disinfection will be accomplished using liquid hypochlorite, and the post-disinfection dechlorination process will use liquid bi-sulfite. The chemical addition and filtration system will be designed in accordance with DHS guidelines for tertiary treatment, using direct filtration technology. The entire treatment process will be designed as a Title 22 tertiary treatment process including monitoring, alarm, and redundancy features as required by Title 22 for this type of reclamation facility. The City will be preparing a Title 22 Wastewater Reclamation Engineers Report for the California Department of Health Services, and an application for Water Recycling Requirements, which shall be submitted and a permit issued by the Board prior to discharge.

Construction of the wastewater treatment facilities will occur in a series of expansion projects, with an ultimate capacity of 10 mgd. Upon completion of the initial phase, the City would have a treatment capacity of 4.5 mgd. At completion of the initial phase, most existing treatment facilities would be decommissioned, leaving only the aerobic digester and percolation ponds 6,7, and 8. Completion of the new treatment facility is planned for July 2002.

Methods of Effluent Disposal

The method of disposal for the existing treatment facility will remain the same as is currently permitted by the facility. The secondary treated effluent will be discharged to disposal ponds, which is then filtered through the soil and commingles with the groundwater. To prevent the elevated level of the groundwater, caused by the rapid percolation of the effluent, from affecting agricultural activities on adjoining properties, a perimeter groundwater extraction system was installed to contain this condition to the treatment plant site. The commingled effluent and groundwater collected by the groundwater extraction system is discharged to Marsh Creek at outfalls 001 and 002. Outfall 002 is the primary discharge point for the facility. Outfall E-1 is used only in the event of an emergency, and has not been used during the term of the existing permit. This method of disposal will continue until the new

treatment facility is constructed and in operation. Upon completion of the new treatment facility, discharge from the groundwater extraction system will be eliminated.

The new 4.5 mgd treatment facility will have three methods of disposal of the treatment plant effluent. Effluent from the new treatment facility will be accomplished in the following order of preference:

1. Effluent reclamation via unrestricted landscape irrigation, conducted in accordance with Water Recycling Requirements, and a Master Reclamation Plan.
2. Limited land disposal of secondary treated effluent to the remaining effluent disposal pond no. 6, 7, and 8.
3. Direct discharge of tertiary treated effluent to Marsh Creek will continue through outfall 002 until an Army Corps of Engineers (ACOE) permit is obtained, at which time the Discharger shall construct outfall 003 and commence discharge through outfall 003. Outfall 003 will be located approximately 40 feet upstream of the existing discharge point 002.

A discussion of each of the disposal methods for the new treatment facility is provided below.

Reclamation - The City has developed some preliminary planning documents to identify uses for reclaimed wastewater at both existing and future sites. The reclaimed wastewater will be used for irrigation of parks, golf courses and other landscape amenities. At this time the City has constructed a portion the distribution system for the reclaimed water, and will continue to expand the system as the City grows.

Reclamation for use off-site is not covered under this permit. In order to use the Title 22 tertiary treated wastewater for reclamation off-site, a Master Reclamation Plan shall be submitted and a permit issued by the Board prior to discharge. The treatment, distribution and use of reclaimed water system shall comply with the California Water Code, Division 7 (Water Quality), Chapter 7 (Water Reclamation). Reclamation requirements established in this permit only covers the use of reclaimed water at the treatment plant site.

Land Disposal - Land disposal of a portion of the wastewater has been selected as the second preferred option to reclamation. This scenario will allow the City to discharge secondary treated wastewater, from the secondary clarifiers, to the remaining disposal pond 6, 7 and 8. This method of disposal is consistent with the existing land methods at the existing facility. The principal difference between the disposal method and the existing system is the elimination of the groundwater extraction system. To mitigate the effects of the land disposal affecting the groundwater level flows to the ponds will be limited.

Effluent disposal capacity of the existing disposal pond system was evaluated in a report entitled *City of Brentwood Wastewater Treatment Plant Effluent Disposal Capacity and Structural Integrity Assessment* (Montgomery Watson, October 1996). In this study percolation rates of the disposal ponds were calculated for the disposal pond system with and without the use of the groundwater extraction system.

The average percolation rate without the use of the extraction system was determined to 0.07 in/hr. To determine the capacity of the effluent disposal ponds, the follow formula was used:

$$\text{Disposal Capacity (mgd)} = 0.07 \text{ in/hr} \times 1 \text{ ft/12in} \times 24 \text{ hr/day} \times \text{___ acres} \times 43560 \text{ ft}^2/\text{acres} \\ \times 7.48 \text{ gal/ft}^3 \times 1 \text{ mg/1} \times 10^6 \text{ gal}$$

As a condition for flood control along Marsh Creek, the Contra Costa Flood Control District is requiring the City to reserve the capacity of disposal pond No.6 for storage of the treatment plant effluent in the event of flood stage is reached in the creek. This restriction applies only during the winter, which is normally defined as mid-October through mid-April. The allowable disposal capacity for both winter and non-winter conditions are shown below.

Allowable Land Disposal Pond Capacity

Disposal Pond No.	Area (Acres)	Disposal Capacity Non-Winter (mgd)	Disposal Capacity Winter (mgd)
6	5.78	0.27	Restricted
7	4.80	0.22	0.22
8	3.86	0.18	0.18
Totals	14.53	0.67	0.40

Since the allowable infiltration rate was an estimated value, and to insure that land disposal does not negatively affect groundwater in the area, groundwater monitoring will be required as a condition of this permit. If the monitoring of the land disposal system shows degradation of the groundwater off-site and the this degradation has potential to affect the beneficial use of the groundwater or adjacent agricultural activities, the land disposal operation will be reevaluated to eliminate the negative impacts.

Direct Discharge to Marsh Creek - Treated wastewater that cannot be utilized for reclamation or by land disposal will be discharged to Marsh Creek. The level of treatment for direct discharge of effluent to Marsh Creek will full Title 22 type tertiary treatment, which is equivalent to the level of treatment required for reclamation. The point of discharge will be through existing outfall 002 until an ACOE permit is obtained, at which time the Discharger will construct outfall 003 and commence discharge through outfall 003. Outfall 003 will be located approximately 40 feet upstream of the existing discharge point 002.

Receiving Water Characteristics

Marsh Creek is a small stream which flows east-northeast from Marsh Creek Reservoir in the Diablo Range through the City of Brentwood. Sand Creek is tributary to Marsh Creek with its confluence located approximately 1.5 miles upstream of the existing City of Brentwood WWTP. Once past the City’s WWTP, Marsh Creek channel turns north-northeast, terminating in the Delta at Big Break, approximately 3.6 miles to the north of the WWTP. The Marsh Creek stream channel is approximately 30 feet wide near the WWTP, and serves as a flood control structure during significant rainfall events. Downstream, and approximately 3 miles to the north of the WWTP, the Contra Costa Water District (CCWD) canal, which conveys raw water from Rock Slough, crosses through a siphon under Marsh Creek.

