

City of Morro Bay

City Council Agenda

Mission Statement

The City of Morro Bay is dedicated to the preservation and enhancement of the quality of life. The City shall be committed to this purpose and will provide a level of municipal service and safety consistent with and responsive to the needs of the public.

**REGULAR MEETING – TUESDAY, JUNE 28, 2011
VETERANS MEMORIAL HALL - 6:00 P.M.
209 SURF ST., MORRO BAY, CA**

ESTABLISH QUORUM AND CALL TO ORDER

MOMENT OF SILENCE

PLEDGE OF ALLEGIANCE

MAYOR AND COUNCILMEMBERS ANNOUNCEMENTS & PRESENTATIONS

CLOSED SESSION REPORT

PUBLIC COMMENT PERIOD - Members of the audience wishing to address the Council on City business matters (other than Public Hearing items under Section B) may do so at this time.

To increase the effectiveness of the Public Comment Period, the following rules shall be followed:

- When recognized by the Mayor, please come forward to the podium and state your name and address for the record. Comments are to be limited to three minutes.
- All remarks shall be addressed to Council, as a whole, and not to any individual member thereof.
- The Council respectfully requests that you refrain from making slanderous, profane or personal remarks against any elected official, commission and/or staff.
- Please refrain from public displays or outbursts such as unsolicited applause, comments or cheering.
- Any disruptive activities that substantially interfere with the ability of the City Council to carry out its meeting will not be permitted and offenders will be requested to leave the meeting.
- Your participation in City Council meetings is welcome and your courtesy will be appreciated.

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the City Clerk, (805) 772-6205. Notification 24 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

A. CONSENT CALENDAR

Unless an item is pulled for separate action by the City Council, the following actions are approved without discussion.

A-1 APPROVAL OF AGREEMENT BETWEEN THE MORRO BAY CHAMBER OF COMMERCE AND CITY OF MORRO BAY TO OPERATE THE VISITORS CENTER; (ADMINISTRATION)

RECOMMENDATION: Approve the Agreement between the Morro Bay Chamber of Commerce and the City of Morro Bay to operate the Visitors Center.

A-2 RESOLUTION NO. 45-11 ESTABLISHING A THREE-YEAR MORATORIUM FOR THE PAYMENT OF DEVELOPMENT IMPACT FEES FOR COMMERCIAL PROJECTS WITHIN A COMMERCIAL ZONE DISTRICT; (PUBLIC SERVICES)

RECOMMENDATION: Adopt Resolution No. 45-11.

B. PUBLIC HEARINGS, REPORTS & APPEARANCES

B-1 RESOLUTION NO. 43-11 DIRECTING THE LEVY OF THE ANNUAL ASSESSMENT FOR THE CLOISTERS LANDSCAPING AND LIGHTING MAINTENANCE ASSESSMENT DISTRICT; (RECREATION & PARKS)

RECOMMENDATION: Adopt Resolution No. 43-11.

B-2 RESOLUTION NO. 44-11 DIRECTING THE LEVY OF THE ANNUAL ASSESSMENT FOR THE NORTH POINT NATURAL AREA LANDSCAPING AND LIGHTING MAINTENANCE ASSESSMENT DISTRICT; (RECREATION & PARKS)

RECOMMENDATION: Adopt Resolution No. 44-11.

B-3 ADOPTION OF THE URBAN WATER MANAGEMENT PLAN 2010 UPDATE; (PUBLIC SERVICES)

RECOMMENDATION: Adopt Resolution No. 46-11.

C. UNFINISHED BUSINESS – NONE.

D. NEW BUSINESS

D-1 CONSIDERATION OF RESOLUTION NO. 42-11 AMENDING THE PARAMETERS FOR THE USE OF THE GENERAL FUND EMERGENCY RESERVE; (ADMINISTRATIVE SERVICES)

RECOMMENDATION: Adopt Resolution No. 42-11.

D-2 REPORT ON THE CAMBRIA VOLUNTARY COMMUNITY BUS PROGRAM; (COUNCIL)

RECOMMENDATION: Discuss the next steps for a Volunteer-run Community Bus Program.

D-3 DISCUSSION AND ADOPTION OF THE PAVEMENT MANAGEMENT PLAN; (PUBLIC SERVICES)

RECOMMENDATION: Review and adopt the Pavement Management Plan as a tool for the maintenance to the City's streets.

D-4 DISCUSSION OF IMPROVEMENTS TO THE "ROCK" PARKING LOT, LOCATED AT THE END OF COLEMAN DRIVE, MORRO BAY; (PUBLIC SERVICES)

RECOMMENDATION: Discuss the project and provide direction to staff.

E. DECLARATION OF FUTURE AGENDA ITEMS

F. ADJOURNMENT

THIS AGENDA IS SUBJECT TO AMENDMENT UP TO 72 HOURS PRIOR TO THE DATE AND TIME SET FOR THE MEETING. PLEASE REFER TO THE AGENDA POSTED AT CITY HALL FOR ANY REVISIONS OR CALL THE CLERK'S OFFICE AT 772-6200 FOR FURTHER INFORMATION.

MATERIALS RELATED TO AN ITEM ON THIS AGENDA SUBMITTED TO THE CITY COUNCIL AFTER DISTRIBUTION OF THE AGENDA PACKET ARE AVAILABLE FOR PUBLIC INSPECTION AT CITY HALL LOCATED AT 595 HARBOR STREET DURING NORMAL BUSINESS HOURS OR AT THE SCHEDULED MEETING.

MORRO BAY VISITOR CENTER AGREEMENT

FY 2011/2012

THIS AGREEMENT is made and entered into this _____ of _____ 2011, by and between the CITY OF MORRO BAY, a municipal corporation, hereinafter referred to as "CITY," and MORRO BAY CHAMBER OF COMMERCE, a non-profit corporation, hereinafter referred to as "CHAMBER."

RECITALS

WHEREAS, CITY recognizes that the need for continued development of the economic base of the community is important, and therefore, wishes to provide for a coordinated effort to encourage, promote, and foster the economic development of the community, and promote its advantages as a tourist and recreational center, and

WHEREAS, arranging, obtaining and distributing favorable coverage about the community, to be read by potential visitors to CITY, is an integral part of its promotion as a tourist and recreation center, and

WHEREAS, CHAMBER has experience, together with available facilities to provide visitor center services, necessary to enhance the economic development and vitality of the CITY; and

WHEREAS, the CITY and the CHAMBER agree that these goals can best be accomplished through the operation of a Visitor Center by CHAMBER, under the terms and conditions outlined hereinafter, making use of funds provided, pursuant to this contract, by CITY for operations of the Visitor Center.

COVENANTS

NOW, THEREFORE, in consideration of the covenants and conditions stated herein, and in consideration of the mutual benefits that will accrue to each of the parties hereto, as well as to the public good of all the citizens of Morro Bay, the parties have agreed, and do hereby agree, as follows:

1. That the foregoing recitals are true and correct, and constitute accurate statements of the facts herein.
2. The term of this agreement shall commence July 1, 2011 and terminate on September 30, 2011.

3. The maximum amount due and payable during the term of this contract is \$38,122.50. CITY shall pay said amount to CHAMBER in monthly increments of \$12,707.50, in advance, for each contract month. Such funds are to be expended only under the terms, conditions and restrictions, and for the purposes specifically set forth in this agreement.
4. The CHAMBER shall provide and perform services to facilitate the welcoming and hospitality of visitors to Morro Bay, in a manner designed to promote the unique character, heritage and special attributes of the community and enhance the economic vitality of the CITY.
5. CHAMBER shall provide qualified and competent staff in public relations, and public information shall be available, as necessary, for the successful implementation of this Agreement. CHAMBER's Executive Director shall be responsible for the day-to-day operations and management of this Agreement.
6. CHAMBER shall also maintain an office in the City of Morro Bay suitable for the conduct of a visitor information service. Said office is to be open to facilitate contact with news media representatives, and to disseminate news releases and promotions information, in a professional manner, for the various media, general public, and visitor information needs. The Visitor's Center shall operate 7 days a week, with operating hours of 9 a.m. to 5 p.m. daily.
7. CHAMBER shall conduct promotional and publicity activities and programs for the CITY and maintain an electronic events calendar on the CITY and CHAMBER website.
8. CHAMBER shall respond promptly (same business day) to high volumes of information requests including telephone calls and emails. CHAMBER shall maintain a voice mail system during closed office hours to receive messages for visitor information requests.
9. CHAMBER shall coordinate services for prospective visitor groups, to include referral to motels, rental facilities, caterers, entertainment and other services, regardless of the businesses' membership status with CHAMBER. Said referrals will be tracked and recorded. CHAMBER shall provide promotional publication materials for visitors, in a quality form acceptable to the CITY, that specify recreational opportunities, campgrounds, art galleries and other services, regardless of the businesses' membership status with CHAMBER.
10. CHAMBER shall ensure that no funds provided by CITY will be used to support traditional CHAMBER activities that generally serve and benefit only CHAMBER membership or programs. Nothing in this contract, however, shall prevent CITY from specifically funding new projects as proposed by CHAMBER.

11. CHAMBER shall cooperate in implementing CITY's Tourism Marketing Plan by cooperating in improving strategic alliances with the CITY Promotions Committee and Tourism Business Improvement District and other business organizations as designated by the CITY.
12. CHAMBER shall submit written and oral monthly reports to CITY Promotions Committee and Tourism Business Improvement District regarding visitor information and promotional activities. The reports need not be lengthy, but should be specific as to the following:
 - a) Number of visitors to the Visitors Center.
 - b) The type and quantity of materials dispensed from the Visitors Center.
 - c) Summary of telephone and email information requests received.
 - d) The type and quantity of any special materials distributed to groups.
 - e) The number of Destination Guides mailed and visitor site referrals made.
 - f) Responses to CITY Promotions Committee and Tourism Business Improvement District specials and packages.
 - g) Summary of the monthly expenditures delineating Visitor Center expenditures from Chamber of Commerce Expenditures.
 - h) Copies of invoices to support the charges.

Failure to provide such monthly reports will be considered by CITY as possible grounds for termination of this contract.

13. CHAMBER agrees to make its books and financial records concerning the funds expended under this agreement available to CITY for inspections, review and audit. CHAMBER will, at no expense to CITY, provide an annual report and accounting of expenditures of the funds covered by this agreement. The City Administrative Services Director shall work with the Chamber to perform a detailed Financial Review at the end of the fiscal year which will be presented to the Community Promotions Committee and the Tourism Business Improvement District.
14. CHAMBER agrees that all persons working for CHAMBER under this Agreement shall be employees of CHAMBER, subject to its exclusive management and control, and shall in no way be considered employees of CITY; and that any liability, which might arise under the Worker's Compensation Law of the State of California due to any injury of any employee of CHAMBER, shall be the sole liability of CHAMBER. CHAMBER shall, throughout the period of this Agreement, maintain in full force and effect, a policy of worker's compensation insurance meeting statutory limits of Labor Code covering all its employees and volunteers. Said policy shall include a waiver of subrogation against the CITY, its officers, agents, employees, and volunteers.

15. CHAMBER shall not use any monies received under this Agreement for the endorsement, opposition or participation in any political or lobbying activity involved in the support or opposition to any candidate for public office or proposed ballot measure.
16. CHAMBER agrees to indemnify, defend and hold harmless CITY, and its officers, employees, and agents, from any and all claims, suits, demands and causes of action resulting from the acts or failure to act of any agent, servant or employee of CHAMBER, or any other person pursuant to this Agreement.
17. CHAMBER agrees to include the City Manager or her designee as a voting member on the Chamber Board, the Executive Board and the Finance Committee.
18. CHAMBER shall obtain and maintain, in full force and effect during the term of the Agreement, a \$1,000,000 liability insurance policy specifically naming CITY as primary additional insured against claims and demands resulting from injuries to persons and property upon premises maintained by CHAMBER, during CHAMBER-sponsored activities and events, wherever situated. Said insurance policy shall provide for thirty (30) day notice of cancellation to CITY. Within ten (10) days of the date of execution of this Agreement, CHAMBER shall submit to CITY evidence of such insurance.
19. Notwithstanding any other representation, oral or written, between the parties, including any and all agents or representatives thereof, the CHAMBER is at all times during the term of this Agreement acting as a free and independent contractor, and shall not be an employee or an agent of the CITY.
20. Except as CITY may authorize in writing, CHAMBER shall have no authority, express or implied to act on behalf of CITY in any capacity whatsoever as an agent. CHAMBER shall have no authority, express or implied, pursuant to this Agreement, to bind CITY to any obligations whatsoever.
21. CHAMBER shall not enter into any contract or agreement that will create a conflict of interest with its duties to CITY under this Agreement. No member, official or employee of CITY shall have any personal interest, direct or indirect, in this Agreement, nor shall any such member, official or employee participate in any decision relating to this Agreement which affects his personal interests or the interests of any corporation, partnership, or association in which he is directly or indirectly interested. The CHAMBER warrants that it has not paid or given, and will not pay or give, any third party any money or other consideration for obtaining this Agreement.
22. CHAMBER represents and warrants to CITY that it has, and shall maintain at all times during the term of this Agreement, at its sole cost and expense, all business licenses, permits, qualifications and approvals of whatsoever nature which are legally required for CHAMBER to provide the services hereunder.

23. CHAMBER shall perform all services required pursuant to this Agreement in a manner and according to the standards observed by a competent practitioner of the profession in which CHAMBER is engaged. All products and services of any nature which CHAMBER provides to CITY and to visitors to the Visitor Center shall conform to the standards of quality normally observed by licensed, competent organizations practicing in CHAMBER's profession.
24. CHAMBER shall devote such time to the performance of services as may be reasonably necessary for the satisfactory performance of CHAMBER's obligations pursuant to this Agreement. Neither party shall be considered in default of this Agreement to the extent performances are prevented or delayed by any cause, present or future, which is beyond the reasonable control of the parties. CHAMBER agrees to assign only competent personnel according to the reasonable and customary standards of training and experience in the relevant field to perform services pursuant to this Agreement.
25. During the term of this Agreement should the CHAMBER be dissolved, disbanded, or otherwise cease to function in a manner described in this Agreement, all funds attributable to the CITY, and equipment purchased out of funds provided by the CITY, shall revert to ownership of the CITY. For the purpose of this provision, the CHAMBER shall maintain a written record of, and include as part of each annual report, a listing of capital equipment that has been purchased with the funds provided by the CITY.
26. No party to this Agreement may assign any right or obligation pursuant to this Agreement. Any attempted or purported assignment of any right or obligations pursuant to this Agreement shall be void and of no effect.
27. CHAMBER agrees to comply with all fair employment practice laws of the State and Federal government. CHAMBER covenants and agrees for itself, its successors, its assigns and every successor in interest, that there shall be no discrimination against or segregation of any person or group of persons on account of race, color, creed, religion, sex, sexual orientation, medical condition, disability, marital status, ancestry or national origin in the provision of any services to be provided by CHAMBER hereunder, nor shall CHAMBER or any person claiming under or through CHAMBER establish or permit any such practice or practices of discrimination or segregation in the provision of any services to be provided by CHAMBER hereunder.
28. The failure of the Parties to abide by any of the terms of this Agreement shall constitute a default under this Agreement. If either party fails to cure any such default within five (5) days of receiving notice from the other party of such default, then this Agreement may be terminated by giving ten (10) days written notice of such termination. Upon any such termination, the final monthly payment to be paid under Section 2, above, shall be adjusted on a pro rata basis, based on a 30-day month, to the date of such termination, and if applicable, CHAMBER shall immediately return to CITY any amounts previously paid by CITY for any period subsequent to the date of such termination.

29. In addition to termination pursuant to Paragraph 28 above, this Agreement may be terminated in whole or in part at any time by either party hereto upon thirty (30) days written notice to the other as identified below. In the event of any termination of this Agreement, all rights and obligations of both parties hereto, including without limitation the monthly payments from CITY to CHAMBER hereunder, shall terminate as of the date of such termination (and the final monthly payment shall be adjusted on a pro rata basis to the date of such termination).
30. This document represents the entire understanding between the parties and supersedes all prior negotiations, representations or agreements, either written or oral. This Agreement may only be amended by a writing signed by both parties.
31. Should any provision of this Agreement be deemed to be legally void or unenforceable, all remaining provisions shall survive and be enforceable. This Agreement shall in all respects be governed by the laws of the State of California.
32. In the event suit is brought for the enforcement, or interpretation, of this Agreement, the prevailing party shall be entitled to reasonable attorney's fees.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the day and year first above written.

CITY OF MORRO BAY

MORRO BAY CHAMBER OF COMMERCE

City Manager

Director

AGENDA NO: A-2

MEETING DATE: 06/28/11

RESOLUTION NO. 45-11

**RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MORRO BAY, CALIFORNIA
ESTABLISHING A THREE YEAR MORATORIUM FOR THE PAYMENT
OF DEVELOPMENT IMPACT FEES FOR COMMERCIAL PROJECTS
WITHIN A COMMERCIAL ZONE DISTRICT**

**THE CITY OF MORRO BAY
City of Morro Bay, California**

WHEREAS, the City Council adopted Development Impact Fees in 2007 with Resolution No. 47-07; and

WHEREAS, the City Council has adopted a Master Fee Schedule, which authorizes the establishment of fees by Resolution of the Council; and

WHEREAS, the Master Fee Schedule includes Development Impact Fees for commercial projects within commercial zone districts; and

WHEREAS, the City of Morro Bay also has a variety of goals and policies to enhance the economic strength of the City; and

WHEREAS, the City Council recognizes that payment of Commercial Development Fees can be a disincentive to commercial projects; and

WHEREAS, in furtherance of these goals, the City Council hereby desires to establish a moratorium of the payment of Development Impact Fees for commercial development projects within commercial zone districts.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Morro Bay, that no Development Impact Fees shall be paid for commercial projects on commercially zoned land for a period of three years commencing on July 1, 2011.

BE IT FURTHER RESOLVED by the City Council of the City of Morro Bay, that only commercial projects on commercially zoned land shall be eligible and that residential projects within the mixed use areas shall not be eligible.

PASSED AND ADOPTED by the City Council of the City of Morro Bay at a regular meeting thereof held on the 28th day of June 2011, by the following vote:

AYES:
NOES:
ABSENT:

WILLIAM YATES, Mayor

ATTEST:

BRIDGETT KESSLING, City Clerk



AGENDA NO: B-1

MEETING DATE: June 28, 2011

Staff Report

TO: Honorable Mayor and City Council **DATE:** June 28, 2011
FROM: Joe Woods, Recreation and Parks Director
SUBJECT: Resolution No. 43-11 Directing the Levy of the Annual Assessment for the Cloisters Landscaping and Lighting Maintenance Assessment District

RECOMMENDATION

Staff recommends the City Council hold a public hearing on the annual levy of assessment for the Cloisters Landscaping and Lighting Maintenance Assessment District, and then adopts Resolution No. 43-11 confirming the levy of assessment for Fiscal Year 2011-12.

FISCAL IMPACT

By adopting Resolution No. 43-11, \$148,944 will be collected through an assessment of all parcel owners in the Cloisters subdivision for the maintenance of the Cloisters Park and Open Space.

SUMMARY

At the May 10, 2011 City Council meeting, the Council adopted Resolution No. 32-11 approving the Engineer's Report describing the annual maintenance to be completed at the Cloisters Park and Open Space, and declaring the City's intent to levy an annual assessment to finance this maintenance. The assessment, projected at \$1,241.20 per assessable lot in the Cloisters subdivision, will be collected by the County Assessor. As part of the assessment process, the City ordered the preparation of an Engineer's report, adopted a resolution of intention to levy an assessment, set June 28, 2011 as the hearing date on the proposed levy of assessment, noticed all property owners on record via first class mail of the hearing and published the notice in the local newspaper. The Council must hold a protest/public hearing before considering the levy of the annual assessment.