The drainage area of the Marsh Creek watershed is approximately 81 square miles upstream of the treatment plant site. No routinely collected flow measurements are available from which to estimate the normal dry-period flow, although streamflow in the creek is generally low, but rarely dry, during most of the summer. Sources of flow in summer are associated with upstream reservoir releases, agricultural return flow, and urban drainage from the Brentwood area. Seasonal stormwater and agricultural runoff contributions have significant impacts on the quality and quantity of water in Marsh Creek.

According to the EIR prepared in support of the WWTP expansion, habitat types of Marsh Creek include annual grassland and some ruderal habitat on the WWTP site, along with areas of marsh and riparian habitats along Marsh Creek that increase as the creek approaches Big Break. Marsh Creek is identified as the primary biological resource and habitat in the project area. Urban development and agriculture have encroached on the creek's banks within the city limits, and water quality has been affected by urban and agricultural runoff and discharge of treated effluent. Marsh Creek is tidally influenced at Big Break south of Jersey Island, and resulting salinity changes vary with the magnitude and timing of the tides and freshwater outflows. No riparian vegetation and little bank vegetation is found near the proposed outfall structure. Farther downstream, some riparian vegetation is present and overall habitat conditions improve, especially at the confluence of Marsh Creek and Big Break.

Water quality of Marsh Creek has been monitored for specific constituents at points 100 ft upstream (R-1), 300 feet downstream (R-2), and the discharge from the Brentwood Wastewater Treatment (002). The receiving water monitoring data was collected from September 1997 through December 1999, and is shown in Table FS-1. The results for the monitoring at these locations are summarized below.

Constituent	Units	Range	Average	Median
Dissolved Oxygen				
Upstream (R-1)	mg/l	4.3 – 11.2	7.7	7.1
Downstream (R-2)	mg/l	4.2 – 10.9	7.5	7.6
WWTP Discharge (002)	mg/l	3.9 – 8.2	5.5	5.2
pH				
Upstream (R-1)	pH units	6.6 – 8.9	7.0	6.9
Downstream (R-2)	pH units	6.5 – 8.5	7.4	7.4
WWTP Discharge (002)	pH units	6.4 – 8.0	7.0	6.9
Specific Conductance				
Upstream (R-1)	µmhos/cm	292 – 2300	1304	1315
Downstream (R-2)	µmhos/cm	569 - 2300	1385	1255
WWTP Discharge (002)	µmhos/cm	1100 – 2270	1546	1500
Total Coliform				
Upstream (R-1)	MPN/100 ml	240 - 1600	1304	1315
Downstream (R-2)	MPN/100 ml	170 - 1600	1385	1255
WWTP Discharge (002)	MPN/100 ml	2 – 1600	146	14

Due to lack of flow data in Marsh Creek, it is not possible to determine actual mixing characteristics in the receiving waters and the treated effluent. In addition, the treatment plant discharge is mixed with groundwater prior to discharge to Marsh Creek. From past studies, it has been determined that a portion

of the treated effluent is discharged directly to Marsh Creek through percolation. This makes it difficult to characterize the actual effects of the treatment plant effluent on Marsh Creek. Discussions on how receiving water criteria will be determined for each constituent are discussed below.

Beneficial Uses of Marsh Creek

From the City of Brentwood WWTP points of discharge, Marsh Creek flows approximately 3.6 miles, passing the community of Oakley, and under several major road crossings. Recreational access trails, including bike trails are located along the banks of Marsh Creek, allowing unrestricted public access.

The Basin Plan at page II-2.00 states that: “Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning. Existing and potential beneficial uses which apply to surface waters of the basins are presented in Figure II-1 and Table II-1. The beneficial uses of any specifically identified water body generally apply to its tributary streams. In some cases a beneficial use may not be applicable to the entire body of water. In these cases the Regional Board’s judgment will be applied. It should be noted that it is impractical to list every surface water in the Region. For unidentified water bodies, the beneficial uses will be evaluated on a case-by-case basis.”

The Fourth Edition of the Basin Plan does not directly specify beneficial uses for Marsh Creek. However, Footnote 9 to Table II-1 of the Basin Plan states: “Per State Board Resolution No. 90-28, Marsh Creek and Marsh Creek Reservoir in Contra Costa County are assigned the following beneficial uses: REC 1 and REC 2”. State Board Resolution 90-28, entitled “*Approval of Revision (Editing and Updating) of the Water Quality Control Plan for the Sacramento River Basin (Basin 5A), Sacramento-San Joaquin Delta Basin (Basin 5B), and San Joaquin River Basin (Basin 5C)*”, approved a revised Basin Plan edition adopted by the Regional Board under Resolution 89-056, with several exceptions. State Board Resolution 90-28 states: “That the State Board...Disapproves the deletion of Marsh Creek and Marsh Creek Reservoir and their beneficial uses. These waterbodies and their beneficial uses are incorporated into Chapter II, Present and Potential Beneficial Uses.” Prior to the edition of the Basin Plan updated by the Regional Board under Resolution 89-056, the beneficial uses identified for Marsh Creek included water contact recreation (REC 1), non-contact water recreation (REC 2), warm freshwater habitat (WARM), wildlife habitat (WILD), and rare, threatened, or endangered species (RARE).

For surface waters, the Fourth Edition of the Basin Plan states on page II-2.00: “In making any exemptions to the beneficial use designation of MUN, the Regional Board will apply the exceptions listed in Resolution 88-63.” Since the waters of Marsh Creek are suitable as a potential source of municipal and domestic supply (MUN), the beneficial use of MUN also applies.

Available Dilution in Effluent Limit Determinations

Based on the available information and on the Discharger’s application, that Marsh Creek, absent the discharge and/or releases from Marsh Creek Reservoir, is an ephemeral stream. The ephemeral nature of Marsh Creek means that the designated beneficial uses must be protected, but that no credit for receiving water dilution is available. Although the discharge, at times, maintains the aquatic habitat, constituents may not be discharged that may cause harm to aquatic life. The lack of dilution results in

more stringent effluent limitations to protect contact recreational uses, drinking water standards, and aquatic life.

Information submitted as part of the Discharger's application shows that at times, particularly during the summer months, the receiving stream has very little flow or no flow in the area of the Marsh Creek WWTP discharge, although it is rarely dry. Based on the information provided by the City, the available worst-case minimum dilution is assumed to be zero to provide protection of the receiving water beneficial uses. This Order contains effluent limitations based on water quality objectives contained in the Basin Plan applied as 'end of pipe' limits allowing for no dilution in the receiving stream to protect the beneficial uses of Marsh Creek.

However, Marsh Creek reservoir often provides sustained releases of water to Marsh Creek. The City has elected to further study the quantity and quality of Marsh Creek flows to support development of proposed operational constraints and seasonal effluent limits which consider actual flows, and potential dilution or assimilative capacity in Marsh Creek during these periods. Currently there is no flow monitoring on Marsh Creek. To determine the flow characteristics of Marsh Creek the City will be required construct a flow monitoring station upstream of their point of discharge.