Prepared By: JMW

Dept Review: _____

City Manager Review: _____

City Attorney Review: _____

DISCUSSION

Staff has received four letters in protest of the Assessment District. Several residents have expressed concerns with parkway maintenance, and consequently staff has developed a redesign with the assistance of Recreation and Parks Commissioner, John Bates and in-house staff. On May 31st Staff Woods and Livick met with two Cloisters residents, Dawn Beattie and Carol DiNolfo to discuss concerns over the maintenance of the Cloister Assessment District. The new parkway design was discussed, and all agreed that staff would proceed with the contract to install the new design at four locations in front of empty lots to serve as demonstration parkways and to solicit resident input. The demonstration parkways were completed by Friday June 17, 2011.

On Tuesday, June 21, 2011, a small group of residents and Staff Woods met to discuss the redesign of selected parkways. We evaluated the parkway at lot 88 in the Emerald Circle cul-de-sac and subsequently concluded to proceed with the redesign of the parkways following staff's letter to all Cloister residents detailing the procedure. The redesign would include clearing the existing vegetation, excluding trees, replacement of the drip line, and the installation of bark mulch (not gorilla hair), selected grasses, and passenger loading zones where applicable.

Staff is preparing a correspondence to all Cloisters property owners explaining the reasons for the redesigned parkways, and the methodology staff will be implementing. The basic idea would be a series of questions with options for the owner to select. Owners may elect to keep their existing parkway design if desired.

On Wednesday June 22, 2011, staff met with a sub-committee of the City Tree Committee to review and evaluate the proposed parkway redesign. The sub-committee endorsed the proposed parkway design and the plant selection to be used. We discussed some of the parkway trees and plan to continue the discussion at a future Committee meeting.

Additionally, staff has begun sending informational notices to subscribing residents via the City's web site using the "Notify Me" modular. Staff has sent two "news flashes" regarding the above mentioned meetings and will continue to utilize our web site to inform the subscribing Cloister residents of future planned maintenance activities

CONCLUSION

Staff is prepared to continue the Assessment District and fulfill the City's obligation to maintain the Cloisters Lighting and Maintenance Assessment District as outlined in previous staff reports. Staff will continue communicating with the owners to enhance our relationships and to allow for noticing of upcoming events which may impact their residence.

RESOLUTION NO. 43-11

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MORRO BAY
DIRECTING THE LEVY OF THE ANNUAL ASSESSMENT
FOR THE CLOISTERS LANDSCAPING AND LIGHTING
MAINTENANCE ASSESSMENT DISTRICT**

**THE CITY COUNCIL
City of Morro Bay, California**

WHEREAS, on May 10, 2011 the City Council did adopt Resolution No. 43-11 declaring the Council's intent to levy an assessment for the annual maintenance of the Cloisters Park and Open Space and approving the Engineers Report; and

WHEREAS, a public hearing to hear all protests as to the levy of the annual assessment of said district was scheduled for June 28, 2011 at 6:00 p.m. in the Veteran's Memorial Building; and

WHEREAS, notices were mailed to one hundred percent (100%) of the property owners on record in the district regarding the proposed assessment and listing the date, time and location of the protest hearing, as well as being published in the local newspaper; and

WHEREAS, the City Council did hear objections of all interested parties as to the levy of the annual assessment for the Cloisters Landscaping and Lighting Maintenance Assessment District on June 28, 2011 at the Veteran's Memorial Building.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Morro Bay that the annual levy for the maintenance of Cloisters Landscaping and Lighting Maintenance Assessment District generally located as shown on Exhibit "A" attached hereto is hereby ordered and the assessment of \$148,944 to be equally distributed per assessable parcel for the Fiscal Year 2011-12 is hereby confirmed.

BE IT FURTHER RESOLVED by the City Council of the City of Morro Bay that adoption of this resolution shall constitute the levy of an assessment for the Fiscal Year 2011-12 and the City Clerk shall file the diagram and assessment with the County of San Luis Obispo Auditor.

PASSED AND ADOPTED by the City Council of the City of Morro Bay at a regular meeting thereof held this 28th day of June, 2011 by the following roll call vote:

AYES:
NOES:
ABSENT:

WILLIAM YATES, MAYOR

ATTEST:
BRIDGETT KESSLING, CITY CLERK

TPOB PARCEL 1
Most northerly corner of
Lot 122 of Tract 1996

TPOB PARCEL 2

PARCEL 2

PARCEL 1

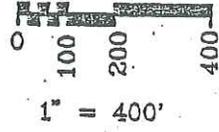


EXHIBIT A

RESOLUTION NO. 44-11

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MORRO BAY
DIRECTING THE LEVY OF THE ANNUAL ASSESSMENT
FOR THE NORTH POINT NATURAL AREA LANDSCAPING AND LIGHTING
MAINTENANCE ASSESSMENT DISTRICT**

**THE CITY COUNCIL
City of Morro Bay, California**

WHEREAS, on May 10, 2011 the City Council did adopt Resolution No. 44-11 declaring the Council's intent to levy an assessment for the annual maintenance of the North Point Natural Area and approving the Engineers Report; and

WHEREAS, a public hearing to hear all protests as to the levy of the annual assessment of said district was scheduled for June 28, 2011 at 6:00 p.m. in the Veteran's Memorial Building; and

WHEREAS, notices were mailed to one hundred percent (100%) of the property owners on record in the district regarding the proposed assessment and listing the date, time and location of the protest hearing, as well as being published in the local newspaper; and

WHEREAS, the City Council did hear objections of all interested parties as to the levy of the annual assessment for the North Point Landscaping and Lighting Maintenance Assessment District on June 28, 2011 at the Veteran's Memorial Building.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Morro Bay that the annual levy for the maintenance of North Point Natural Area Landscaping and Lighting Maintenance Assessment District generally located as shown on Exhibit "A" attached hereto is hereby ordered and the assessment of \$5,645 to be equally distributed per assessable parcel for the Fiscal Year 2011-12 is hereby confirmed.

BE IT FURTHER RESOLVED by the City Council of the City of Morro Bay that adoption of this resolution shall constitute the levy of an assessment for the Fiscal Year 2011-12 and the City Clerk shall file the diagram and assessment with the County of San Luis Obispo Auditor.

PASSED AND ADOPTED by the City Council of the City of Morro Bay at a regular meeting thereof held this 28TH day of June, 2011 by the following roll call vote:

AYES:
NOES:
ABSENT:

WILLIAM YATES, MAYOR

ATTEST:

BRIDGETT KESSLING, CITY CLERK



AGENDA NO: B-3

MEETING DATE: June 28, 2011

Staff Report

TO: Honorable Mayor and City Council

DATE: June 22, 2011

FROM: Dylan Wade P.E. Utilities/Capital Projects Manager

SUBJECT: Adoption of the Urban Water Management Plan 2010 Update

RECOMMENDATION:

Review the 2010 Urban Water Management Plan (UWMP) Update, propose any necessary amendments, and adopt it with Resolution Number 46-11.

FISCAL IMPACT:

Failure to adopt the 2010 UWMP will preclude the City from being eligible for some pools of grant funding as well as for the State Revolving Fund loan anticipated for the upgrade to the Waste Water Treatment Plant.

BACKGROUND:

In order to comply with the water code and other segments of state law, water utilities that serve more than 3000 customers or sell more than 3000 afy of water are required to prepare an UWMP in years ending in 5 and 10. The City began preparing an update to the 2005 UWMP in the fall of 2010 and is bringing this document forward for public comment and Council adoption at this time. Public Review Drafts including the Appendices has been available on the City website, in Public Services, and at City Hall. A copy of the plan without the appendices is attached.

DISCUSSION:

The City of Morro Bay has twice in the past (in 2002 and 2005) embarked on the process of developing a UWMP. While the 2002 plan was never submitted to DWR for review, it served as the foundational document for the 2005 update. In 2005, the City updated the 2002 version of the UWMP. This effort led to the adoption of the plan by the City Council and was submitted to DWR for review. While DWR never accepted the City's plan as being complete, the 2005 plan became the basis for the 2010 update.

Prepared By: D. Wade _____

Dept Review: D. Wade _____

City Manager Review: _____

City Attorney Review: _____

HIGHLIGHTS FROM THE 2010 UPDATE INCLUDE

1. The City has adequate supplies to meet its projected demands now and into the future.
2. Impacts from contamination in both the Morro and Chorro groundwater basins have both increased reliance on imported supplies and reduce supply reliability.
3. The City has implemented the Demand Management Measures that are locally cost effective and has seen significant reductions in per capita usage as a result.
4. Wastewater reclamation represents an opportunity to increase supplies and supply reliability but may not be cost effective.

CONCLUSION:

In conclusion staff requests that the City Council review the UWMP, propose any necessary amendments, and adopt it with Resolution Number 46-11.

Attachments:

Attachment A –2010 Urban Water Management Plan

RESOLUTION NO. 46-11

**A RESOLUTION OF THE CITY COUNCIL
OF THE CITY OF MORRO BAY, CALIFORNIA
ADOPTING THE 2010 URBAN WATER MANAGEMENT PLAN**

**THE CITY COUNCIL
City of Morro Bay, California**

WHEREAS, California Water Code Division 6 Part 2.6. Sections 10610-10656, known as the Urban Water Management Planning Act, require preparation of an Urban Water Management Plan; and,

WHEREAS, Senate Bill x 7_7 (Steinberg) passed in 2009 modifies the requirements of the Urban Water Management Plan to reduce the per capita usage by 20% in 2020; and,

WHEREAS, Staff and its consultants have prepared the 2010 Urban Water Management Plan to meet the requirements of the Urban Water Management Planning Act; and,

WHEREAS, Staff and its consultants have prepared the 2010 Urban Water Management Plan to meet the requirements of Senate Bill x 7_7.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Morro Bay, California, that the City Council adopts the 2010 Urban Water Management Plan.

PASSED AND ADOPTED by the City Council of the City of Morro Bay at a regular meeting thereof held on the 28th day of June, 2011 on the following vote:

AYES:

NOES:

ABSENT:

WILLIAM YATES, Mayor

ATTEST:

BRIDGETT KESSLING, City Clerk

Draft Report

2010 Urban Water Management Plan City of Morro Bay



Prepared for

City of Morro Bay
955 Shasta Ave
Morro Bay, CA 93442



Prepared by



June 2011

Public Review Draft Report

2010 Urban Water Management Plan - City of Morro Bay

Prepared for
City of Morro Bay

955 Shasta Ave
Morro Bay, CA 93442

June 2011

CH2MHILL
325 E. Hillcrest Drive
Suite 125
Thousand Oaks, CA 91360

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Notice of Adoption

Abbreviations and Acronyms

µg/L	microgram per liter
#	number
ac-ft	acre-feet
ac-ft/yr	acre-feet per year
Act	Urban Water Management Planning Act
BMPs	best management practices
BRWO	Brackish Water Reverse Osmosis
CAGR	compound annual growth rates
CCWA	Central Coast Water Authority
CDPH	California Department of Public Health
cfs	cubic feet per second
CIMIS	California Irrigation Management Information System
City	City of Morro Bay
Council	California Urban Water Conservation Council
CMC	California Men's Colony
CSD	Cayucos Sanitary District
CWC	California Water Code
DAC	disadvantaged community
DMM	demand management measure
DOF	Department of Finance
DWR Guidebook	Guidebook to Assist Water Suppliers in the Preparation of 2010 Urban Water Management Plan
DWR	Department of Water Resources (California)
EPA	U.S. Environmental Protection Agency
ETo	evapotranspiration
gpcd	gallons per capita per day
gpd	gallons per day

gpm	gallons per minute
LCP	Local Coastal Plan
MCL	maximum contaminant level
mgd	million gallons per day
MTBE	methyl tertiary butyl ether
NAICS	North American Industry Classification System
No.	number
NPV	net present value
OEHHA	Office of Environmental Health Hazard Assessment
PPCPs	pharmaceuticals and personal care products
PPIC	Public Policy Institute of California
ppm	parts per million
RWQCB	Regional Water Quality Control Board
SCADA	Supervisory Control and Data Acquisition
SLOFCWCD	San Luis Obispo Flood Control and Water Conservation District
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWRO	Seawater Reverse Osmosis
TBD	to be determined
TDS	total dissolved solids
ULF	ultra low flush
ULFT	ultra-low-flush-toilet
USC	University of Southern California
UWMP	Urban Water Management Plan
WRCC	Western Regional Climate Center
WWTP	Wastewater Treatment Plant

Definitions

Chapter 2, Part 2.6, Division 6 of the California Water Code (CWC) provides for definitions for the construction of the Urban Water Management Plans. Appendix A contains the full text of the Urban Water Management Planning Act.

CHAPTER 2. DEFINITIONS

10611. *Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.*

10611.5. *“Demand management” means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.*

10612. *“Customer” means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.*

10613. *“Efficient use” means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.*

10614. *“Person” means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.*

10615. *“Plan” means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.*

10616. *“Public agency” means any board, commission, county, city and county, city, regional agency, district, or other public entity.*

10616.5. *“Recycled water” means the reclamation and reuse of wastewater for beneficial use.*

10617. *“Urban water supplier” means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.*

Section 1. Introduction and Plan Preparation

Background

The Urban Water Management Plan (UWMP) for the City of Morro Bay (City) is prepared in compliance with Division 6, Part 2.6, of the CWC, Sections 10610 through 10657 as last amended by Senate Bill (SB) 318, the Urban Water Management Planning Act (Act). The original bill, requiring a UWMP, was initially enacted in 1983. SB 318, which became law in 2004, is the eighteenth amendment to the bill. Increased emphasis on drought contingency planning, water demand management, reclamation, and groundwater resources has been provided through the updates to the original bill. In addition to some changes in the Act since the last UWMPs were submitted in 2005, Governor Schwarzenegger in his 20x2020 Plan determined that for California to continue to have enough water to support its growing population, it needs to reduce the amount of water each person uses per day (Per Capita Daily Consumption). This reduction of 20 percent per capita use by the year 2020 is supported by legislation passed in November 2009 SBx7-7 (Steinberg). SBx7-7 has amended and repealed some sections of the Water Code and affected reporting requirements for 2010 UWMP under the Act and other government codes.

Under the current law, urban water suppliers with more than 3,000 service connections or water use of more than 3,000 acre-feet per year (ac-ft/yr) are required to submit a UWMP every 5 years to the California Department of Water Resources (DWR). The reports must be submitted by December 31. The deadline for adoption of a water supplier's 2010 UWMP is July 1, 2011 (CWC §10608.20 (j)). This date is extended from the normal requirement of December 31 in years ending in five and zero (CWC §10621 (a)) to allow additional time for water suppliers to address the UWMP requirements in the Water Conservation Bill of 2009.

The law, as it is now, finds and declares the following:

Section 10610.2.

(a) *The Legislature finds and declares all of the following:*

- (1) *The waters of the state are a limited and renewable resource subject to ever-increasing demands.*
- (2) *The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.*
- (3) *A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.*
- (4) *As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.*

- (5) *Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.*
 - (6) *Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.*
 - (7) *Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.*
 - (8) *Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.*
 - (9) *The quality of source supplies can have a significant impact on water management strategies and supply reliability.*
- (b) *This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.*

Section 10610.4. The Legislature finds and declares that it is the policy of the state as follows:

- (a) *The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.*
- (b) *The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.*
- (c) *Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.*

The required elements for this Section (UWMP Plan Preparation) include the following (item numbers are from the 2010 UWMP guidebook outline checklist):

#4. Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable (10620(d)(2)).

#6. Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision (10621(b)).

#54. The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan (10635(b)).

#55. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan (10642).

#56. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area (10642).

#7. The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640) (10621(c)).

#57. After the hearing, the plan shall be adopted as prepared or as modified after the hearing (10642).

#58. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan (10643).

#59. An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption (10644(a)).

#60. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours. (10645).

This section includes specific information on how the UWMP for the City of Morro Bay was prepared, coordinated with other agencies and the public, and adopted. It includes background information and system overview as well.

The primary purpose of this UWMP is to provide information and recommendations necessary to develop a long-term plan for ensuring a reliable, environmentally sensitive, and economical water supply for the City of Morro Bay. This report has been created to meet the requirements of SBx7-7 and the associated State mandatory reductions in water usage targets for 2020. Planning on reductions in future years, to comply with the requirements of State law and to the extent that actual reductions in per capita water usage are not met, will reduce the accuracy and utility of this document for future water supply planning purposes. Readers of this document are advised to use this information judiciously.

2010 UWMP Organization

The City of Morro Bay has twice in the past (in 2002 and 2005) embarked on the process of developing an UWMP. While the 2002 plan was never submitted to DWR for review, it served as the foundational document for the 2005 update. In 2005, the City updated the 2002 version of the UWMP. This effort led to the adoption of the plan by the City Council and was submitted to DWR for review.

The 2005 UWMP was restructured following the DWR Final Guidebook (DWR, 2011) and new elements required for the 2010 UWMP have been included. Each section in this UWMP follows the 2010 UWMP guidebook outline. Required elements are presented in italicized text in the beginning of each section. The original checklist numbers are also retained and are included in front of the italicized text.

System Overview

The City of Morro Bay is located on the Central Coast in San Luis Obispo County about 250 miles north of Los Angeles. The City provides water distribution and wastewater collection, treatment, and disposal services.

The City derives its water supply from purchased water from the State Water Project (SWP) and local groundwater. A desalination plant also supplements the City's water supply.

The City's existing water supplies are currently provided almost entirely by the SWP. The City is contractually entitled to 1,313 ac-ft/yr of State Water from the County of San Luis Obispo plus an additional 174 percent drought buffer to ensure reliability when the SWP has to reduce overall deliveries during dry years.

Prior to the delivery of the SWP, the City relied on groundwater solely from the Morro and Chorro Groundwater Basins for its primary source of water supply. The Chorro and Morro Groundwater Basins are shallow alluvial basins that behave similar to an underground stream. Rainfall in the watershed percolates into the ground and flows underground to the ocean. Use of such water resources are controlled by the State Water Resources Control Board (SWRCB). The SWRCB in 1972 issued findings that the Chorro and Morro Basins are riparian underflow. The City of Morro Bay applied for appropriative water rights and, in 1995, the SWRCB approved water right permits for up to 1.2 cubic feet per second (cfs) and 581 ac-ft/yr from the Morro basin and up to 3.171 cfs and 1142.5 ac-ft/yr annually of Chorro Creek underflow. In accordance with water right permits, the City can pump up to 1,723.5 ac-ft/yr of groundwater in normal years, but only 1,150 ac-ft/yr in severe drought years.

In 1992, the City constructed a seawater desalination plant during a drought emergency, and in 2009 expanded the plant facility with the installation of Brackish Water Reverse Osmosis (BWRO) treatment trains. The City operates both a Seawater Reverse Osmosis (SWRO) and BWRO treatment systems at the same desalination facility. The existing desalination plant is capable of producing 645 ac-ft/yr, but is not currently in regular operation. The plant operated for several months after completion in 1993, but due to high operating costs, plant use was discontinued. In 1995, the California Coastal Commission approved a Local Coastal Plan (LCP) amendment that allows the City to use the plant as a regular non-emergency water source. The plant was briefly used as a supplemental source of water in 1995; however, raw water quality problems caused the plant to shut down.

Figure 1-1 illustrates the location of the City's system.



Image Source: ESRI, i-cubed, USDA FSA, USGS.

Figure 1-1 City of Morro Bay System Location Map

Coordination

The City initiated agency coordination with a mailing of letters to the County within its service area and the local wholesale water agency. The initial letters notified the agencies of the City's intent and requested data for the preparation of the UWMP. Follow up with staff from the agencies was conducted when appropriate.

Table 1-1 lists the agencies contacted during the preparation of this UWMP.

Table 1-1
Coordination with Appropriate Agencies

Coordinating Agencies	Participated in UWMP Development	Commented on the Draft	Attended Public Meetings	Was Contacted for Assistance	Was sent a Copy of the Draft Plan	Was sent a Notice of Intention to Adopt	Not Involved/No Information
County of San Luis Obispo				✓			
Central Coast Water Authority				✓			
San Luis Obispo Council of Governments				✓			
General public							

Notes:

1. Table format based on DWR Guidance Document Table 1.
CCWA = Central Coast Water Authority

Notification Requirement – 60 days prior to Review/Adoption Hearing

Pursuant to the new requirement (for the 2010 UWMP) in Section 10642 of the Act, the City of Morro Bay notified the County of San Luis Obispo (within which it provides water supplies) that the 2010 UWMP was being reviewed and changes were being considered. The notification was sent 60 days prior to the UWMP public hearing. Appendix B contains a copy of the notification.

In addition to making a public review copy of the plan available to the general public, the City placed a notice into its water bills advertising the upcoming hearing. The Public Works Advisory Board (PWAB) was used as an opportunity to solicit public participation from a diverse group stakeholder and receive comment on the draft plan.

This document will be presented at a public hearing. A copy of the public notice for the public hearing is enclosed in Appendix C. The public meeting was noticed in accordance with Government Code 6066.

Appendix D contains a copy of the hearing notice from a local newspaper and the meeting minutes from the public pertaining to the UWMP. Appendix D also contains comments received, and comment resolution.

Plan Adoption, Submittal, and Implementation

Plan adoption requirements are detailed in Section 10642 of the Act.

After the plan is adopted, this plan will be submitted to DWR. Within 30 days of submittal to DWR, copies of this plan will be provided to the California State Library System, the City of Morro Bay Public Services Department, and posted on the City's website to make the information available to the public. Copies of this plan will also be provided to the County of San Luis Obispo no later than 60 days after its submission to DWR.

The final UWMP, as adopted by the City, will be submitted to the DWR, the California State Library, and any city or county within which the City supplies water within 30 days of adoption. This plan includes all information necessary to meet the requirements of CWC Division 6, Part 2.6 (Urban Water Management Planning). Adopted copies of this plan will be available to the public at the Public Services Department.

The City is committed to the implementation of this UWMP as required by Section 10643 of the Act.

UWMP Preparation

The City prepared this UWMP with the assistance of its consultant, CH2M HILL, as permitted by Section 10620 (e) of the Act.

During the preparation of the UWMP documents that have been prepared over the years by the City and other entities were reviewed and results of those documents incorporated, as applicable, into this UWMP. The list of the documents is provided in the reference section, Section 7.

The adopted plans will be made available for public review at the City of Morro Bay Office of the City Clerk and the Morro Bay Public Services Department. Copies of the plan will be submitted to DWR, cities and counties within the service area, the State Library, and other applicable institutions within 30 days as required by Section 10644 and 10645.

Content of the UWMP

This UWMP addresses all subjects required by Section 10631 of the Act as defined by Section 10630, which permits "levels of water management planning commensurate with the numbers of customers served and the volume of water supplied." All applicable sections of the Act are discussed in this UWMP. Table 1-2 lists the sections of this UWMP and the corresponding provisions of the Act.

Table 1-2
Summary of UWMP Chapters and Corresponding Provisions of the California Water Code

Section	Corresponding Provisions of the Water Code		
1. Introduction and Plan Preparation	10642	Public Participation	
	10643	Plan Implementation	
	10644	Plan Filing	
	10645	Public Review Availability	
	10620 (a) – (e)	Coordination with Other Agencies; Document Preparation	
	10621 (a) – (c)	City and County Notification; Due Date; Review	
	10620 (f)	Resource Optimization	
	10630	Level of Planning	
	10641	Coordination	
	10644(a)	UWMP Distribution	
	10621(b)	Notification	
	2. System Description	10631 (a)	Demographics and Climate
	3. System Demands	10631 (e), (k)	Water Use, Data Sharing
10631.1		Lower Income Housing Water Use Projections	
4. System Supplies	10631 (b) – (d), (h), (k)	Water Sources, Reliability of Supply, Transfers and Exchanges, Supply Projects, Data Sharing	
	10633	Recycled Water	
	10633(d)	Potential Recycled Water Uses	
	10631 (i)	Desalination	
5. Water Supply Reliability and Water Shortage Contingency Plan	10632	Water Shortage Contingency Plan	
	10635	Water Service Reliability	
	10634	Water Quality Impacts on Reliability	
6. DMMs	10631 (f) – (g), (j)	DMMs	
	10631.5	DMM Implementation Status	
	10631.5(b)	DMM Compliance	

Note:

DMM = demand management measure

Section 2. System Description

A detailed description of the City's service area is requested by the Act. Section 10631 (a) of the Act requires that (item numbers are from the 2010 UWMP guidebook outline checklist):

#8. Describe the service area of the supplier (10631(a)).

#9. (Describe the service area) climate (10631(a)).

#10. (Describe the service area) current and projected population . . . The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier . . . (10631(a)).

#11. . . . (population projections) shall be in five-year increments to 20 years or as far as data is available (10631(a)).

#12. Describe . . . other demographic factors affecting the supplier's water management planning (10631(a)).

This section summarizes the City's system service area and presents an analysis of available demographics, population growth projections, and climate data to provide a basis for estimating future water requirements.

Service Area Physical Description

The City of Morro Bay (City) is located 12 miles northwest of San Luis Obispo and is located on Highway 1. The City's Water service area is bounded by the City of Morro Bay's sphere of influence, which has changed since the City's 2005 UWMP was prepared. In 2007, the San Luis Obispo Local Agency Formation Commission (LAFCO) redefined the City's sphere of influence to the City limit boundary (see Figure 2-1). Excluding the 11 properties and the associated population served outside the City limits will cause a negligible increase to the City's per capita consumption, and so for the duration of this report the City limit will be assumed to be concurrent with the service area. The City has a total area of 10.2 square miles, of which, 5.2 square miles of it is land and 5.0 square miles of it (49.2 percent) is water (<http://factfinder.census.gov>). The service area is primarily characterized by residential and commercial land use.

The topography of service area is generally hilly to mountainous, with development and agriculture concentrated on the coastal plain and valleys. Slopes are steeper than 20 percent and up to 50 percent for much of the area, with the estuarine and valley areas exhibiting slopes less than 20 percent. The topography of the region limits development to the coastal plain and valleys. Surrounding mountains and the ocean ultimately restrict the expansion of the City.

The Franciscan Formation, formed primarily of metamorphic rock, dominates the Coastal Range in the area of Morro Bay. The southern side of the area consists of the Islay Hill - Morro Rock complex, which is a 15-mile long series of Oligocene volcanic rocks that have intruded up through the Franciscan Formation. Overlaying the bedrock within much of Morro Bay are the bay muds and alluvium of Morro Creek and Estero Bay that are comprised of unconsolidated sedimentary deposits, which are comprised predominantly of fine grain sediments.

Soils in the area consist of loamy sands, sandy loam, clays, clay loam, and silty clay loam. The alluvial water bearing deposits are generally capped by 20 to 50 feet of clay. Soils in the valleys are suitable for agriculture, affecting the demands for groundwater. Alluvium in the Morro and Chorro Valleys contains sand and gravel deposits that make up the principal aquifer.

In 1994, the Governor established Morro Bay as California's first State Estuary. The Morro Bay National Estuary Program (MBNEP) is one of 28 national programs that combine governmental and private efforts to protect this important coastal area. The comprehensive conservation and management plan (CCMP) calls for actions in several areas, including water quality, habitat protection, and public education.

The economy of the City is primarily oriented toward tourism and recreational activities. In addition, it is a desirable place to retire. In accordance with the City's reliance on tourism, about 20 percent of the City's residences are vacant or used as seasonal second residences.

Morro Bay has a wide array of recreational opportunities, which include fishing, surfing, hiking, bird and sea life watching, sightseeing, boating, golf, and beach activities. There are facilities for boating and camping.

A number of coastal dependent industries such as commercial and recreational fishing and boating related services are present in the City. Coastal dependent industries have been decreasing over a number of years. However, the City has been taking active steps to ensure that a viable industrial base is maintained. The City recognizes that coastal-dependent industries are important to its character and to the tourism industry.

Part of the service area is utilized for agriculture. This area consists of irrigated and dry-land farm crops, predominantly in the valleys where slopes are flatter. Steeper farmland is used for grazing of cattle. In recent years, steeper lands have increasingly been planted as orchards and vineyards.

Agriculture also plays a significant role in the local economy. Agriculture and seasonal occupants which includes large numbers of visitors and owners of vacation or secondary homes in the City affect City's water demands seasonally.

Demographics

At the time of preparation of this UWMP, population data for the 2010 Census are available. However, demographics data for 2010 are not available. Therefore, for the description of the demographics 2000 Census data are used. This data while old should still be representative of the demographic mix of Morro Bay's population.

According to 2000 US census data, the median age of Morro Bay's residents is 45.7 years. Morro Bay has an average household size of 2.04 people and a median household income of approximately \$34,379.

The City of Morro Bay is estimated to a Disadvantaged Community (DAC). A DAC is defined as a community with an annual median household income that is less than 80 percent of the statewide annual median household income. The estimated median household income for Morro Bay from the 2000 Census was \$34,379 in 1999 dollars. The median Household income for California was \$47,493 in 1999 dollars (<http://factfinder.census.gov>). Therefore, the median household income for Morro Bay was 72 percent of the statewide annual median household income.

Per the 2000 Census, the City had 6,286 housing units. The City had approximately 37.5 percent of households in the low income group (less than \$24,999 per year).

Residential development and open space represent the predominant land use in Morro Bay with 26 percent and 41 percent of the City's total area, respectively. The remaining portion of the City's land use is divided among industrial and commercial uses. Of the residential developments, about 80 percent of existing housing falls into the single family category and 17 percent falls into the multi-family category (<http://factfinder.census.gov>). This preference for single family housing is expected to continue; however, in the future, new development of affordable multi-family housing units may potentially be implemented within the Morro Bay existing service area. The Morro Bay area experienced relatively high annual population growth of 7.1 percent between 1990 and 2000 (from 9,664 people in 1990 to 10,350 people in 2000). During the last decade, the City's population grew at a slow rate of 0.25 percent, from 10,350 in 2000 to 10,608 in 2010. It is expected to experience slow annual population growth of 0.6 percent from 2010 through 2030 (San Luis Obispo Council of Governments [SLOCOG], 2006).

According to the 2000 Census data, the population of the City in 2000 was 10,350. About 4,986 households and 2,612 families were residing in the City. The population density was 2,007 people per square mile. There were 6,251 housing units at an average density of 1,212.1 per square mile (<http://factfinder.census.gov>).

Service Area Population

“Occupancy” in Morro Bay includes two categories of population: permanent residents and seasonal occupants. Permanent residents include homeowners or renters who have their primary residence in the City and as such are counted by the census. Seasonal occupants include large numbers of visitors and owners of vacation or secondary homes in the City.

Permanent Population

The service area population was estimated following Technical Methodology 2 described in Section M of the Methodologies for Calculating Baseline and Compliance Urban per Capita Water Use document (DWR, 2011). The City is a retail water supplier that falls into the Category 1 supplier, the actual distribution area of the City is nearly the same as the City’s boundary during baseline and compliance years. The population data published by the California Department of Finance (DOF) and the U.S. Census Bureau serve as the foundational building block for population estimates for the City. The past population data (from 1990s to 2010) provided by DOF were used to calculate historic trends in population dynamics. Those data were also used for developing baseline and target water demands for the City’s water conservation plan. The SLOCOG data were used to develop estimates of future population within the City (SLOCOG, 2006). Water demand projections presented in Section 3 are based on population projections provided by SLOCOG.

Seasonal Population

Due to the importance of tourism and retirement lifestyles to Morro Bay, average annual occupancy rates for dwellings have been historically low, around 80 percent.

While seasonal fluctuations in population greatly affect water demand and trigger the need for additional water supply, this population is not included in the DOF or Census population or in future population estimates for the City’s service area. The guidelines for this plan do not allow for the inclusion of seasonal visitor populations. This omitted source of water demand significantly inflates the City’s per capita water use by distributing visitor and seasonal occupant water use into the City’s permanent population.

SLOCOG Population Projection Methodology

The 2000 population data are derived from the 2000 U.S. Census, which form a baseline for local data projections. Economics Research Associates (ERA) analyzed population projection for SLOCOG. These population projections are derived from all DOF statistical information from E-4 (Population Estimates) and E-6 (Revised County Population Estimates) data sets. The projected population is based on US Census Bureau and DOF reports by the University of Southern California (USC) and the Public Policy Institute of California (PPIC). PPIC assumed both a high and low growth rates for their population projections.

High, low and medium growth scenarios are estimated from compound annual growth rates (CAGR) provided by DOF, Census, USC, PPIC-High and PPIC-Low. The medium growth rate is an average projected implied growth for all studies by five-year time periods, while the low-growth scenario was taken from Census projections and the high-growth scenarios was taken from USC’s projections. Population growth is estimated based on

expected population growth in the service area. These growth estimates are presented in the section below.

The City of Morro Bay's approach on controlling development of new housing units but not the number of people living in them is described in Measure F. A key development assumption in the population projections places a limit on the rate at which new housing is developed and a ceiling on the "ultimate" buildout of each jurisdiction based on the land use plans.

Measure F

While some or all conditions of Measure F may have lapsed, the requirements are included herein for reference. The voters in Morro Bay approved Measure F, a resource management initiative, in 1984 to limit new construction. As a result, City Ordinance No. 266 (Appendix E) was adopted by the City Council to implement the measure, including provisions to administer and monitor the allocation system for all new development and construction. The major features of the ordinance are summarized below:

- The ordinance provides for a population growth from 9,600 up to 12,200 by the year 2000. As of 2000 the Morro Bay population reached 10,350 residents.
- Development is subject to availability of water resources both in quantity and quality, through the adoption of a Water Management Plan.
- If water and wastewater treatment capacities become available, the measure allows for population increases beyond 12,200. Changes to the growth management procedures require a majority vote.

For population projections, 2000 Census data were used to determine both the residential occupancy rate for Morro Bay (the fraction of occupied dwellings to total dwellings) and the average number of persons per *inhabited* dwelling. Using these values and the average number of dwelling units allocated each year by the City of Morro Bay for residential development, population increases were projected over the next 25 years. This population forecast is based on assumptions regarding future conformance with the City of Morro Bay General Plan, household size, the economy and numerous other short-term and long-term factors that can influence a community's rate of growth, including provisions described in Measure F.

Morro Bay is reaching build out within the City limits, and is limited in future growth by its current sphere of influence. The low population growth scenario, as described earlier with the SLOCOG's long-range population projection method, was chosen by the City to estimate population growth for the service area due to Morro Bay's limited population growth.

City of Morro Bay System Population Projections

The City of Morro Bay's population that is served within the City's boundaries was 10,608 people in 2010. This population served within the City's boundaries is expected to reach 12,255 by 2035. A summary of historic and projected population within the Morro Bay's service boundaries is presented in Table 2-1 and illustrated in Figure 2-2.

The future population projections between 2015 and 2035 are provided by SLOCOG, which are based on the 2000 census data (SLOCOG, 2006). These projections are based on the low population-growth scenario (following the Census projections). DOF and SLOCOG do not have population projections prepared for the service area for 2035. For the purposes of this plan, City staff projected the population using SLOCOG's low population projection CAGR of 0.58 percent. The CAGR when extended to a 5-year growth projection interval yields a compound 5 year interval growth rate of 2.9 percent. This corrected growth-rate interval was used to extend the population projections from 2030 to 2035.

Table 2-1
Population – Current and Projected

Year	Service Area Population³	Data Source
2005	10,350	DOF
2010 ⁵	10,608	DOF
2015	10,910	SLOCOG
2020	11,210	SLOCOG
2025	11,560	SLOCOG
2030	11,910	SLOCOG
2035	12,255	SLOCOG

Notes:

1. This table is based on the DWR Guidebook Table 2.
2. Based on calendar year (January 1 – December 31).
3. Service area population is defined as the population served by the City of Morro Bay's distribution system. The population projected per Technical Methodology 2: Service Area Population (2010 UWMP Guidebook, Section M)
4. Historic service area population data are based on DOF
5. DOF E-4 data are reported for 2010
6. Service area population projections are based on low population growth projection scenario by SLOCOG for the city of Morro Bay (SLOCOG, 2006)

DWR Guidebook = Guidebook to Assist Water Suppliers in the Preparation of 2010 UWMP

The 2005 UWMP predicted population in 2010 to reach approximately 10,800 and 2020 population to reach 12,000 people. The population in 2010 and 2020, as presented in this report, are 10,608 and projected to be 11,210 people, respectively. The population for year 2010 and 2020 in the current study is less than the estimates in the previous 2005 report. 2005 UWMP population projections assumed average population growth rate of 1 percent between 2005 and 2010. However, actual average annual population growth rate was 0.10 percent between 2005 and 2010. A slight increase in population growth was observed between 2005 and 2010. Per this plan and based on the SLOCOG population data, average annual growth rates between 2010 to 2020 and 2020 to 2030 are assumed as 0.54 percent and 0.59 percent, respectively.