Groundwater Characteristics

The WWTP overlies silty and clayey sediments formed from alluvial deposits that originated through the erosion of sedimentary rocks in the Diablo Range and fluvial deposits laid down in the Delta. Large amounts of sand were deposited in the area of Sand Hill in the northwest region of Brentwood. Groundwater in the project region is typically shallow, with depths of approximately 10-30 feet below ground surface (The Planning Center 1993). The beneficial uses of the underlying groundwater are municipal, domestic, industrial, and agricultural supply.

The principal source of domestic drinking water for Brentwood is from groundwater, although the City has recently implemented an interim surface water supply pipeline connection using water leased from the Contra Costa Water District. The City is also pursuing long-term options for surface water supply.

Agricultural water is provided by East Contra Costa Irrigation District (ECCID) through an extensive channel system. The source of irrigation water is Indian Slough. Local use of groundwater for domestic drinking water is extensive; therefore, maintaining and protecting groundwater quality is an important consideration for City planning and alternatives analysis.

The water quality of local wells that the City uses for municipal supply is variable depending on the well used. The principal wells used have moderately elevated levels of mineral hardness (280-580 mg/l as CaCO₃) and associated total dissolved solids (630-1,090 mg/l) (The Planning Center 1993). Nitrates are typically elevated, and some wells have been removed from service as a result of nitrate levels that would exceed regulatory drinking water standards.

Because the discharge of treated effluent to on-site disposal ponds results in groundwater mounding beneath the facility, the City has installed a network of groundwater monitoring wells around the perimeter of the wastewater treatment facilities.

Impacts identified in the EIR

The Environmental Impact Report (EIR) which was prepared to assess the potential environmental effects of the proposed long-term expansion of the City's wastewater treatment facilities, with discharge to Marsh Creek, identified potential impacts, and provided discussion of mitigating factors. Excerpts from the EIR which address potential adverse water quality related impacts are summarized below, along with excerpts which discuss mitigating factors:

Impact: Discharge of conventional pollutants in treated effluent could result in degradation of water quality in Marsh Creek. This impact is considered less than significant.

Discussion: Direct discharge of treated effluent to Marsh Creek could impair ambient surface water quality by altering various characteristics or constituents, such as temperature; pH; turbidity; and levels of residual chlorine, pathogenic organisms, nutrients that are biostimulatory to aquatic algae and submerged vegetation, and potentially toxic substances such as un-ionized ammonia. Increases or changes in the level of these constituents in the proposed WWTP discharge could degrade water quality and reduce the quality of habitat for aquatic organisms.

The treatment facilities would be designed to meet relevant restrictions for effluent and receiving water discharge imposed by the RWQCB under a new NPDES permit. The WWTP would have sufficient treatment facilities and capacity to meet the discharge limits established as a performance criterion and would be required to meet any new or revised standards that may be established in the future. The proposed WWTP would be designed to EPA Class I reliability standards, and specifically would be designed to meet the anticipated NPDES permit limits listed in Table 3A-4. The City would implement monitoring procedures for influent, effluent, and receiving water quality according to provisions of the NPDES permit.

Temperature. Thermal conditions in Marsh Creek may either increase or decrease downstream of the discharge compared to background levels. October and November are the most critical periods because creek flows are low and stream temperatures are lower due to the onset of fall weather. However, the effluent would generally be warmer than the stream, and the anticipated NPDES permit limit of a temperature increase of less than 5°F could be violated.

Based on limited temperature data collected in the creek and for the discharge, it is anticipated the discharge will not exceed the NPDES receiving water temperature limits. In the future, if temperature becomes an issue, the effluent could be routed through emergency storage ponds or a beneficial-use wetland to decrease temperature. This potential impact is considered less than significant. pH. During low-flow periods in Marsh Creek, the effluent discharge could alter the normal ambient pH of the receiving water more than 0.5 units, which is the anticipated future NPDES permit limit. The City's current NPDES permit noted that recorded pH levels in the receiving water typically improved between the upstream and downstream monitoring points indicating that the discharge may enhance the quality of the receiving water with respect to pH.

The effluent pH from the proposed wastewater treatment facilities is expected to remain between 6.5 and 7.1 as a result of the nitrification process. In the future, if pH alteration in the stream becomes an issue pH adjustment facilities could be added at the WWTP. Therefore, there will be no significant impact on the receiving water pH from the discharge.

Turbidity, BOD, Total Suspended Solids, and Total Coliform Bacteria. The proposed WWTP design would produce an effluent with turbidity of less than 2 NTU and BOD and total suspended solids of less than 10 mg/l. The effluent would be disinfected to reduce pathogenic organisms to comply with limits set in the NPDES permit. The method of disinfection would be the use of ultraviolet light or sodium hypochlorite for chlorination followed by sodium bisulfate for dechlorination. Discharges of residual chlorine from the use of sodium hypochlorite could be toxic to aquatic organisms, and pathogenic bacteria could impair beneficial uses of the receiving water for contact-based recreation. The potential for adverse effects would be avoided because the proposed WWTP would include facilities to fully dechlorinate the effluent, so that no residual chlorine would be discharged to the creek. The disinfection facilities will be provided with continuous monitoring to ensure a zero chlorine residual.

Ammonia Toxicity. Contributions to Marsh Creek of un-ionized ammonia, a highly toxic nitrogen compound, could be directly toxic to sensitive fish species. Concentrations of un-ionized ammonia in the receiving water are determined primarily on effluent ammonia levels and pH levels of the effluent and creek; the fraction of ammonia that is un-ionized increases as pH values rise. Ammonia will be maintained at low levels (e.g., 1 mg/l) in the effluent because the proposed WWTP will be designed and operated to provide complete oxidation of nitrogen compounds (i.e., nitrification) to nontoxic forms such as nitrates and organic nitrogen. The operation of the WWTP and the quality of the resulting effluent would be monitored routinely to control the nitrification process and prevent increases in un-ionized ammonia.

Biostimulatory Nutrients. Effluent discharges of nitrogen and phosphorus compounds may stimulate additional growth of aquatic algae and submergent vegetation in Marsh Creek. The potential for nuisance growth conditions is directly related to the residence time of the water and ability for photosynthetic organisms to absorb the nutrients and be converted to plant biomass. However, the relatively short segment of stream downstream of the WWTP (3.6 miles) would result in a short time of travel for the discharge before mixing with waters of Dutch Slough and Big Break in the Delta. Assuming a conservative condition of slow streamflow (< 0.5 foot per second), the travel time would be approximately 11 hours, and thereby have a small potential for stimulating nuisance growth.

Biostimulatory effects in Dutch Slough and the Big Break would also be negligible because the total load of nutrients from the proposed WWTP effluent would be small relative to the large volume of water where mixing would occur. In addition, the daily tidal exchange of water in the Delta would contribute to rapid mixing of constituents, thereby reducing the potential for biostimulation of algae.

Because the City would implement the design and operational requirements for treatment facilities described above, this impact is considered less than significant.

NOTE: The City has designed the new treatment facility with both nitrification and denitrification processes, which will significantly reduce the potential for biostimulation from the treatment plant effluent.