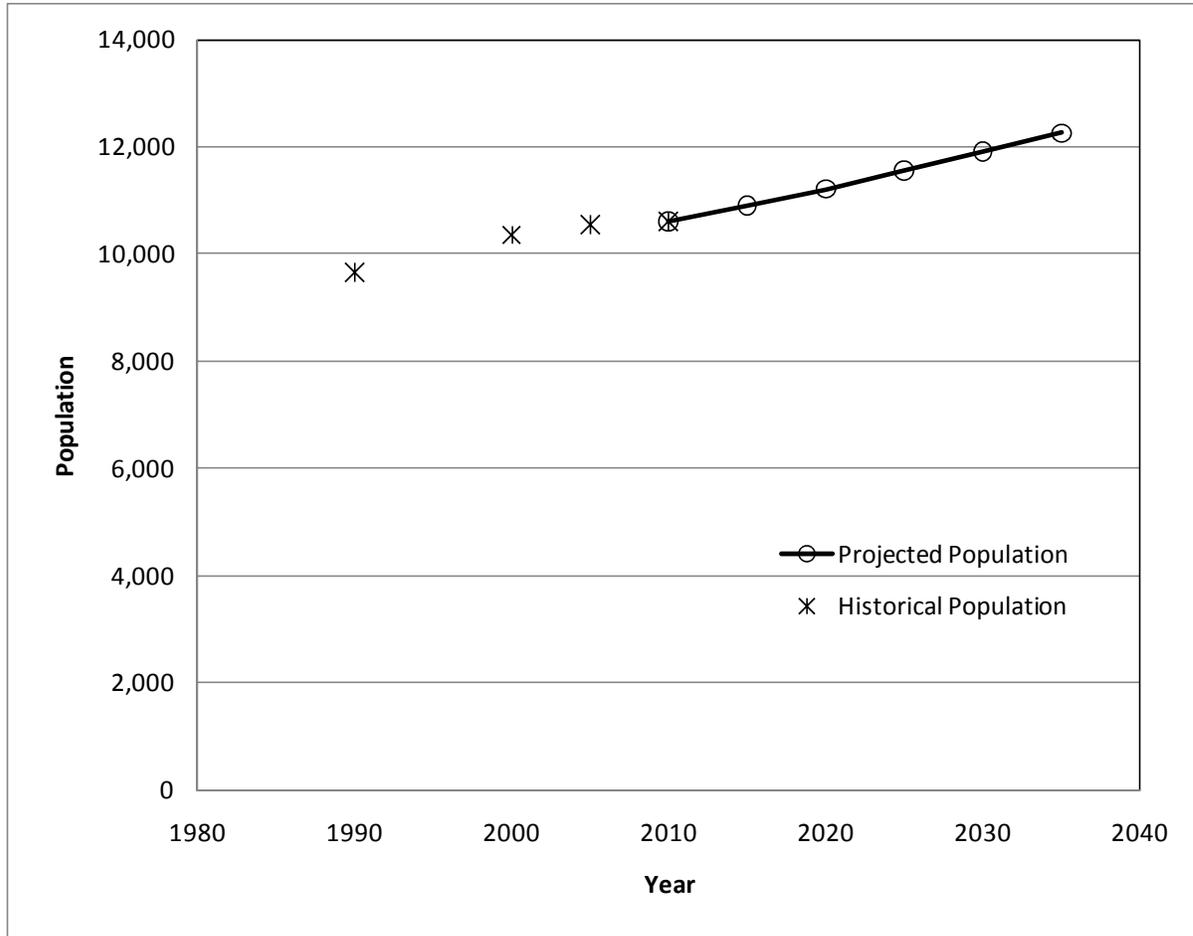


Figure 2-2 Population Growth Projections

Service Area Climate

The City of Morro Bay has a mild Mediterranean type of climate, influenced by its proximity to the ocean. Cool breezes from the ocean keep peak summer temperatures below levels typically seen in inland communities. As a result, irrigation water demands in the City exhibit less seasonal fluctuations than occur inland. Reduced seasonal fluctuations in water demands benefits the City's water planning.

The Western Regional Climate Center (WRCC) web site (www.wrcc.dri.edu) maintains historical climate records for the past 51 years (2/1/1959 to 12/31/2010) for Morro Bay. Table 2-2 presents the monthly average climate summary based on 51 years of historical data for Morro Bay. In winter, the lowest average monthly temperature is approximately 42.8 degrees Fahrenheit while the highest average monthly temperature reaches approximately 69 degrees Fahrenheit in the summer (Figure 2-3). Figure 2-4 presents the monthly average precipitation based on 51 years of historical data (2/1/1959 to 12/31/2010). The rainy season is from November through March. Monthly precipitation during the winter months ranges from 2 to 3 inches. Annual total rainfall is about 17 inches. Low humidity occurs in the summer months from May through October. The moderately

hot and dry weather during the summer months typically results in moderately high water demand.

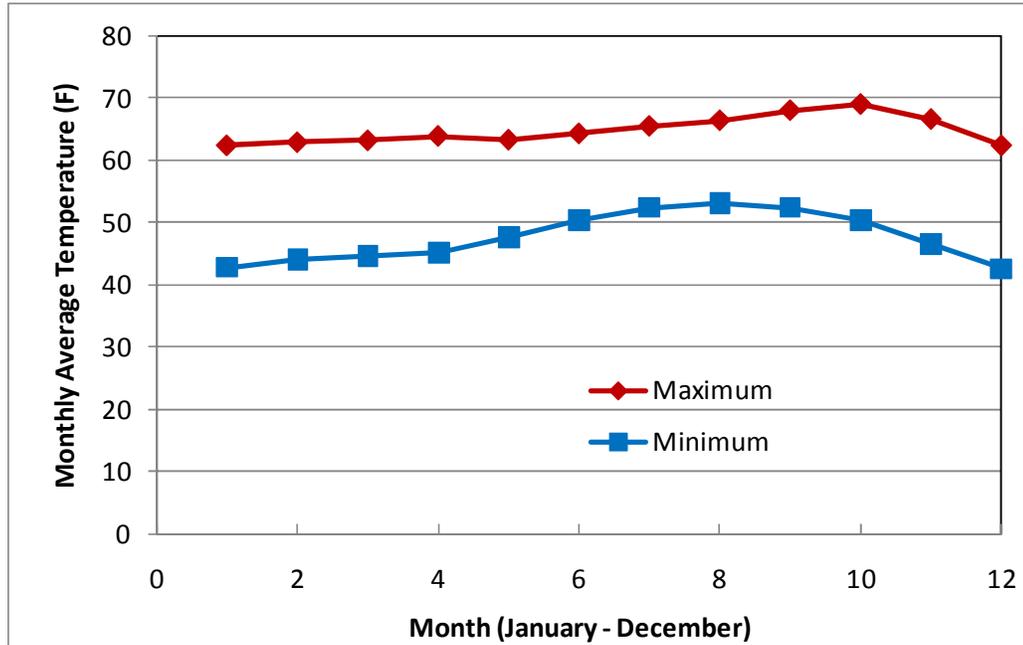


Figure 2-3 Monthly Average Temperature Range in Morro Bay based on Historical Data (1959-2010)

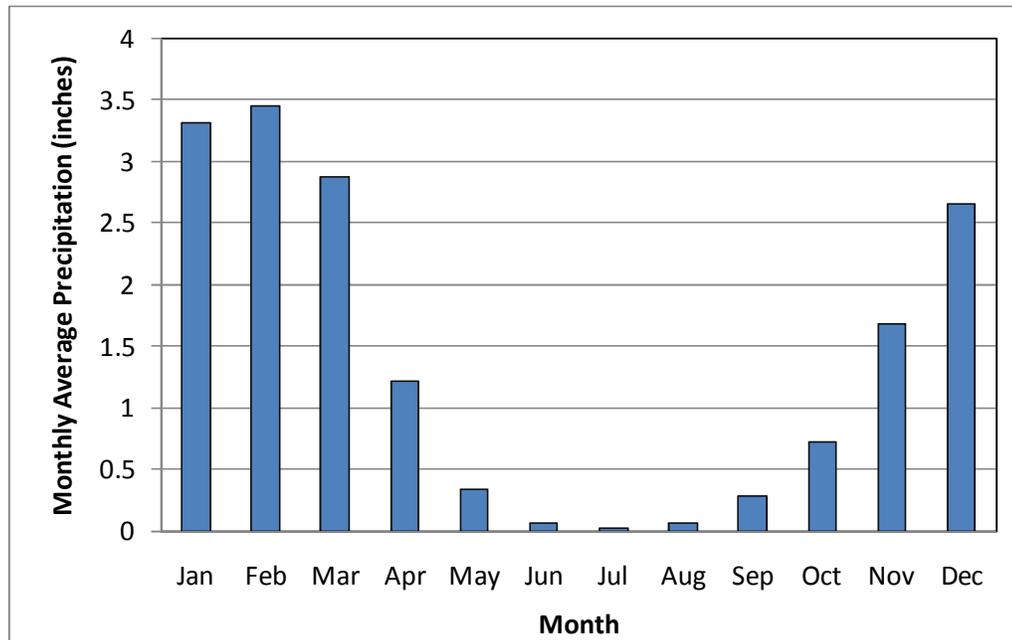


Figure 2-4 Monthly Average Precipitation in Morro Bay based on Historical Data (1959-2010)

Similar to the WRCC in the San Luis Obispo area, the California Irrigation Management Information System (CIMIS) web site (www.cimis.water.ca.gov) tracks and maintains records of evapotranspiration (ET_o) for few cities. ET_o statistics used for this system are

available from a San Louis Obispo (West) CIMIS station that was active from 1986-2010. ETo is a standard measurement of environmental parameters that affect the water use of plants. ETo is given in inches per day, month, or year and is an estimate of the ETo of a large field of well-watered, cool-season grass that is 4 to 7 inches tall. The monthly average ETo is presented in inches in Table 2-2. As the table indicates, a greater quantity of water evaporates from May through August, which may result in higher water demand than winter months.

Table 2-2
Monthly Average Climate Data Summary for Morro Bay

Month	Standard Monthly Average ETo ⁽¹⁾ (inches)	Average Total Rainfall ⁽²⁾ (inches)	Average Temperature ⁽²⁾ (degrees Fahrenheit)	
			Max	Min
January	2.21	3.32	62.4	42.8
February	2.5	3.45	62.9	44.1
March	3.8	2.88	63.2	44.6
April	5.08	1.21	63.9	45.2
May	5.7	0.34	63.3	47.7
June	6.19	0.06	64.3	50.3
July	6.43	0.03	65.5	52.4
August	6.09	0.06	66.4	53.1
September	4.87	0.29	68	52.4
October	4.09	0.72	69	50.3
November	2.89	1.68	66.6	46.6
December	2.28	2.66	62.4	42.6

Notes:

1. ETo Overview from <http://www.cimis.water.ca.gov/cimis/monthlyEToReport.do>
2. Rainfall and Temperature data from: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5866>

Section 3. System Demands

The Act requires that an evaluation of baseline (base daily per capita) water use and interim and urban water use be performed for the City of Morro Bay. The Act states the following (item numbers are from the 2010 UWMP guidebook outline checklist):

#1. An urban retail water supplier shall include in its urban water management plan...due in 2010 the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

#2. Urban wholesale water suppliers shall include in the urban water management plans . . . an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part (10608.36). Urban retail water suppliers are to prepare a plan for implementing the Water Conservation Bill of 2009 requirements and conduct a public meeting which includes consideration of economic impacts (CWC §10608.26).

#25. Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses: (A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; (I) Agricultural (10631(e)(1) and (2)).

#33. Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c) (10631(k)).

#34. The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier (10631.1(a)).

As part of the UWMP, California regulation requires water suppliers to quantify past and current water use and to project the total water demand for the water system, including calculations of its baseline (base daily per capita) water use and interim and urban water use targets. Projections of future water demand allow a water supplier to analyze if future water supplies are adequate, as well as help the agency when sizing and staging future water facilities to meet water use targets. Projected water use, combined with population projections, provide the basis for estimating future water requirements.

Baseline and Targets

This section presents an analysis of water use data and resulting projections for future water needs for the City of Morro Bay, including a 2020 water use target and a 2015 interim target water use.

Baseline Water Use of the City of Morro Bay

DWR has developed methodologies and criteria for determining baseline water use and water use targets (Part II, Section M; Guidebook Part II, Section D per the Water Conservation Bill of 2009 (DWR, 2011). DWR documents provide guidance to water purveyors to prepare both a 10-year and 5-year water use baseline (DWR, 2011). The City has developed the baselines and targets for the City of Morro Bay individually, which covers the water usage within the City's service area. Following requirements provided in the guidebook, the City has calculated baseline per capita water use, an urban water use target for 2020, and an interim water use target for 2015.

The City's 2008 recycled water use is less than 10 percent of total annual water use; therefore, the base period is considered as a continuous 10-year period (DWR, 2011). Table 3-1 presents a summary of base period ranges for the City. The table also provides information on 2008 water deliveries. The 10-year baseline period used for estimating a gallon per capita per day (gpcd) value begins with January 1, 1995, and ends on December 31, 2004. A 5-year base period range starting from January 1, 2003, through December 31, 2007, was used to determine a minimum required reduction in water use by 2020.

Table 3-1
Summary of Base Period Ranges of the City of Morro Bay

Base	Parameter	Value	Units
10- to 15-year Base Period	2008 Total Water Deliveries	13,060	ac-ft
	2008 Total Volume of Delivered Recycled Water	0	
	2008 Recycled Water as a percent of Total Deliveries	0	
	Number of Years in Base Period ²	10	years
	Year beginning Base Period Range	1995	
	Year-ending Base Period Range ²	2004	
5-year Base Period	Number of Years in Base Period	5	years
	Year beginning Base Period Range	2003	
	Year ending Base Period Range ³	2007	

Notes:

1. Table format is based on DWR Guidance Document Table 13.
2. The 2008 recycled water percent is less than 10 percent; therefore, the first base period is a continuous 10-year period. The ending year is December 31, 2004.
3. The ending year is December 31, 2007.

Water Use Targets

The Water Conservation Act of 2009, Senate Bill SBx7-7 requires water agencies to reduce per capita water use by 20 percent by 2020 (20x2020). Per DWR's guideline (DWR, 2011) four methods are outlined for consideration by the water agencies to determine the urban water use target. These methods include:

- Method 1: 80 percent of Base Daily Per Capita Water Use
- Method 2: Performance Standards
- Method 3: 95 percent of Regional Target
- Method 4: Water Savings

Water suppliers are required to set a water use target for 2020 and an interim water use target for 2015 using one of four methods. The 2020 urban water use target may be updated in a supplier's 2015 UWMP.

The City adopted Method 3 described in the DWR guidance document (DWR, 2011) to set its 2015 interim and 2020 water use targets. Method 3 requires the City to identify the hydrologic region within which the service area resides, and uses 95 percent of the Regional Hydrologic Region's baseline per capita water use to calculate the 2020 water use target.

DWR has established interim and final targets for each of the State's 10 hydrologic regions based on population, climate, and water use. The hydrologic region targets were incorporated into the Water Conservation Bill of 2009. Per DWR (DWR, 2011) current water use and conservation targets vary among the regions due to many factors, such as land use patterns (lot sizes, square footage of irrigated landscape), the age and condition of the water distribution infrastructure (water losses), and industrial and socioeconomic characteristics (the cost of water and income level of residents). Figure 3-1 provides a map showing interim and final targets for each hydrologic region in California (DWR F-2, DWR 2011). Note that the City's service area resides fully within the Central Coast Hydrologic Region as shown in Figure 3-1. The 95 percent regional targets for each hydrologic region are shown in Figure 3-2 (DWR D-3, DWR 2011).

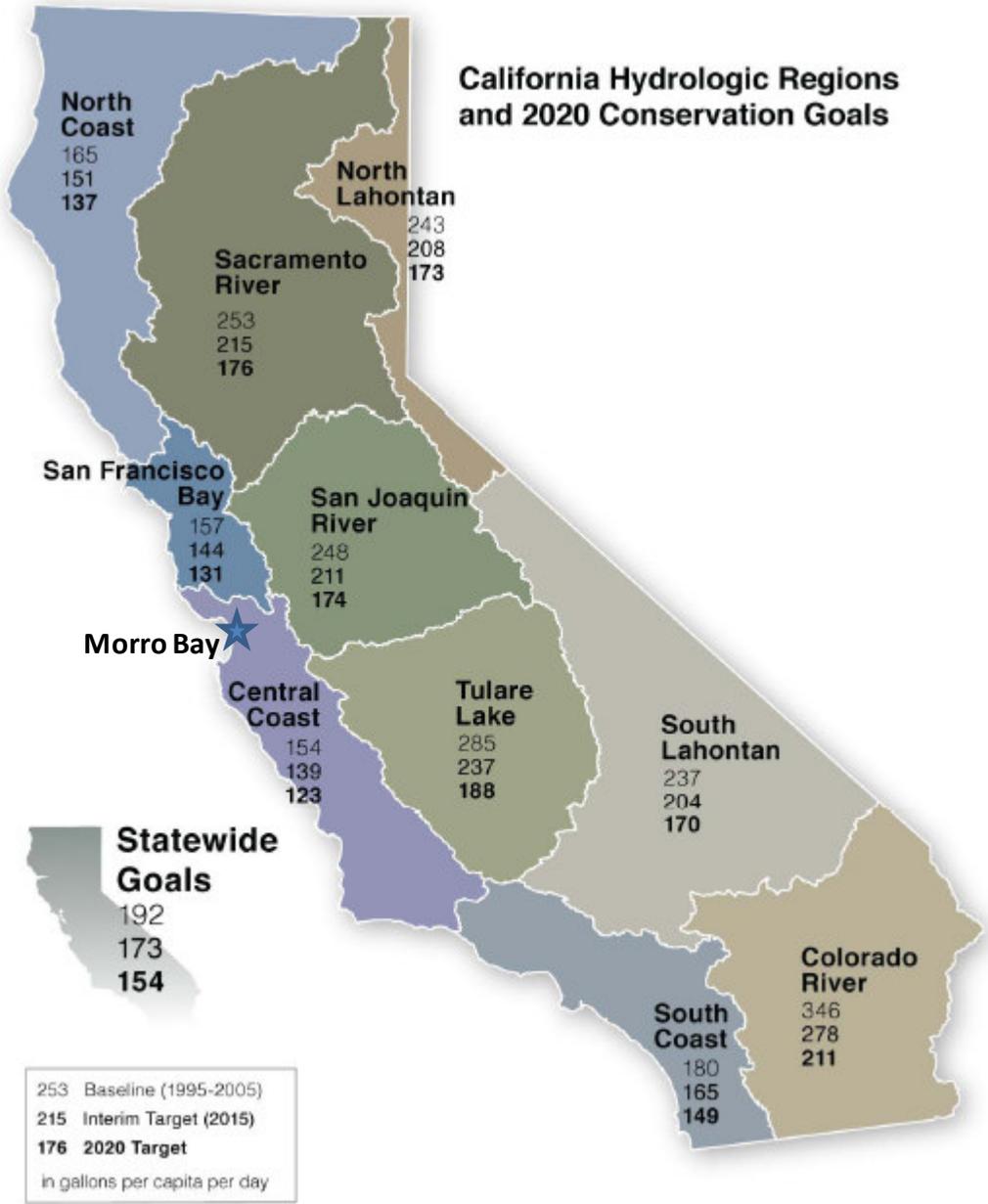


Figure 3-1 California Hydrologic Regions and 2020 Water Conservation Goals (DWR F-2, DWR 2011)

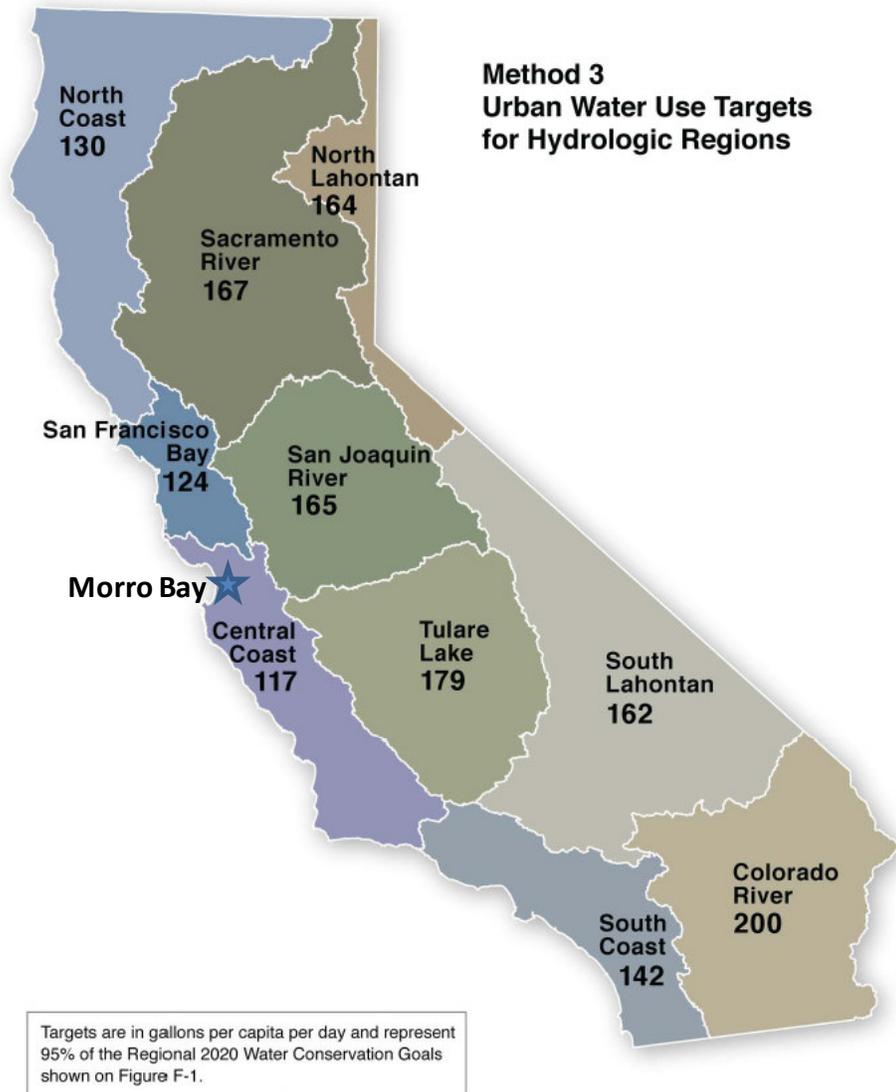


Figure 3-2 Method 3 Water Use Targets for California Hydrologic Regions (DWR D-3, DWR 2011)

The City analyzed per capita water use between 1995 and 2004 to set the 10-year base period for water use (Table 3-2). The base per capita water use estimated (as an average for 10 base years) is 125 gpcd.

Distribution system population for both the 10-year and 5-year water use baseline were obtained directly from DOF provided population data. Daily gross water use was calculated using the City's historical water production records from all water supply sources. These sources include:

- SWP Deliveries
- The Morro Well Field
- The Chorro Well Fields (Ashurst and Romero)
- The Morro Bay Desalination Facility

Total annual water production was converted to daily water production and is reported in Tables 3-2 and 3-3.

Table 3-2
Base Daily Per Capita Water Use (10- to 15-year Range) of the City of Morro Bay

Base Period Year		Distribution System Population	Daily System Gross Water Use (mgd)	Annual Daily Per Capita Water Use (gpcd)
Sequence Year	Calendar Year			
Year 1	1995	9,749	1.28	131
Year 2	1996	9,843	1.34	136
Year 3	1997	9,975	1.40	140
Year 4	1998	10,097	1.18	117
Year 5	1999	10,168	1.24	122
Year 6	2000	10,350	1.25	121
Year 7	2001	10,428	1.26	121
Year 8	2002	10,523	1.26	119
Year 9	2003	10,518	1.26	120
Year 10	2004	10,552	1.31	124
Base daily per capita water use ²				125

Notes:

1. Table format is based on DWR Guidance Document Table 14.
 2. The 10-year average is based on the calendar year ending on December 31, 2004.
- mgd = million gallon(s) per day

Table 3-3 presents historic population and gpcd water use for the 5-year period (2003 to 2007). This table indicates the population served and water supplied for each of those years within the 5-year range and gross water use for each of the 5 years. The average base per capita water use estimated for 5 base years is 119 gpcd. Those data are used to determine whether the 2020 per capita water use target meets the legislation's minimum water reduction requirement per Section 10688.22.

Table 3-3
Base Daily Per Capita Water Use (5-year Range) of the City of Morro Bay

Base Period Year		Distribution System Population	Daily System Gross Water Use (mgd)	Annual Daily Per Capita Water Use (gpcd)
Sequence Year	Calendar Year			
Year 1	2003	10,518	1.26	120
Year 2	2004	10,552	1.31	124
Year 3	2005	10,553	1.21	115
Year 4	2006	10,521	1.20	114
Year 5	2007	10,485	1.27	122
Base daily per capita water use ²				119

Notes:

1. Table format is based on DWR Guidance Document Table 15.
2. The 5-year average is based on the calendar year ending on December 31, 2007.

Minimum Water Use Reduction Requirements

Since the 5-year baseline per capita water use per Section 10608.12 (b)(3) is greater than 100 gpcd, the following calculations are used to determine whether the City of Morro Bay's 2015 and 2020 per capita water use targets meet the legislation's minimum water use reduction requirement per Section 10608.22. Those calculations entail the following steps:

1. Calculated base daily per capita water use of 119 gpcd using a continuous 5-year period ending in December 31, 2007, as presented in Table 3-3.
2. Multiply the 119-gpcd value by 0.95. The resulting value is 113 gpcd. This is the maximum allowable gpcd target in 2020.
3. The 2020 target under Method 3 is 117 gpcd.
4. Because Method 3 target of 117 gpcd is greater than 113 gpcd (i.e., 95 percent of the 5-year base daily per capita water use), adjustment to 2020 target is required.
5. Set 2020 target of 113 gpcd and 2015 (interim) target as the midpoint of 125 (10-year average baseline) and 113 gpcd, which is 119 gpcd.

Table 3-4 presents a summary of base per capita water use and target for 2020 for the City of Morro Bay. The City's interim water use target in 2015 is 119 gpcd, which is halfway between the 10-year baseline water use and 2020 target. The 2020 water use target for the City is 113 gpcd.

The base period of 5-year continuous period is used to determine whether the 2020 per capita water use target meets the legislation's minimum water use reduction requirement per Section 10608.20. Based on the set 2020 target the City of Morro Bay meets the legislation's minimum water use reduction requirement.

Table 3-4
20x2020 Base and Target for the City of Morro Bay

20x2020 Data	Gallons per Capita per Day (gpcd)
Base per capita water use	
10-year Average ¹	125
5-year Average ²	119
20x2020 Target Using Method 3³	
95 percent of Hydrologic Region Target (123 gpcd)	117
95 percent of base Daily Capita Water Use 5-year Average (119 gpcd)	113
Actual 2020 Target	113
2015 Interim Target	119

Notes:

1. Per Table 3-2
2. Per Table 3-3
3. Methodology requires smaller of two results to be actual water use target to satisfy minimum water use target

Historical and Projected Water Use

Historical water use data from 2005 to 2010 were analyzed to estimate the City's future water demands. Projections for the number of service connections and future water use were calculated for the years 2015 through 2035 in 5-year increments. Future water demands were estimated using a population-based approach. Detailed descriptions of how the population-based projections were calculated are provided later in this section. Figure 3-3 shows the historical and projected number of metered service connections for the City's system from 2005 through 2035. Figure 3-4 shows the historical and projected water use for the City of Morro Bay from 2005 through 2035. As shown in this figure, the water demand varies from year to year and can be influenced by a number of factors such as population growth, weather, water conservation, drought, and economic activities.

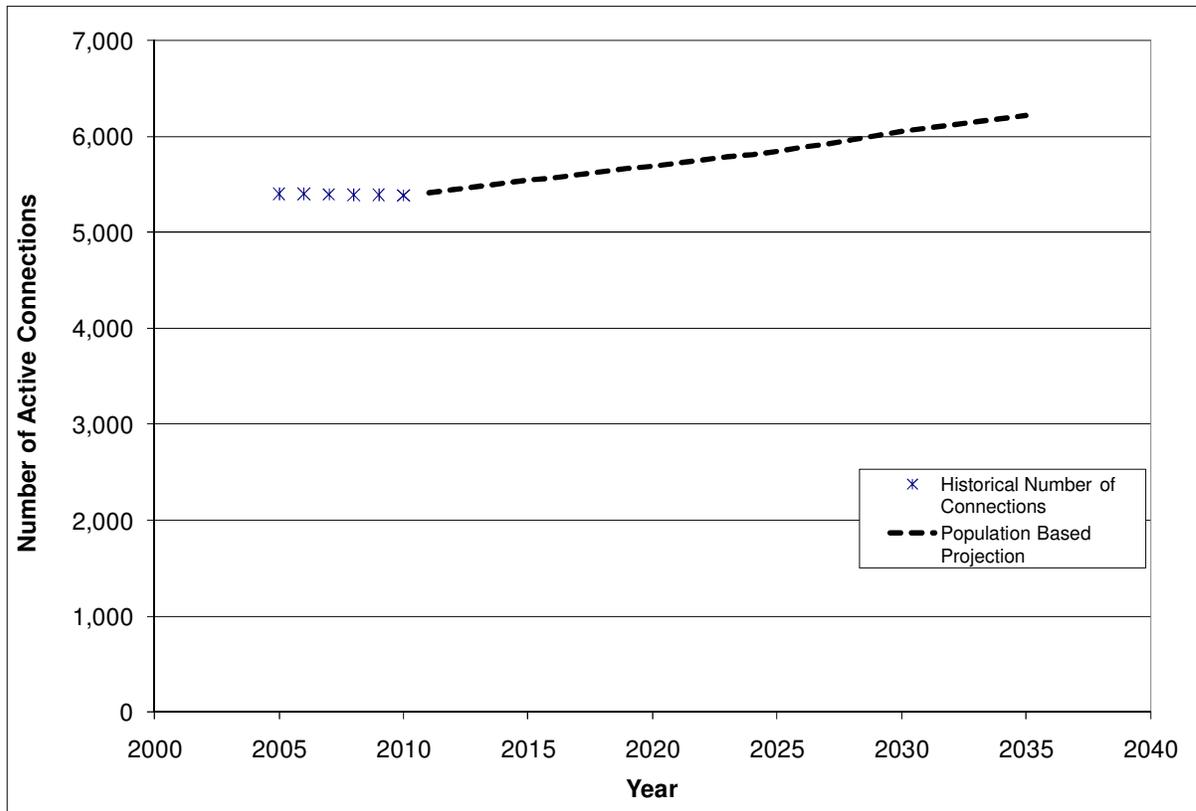


Figure 3-3 Historical and Projected Number of Metered Service Connections

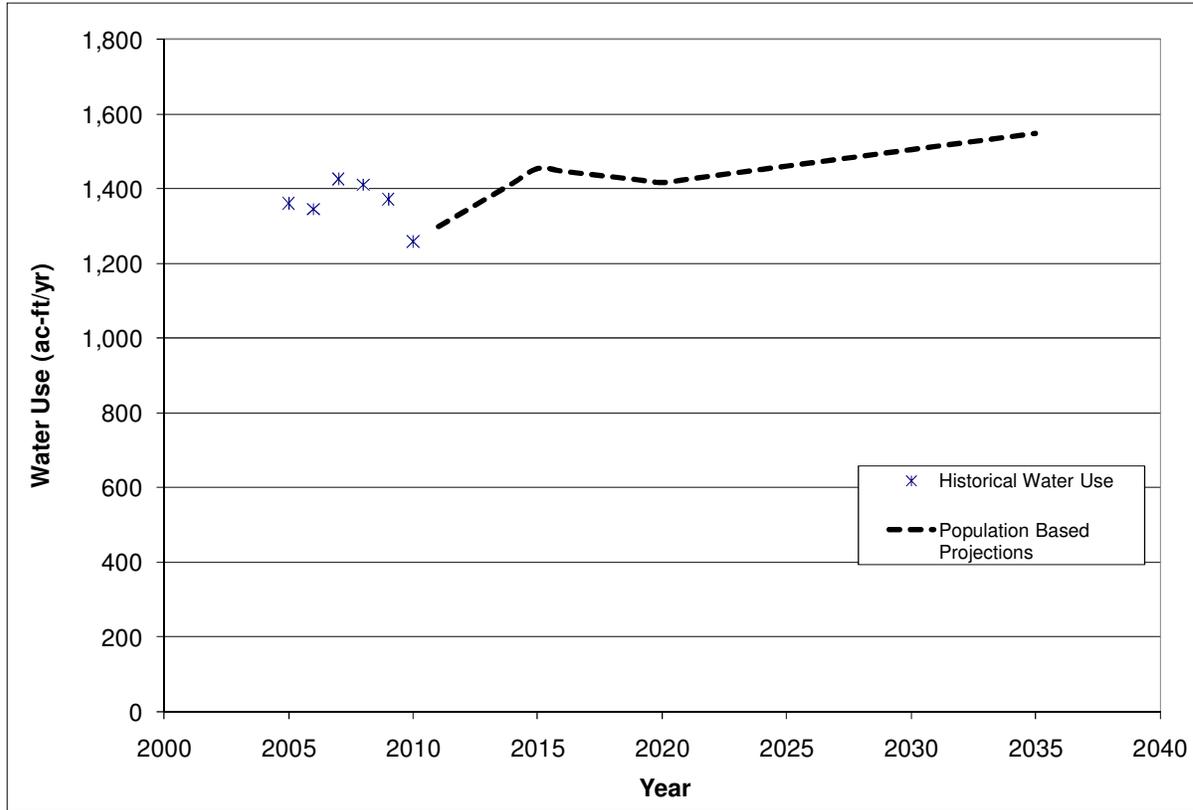


Figure 3-4 Historical Water Use and Future Water Use Projections

During the severe drought of the early 1990s, the City implemented a mandatory water conservation program. Low per capita water demand in 1990 demonstrates the effectiveness of the mandatory water conservation program. After the drought, the mandatory severe drought-level water conservation requirements were replaced by ongoing water conservation programs as described in Section 6 of this UWMP.

Figure 3-5 shows the historical and anticipated per capita water use. As seen from this figure, total water use varies from year to year and is affected by a number of factors such as drought, water conservation, weather, population growth, and economic conditions. Before the City's water conservation program was initiated in the early 1990s, water demand ranged between 132 and 193 gpcd. The average per capita demand during the 10-year period preceding the drought (1978 to 1987) was 154 gpcd. The per capita water use declines in wet years such as 1998 with high rainfall totals and increases in dry years such as 1997 when high irrigation rates were required to sustain crops and gardens. During the 1992 to 2005 period, after the City's water conservation program was implemented, the maximum water use was 141 gpcd. Since the major drought of the early 1990s ended, the maximum seven-year average water use has been 128 gpcd.

Water demand in the City of Morro Bay has gradually increased as population has increased. However, as a result of water conservation measures taken by the City, per capita water use has dropped considerably over time. Per capita water use dropped from over 140 gpcd before 1990 to under 106 gpcd in 2010.

As mentioned previously, the City's 2020 water conservation goals need to be adjusted as 95 percent of the 5-year base daily per capita water use value of 113 gpcd. The City's current (2010) urban water use of 106 gpcd is below the analyzed urban water use target of 113 gpcd in 2020.

One of the reasons that the City of Morro Bay has such low per capita water consumption is that many of the water conservation measures implemented during the drought, such as plumbing retrofits and prohibitions against wasting irrigation water, continue to benefit the community.

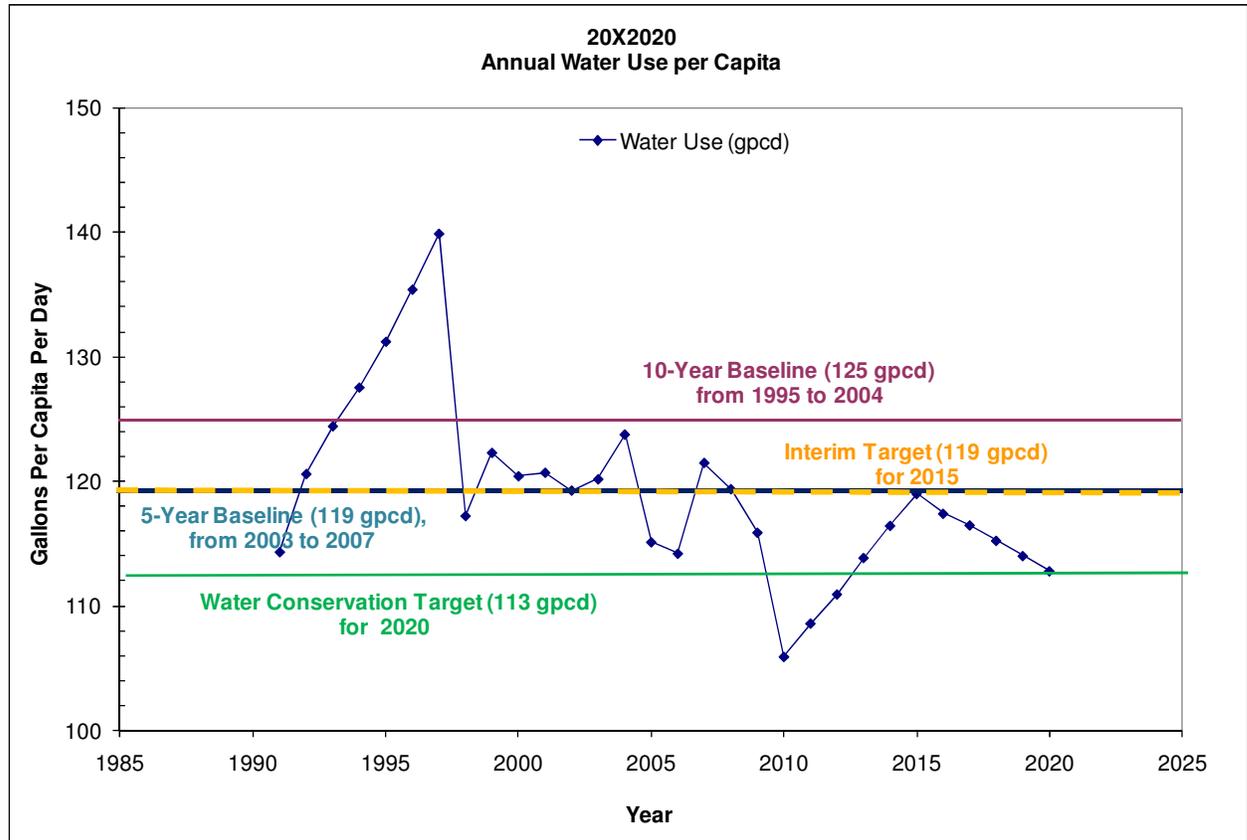


Figure 3-5 Historical Water Use and Future Water Use Projections

Water Demand by Water Use Sectors

Historical water use records from 2005 through 2010 were analyzed to estimate future water demands. These water use data were sorted by customer type using North American Industry Classification System (NAICS) codes into the following categories: single-family, multi-family, industrial, commercial, institutional, and others. Tables 3-5 and 3-6 show the historical (actual) water use data for the City for various categories (e.g., single-family, multi-family, industrial, institutional, and others) for 2005 and 2010, respectively. The water demand does not include losses in the City's system and unaccounted for water use. The categorical water demands in the following tables were prepared from the City's water meter reads and billing database. Tables 3-7 through 3-9 show projected water demands for years 2015 through 2035.

**Table 3-5
Water Deliveries – Actual, 2005**

Water Use Sectors	2005				Total Volume (ac- ft/yr)
	Metered		Not metered		
	# of Accounts	Volume (ac- ft/yr)	# of Accounts	Volume (ac-ft/yr)	
Single-family	4,489	706	0	0	706
Multi-family	330	105	0	0	105
Commercial	428	268	0	0	268
Industrial	7	7	0	0	7
Institutional/governmental	88	109	0	0	109
Landscape	60	19	0	0	19
Agriculture	0	0	0	0	0
Other	0	0	0	0	0
Total	5,402	1,214	0	0	1,214

Notes:

1. Table format is based on DWR Guidance Document Table 3.
2. Water use sector – Sales to other agencies/saline water intrusion barriers/groundwater recharge/conjunctive use/any combination thereof is provided in Table 3-12.
3. Additional water uses and losses are not included in this table. Refer to Table 3-13 for total water use volumes.