Impact: Reductions in dissolved oxygen levels and increases in electrical conductivity could result in minor reductions in water quality of Marsh Creek. This impact is considered less than significant.

Discussion: *Direct discharge of treated effluent to Marsh Creek could reduce levels of ambient DO and increase EC. Such changes can degrade the quality of habitat and adversely affect aquatic organisms. DO concentrations above 5.0 mg/l are considered the minimum level for maintaining the quality of habitat for desirable species of fish and aquatic invertebrates. Increases in EC, if sufficient in magnitude, can cause corresponding changes in the types of aquatic vegetation and organisms present in a water body (e.g., from freshwater to brackish water forms).*

Dissolved Oxygen. *Assumptions used for the DO analysis included zero background streamflow and a high-average summer water temperature of 24°C and winter temperature of 12°C. Initial effluent DO values were set to equal the historical 1991-1997 creek DO for the summer (7.74 mg/l) and winter (8.88 mg/l) periods, assuming that the effluent would be aerated with a cascade aerator system. Initial DO deficits were then calculated from assumed effluent DO and stream temperature. The analysis indicated that DO would reach a minimum in the reach of stream approximately 2-3 miles below the discharge point but would remain above 5.0 mg/l, which is the established water quality objective in the Basin Plan and NPDES permit for the existing WWTP. The cascade aerator would be operated as needed to ensure that the effluent contains a minimum DO of 5 mg/l. Therefore, potential impacts associated with DO would be less than significant.*

NOTE: The parameters used for the analysis have been revised to reflect worst case conditions in Marsh Creek. An effluent DO limit of 5.5 mg/l is included in this permit. Further discussion of the DO limit is provided later in the Fact Sheet.

Electrical Conductivity. *Effects of the proposed discharge on EC were evaluated with conservative assumptions of summer low-flow conditions and estimated values of future EC levels in the effluent. The historical EC level in Marsh Creek indicates no trend of increasing values. Therefore, the summer period (May through October) average EC from 1996 and 1997 monitoring data of 885 µmhos/cm was assumed to be similar and representative of background EC levels under future conditions. It is expected that future EC levels in the influent to the WWTP will be considerably lower than current conditions because the City will be increasing their use of surface water supplies that have lower EC levels than the groundwater currently used. The source of this future surface water is anticipated to come from the Delta. Based on information obtained from Contra Costa Water District's 1997 Annual Water Quality Report, the total dissolved solids of raw water taken from the Delta ranged from 170 to 389 mg/l with an average of 267 mg/l, which equates to an approximate average EC of 411 µmhos/cm. The EC in the surface water is considerably lower than the levels in groundwater (770 µmhos/cm) currently being used by Brentwood. The projected annual use of surface water in the future is 22,800 acre-feet and well water will constitute approximately 3,800 acre-feet of the supply. Therefore, the EC of the future water supply was estimated from the City's projected ratio of use between surface and well water and the existing EC levels in the two water sources. Projected future EC in the influent and effluent for the proposed WWTP was then calculated by multiplying the source water EC by a coefficient to account for the increase in EC that occurs as water is used for domestic consumption. Domestic use generally increases the EC levels due to the introduction of wastes. The existing consumptive use factor of approximately 1.37 was calculated from existing well water and WWTP effluent EC values and then applied to the future source water EC to derive a future average effluent EC of 705 µmhos/cm.*

Impact: Discharge of priority pollutants in treated effluent could result in degradation of water quality in Marsh Creek. This impact is considered significant.

Discussion: The discharge of treated effluent to Marsh Creek could contribute to the creek priority pollutants, such as trace metals and organic compounds, that could be toxic to aquatic organisms. Because project compliance with proposed pollutant criteria is uncertain, this impact is considered significant. Implementation of the source control program and design and operation of treatment processes, described below, would reduce this impact to a less-than-significant level.

Mitigation Measure A-1: Design and operate the WWTP to meet NPDES permit limits for priority pollutants. The WWTP shall be designed to meet NPDES permit limits for priority pollutants imposed by the RWQCB. When and if the California Toxics Rule is adopted and appropriate permit limits are included in the NPDES permit, the WWTP effluent shall also be treated as required to comply with applicable numeric criteria for priority pollutants. Treatment processes would be implemented and operated accordingly to help ensure compliance with NPDES permit limits. The WWTP operator would monitor performance of the treatment system to optimize and enhance processes that increase removal efficiency for trace metals and organic compounds

Mitigation Measure A-2: Implement source control program. The City would implement a source control program to reduce concentrations of these pollutants in WWTP influent, in consultation with the RWQCB. Source control would target pollutants that are present at levels that exceed the discharge limits and commercial and industrial facilities that are known to have discharges containing the pollutants in question.

Reasonable Potential Analysis/ Development of Effluent Limitations

Federal regulations, 40 CFR Part 122.44 (d)(1)(i), require that NPDES permit effluent limitations must control all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above any State water quality standard, including any narrative criteria for water quality. Beneficial uses, together with their corresponding water quality objectives, can be defined per federal regulations as water quality standards.

The Porter Cologne Water Quality Control Act defines water quality objectives as "...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area". Water quality objectives designed to protect beneficial uses and prevent nuisances are found in the Basin Plan, and may be stated in either numerical or narrative form.

Additionally, Section 304(a)(1) of the Clean Water Act requires EPA to develop and publish, and from time to time revise, criteria for water quality accurately reflecting the latest scientific knowledge. Water quality criteria developed under Section 304(a) are based solely on data and scientific judgments on the relationship between pollutant concentrations and environmental and human health effects. Section 304(a) criteria do not reflect consideration of economic impacts or the technological feasibility of meeting the chemical concentrations in ambient water. Section 304(a) criteria provide guidance to States in adopting water quality standards that ultimately provide a basis for controlling discharges or releases of pollutants. Staff has used EPA's ambient water quality criteria as a means of deriving

numeric limitations to protect receiving waters from toxicity as required in the Basin Plan's narrative standard prohibiting the discharge of toxic constituents in toxic amounts. EPA developed the ambient criteria to protect aquatic life at considerable time and expense under public and scientific review.

In determining whether a discharge has the reasonable potential to contribute to an in-stream excursion, the dilution of the effluent in the receiving water may be considered where areas of dilution are defined.

The available dilution may also be used to calculate protective effluent limitations by applying water quality criteria at the edge of the defined mixing zone. These calculations include receiving water pollutant concentrations which are typically based on worst-case conditions for flow and concentration. U.S. EPA recommends that permit limitations be based on the lowest observed flow over a 10-year period. If limited or no dilution is available, the effluent limitations are set equal to the applicable water quality criteria which are applied at the end-of-pipe so the discharge will not cause the receiving stream to exceed water quality objectives established to protect the beneficial uses.

Since the worst case condition has no dilution at the point of discharge, dilution was not considered in determining reasonable potential, and effluent limitations have been established in the proposed permit as applicable water quality criteria 'end-of-pipe' limits.