**Table 3-6
Water Deliveries – Actual, 2010**

Water use sectors	2010				Total Volume (ac-ft/yr)
	Metered		Not metered		
	# of Accounts	Deliveries (ac-ft/yr)	# of Accounts	Deliveries (ac-ft/yr)	
Single-family	4,481	653	0	0	653
Multi-family	355	99	0	0	99
Commercial	409	250	0	0	250
Industrial	5	3	0	0	3
Institutional/ governmental	83	236	0	0	236
Landscape	51	14	0	0	14
Agriculture	0	0	0	0	0
Other	0	0	0	0	0
Total	5,384	1,255	0	0	1,255

Notes:

1. Table format is based on DWR Guidance Document Table 4.
2. Water use sector - Sales to other agencies/saline water intrusion barriers/groundwater recharge/conjunctive use/any combination thereof is provided in Table 3-12.
3. Additional water uses and losses are not included in this table. Refer to Table 3-13 for total water use volumes.

Table 3-7
Water Deliveries – Projected, 2015

Water use sectors	2015				Total Volume (ac-ft/yr)
	Metered		Not metered		
	# of Accounts	Deliveries (ac-ft/yr)	# of Accounts	Deliveries (ac-ft/yr)	
Single-family	4,609	693	0	0	693
Multi-family	365	105	0	0	105
Commercial	421	265	0	0	265
Industrial	5	4	0	0	4
Institutional/ governmental	85	251	0	0	251
Landscape	52	15	0	0	15
Agriculture			0	0	
Other			0	0	
Total	5,537	1,334	0	0	1,334

Notes:

1. Table format is based on DWR Guidance Document Table 5.
2. Water use sector - Sales to other agencies/saline water intrusion barriers/groundwater recharge/conjunctive use/any combination thereof is provided in Table 3-12.
3. Additional water uses and losses are not included in this table. Refer to Table 3-13 for total water use volumes.

Table 3-8
Water Deliveries – Projected, 2020

Water use sectors	2020				Total Volume (ac-ft/yr)
	Metered		Not metered		
	# of Accounts	Deliveries (ac-ft/yr)	# of Accounts	Deliveries (ac-ft/yr)	
Single-family	4,735	695	0	0	695
Multi-family	375	106	0	0	106
Commercial	432	266	0	0	266
Industrial	5	4	0	0	4
Institutional/ governmental	88	251	0	0	251
Landscape	54	15	0	0	15
Agriculture	0	0	0	0	0
Other	0	0	0	0	0
Total	5,690	1,336	0	0	1,336

Notes:

1. Table format is based on DWR Guidance Document Table 6.
2. Water use sector - Sales to other agencies/saline water intrusion barriers/groundwater recharge/conjunctive use/any combination thereof is provided in Table 3-12.
3. Additional water uses and losses are not included in this table. Refer to Table 3-13 for total water use volumes.

Table 3-9
Water Deliveries – Projected 2025, 2030, and 2035

Water use sectors	2025		2030		2035	
	Metered		Metered		Metered	
	# of Accounts	Deliveries (ac-ft/yr)	# of Accounts	Deliveries (ac-ft/yr)	# of Accounts	Deliveries (ac-ft/yr)
Single-family	4,883	709	5,031	733	5,177	755
Multi-family	387	108	399	111	410	115
Commercial	446	271	459	280	473	289
Industrial	5	4	6	4	6	4
Institutional/ governmental	90	256	93	265	96	273
Landscape	56	15	57	16	59	16
Agriculture	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total	5,867	1,364	6,045	1,409	6,220	1,452

Notes:

1. Table format is based on DWR Guidance Document Table 7.
2. Water use sector - Sales to other agencies/saline water intrusion barriers/groundwater recharge/conjunctive use/any combination thereof is provided in Table 3-12.
3. Additional water uses and losses are not included in this table. Refer to Table 3-13 for total water use volumes.

The annual water use by connection type was also projected for the years 2015 through 2035. Based on the 2010 data, percentages of water use for each category (connection type) were calculated. Those percentages were applied for calculating water use for each category in the future years (from 2015 through 2035).

The number of service connections for each category was also projected based on a scaling factor. The scaling factors are calculated based on the ratio of population of the current year divided by the previous year (in a 5-year interval). For example, a scale factor in 2015 is determined by dividing population in 2015 by population in 2010. The scale factors from 2015 through 2035 (in 5-year increments) ranged between 1.02 and 1.03. The total annual water use for each connection type was calculated by multiplying the scale factor to each connection type.

Figure 3-6 shows the population-based water use projections by customer type, unaccounted for water, and projected sales to other agencies. The population-based projections of the number of service connections, and the resulting water demand from 2015, 2020, and 2025 to 2035, are provided in Tables 3-7, 3-8, and 3-9, respectively.

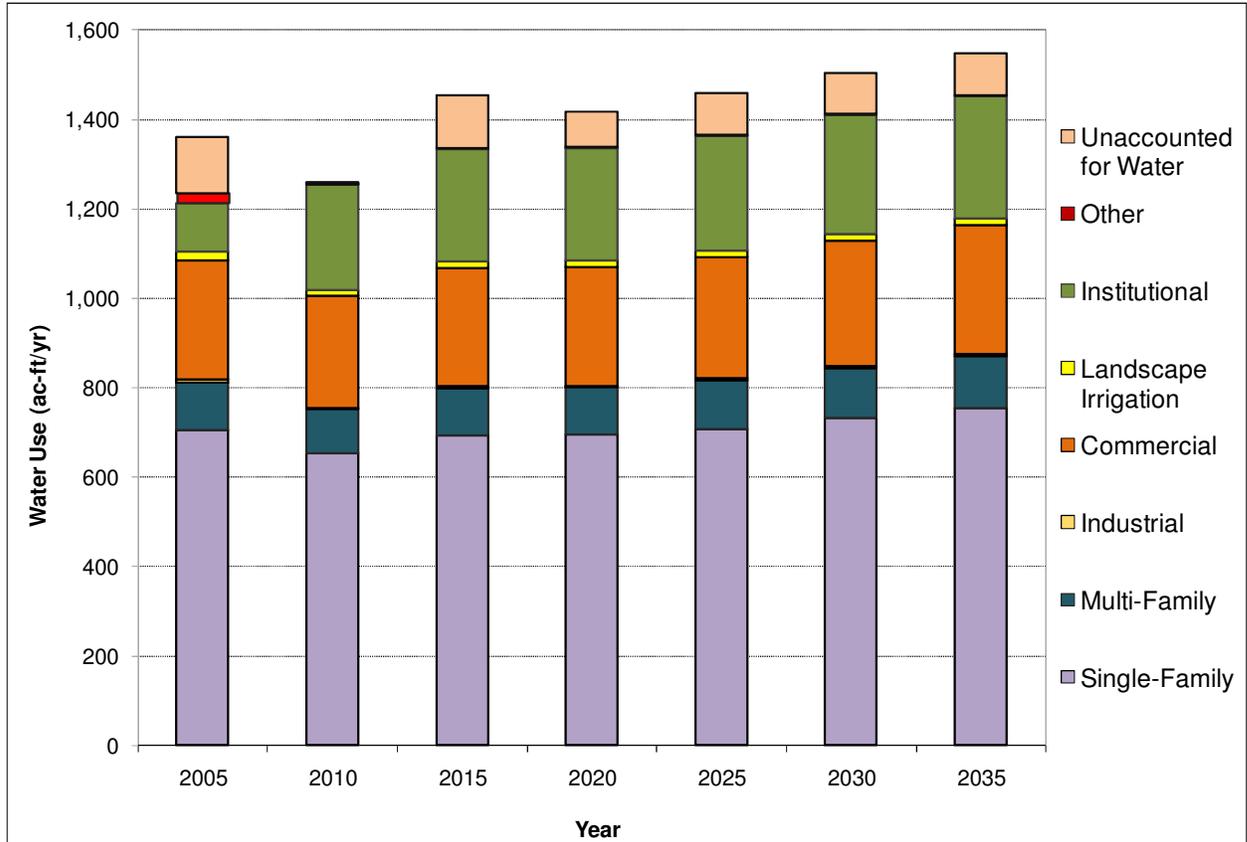


Figure 3-6 Water Use by Customer Type

The projected water demands were calculated using the population projection from Section 2 of this plan and the 2020 target of 113 gpcd. The annual average daily demand was used instead of the annual average daily water use because the demand number does not reflect system losses or unaccounted for water use, and is therefore a better indicator of future water deliveries. The actual and projected water loss and unaccounted for water use are shown later in Table 3-13.

Low Income Projected Water Demands

The requirements for the 2010 UWMP call for projections of water demands for low income customers. The estimated lower income water use projections for single-family and multi-family housing units are presented in Table 3-10. On average, the low income family water use is estimated based on about 19 percent of total water demand to low income single-family residential and about 3 percent of total water demand to low income multi-family residential. Per the 2000 Census data, about 37 percent of households belong to the low-income group (with annual income less than \$24,999, which is less than 80 percent of the household median income in 2000). To forecast low income single family water demand, the 37 percent of 52 percent total single family (which is equivalent to about 19 percent of total water demand) and 37 percent of 7.9 percent total multi-family household (which is equivalent to about 3 percent of total water demand) was applied to the total water use to determine water use by the low-income households in the future. The lower income water

use projections are included in the overall water use projections provided in Tables 3-5 through 3-9.

Table 3-10
Low-Income Projected Water Demands (Ac-ft) for City of Morro Bay

Low-Income Water Demands	2015	2020	2025	2030	2035
Single-family residential	264	271	280	288	297
Multi-family residential	40	41	42	44	45
Total	304	312	322	332	342

Notes:

1. Table format is based on DWR Guidance Document Table 8.

Sales to Other Water Agencies

The City does not provide or sell water to any other water agency; therefore, Table 3-11 has been intentionally left blank.

Table 3-11
Sales to Other Water Agencies

Water Distributed	Water Sales						
	2005	2010	2015	2020	2025	2030	2035
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. Table format is based on DWR Guidance Document Table 9.
2. Unit of measure: Ac-ft/yr
3. Based on calendar year

Additional Water Uses and Losses

To accurately predict total water demand, other water uses, as well as any water lost during conveyance, must be added to the customer demand. California regulation requires water suppliers to quantify any additional water uses not included as a part of water use by customer type. There are no other water uses in the City's system in addition to those already reported above.

Unaccounted-for water must be incorporated when projecting total water demand. Unaccounted-for water is defined as the difference between annual production and supply and annual sales. Included in the unaccounted-for water are system losses (due to leaks, reservoir overflows, or inaccurate meters) and water used in operations. In the City's potable water system, from 2005 through 2010, unaccounted-for water has averaged 9 percent of the total production varying from less than 1 percent to fourteen percent. Table 3-12 provides a summary of unaccounted-for water including hydrant flushing and street sweeping in the City's system.

The City had historically had high water losses resulting from pipeline leakage and unaccounted for use. The City's extensive pipeline replacement program has reduced pipeline losses. To further reduce water losses, the City continues the following actions:

- Continue to promptly repair identified water leaks.
- Monitor water consumption versus production so that the water loss can be identified.
- Calibrate water meters periodically.
- Replace less accurate gear-drive water meters.

Table 3-12
Additional Water Uses and Losses

Water Use Type	Water Uses and Losses						
	2005	2010 ⁽¹⁾	2015	2020	2025	2030	2035
Saline Barriers	0	0	0	0	0	0	0
Groundwater Recharge	0	0	0	0	0	0	0
Conjunctive Use	0	0	0	0	0	0	0
Raw Water	0	0	0	0	0	0	0
Recycled Water	0	0	0	0	0	0	0
System losses	143	4	120	80	97	96	96
Total	143	4	120	80	97	96	96

Notes:

1. Unaccounted-for water includes system losses due to leaks, reservoir overflows, and inaccurate meters, as well as water used in operations, hydrant flushing, street sweeping, line breaks etc. – an average value of 9 percent is used for making future projections based on data between 2005 and 2010.
2. Low water losses and uses could be due to multiple factors, such as replacement of some well production meters but meter error and other errors can combine to produce a range of losses (apparent) that do not necessarily occur
3. Based on calendar year
4. Unit of measure: ac-ft/yr
5. Table format is based on DWR Guidance Document Table 10.

Total Water Use

As mentioned previously, other water uses, as well as any water lost during conveyance, must be added to the customer demand to project the City's water demand. In addition to the City's sales to other agencies, unaccounted-for water must be incorporated to the total water demand (refer to the previous section for a definition of unaccounted-for water).

Table 3-13 summarizes the projections of water sales to other agencies, demand within the City, unaccounted-for water, and total water demand of the population-based projections through the year 2035.

Table 3-13
Total Water Uses and Loses

Water Use	Total Water Use						
	2005	2010	2015	2020	2025	2030	2035
Total water deliveries (from Table 3-5 to 3-9)	1,214	1,255	1,334	1,336	1,364	1,409	1,452
Sales to other water agencies (from Table 3-11)	-	-	-	-	-	-	-
Additional water uses and losses (from Table 3-12)	143	4	120	80	97	96	96
Total	1,357	1,259	1,454	1,416	1,461	1,505	1,548

Notes:

1. Table format is based on DWR Guidance Document Table 11.

2. Unit of measure: Ac-ft/yr

City of Morro Bay's Production Facilities

The City measures flow at each of its production facilities using volumetric water meters. The City field crew calibrates production meters to ensure reasonably reliable measurements. Flow from the SWP is measured continuously through the City's supervisory control and data acquisition (SCADA) system and stored in a database. The City began receiving SWP water from the County of San Luis Obispo via the Coastal Branch Aqueduct in 1997. The State Water Turnout production facility did not exist during the first few years of the 10-year base period. State Water Project production is calculated by averaging flow every five minutes. During the baseline period, the flow measurements were conducted using the similar instrumentation. However, the flow measuring methodologies were refined over time as the technologies have advanced and as new sources were brought online. During the baseline period the SWP was brought online. No changes have been made to the metering of other sources of production.

Data Provided to Wholesale Agency

The City provided the following water use projections data to the County of San Luis Obispo, its wholesale water supplier for the SWP. The requested amounts from the County of San Luis Obispo in Table 3-14 reflect the water needed to meet demands for the City of Morro Bay from 2010 through 2035.

Table 3-14
Retail Agency Demand Projections Provided to Wholesale Suppliers

Wholesaler	Contracted volume (ac-ft/yr)	Year					
		2010	2015	2020	2025	2030	2035
County of San Luis Obispo	1,313	1,313	1,313	1,313	1,313	1,313	1,313

Notes:

1. Table format is based on DWR Guidance Document Table 12.
2. Based on calendar year
3. Unit of measure: ac-ft/yr

Water Use Reduction Plan

The City of Morro Bay is in compliance with the Water Conservation Bill of 2009. As previously mentioned, the City's current water use is less than the interim and 2020 per capita water use target. The City is committed to the implementation of the conservation plan as required by the Act to ensure that the City meets the targets in the future years as well. The City will conduct a public hearing which will include a general discussion of the City's implementation plan for complying with the Water Conservation Bill of 2009.

One of the City's main water use reduction plan goals is to actively reduce water losses and unaccounted for water through aggressive leak detection, main line replacement, meter replacements, and more accurately metering temporary water connections. In addition, the City has successfully implemented a rigorous and effective water conservation program as a part of the water reduction plan. A series of water conservation measures were adopted during the height of the drought in the early 90s, when the City's water supplies were taxed to their limit. The water conservation program, as implemented by the City, is intended to protect the public health and safety as well as minimize adverse impacts to commerce, industry and recreation associated with drought conditions.

The City has long recognized water conservation as major goal toward achieving independence in managing its water portfolio. In response to the drought of 1987-1992, the City expanded a voluntary water conservation program in 1990. Prompted by an extensive public awareness program and education campaign, the City customers responded not only with water saving practices but also by installing conservation measures in their homes and businesses. Devices such as low-flow showerheads and ultra-low-flush toilets (ULFT) replaced existing non-water saving devices. These hardware changes, coupled with more responsible use habits, have significantly reduced the amount of imported water that the City would have to otherwise buy as the City's population and commerce has continued to grow. In response to the current water shortage conditions the City has reinitiated its extensive public awareness campaigns to encourage water saving practices and installation of conservation devices in homes and businesses. Conserving customers see a tangible benefit as well through monetary savings on their water bill.

The City's water conservation policies promote the more efficient use of the existing water resources. Conservation has shown a positive impact on the City's water use patterns and

has become a permanent element of the City's water management approach. Since the City adopted its water conservation program in the late 1980s, water demand in the City has declined substantially such that Morro Bay per capita water demand is currently one of the lowest in the State.

Water usage in the City in 2010 was less than the water use in 1990 despite an increase in population of about 1,000 people, which is about 10 percent increase of population (see Figure 3-7). Between 1990 and 2010, water use decreased by approximately 270 ac-ft which is about 18 percent water savings. Per capita water use decreased from 141 gpcd in 1990 to 106 gpcd in 2010.

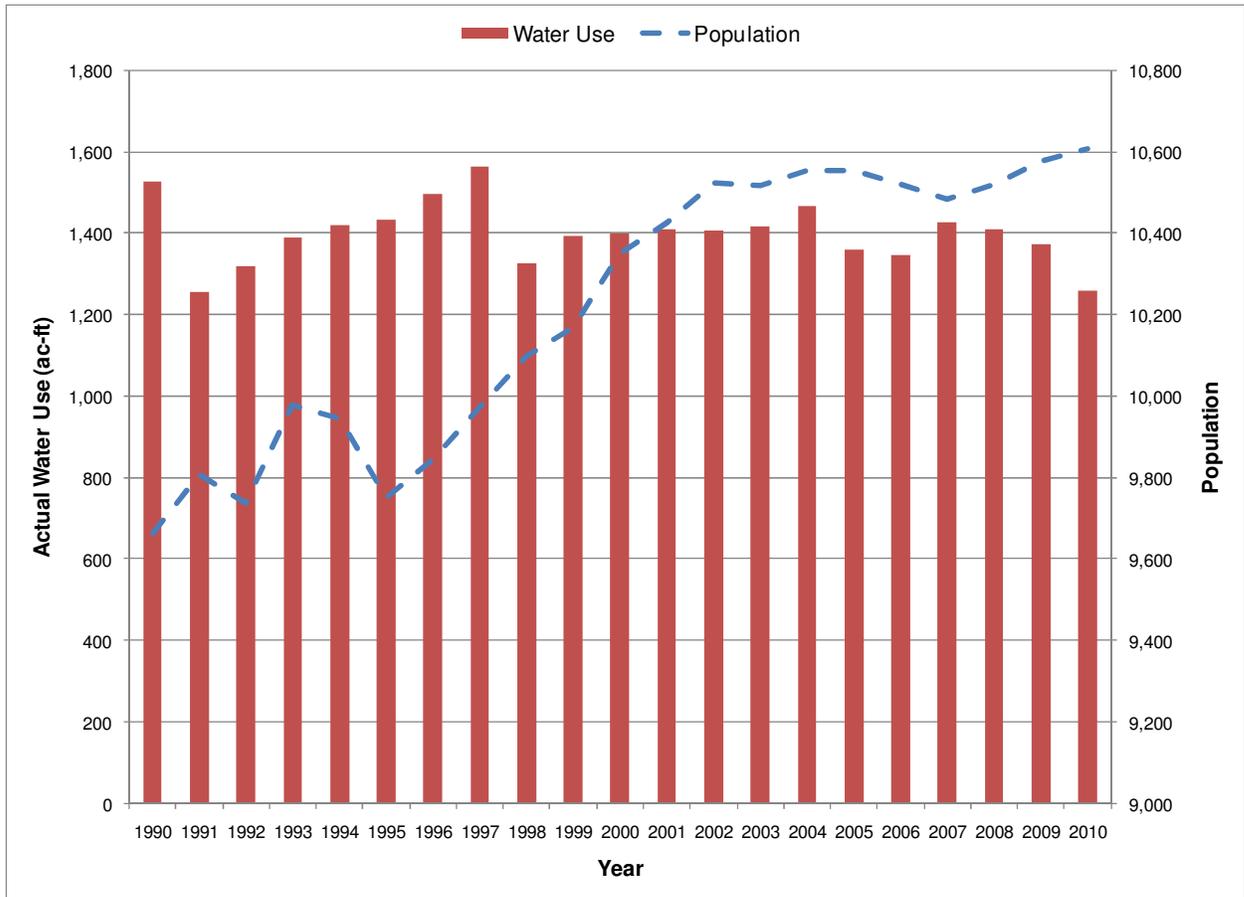


Figure 3-7 Population and Historical Water Use for the City of Morro Bay

Figure 3-8 indicates that the water demand or the per capita use for the City has decreased over the last few years. The reduction in demand could be due to a combination of factors such as weather, water conservation, drought, and economic activities. From 1998 through 2009, per capita water use varied between 124 and 114 gpcd. In 2009 and 2010, per capita water use further declined, which is attributed to conservation and a severe economic recession. Due to recent water use reduction plans, per capita water demand dropped dramatically between 2008 and 2010 from 119 gpcd to 106 gpcd. Future water demand is expected to increase due to an increase in population and a slight increase in per capita use, but demands are projected to remain below the 2020 target, as the economy recovers.