Coliform Bacteria

WDRs Order No. 96-039 required that the effluent total coliform meet a monthly median and daily maximum of 23 MPN/100 ml (most probable number per 100 millimeters) and 500 MPN/100 ml, respectively. Because the percolation of treated effluent into the ground effectively filters out these constituents as it passes through the soil substrate, the City has consistently met these permit limits. High levels of total coliform bacteria (e.g., more than 1,600 MPN/100 ml) have been routinely identified in Marsh Creek upstream of the WWTP discharge.

The beneficial uses of Marsh Creek include municipal and domestic water supply (MUN), and contact recreation (REC-1). The ephemeral nature of the Creek indicate that little or no flow may be present for dilution of effluent. Because of these low flow conditions, and to adequately protect the beneficial uses of Marsh Creek, the wastewater must be disinfected and adequately treated to prevent the spread of diseases associated with wastewater pathogens.

The Basin Plan prescribes a receiving stream 30-day geometric mean fecal coliform standard to protect contact recreational uses of 200 MPN/100 ml. Fecal coliform organisms are shed by warm-blooded animals, such as cattle, beaver and ducks, as well as humans. The Basin Plan coliform standard is for natural stream systems not containing wastewater discharges with human pathogens and is not directly applicable as disinfection standards to municipal wastewater.

The degree of treatment and disinfection depends on the available dilution and uses of the water. Disinfection and treatment standards applicable to a discharge are based on site specific evaluation, in consultation with State and local health departments. The California Department of Health Services (DHS) has developed reclamation criteria, California Code of Regulations, Title 22, for the reuse of wastewater. Title 22 requires that for spray irrigation of food crops, parks, playgrounds, school yards and other areas of similar public access, that wastewater be adequately disinfected, oxidized, coagulated, clarified and filtered and that the effluent total coliform levels not exceed 2.2 MPN/100 ml as a 7-day median. To protect the beneficial use of contact recreation in a receiving stream with less

than twenty to one dilution, and where most of the following conditions exist: (1) The discharge occurs in a residential area; (2) The discharge occurs in an area where there is ready access to the stream and exclusion of the public is not realistic; (3) There have been no historical attempts to post the stream to exclude the public, however, such attempts would likely be unsuccessful, since the stream is used by the public for recreational purposes; (4) The recreation potential, and current use, in the stream is high and justified; and (5) Public interest has been identified and the resident population wants or expects body contact recreation, DHS recommends the wastewater be oxidized, coagulated and filtered and the effluent be disinfected such that the median MPN of coliform organisms does not exceed 2.2MPN/100 ml.

DHS recommends that in the cases where treated wastewater discharges to agricultural drains and creeks identified to have beneficial uses that include contact recreation and food crop irrigation, and the receiving stream provides less than 20:1 dilution, then the wastewater should be oxidized, coagulated, filtered, and the effluent and the effluent disinfected such that the median MPN of coliform organisms does not exceed 2.2 MPN/100 ml.

The conditions discussed above exist in Marsh Creek and the reclamation criteria are appropriate to apply since contact recreation in Marsh Creek would result in similar or greater exposure than the activities specifically included in the Title 22 regulations. The method of treatment is not prescribed by the Order, however, the new WWTP will include tertiary treatment processes required to meet the level of treatment specified in DHS regulations and recommendations for protection of beneficial uses, including contact recreation, in Marsh Creek. The existing treatment system, and subsequent effluent discharge from outfall 002, does not provide treatment consistent with reclamation criteria in Title 22, and may be unable to consistently reduce total coliform in the final effluent to the 2.2 MPN/100ml limit.

Chlorine

The existing WWTP and groundwater extraction system does not incorporate disinfection processes, however, the new facilities will include chlorine and dechlorination as part of the disinfection process. The disinfection process will use liquid hypochlorite, and the post-disinfection dechlorination process will use liquid bi-sulfite. The Basin Plan does not provide a numeric water quality objective for chlorine. However, the U.S. EPA has developed recommended ambient water quality criteria for chlorine to protect freshwater aquatic organisms. These criteria are used to implement the narrative toxicity objective of the Basin Plan. EPA's ambient water quality criteria for protection of aquatic life are 11 µg/l as a 4-day average (chronic) concentration, and 19 µg/l as a 1-hour average (acute) concentration for total residual chlorine. As a result, this permit requires continuous monitoring of chlorine residual concentrations and the permit contains effluent discharge limitations for total residual chlorine of 0.011 mg/l as a weekly average, and 0.019 mg/l as a one-hour average, based on the ambient criteria to protect aquatic life. The one-hour average limitation, rather than an instantaneous or daily maximum, will allow for continuous monitoring anomalies while protecting aquatic organisms against toxicity. Monitoring is only required when chlorine is used at the plant or in the collection system.

Temperature

The Basin Plan states that: "At no time shall the temperature of...WARM intrastate waters be increased more than 5°F above natural receiving water temperature". This Order contains receiving water limitations inclusive of the Basin Plan objectives. Based upon information supplied by the City with the

RWD, the 003 effluent discharge from the yet-to-be constructed WWTP may have the potential to violate temperature objectives and receiving water limitations under various hydraulic and climatic conditions. As required by this Order, the City shall develop a workplan, and conduct a study to evaluate facility alternatives which mitigate thermal impacts of the discharge, and achieve compliance with receiving water limitations.

pH

The Basin Plan provides that the pH (of surface waters) shall not be depressed below 6.5 nor raised above 8.5. The Basin Plan further provides that changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated WARM beneficial uses. Monitoring reports submitted by the City indicate that the effluent has the potential to be depressed below 6.5. Frequent low flow conditions in Marsh Creek also suggest the potential exists for changes in pH of the receiving water, between up and downgradient locations from the discharge, to be greater than 0.5 pH units. Current scientific information indicates aquatic life is not adversely impacted by receiving water pH changes greater than 0.5 pH units, as long as the receiving water remains in the range of 6.5 to 8.5. Therefore, a 30-day averaging period was established for the 0.5 pH unit change standard. This Order includes effluent and receiving water limits for pH.

Ammonia

In natural waters ammonia exists in two forms, un-ionized ammonia (NH_3), and the ammonium ion (NH_4), with equilibrium controlled by temperature and pH. The EPA has established freshwater aquatic life criteria for ammonia in the *1999 Update of Ambient Water Quality Criteria for Ammonia*. The criterion establishes ammonia limit for both chronic and acute exposure limits. The acute criteria, referred to as Criteria Maximum Concentration (CMC), is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable risk. The allowable CMC varies with pH and whether a specific fish species (salmonids) are present in the receiving water. The chronic criteria, referred to as the Criterion Continuous Concentration (CCC), is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. The allowable CCC is a function of pH and temperature. Both the CMC and CCC for ammonia are expressed in milligrams ammonia nitrogen per liter (mg N/l), as shown in Attachments F and G.

The City of Brentwood has not historically been required to monitor the plant effluent for ammonia, or temperature. However, bioassays have been part of the monitoring requirements for the facility. Bioassays provide a qualitative measure of effluent toxicity, which would provide an indicator if chronic levels of ammonia were present in the effluent. The bioassay limitations for facility are for survival of aquatic organisms in a 96-hour bioassay of undiluted effluent from 002. The minimum survival requirement for one bioassay is 70% and the average of three consecutive bioassay tests is 90%. The results the bioassay test, provided in the Discharge Monitoring Reports, showed that the facility has achieved 90% survival or greater from February 1997 through August 1999. This implies that the level of toxicity for ammonia has consistently been below the acute level in the effluent. This test does not provide sufficient information relative to the chronic levels of ammonia to determine if the CCC has been violated.

The proposed WWTP will be designed and operated to provide complete nitrification and partial denitrification as part of the treatment plant process, which will significantly reduce the potential for ammonia in the effluent from the facility. However, federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above a narrative or numerical water quality standard. Until sufficient monitoring data is collected, the likely presence of ammonia in the discharge presents a reasonable potential to cause exceedance of U.S. EPA's 1999 update of ambient water quality criteria for the protection of fresh water aquatic life.

An effluent limitation for ammonia has been included in this Order. Effluent limitations for ammonia are based on *EPA's 1999 Update of Ambient Water Quality Criteria for Ammonia*. In accordance with this criterion, the CMC and CCC limits are variable with temperature, pH, and if salmonids are present in the receiving water. In the case of Marsh Creek, which is tributary to the Sacramento-San Joaquin Delta, the Basin Plan states that salmonids (specifically Chinook Salmon) are present. The effluent limits for ammonia for this facility are presented in Attachments F and G. Compliance with these limits will require recording of temperature and pH at the time that the samples are collected for ammonia.

Nitrates

The Basin Plan does not include a numeric objective for nitrates. However, the EPA has established a primary Maximum Contaminant Level (MCL) for nitrates, as nitrogen (N) of 10 mg/l, 45 mg/l as NO₃. Additionally, EPA's ambient water quality criteria for nitrates, protective of human health for consumption of water and organisms, is expressed also as a concentration of 10 mg/l (as N).

Effluent discharged to Marsh Creek currently consists of commingled wastewater and groundwater. Monitoring reports and supplemental information submitted by the City with the permit application indicate nitrate concentrations up to 28 mg/l (as NO₃) in the final effluent at discharge location 002. A thirty-day average concentration effluent limit of 10 mg/l for nitrates (as N), 45 mg/l as NO₃, has been included in this Order. At this time, the City may be unable to meet this effluent limit for nitrates. To comply with this limit, the new treatment plant is being designed with both full nitrification and partial de-nitrification capabilities, which will enable the facility to meet the prescribed effluent limit for nitrates. Additionally, the new facility will discharge to Marsh Creek via a new outfall 003 which will discharge directly to the creek. This will eliminate the potential for any concentration of nitrates contributing to the discharge, which may contribute to the nitrate concentration in the existing point of discharge 002.

Given the prior order did not establish a nitrate limit for the discharge to Marsh Creek, a time schedule for compliance is included in Provision H.2 of this Order. The nitrate limit will become effective commensurate with the operation of the new treatment plant, which is planned for July 2002 and will be fully operational in September 2002.

Effluent Limit for Biochemical Oxygen Demand (BOD) and Dissolved Oxygen (DO)

An effluent limitation for BOD is included in the permit for the discharge points 001, 002, and 003. BOD is a measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. Since BOD continues to affect the DO concentrations within the receiving water, and since Marsh Creek has been had incidences where the DO has fallen below 5.0 mg/l, the final

effluent or the effluent has or may have the potential to cause the waters of Marsh Creek to violate the Basin Plan's water quality objective for dissolved oxygen.

To determine the allowable DO sag in Marsh Creek and associated BOD, an analysis using the DO sag (Streeter-Phelps) equation was performed. The Streeter Phelps Equation is show below.

$$D_{(x)} = (D_o) e^{-K_a(x/u)} + \frac{K_d \cdot L_o}{K_a \cdot K_r} (e^{-K_r(x/u)} - e^{-K_a(x/u)})$$

where,

$D_{(x)}$ = dissolved oxygen deficit at a certain distance "x" (mg/l)

D_o = initial dissolved oxygen deficit (mg/l)

K_a = re-aeration coefficient (1/day)¹

K_d = deoxygenation coefficient (1/day)¹

K_r = river decay coefficient (1/day)¹

L_o = ultimate BOD of mixed river and waste discharge (mg/l)²

x = distance downstream from discharge (miles)

u = velocity of river (miles/day)

¹ Temperature correct of coefficients is required for K_a , K_d , and K_r .

² Ultimate BOD = (CBOD₅ (initial mixed river conditions) / 0.68) + NBOD

Using this formula requires using values for the variables K_a , K_d , and K_r . In using this equation, conservative values were used since variables specific to Marsh Creek and the treatment plant effluent were not available. Additionally, a DO of 4.3 mg/l was used as the stream DO, which is the lowest recorded DO upstream of the treatment plant discharge. BOD of the Marsh Creek upstream of the treatment plant discharge was assumed to be 3 mg/l.

The analysis showed that at a treatment plant discharge flow of 5.0 mgd, the daily maximum effluent BOD of 15 mg/l with a DO of 5.50 mg/l results in a critical DO of the combined stream flow and treatment plant effluent of 5.33 mg/l. This value is above the 5.0 mg/l required by the Basin Plan, and given that the conditions that were analyzed for are a worst case scenario, the discharge limits of 15 mg/l with a DO of 5.5 mg/l should sustain adequate DO in Marsh Creek. To calculate the average monthly limit, the methodology provided in the EPA technical Support Document for Water Quality Based Toxics Control was used. Based upon a sampling frequency of 4 samples per month, the average monthly limit for BOD is 7.0 mg/l.

The prior order established monthly average and daily maximum limits for BOD of 5mg/l and 20 mg/l, respectively. The limit established for the prior order is not reflective of a direct discharge to Marsh Creek. The monthly limit is based on the past performance of the existing facility and that the discharge is commingled treated effluent and groundwater. The Discharge Monitoring Reports from September 1997 through November 1999, the long term average BOD of the commingled effluent and groundwater is 5.0 mg/l. In addition, the BOD limit in the existing Order was not a water quality based limit (that is, it was not developed based upon receiving water studies), it was a technology-based limit based on performance of the existing treatment system.

The new treatment facility will materially and substantially change the treatment process of the existing facility. This facility will provide advanced tertiary treatment, which will produce a higher level of direct treatment, and a higher overall quality effluent from the facility. Analysis of the receiving water for allowable monthly average concentration for BOD from the treatment plant discharge was determined to be 7.0 mg/l. This limit is protective of the beneficial uses of Marsh Creek. Based upon these findings, increasing the average monthly concentration of BOD from 5.0 mg/l to 7.0 mg/l is allowable in accordance anti-backsliding exception provisions in 40 CFR 122.44(l).