Continued conservation measures will be implemented by the City in an effort to control water demand.

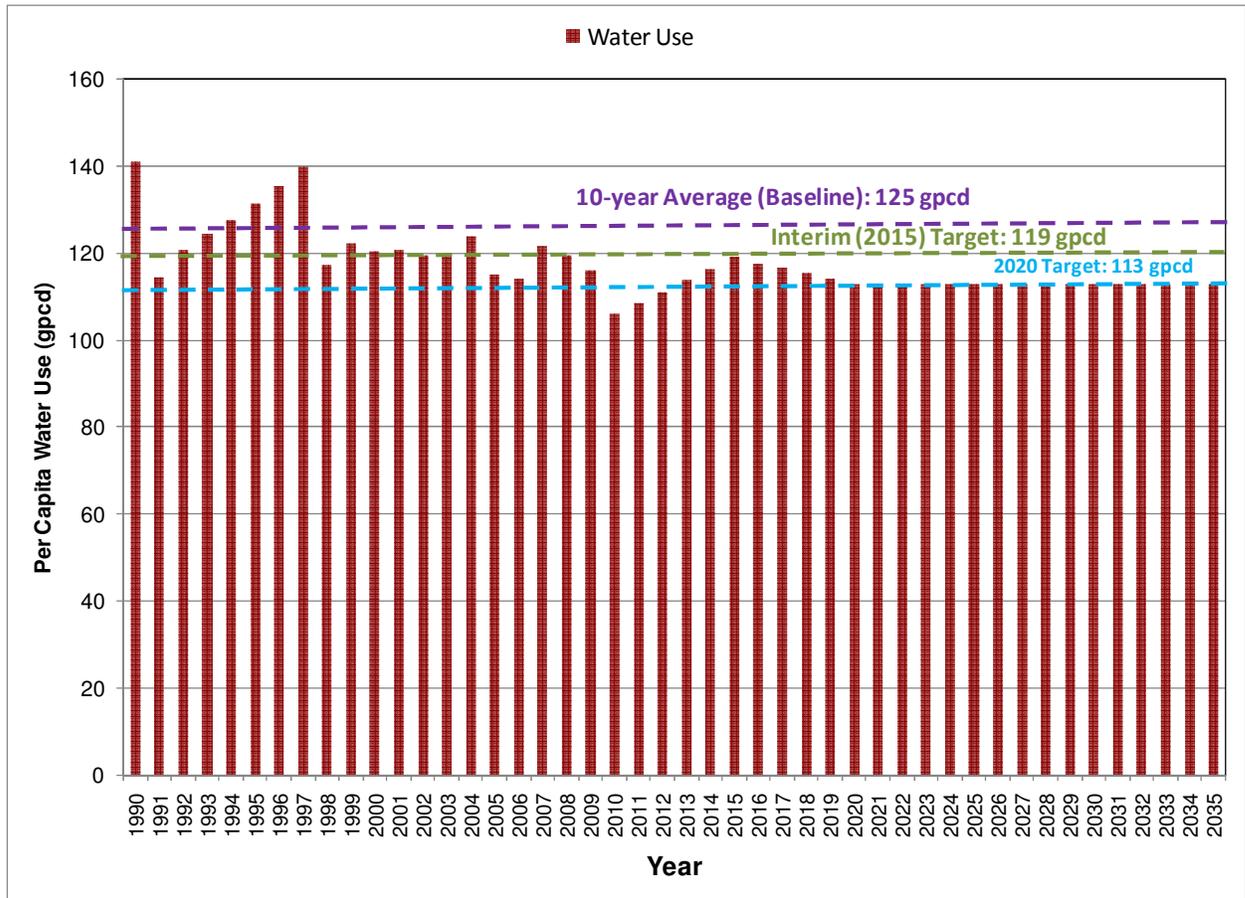


Figure 3-8 Historical Water Use and Future Water Use Targets for the City of Morro Bay

Some of the recent actions the City has taken toward achieving reduction of water use include the following:

- Continue to implement and invest in water conservation programs and measures targeting cost-effective reductions in water use
- Continue regional partnerships with the San Luis Obispo County Partners in Water Conservation Group
- Enforce the uniform plumbing code for new development
- Promote efficient use of local and state water supplies through information and assistance to residential, commercial, and institutional customers
- Regular monitoring and analysis of demand through updates of the City's water conservation plan
- Continue efforts in providing the public with general information regarding water conservation issues

- Continue protecting water resources, along with maintenance of the City's water supply system, to help sustain the City's water distribution system so that the residents can continue to have clean and reliable water supplies.

City residents currently conserve water at a level greater than in most other municipalities. Water conservation measures have included plumbing retrofit requirements that have been in place for more than a decade. The City's high water rates and tiered rate structure have also encouraged residents to conserve water. In order to continue investing in the water conservation program and to remedy the impact of reduced water sales on revenues, the City may need to apply an adjustment billing factor in the near future.

With continued implementation of conservation efforts, the City has emphasized the policies/programs that avoid placing a disproportionate burden on any customer sector. The City has actively been pursuing outside sources of grant funding to complement the City's resources.

As an example, the City of Morro Bay applied for Proposition 84 grant funding through the California Department of Public Health (CDPH) for the Desalination Plant Energy Recovery Project. The goal of the project is to assist in the remediation of anthropogenic nitrate contamination of the Morro Groundwater Basin. The City received \$600,000 from the grant to administer and construct the project. The project consists of installing two new BWRO trains to treat water from freshwater wells, which operate under less pressure, and require less energy than the SWRO trains currently at the plant, installing an additional transformer for power supply, replacing mechanical pumping equipment, and conducting a SCADA upgrade. The new BWRO treatment trains will lower the energy needed to treat the freshwater supply wells during periods of SWP reduced deliveries or shut-downs. The modifications to the plant will allow for full utilization of the treatment capacity of the facility, by allowing the BWRO trains and SWRO trains to operate simultaneously. The Desalination Plant Energy Recovery Project will reduce the operation costs and energy use per unit of production. This will allow the City of Morro Bay to utilize the Morro Basin groundwater, which will help to flush the high nitrate concentrations out of the Morro Valley Groundwater Basin.

Also, the City is a partner agency in the San Luis Obispo Integrated Regional Water Management Plan which has pursued both Proposition 84 and Proposition 50 grant monies.

Section 4. System Supplies

A detailed evaluation of water supplies is requested by the Act. Sections 10631 (a) through (d) require that (item numbers are from the 2010 UWMP guidebook outline checklist):

#13. Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a) (10631(b)).

#14. (Is) groundwater . . . identified as an existing or planned source of water available to the supplier . . . (10631(b))?

#15. (Provide a) copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management (10631(b)(1)).

#16. (Provide a) description of any groundwater basin or basins from which the urban water supplier pumps groundwater (10631(b)(2)).

#17. For those basins for which a court or the board has adjudicated the rights to pump groundwater, (provide) a copy of the order or decree adopted by the court or the board (10631(b)(2)).

#18. (Provide) a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree (10631(b)(2)).

#19. For basins that have not been adjudicated, (provide) information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition (10631(b)(2)).

#20. (Provide a) detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records (10631(b)(3)).

#21. (Provide a) detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records (10631(b)(4)).

#24. Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis (10631(d)).

#31. Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply (10631(i)).

#44. Provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area (10633).

#45. (Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal (10633(a)).

#46. (Describe) the quantity of treated wastewater that meets recycled water standards, being discharged, and is otherwise available for use in a recycled water project (10633(b)).

#47. (Describe) the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use (10633(c)).

#48. (Describe and quantify) the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses (10633(d)).

#49. (Describe) the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision (10633(e)).

#50. (Describe the) actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year (10633(f)).

#51. (Provide a) plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use (10633(g)).

#30. (Describe) all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program (10631(h)).

This section addresses water supply sources available to the City of Morro Bay. It includes a description of each water source, source limitations (physical or political), water quality, and water exchange opportunities. The section presents a complete water portfolio for the City of Morro Bay. The following sections provide details in response to those requirements of this portion of the Act.

Water Sources

The City's water portfolio is comprised of the following available water supply sources: local groundwater, purchased water from the SWP, and the Morro Bay desalination facility. The imported water supplies for the City are obtained from the SWP via a contract with the County of San Luis Obispo.

Table 4-1 summarizes current and planned water supplies available to the City from 2010 through 2035. It should be noted that the water supply available to the City is much greater

than the supply needed to meet projected demand. A detailed description of available supply and demand is presented in Section 5 of this UWMP.

**Table 4-1
Current and Projected Water Supplies for the City of Morro Bay**

Source		2010	2015	2020	2025	2030	2035
Water Purchased from	Wholesaler supplied volume (yes/no)						
Purchased Water from County of San Luis Obispo ⁽²⁾	yes	873	1,313	1,313	1,313	1,313	1,313
Groundwater ⁽³⁾		128	1,724	1,724	1,724	1,724	1,724
Transfers In		0	0	0	0	0	0
Exchange In		0	0	0	0	0	0
Recycled Water		0	0				
Desalination Water		258	645	645	645	645	645
Other		0	0	0	0	0	0
Total		1,259	3,682	3,682	3,682	3,682	3,682

Notes:

1. Unit of measure: ac-ft/yr
2. The City anticipates to receive its full contracted SWP water due to the City's drought buffer.
3. Groundwater supplies are based on appropriative rights in the Chorro and Morro Groundwater Basins as defined in the water rights permits. Pursuant to the permits, the City has been assigned 581 ac-ft/yr in Morro and 1,143 ac-ft/yr in Chorro of appropriative rights, which are included in this data. Further details can be found in the Groundwater Permits (Appendix F).
4. See Reliability section for details on these supplies.
5. Table format based on DWR Guidance Document Table 16

The City's water supply is projected to remain relatively constant from 2015 to 2035 to meet associated projected water demands, with the majority of this demand being met by imported surface water and the remaining supplies serving as a backup for reliability. The City is expected to have an available supply in excess of the projected demands through 2035 (presented in Section 3). Details of the imported water, native groundwater, and desalination facility supplies are presented in the following section.

Wholesale Supplies

The City's primary source of water is the SWP. California's Department of Water Resources (DWR) is responsible for the construction, operation and maintenance of the SWP. SWP water originates within the Feather River watershed, is captured in Lake Oroville, and flows via the Sacramento-San Joaquin Delta, the California Aqueduct and the Coastal Branch Extension into CCWA's treatment and conveyance facilities.

The City has entered into two contracts with the San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD) for receipt of the SWP water. The first contract,

the *Water Treatment and Local Facility Agreement*, dated March 1, 1992, covers the CCWA treatment plant and local facilities such as the Chorro Valley Pipeline. The second contract, *Water Supply Agreement between San Luis Obispo County Flood Control and Water Conservation District and the City of Morro Bay*, dated May 11, 1992, covers receipt of State Water and payment for State facilities. Both contracts require the City to make certain payments whether or not water is received.

The City has an entitlement to receive 1,313 ac-ft/yr of State Water. The City also has entitlement to an additional drought buffer of 174 percent which allows the City to receive deliveries up to its full allocation of 1,313 ac-ft/yr when SWP water deliveries are reduced due to drought conditions. Table 4-2 presents the contracted volumes available from CCWA to the City per Table A SWP water and the amount needed by the City to meet the demands from 2015 through 2035. Appendix G contains the CCWA provided future projections of the volume of water to be delivered to the City of Morro Bay.

Table 4-2
Wholesale Supplies – Existing and Planned Sources of Water

Wholesale Sources ^{2,3}	Contracted Volume ³	2015	2020	2025	2030	2035
Purchased Water from SWP ⁽²⁾	1,313	1,313	1,313	1,313	1,313	1,313

Notes:

1. Unit of measure: ac-ft/yr
2. Water volumes are accounted for in Table 4-1
3. Indicate the full contracted amount of water
4. Table format based on DWR Guidance Document Table 17.

On average, the SWP can deliver only part of the entitlements held by SWP contractors and subcontractors with the SWP facilities currently in service. This is because not all of the water delivery facilities originally included in the SWP plan have been constructed. Some originally planned facilities may never be constructed. In addition, environmental concerns and the outcome of the California-Federal (CalFed) Water negotiations reduced the actual diversions below original forecasts. The long-term reliability of this source is discussed in Section 5 of this UWMP.

Groundwater

Prior to construction of the City's SWP connection, the City received its entire water supply from two local groundwater basins: the Morro and Chorro Basins. These basins are shallow alluvial aquifers located in the Morro and Chorro Valleys. Past experience indicates that the basins have a limited storage capacity, with groundwater flowing to the ocean by gravity. The basins can be drained after a short drought. Annual recharge from rainfall is important to maintain continuous extractions.

The Chorro and Morro Basins are shallow alluvial basins that behave similar to an underground stream. Rainfall in the watershed percolates into the ground and flows underground to the ocean. Use of such water resources are controlled by the SWRCB. In 1972, the SWRCB issued findings that the Chorro and Morro Basins are riparian underflow.

In response to these findings the City of Morro Bay applied for appropriative water rights. In 1995, the SWRCB approved water right permits for up to 1.2 cubic feet per second (cfs) and 581 ac-ft/yr from the Morro Creek subterranean stream underflow, and up to 3.171 cfs and 1142.5 ac-ft/yr annually of Chorro Creek subterranean stream underflow. The Chorro Creek water right includes a condition that the City can only pump its wells when the Chorro Creek flow exceeds 1.4 cfs. This condition can limit the availability of the resource for use as a water supply. Table 4-3 lists groundwater pumping rights for the City.

Table 4-3
Groundwater Pumping Rights

Basin Name	Pumping Rights
Morro Groundwater Basin	581
Chorro Groundwater Basin	1,142.5
Total	1,723.5

Note:

1. Unit of measure: ac-ft/yr

Table 4-4 presents the City's wells and current well capacities. The City's current well system has a total production capability of 2,032 gallons per minute (gpm) (3,277 ac-ft/yr).

Table 4-4
Wells and Well Capacity in the City of Morro Bay System

Well Name	Well Field	Nominal Well Capacity (gpm)	Nominal Well Capacity (ac-ft/yr)	Status ⁽¹⁾
1	Morro	-	-	Abandoned
2	Morro	-	-	Abandoned
3	Morro	140	226	Active
4	Morro	300	484	Active
13	Morro	-	-	Abandoned
14	Morro	125	201	Active
15	Morro	113	182	Active
8	Chorro	-	-	Abandoned
9	Chorro	223	360	Inactive
9A	Chorro	140	226	Inactive
10	Chorro	220	355	Inactive
10A	Chorro	140	226	Inactive
11A	Chorro	225	363	Active
12	Chorro	216	348	Inactive
16	Chorro	190	306	Inactive
Total Capacity		2,032	3,277	

Notes:

1. Reported well status is from December 2010.

The Morro Groundwater Basin was previously unavailable to the City due to nearby methyl tertiary butyl ether (MTBE) contamination in the groundwater basin. Treatment The City began treatment for MTBE in 2002 and continued this treatment until MTBE contamination levels fell below the Regional Water Quality Control Board's (RWQCB) monitoring threshold in 2008. Since then the MTBE levels continue to remain below the RWQCB's monitoring threshold. One of the Chorro Basin wells (Well No. 8) has been abandoned and a second Chorro Basin well (Well No. 12) is out of service due to proximity to surface water and the associated water quality concerns. The City's Ashurst well field in the Chorro Groundwater Basin (consisting of wells 9, 9A, 10, 10A, and 16) was taken out of service (per direction from the California Department of Public Health) in 2009 due to nitrate contamination in the basin. Historic groundwater water production is summarized in Table 4-5.

Table 4-5
Groundwater Pumping History by the City of Morro Bay (2006 to 2010)

Basin Name	Metered or Unmetered ⁴	2006	2007	2008	2009	2010
Morro Groundwater Basin ⁽¹⁾	Volumetric Meter	105	54	80	144	312
Chorro Groundwater Basin	Volumetric Meter	257	276	184	235	74
Total Groundwater Pumped		362	330	264	379	386
Groundwater as Percent of Total Water Supply ⁽²⁾		26	23	18	26	31

Notes:

1. Morro Groundwater Basin consists of water supplied from the Morro well field directly and Morro groundwater that is treated at the Desalination Facility.
2. Percentage of annual groundwater production as a percentage of total annual potable water production
3. Table format based on DWR Guidance Document Table 18
4. All values are in ac-ft
5. Years are reported in calendar years (January 1 – December 31)

Table 4-6 shows the projected groundwater pumping supply amounts for the City. Projections of groundwater supply are based on the full beneficial use of groundwater allocations from the City's water rights permits. The City has the ability to extract up to 1723.5 ac-ft/year of groundwater as needed to meet annual water demands. The City offsets its appropriative groundwater supply with ongoing conservation efforts and the conjunctive use of surface water supply sources. Water Code Sections 1011 and 1011.5 allow the City to claim beneficial use of water conserved and water used conjunctively. The City plans to make full beneficial use of its appropriative rights in both the Morro and Chorro Groundwater Basins while implementing conservation and using surface water conjunctively.

The water will be supplied from the City's active wells or from new replacement wells as may be required in the future to meet existing and projected demands. The City's projected total water demands are presented in Section 3.

Table 4-6
Projected Groundwater Pumping Amounts by the City of Morro Bay from 2015 to 2035

Basin Name	2015	2020	2025	2030	2035
Morro Groundwater Basin ⁽¹⁾	581	581	581	581	581
Chorro Groundwater Basin	1142.5	1142.5	1142.5	1142.5	1142.5
Total Groundwater Pumped ⁽²⁾	1723.5	1723.5	1723.5	1723.5	1723.5
Groundwater as Percent of Total Water Supply	47	47	47	47	47

Notes:

1. Morro Groundwater Basin consists of water supplied from the Morro well field directly and Morro groundwater that is treated at the Desalination Facility.
2. Projections of groundwater supply are based on the full beneficial use of groundwater allocations from the City's water rights permits.
3. Table format based on DWR Guidance Document Table 19
4. All values are in ac-ft
5. Years are reported in calendar years (January 1 – December 31)

Morro Basin Wells

The City has historically operated seven drinking water wells in the Morro Groundwater Basin. Four of these wells are currently active while the other three permitted diversions have been physically disconnected from the system. The City can extract its full entitlement from the basin using the currently active wells. The City will work on replacing the abandoned points of diversion to allow for redundant access to the City's permitted water rights in the basin.