Based on the analysis of the receiving water, as stated above, **BOD** receiving water limits of 7.0 mg/l (monthly average) and 15 mg/l (daily maximum) are protective of the beneficial uses of Marsh Creek. To confirm that the BOD and DO limits established by this permit are appropriate for this discharge, the Discharger shall develop a work plan and conduct a two part study to determine the effects of the treatment plant discharge to Marsh Creek. The study will consist of collecting seasonal BOD, DO, and flow data in the receiving water and from the treatment plant. The results of this study will be used to confirm the analysis used to establish the BOD and DO limit prescribed in this permit. The first phase of this study will be performed prior to the construction of the treatment facility, and the second will be performed after the new treatment plant is operational and discharging to Marsh Creek.

Salinity/Total Dissolved Solids/ Electrical Conductivity

The City of Brentwood's domestic water supply is primarily from groundwater wells. The City's groundwater wells have concentrations of total dissolved solids (TDS) ranging from 630 to 1090 mg/l. When TDS (dissolved salts) pass through human organisms the salts become concentrated approximately by two times. The resulting waste stream for the City of Brentwood's water supply would have TDS in the range of 1260 to 2180 mg/l. These values are consistent with the influent TDS at the wastewater treatment plant.

There are several terms that are frequently used to discuss dissolved salts. Salinity, total dissolved solids (TDS), and electrical conductivity (EC) are measures of dissolved salts in water. Salinity is a measure of the mass fraction of salts (measured in parts per thousand), whereas TDS is a measure of the concentration of salts (measured in mg/l). Since the electrical conductivity (measured in $\mu\text{mhos/cm}$) of water generally changes proportionately to changes in dissolved salt concentrations, EC is a convenient surrogate measure for TDS.

For municipal and domestic supply beneficial uses, federal and state promulgated maximum contaminant levels (MCL's) are appropriate minimum water quality objectives. The CA Department of Health Services has established a Secondary maximum contaminant level (MCL) for EC ranging from 900 to 1,600 $\mu\text{mhos/cm}$.

In accordance with Provision E.5. of the prior Order, the City conducted a study to evaluate the electrical conductivity (EC) characteristics of both the WWTP effluent and Marsh Creek. A report entitled *Technical Report on Dissolved Oxygen and Electrical Conductivity in Marsh Creek* was completed in February 1997. The report concluded that there are significant seasonal and wet weather variations in the EC levels in Marsh Creek due to urban runoff and agricultural drainage. The report also demonstrated that the disposal pond EC does not vary significantly from the 002 discharge EC. The EC

and TDS for the disposal ponds are 2200 $\mu\text{mhos/cm}$ and 1300 mg/l, respectively. The measured TDS in the disposal ponds is consistent the anticipated range for the level of TDS in the drinking water supply.

Dissolved solids are not readily amenable to cost effective treatment. Source control measures, consisting of public education programs, development of local ordinances, and transition to an alternative water source with lower TDS are considered preferred alternatives to waste stream treatment.

The City has contracted with Contra Costa Water District (CCWD) to supply treated surface water to augment the existing water supply and reduce the TDS of the water supply. As domestic water demands increase, the use of the CCWD water will increase. The projected future water usage for Brentwood is 14,800 acre-feet of surface water and approximately 6,100 acre-feet of groundwater. The primary source of water will be surface water in the future with the wells being used to accommodate periods of maximum demand. The typical value of TDS from treated water from CCWD is from 120-388 mg/l. Over time, as the use of the CCWD supply increases, the TDS concentration of the combined groundwater and surface water will decrease, which in turn will decrease the TDS of the of the wastewater. This long-term corrective action will reduce the concentration of the TDS in the wastewater effluent.

The new treatment plant will be a tertiary treatment process, which will utilize the treated effluent for reclamation. During the irrigation season, normally April through October, it is anticipated that a large percentage of the treated effluent will be used for irrigation, which in turn reduces the net discharge to Marsh Creek. Over time, as the reclaimed water system is expanded the use of the reclaimed water will increase. Since the primary use of the effluent will occur during low flow conditions in Marsh Creek, the mass loading to the receiving water should be reduced during a large portion of the year.

To insure that the City is implementing source control measures, a *Salinity Source Control Study and Implementation Plan* is required by this Order. A work plan for the study will be required for this study and shall include, but is not limited to; wastewater quality objectives, methods and time schedule for TDS reduction, source control measures, effluent monitoring, and receiving water monitoring requirements to validate that the salinity source control measures are effective.

Trace Metals

Marsh Creek has been identified as a Water Quality Limited Segment, and is listed on the California CWA Section 303(d) List for mercury and metals. Waste rock and tailings from the Mount Diablo Mercury Mine near Clayton, which is upstream of the Marsh Creek reservoir, has been identified in several studies as a primary source of mercury discharged to Marsh Creek. Abandoned mine workings in Mount Diablo State Park have also been identified as contributing mercury to Marsh Creek.

The Board plans to adopt Total Maximum Daily Loads (TMDLs) for mercury in the Marsh Creek watershed by December 2011. When the TMDL is complete, the Board will adopt appropriate water quality based concentration and mass loading effluent limits for the discharge. Until the TMDL is completed and water quality based effluent limits are prescribed, an interim, performance based, mass loading limit will be prescribed.

The term metals, as identified on the 303 (d) List for Marsh Creek, is not specifically defined which metals were identified to cause the water body to be impaired. In the next update of the 303(d) List, which will occur in 2002, the specific metals that cause the impairment will be identified. Until these elements are defined, water quality based effluent limits will be established for trace metals that are identified in the treatment plant effluent, and if there reasonable potential to exceed the water quality based criteria.

This Order establishes water quality based effluent limits for specific metals based upon a reasonable potential analysis. These metals include aluminum, lead, and thallium. For lead, recommended EPA ambient water quality criteria are hardness dependent, and freshwater criteria are expressed as a function of hardness (mg/l) in the water column. The hardness of the existing 002 effluent discharge typically exceeds 300 mg/l as CaCO₃. The hardness of the effluent will likely be altered with change in source water, and as a byproduct of tertiary treatment processes, including coagulation, and filtration.

Marsh Creek is an ephemeral stream, and for purposes of determining assimilative capacity, no credit for receiving water dilution is available. However, there are also extended periods of low flows sustained by releases from Marsh Creek reservoir. From data provided by the City, the low flow hardness of Marsh Creek is approximately 150 mg/l. In consideration of these site specific conditions, and for purposes of determining the reasonable potential of trace metals causing toxicity in the receiving water, a conservative hardness of 150 mg/l as CaCO₃ was used in identifying water quality objectives for trace metals concentrations.

Aluminum

The Basin Plan does not provide a numeric water quality objective for aluminum. However, Federal regulations require that NPDES permit effluent limitations control all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above any State water quality standard, including any narrative criteria for water quality. Staff has used EPA's ambient water quality criteria as a means of deriving numeric limitations to protect receiving waters from toxicity as required in the Basin Plan's narrative standard prohibiting the discharge of toxic constituents in toxic amounts. The U.S. EPA has recommended, as a freshwater ambient water quality criteria for aluminum, a chronic, criterion continuous concentration (CCC) of 87 µg/l expressed in terms of total recoverable metal in the water column. In support of the July 1999 Report of Waste Discharge, the City collected samples for measurement of total and dissolved metals, including aluminum, from the current oxidation ditch under typical dry weather conditions. From this sampling effort, the total concentration for aluminum was reported as 92.4 µg/l. While it is likely that the proposed tertiary treatment processes will reduce metals concentrations in the final effluent, results of this limited sampling effort indicate that the discharge has the reasonable potential to exceed the EPA chronic criteria for aluminum, and a thirty-day average concentration effluent limit of 87 µg/l for aluminum has been included in this Order.

Arsenic

The Basin Plan objective for arsenic, in the Sacramento-San Joaquin Delta is 10 µg/l, measured as a dissolved concentration. Additionally, staff has used EPA's ambient water quality criteria as a means of deriving numeric limitations to protect receiving waters from toxicity as required in the Basin Plan's

narrative standard prohibiting the discharge of toxic constituents in toxic amounts. U.S. EPA's ambient water quality criteria for arsenic, protective of human health for consumption of water and organisms, is expressed as a dissolved concentration of $0.018 \mu\text{g/l}$. This criterion is based upon a carcinogenicity risk of 1×10^{-6} , and refers to the inorganic form of arsenic only. In support of the July 1999 Report of Waste Discharge, the City collected samples for measurement of total and dissolved metals, including arsenic, from the current oxidation ditch under typical dry weather conditions. From this sampling effort, the dissolved concentration for arsenic was reported as $1.11 \mu\text{g/l}$. Although the waters of Marsh Creek are potentially suitable for municipal and domestic use, the existence of seasonal dilution, and lack of an established downgradient domestic supply intake, does not support use of the exposure model used in deriving the $0.018 \mu\text{g/l}$ arsenic criterion. An effluent limit for arsenic has not been included in this Order. If these conditions change, this Order may be reopened to include effluent limits for arsenic.

Lead

The Basin Plan does not include a numeric objective for lead. However, the CTR establishes ambient water quality criteria for priority toxic pollutants, including lead, in the State of California. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have reasonable potential to cause, or contribute to an in-stream excursion above the CTR standard. For lead, recommended EPA ambient water quality criteria are hardness dependent, and freshwater criteria are expressed as a function of hardness (mg/l) in the water column. The hardness of the existing 002 effluent discharge typically exceeds 300 mg/l as CaCO_3 . The hardness of the effluent will likely be altered with change in source water, and as a byproduct of tertiary treatment processes, including coagulation, and filtration. These changes will be beneficial to the achievement of salinity objectives, but may also result in increased metals related toxicity. At a water hardness of 150 mg/l , the U.S. EPA has recommended as a freshwater ambient water quality criteria for lead, a chronic, criterion continuous concentration (CCC) of $3.9 \mu\text{g/l}$ expressed in terms of a four-day average dissolved concentration. This criterion was originally developed using metals concentrations expressed as total recoverable metals. Since the dissolved fraction of metals more closely approximates the biologically available fraction, conversion factors were used to predict how different the criteria would be if they had been based on measurement of the dissolved concentrations in all of the toxicity tests. Conversion Factors (CF) have the effect of reducing water quality criteria concentrations. For lead, the conversion factor for both the acute and chronic criteria is hardness dependent, and is expressed as: $\text{CF} = 1.46203 - [\ln(\text{hardness})(0.145712)]$. For a hardness of 150 mg/l , the $\text{CF} = 0.732$.

40 CFR 122.45(c) requires that permit limits be expressed as total recoverable metal. A conservative assumption is that the metal concentration in the receiving water is biologically available to the same extent as during the toxicity testing which established the criteria. Therefore, the water quality criteria, expressed as dissolved metal, has been divided by the conversion factor for purposes of comparing with analytical results (for total recoverable metals) and for establishing an effluent limitation.

In 1996 and 1997 the City conducted an *Effluent and Receiving Water Quality Assessment*, which included monthly collection of samples for measurement of total metals concentrations, including lead. From the January 1997 round of sampling, a total lead concentration of $20 \mu\text{g/l}$ was reported by the City, and in August 1997, a total lead concentration of $68 \mu\text{g/l}$ was reported. Results of sampling demonstrate that the total recoverable concentration of lead in the effluent has exceeded the converted chronic

criteria for protection of aquatic life in 2 of 13 samples. A chronic, thirty day average effluent limitation of 5.3 µg/l for lead has been included in this Order based on the converted dissolved chronic criteria (3.9 µg/l / 0.732).

Thallium

The Basin Plan does not include a numeric objective for thallium. However, U.S. EPA provides criteria in 40 CFR 131.36 which apply to specific States' designated uses, and which supersede any criteria adopted by the State (except when State regulations contain criteria which are more stringent for a particular use). For waters of the State defined as inland (i.e. all surface waters of the State not bays or estuaries or ocean) that include a MUN use designation, 40 CFR 131.36 has assigned criteria for specific pollutants, including thallium. The criteria provided for thallium, protective of human health for consumption of water and organisms, is expressed as a dissolved concentration of 1.7 µg/l.

Additionally, the CA Department of Health Services has established a Primary Maximum Contaminant Level (MCL) for thallium of 2.0 µg/l. Using a conservative conversion factor of 1.0 to translate dissolved to total metals, results of samples collected in support of the *Effluent and Receiving Water Quality Assessment* study showed 3 of the 13 samples exceeded 1.7 µg/l. Based upon the results of this study, the discharge has the reasonable potential to exceed the EPA criteria for human health through consumption of water and organisms and the MCL, and a chronic, thirty day average concentration effluent limit of 1.7 µg/l for thallium has been included in this Order to protect the potential MUN beneficial use of Marsh Creek.

Toxicity Receiving Water Limitation and Chronic Toxicity Testing

This Order updates the receiving water limit for toxicity to be consistent with the current Basin Plan. The chronic toxicity testing which must be conducted to determine whether the effluent is contributing toxicity to Marsh Creek is updated to be consistent with EPA procedures. The testing shall be conducted as specified in EPA 600/4-91-002 (or later amendment). If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the City shall submit a work plan to conduct a toxicity reduction evaluation (TRE), and upon approval conduct the TRE. This Order may be re-opened to include a chronic toxicity limitation and/or a limitation for the specific toxicant identified in the TRE.

Additional data are necessary to further evaluate whether or not the existing discharge at 002, and future discharge at 003, is contributing, or will contribute to chronic toxicity in Marsh Creek. The updated EPA monitoring procedures and analytical methods are expected to provide valuable data. Chronic toxicity is prohibited by this Order.

Pretreatment Requirements

When constructed the new wastewater treatment facility will have an average dry weather design capacity of 4.5 mgd. Prior to commencing discharge from the new treatment facility, which is anticipated to be October 2002, the City shall prepare and have in effect a pretreatment program, approved by the Executive Officer prior to commencing discharge from the new treatment facility.

FACT SHEET ORDER NO. 5-00-171
CITY OF BRENTWOOD
WASTEWATER TREATMENT PLANT
CONTRA COSTA COUNTY