The Morro Groundwater Basin is susceptible to nitrate contamination. The City conducted an analysis to determine the source of the nitrate contamination throughout the basin. The *2007 Morro Valley Nitrate Analysis*, identified nitrate based agricultural fertilizers as the primary source of nitrate contamination in the Morro Groundwater Basin (Cleath and Associates, 2007). The City has installed reverse osmosis treatment to allow continued extractions in light of the degraded water quality and nitrate levels in the Morro Basin. Details of the groundwater quality of the basin can be found in Section 5.

The Morro Wells were taken out of service in 2000 after the SWRCB issued an order forbidding the City to use the wells because an underground fuel storage tank leaked and contaminated with MTBE the Morro Groundwater Basin in the vicinity of the Morro Wells.

In 2002, treatment of the Morro Wells for MTBE contamination and a November outage of the SWP pipeline resulted in a short-term need for water. This demand was partially met by the renovated desalination plant and temporary pretreatment facilities (see details of this source later in this section). The MTBE issue was resolved in 2008 when MTBE concentrations were no longer detected above the monitoring threshold, and the Central Coast RWQCB closed the case on behalf of the responsible service station owner, Shell Oil.

In the past, the Morro Groundwater Basin has experienced intermittent periods of seawater intrusion during long-term droughts. A study of the condition of the Morro Groundwater Basin was conducted (Cleath and Associates, 1994). Based on the study findings, with the City's 581 ac-ft/yr (189 million gallons/year) annual limit on pumping from the Morro Basin, seawater intrusion is less likely to occur in the future. In addition, the Morro wells should be able to produce year round at the maximum 1.2 cfs rate allowed in the City's water right permit (Cleath and Associates, 1994).

Chorro Basin Wells

The City has historically operated 8 drinking water wells in the Chorro Groundwater Basin. Only one of these wells is currently active. The CDPH inactivated five of the Chorro Wells (the Ashurst Well Field) in 2009 due to the detection of high nitrate levels. The other two diversions in the basin are under the influence of surface water, one well is currently inactive and the other well has been physically abandoned.

The City will work on replacing or providing treatment for the abandoned points of diversion to allow for redundant access to the City's permitted water rights in the basin.

Like the Morro Basin, the Chorro Groundwater Basin is susceptible to nitrate contamination. In a study (Cleath Harris, 2009), it was found that nitrate based agricultural fertilizers are the primary source of nitrate contamination in the Ashurst Well Field. Per the direction of CDPH, the City cannot use the Ashurst wells as a potable drinking water supply until the City provides blending, treatment, or nitrate levels in the basin subside. The City is working on solutions to the degraded water quality in regards to nitrate levels in the Chorro Basin.

As a condition of the Chorro Basin water right, the City was required to install permanent inflow stream monitoring equipment to ensure a minimum stream flow of 1.4 cfs in Chorro Creek. In the fall of 2000 a monitoring station located at the South Bay Boulevard Bridge was washed out in a storm. Currently, the City conducts biweekly monitoring of stream flows and is correlating them with an existing county staff gauge. These measurements permit the City to operate its Chorro wells whenever stream flow exceeds 1.4 cfs. A permanent flow monitoring station will be located and installed in the near future once direction has been provided by the SWRCB and approval from the Army Corps of Engineers, California Fish and Game Department, and other permitting agencies.

In 2001 CDPH, identified two of the Chorro Basin wells as being under the influence of Chorro Creek surface water (Wells No. 8 and 12). Subsequently CDPH issued a compliance order to the City, requiring filtration to meet the Surface Water Treatment Rule (SWTR) requirements. The City has taken both of the wells cited by CDPH out of service. Well No. 8 was abandoned when the City terminated its lease agreement with the property owner of the well site.

In order to continue using Well No. 12, the City would need to construct a filtration plant meeting the requirements of the Surface Water Treatment Rule. For the purpose of this study, it is assumed that future use of Well No. 12 and a replacement well near the original Well No. 8 location would require a treatment solution to be developed. Alternatively, replacement wells for Wells No. 8 and 12 could be constructed in locations not under the influence of surface water. These replacement wells are not included in supply calculations because the existing wells can extract the City's full entitlement.

Transfers and Exchanges

The City has water transfer and exchange opportunities with adjacent purveyors as discussed below. The exchanges under these options may occur on an as needed basis (Table 4-7).

- California Men’s Colony (CMC) Water Treatment Plant:** The CMC has a water filtration plant with a rated capacity of 3 mgd that operates approximately 8 hours per day to treat water from the Whale Rock, Chorro and Salinas Reservoirs and other water sources. By operating the plant on a 24-hour basis, the CMC plant could provide up to 1.7 mgd to the City of Morro Bay.

The City and CMC have signed a mutual aid agreement that allows the two water purveyors to provide water to each other during water shortages. The mutual aid agreement calls for each purveyor to repay the borrowed water at a later, mutually agreeable time. The City has received water from these agreements in the past several years during State Water system shutdowns.

- Whale Rock:** The City of Morro Bay entered into an emergency supply agreement with the purveyors of the Whale Rock system. Because the water from Whale Rock is raw water requiring surface water treatment, and the connection to the Whale Rock system is with a potable pipeline, this is an emergency only agreement. For planning purposes, this report assumes that CMC water treatment plant water will only be borrowed temporarily should emergency shortages occur. Repayment of borrowed water would be required soon after any water shortage emergency ended.
- Morro Bay Power Plant:** The City has previously had and may have the opportunity in an emergency to receive water from the Morro Bay Power Plant. There is no formal agreement with this agency at this time but in a short-term emergency water may be available for the City to exchange.

Table 4-7
Transfer and Exchange Opportunities

Transfer Agency	Transfer or Exchange	Short Term or Long term	Proposed Volume
CMC	Exchange	Short-Term	TBD ⁽¹⁾
Whale Rock	Exchange	Short-Term	TBD ⁽¹⁾
Morro Bay Power Plant	Exchange	Short-Term	TBD ⁽¹⁾

Notes:

1. Exchanges under these programs will occur on an as needed basis.

2. Table format based on DWR Guidance Document Table 20.

TBD = to be determined

Desalinated Water Opportunities

This sub-section presents opportunities to use desalinated water as a current and future water supply source for the City per requirements of CWC Section 10631(i).

In 1992, the City constructed a seawater desalination plant during a drought emergency, and in 2009 expanded the facility with the installation of BWRO treatment trains. Permits to construct and operate the original plant were expedited with the provision that the plant would be used only during a declared emergency. The City adopted a final EIR for the Morro Bay Desalination Facilities in April 1993. The EIR covers both emergency and normal use of the plant, and also considers a plant expansion of up to 960 gpm. In 1995 the California Coastal Commission approved Morro Bay LCP Amendment LCP 1-94 allowing the desalination plant to operate “as needed to ensure that the City's minimum water quality standards are met, as routine replacement, and to offset drought conditions.” The LCP requirement that the City update its Water Management Plan every 5 years is met through the update and review of the City’s Water Management Plan.

The City’s desalination plant utilizes a SWRO system to desalinate seawater produced from five seawater wells located along the Morro Bay harbor. In its original configuration, the City's desalination plant had the ability to supply 400 gpm of treated water to the City's distribution system.

The City completed construction of the SWRO desalination plant in 1992. After completion, the plant operated for several months and was shut down due to excessive operating costs. The plant remained unused until 1995 when the City again operated the plant as a reliable water source during a drought. Operation of the facility ceased after increasing iron concentrations in the raw water caused rapid fouling of the desalination plant's pretreatment system. Between 1995 and 2002, the desalination plant was not operated. Limited pilot testing was conducted during June/July of 2001 to evaluate potential methods to minimize the impact of the raw water's high iron concentrations. Filtration was selected as an option for improving pretreatment, and a filter was installed in 2002 to improve plant performance. The plant was operated for approximately one month during fall 2002. The existing iron pretreatment system does not provide adequate flocculation for the specific type of iron in the raw water supply. The seawater system’s reliability is currently limited due to continuous pretreatment clogging from iron. Currently, the desalination plant is operated to offset seasonal peaking and for routine supply replacement, such as SWP outages. In the future the desalination plant may be utilized more regularly once the iron fouling issues have been resolved.

In 2008, the City chose to expand the capabilities of the existing desalination facility to reclaim the nitrate contaminated groundwater in the Morro Groundwater Basin. The City installed two BWRO trains to treat the contaminated groundwater. The BWRO trains require less pressure to treat the brackish groundwater than the SWRO trains require desalinating seawater. Due to the lower pressure requirements the BWRO system consumes less energy and is more cost effective than the SWRO system. The City obtained a revised Drinking Water Supply Permit from CDPH, allowing the City to operate the BWRO system prior to its use during the 2009 SWP shutdown. The BWRO system acted as the primary water supply source for the City during the first 3 months of 2010 when SWP deliveries were at 5 percent. The City currently relies on the BWRO facility to manage peaking demands during SWP deliveries, and as the City’s main water supply source during SWP shutdowns and interruptions in deliveries.

Originally, brine discharge was to have been released through an existing outfall from the adjacent Morro Bay-Cayucos Wastewater Treatment Plant (WWTP), jointly owned by the

City and the Cayucos Sanitary District (CSD). The wastewater plant has a 4,400-foot long outfall with a discharge depth of 50 feet. However, the CSD did not want Morro Bay to discharge brine from the desalination plant through the outfall. As a result, Morro Bay and CSD signed an agreement that Morro Bay would not use the wastewater outfall. Should the City desire to use the CSD outfall line, prior consent of the CSD would be required. Brine is now discharged through the Dynegy power plant outfall, which has a capacity of 720 mgd. The City has an agreement in place to allow Dynegy's continued use of the outfall. The City's permitted discharge does not require concurrent discharge from Dynegy plant however, when concurrent discharges do occur, it aids in dilution and blending of the BWRO brine.

Recycled Water Opportunities

The Morro Bay-Cayucos WWTP Facility discharges about 1.1 mgd of mixed primary and secondary treated effluent and does not currently have the ability to supply Title 22 recycled water. A *Comprehensive Recycled Water Study* was conducted jointly by the City and CSD in 1999 (Carollo, 1999). The following conclusions were made from the study:

- The WWTP's effluent quality consistently meets existing permit limits.
- Ocean monitoring over the last decade has shown no negative environmental impacts associated with the discharge.
- Current operation of the WWTP maximizes overall treatment performance and ensures highest quality effluent possible is being discharged.
- WWTP capacity is adequate for future planned growth at existing level of treatment.
- Implementation of reuse project will require upgrading entire wastewater flow to secondary treatment.
- Implementation of reuse project will require portion of the wastewater flow going to reuse be upgraded to tertiary treatment.
- Addition of full secondary treatment and tertiary treatment will increase the amount of biosolids to be disposed.

The study recommended that a reuse project should not be implemented at that time, due to the costs of implementation. The City has more cost effective sources of water for its current and future water needs.

The City and CSD are currently in the process of upgrading the WWTP to provide tertiary treatment. Once the facility has been upgraded, there may be increased opportunities for the use of recycled water. The cost of a recycled water distribution system and water quality parameters may ultimately limit reuse.

Wastewater Quantity, Quality, and Current Uses

A per capita wastewater generation factor was used to calculate the volume of wastewater generated by the customers in the City's wastewater system. Historical wastewater volumes were obtained from the WWTP. The per capita wastewater generation for the City service area is assumed approximately 0.09 ac-ft/yr per capita (or 81.68 gpcd) based on the average

wastewater generated for the period of 2005 through 2010. This per capita wastewater generation factor was used to estimate the projected volumes of wastewater collected and treated in the City (Table 4-8). Currently, the City does not directly supply recycled water to its customers.

Table 4-8
Recycled Water – Estimates of Existing and Projected Wastewater Collection and Treatment for the City

Type of Wastewater	Volume (ac-ft/yr)						
	2005	2010	2015	2020	2025	2030	2035
Population in service area	10,553	10,608	10,910	11,210	11,560	11,910	12,255
Wastewater collected & treated in service area ²	966 (0.86 mgd)	971 (0.87 mgd)	998 (0.89 mgd)	1,026 (0.91 mgd)	1,058 (0.94 mgd)	1,090 (0.97 mgd)	1,121 (1.00 mgd)
Volume that meets recycled water standard	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. Table format based on DWR Guidance Document Table 21

2. This is the City's portion (which is 78 percent) of the combined volume of wastewater collected from the City of Morro Bay and CSD.

Currently, the City disposes of all of its treated wastewater through an ocean outfall under a NPDES permit. Table 4-9 has been completed with projected wastewater treatment amounts through 2035. The City and the CSD, with whom the City shares the plant, plan to provide tertiary treatment for a portion of wastewater flows in the future. Although the City and CSD do not currently have potential recycled water customers and delivery of recycled water is not currently cost effective, the City and CSD are providing the capacity for future recycled water use by providing tertiary treatment processes in their WWTP Upgrade Project.

Table 4-9
Recycled Water – Estimates of Existing and Projected Disposal of Non-recycled Wastewater for the City of Morro Bay

Method of disposal	Treatment level	Volume (ac-ft/yr)					
		2010	2015	2020	2025	2030	2035
Ocean Outfall	Secondary/ Subsecondary/ Tertiary	971	998	1,026	1,058	1,090	1,121

Notes:

1. Table format based on DWR Guidance Document Table 22

Potential Use

The Morro Bay - Cayucos WWTP discharges about 1.1 mgd of mixed primary and secondary effluent into the Pacific Ocean through an outfall. According to City staff, total dissolved solids (TDS) measurements have exceeded 1,000 mg/L when wastewater from Morro Bay and Cayucos are blended. With higher levels of treatment and TDS removal, this water could be used for a variety of non potable uses. The recycled water could represent a

valuable resource for use by the City to increase the reliability of its water supply portfolio. The feasibility of using recycled water was evaluated in the 1994 City of Morro Bay Analysis and Recommendations/or a Water Management Plan and in the more recent Cayucos/Morro Bay Comprehensive Recycled Water Study prepared for the City of Morro Bay and the CSD in 1999.

Some of the potential recycled water projects evaluated included: irrigating public parks, school yards and the Morro Bay Golf Course; agricultural irrigation in Morro Valley; enhancement of the stream flow in Morro Creek, Chorro Creek and/or the Morro Bay National Estuary and groundwater recharge.

In the two earlier recycled water evaluations, irrigating public parks and school grounds was eliminated from further consideration because the total acreage available for irrigation is small compared to the construction costs for the separate distribution system necessary to bring the recycled water to the irrigation sites.

The remaining projects have larger irrigation water requirements. Recycled water project costs could be reduced if the recycled water customers could be served with secondary treated recycled water, thereby limiting the necessary WWTP upgrades. Surface irrigation with secondary level treated wastewater while legally permitted for golf courses with restricted access and certain non-food and food crops where the recycled water does not come into contact with the edible portion of the crop may not be feasible in Morro Bay. Some orchards can be irrigated with secondary level recycled water; however, avocado trees, which often have fruit bearing branches close to the ground may not be good candidates due to the potential cross contamination, their sensitivity to chloride ions, and the relatively high salt content of the effluent.

The two Morro Bay recycled water assessments concluded that the Morro Bay golf course and most of the potential Morro Valley recycled agricultural irrigation water customers would require tertiary levels of water treatment thereby requiring an upgrade to the existing WWTP. Given the higher capital and operations and maintenance costs to upgrade the Morro Bay - Cayucos WWTP to tertiary level treatment plus the long pipeline required to bring recycled water to the potential customers, the cost per acre foot for recycled water would be about \$2,400 per ac-ft. Agricultural irrigation water demand also varies seasonally and drops significantly in the wet winter months making the financing of reclamation facilities even more difficult.

Wastewater reclamation has been presented as an approach for increasing the use of Chorro groundwater. A Community Development Block Grant (CDBG) Wastewater Reclamation Feasibility Study was conducted (Boyle Engineering, 1999). In that Study, a concept for construction of a treatment plant at the eastern end of Morro Bay, near Chorro Creek, was presented as an approach for improving wastewater service while also increasing summer stream flows in the creek. The City has considered construction of a new plant to offset demand at the existing jointly owned Cayucos/Morro Bay facility. The initial projected flow at the new facility (0.6 mgd) is less than the stream flow (1.4 cfs or 0.9 mgd) required for full use of the Chorro wells. Discharge from the treatment plant alone could not sustain the desired flow rate in Chorro Creek. However, potential ultimate flows from future development that could be served by the new treatment plant could reach 1.2 mgd. The treated water from this flow rate (1.8 cfs) would be sufficient to meet the desired flow in the creek necessary to enhance water supply reliability.

There are no existing recycled water customers in the City of Morro Bay System. Therefore, Table 4-10 has been intentionally left blank. The City is in the process of upgrading their WWTP to allow for tertiary level treatment. The City plans to have recycled water available by planning year 2020. The actual users and distribution network have not yet been identified and will be developed based on the requirements of future users and type of use.

Table 4-10
Potential Future Recycled Water Uses

User type	Description	Feasibility	2015	2020	2025	2030	2035
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. This table is based on the DWR Guidebook Table 23.

In the *City of Morro Bay 2005 Urban Water Management Plan*, projections of recycled water within the City by the year 2010 were not included. Therefore, Table 4-11 is not applicable for this system and has been intentionally left blank.

Table 4-11
Comparison of Recycled Water Uses—Year 2005 Projections versus 2010 Actual

Type of Use	2010 Actual Use	2005 Projection for 2010
N/A	N/A	N/A

Notes:

1. This table is based on the DWR Guidebook Table 24.

Optimization and Incentives for Recycled Water Use

Apart from upgrading the level of treatment at the plant, and a settlement agreement with the High School which could require their use of recycled water, the City does not have any plans in place to encourage uses of recycled water. Therefore, Table 4-12 is only minimally applicable for this system at this time and has been intentionally left blank. The City will update this table in the future if the City develops a recycled water program.

Table 4-12
Methods to Encourage Recycled Water Use

Actions	Projected Results					
	2010	2015	2020	2025	2030	2035
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. This table is based on the DWR Guidebook Table 25.

Future Water Projects

The City will construct new wells, pipelines, and treatment systems, as needed, as a part of its ongoing operations to maintain its existing sources of supply and to meet distribution

system requirements. The City's plan is to maximize supplies from the SWP to provide increased reliability for water quality reasons, then to provide treatment to groundwater, brackish water, and seawater supplies to meet water quality objectives during peak-use and during shortages in the SWP. This also lessens the City's reliance on SWP for the long-term.

Between 1998 and 2009, the City of Morro Bay had difficulty meeting the City's water demand. The City's long-time historical water sources, the Chorro and Morro wells, were out of service because of water quality concerns and in-stream minimum flow requirements as explained previously in this plan. Fortunately, the City's SWP connection was in service and the City was able to obtain agreements with CCWA and the County to provide sufficient SWP water for 2000 and 2001 summer and fall peak-demand period requirements. During the planned maintenance shutdowns of the SWP pipeline during late October and early November, the City has made special arrangements with the CCWA to continue purchasing stored SWP water, when available. In the past, the City supplemented the water with water pumped from the Chorro Basin and on several occasions used emergency exchange water from the CMC water treatment plant. In 2010 the City met its water demands with the BWRO trains at the Desalination Facility, Morro Well Field and Well 11A in the Chorro Well Field. The City plans to improve its local source water reliability, so these sources can be used in the future to get through planned SWP shutdowns.

Beyond these recent water supply shortages, the City needs to identify sufficient water supplies to serve the City under the following conditions:

1. To improve water supply operational reliability during droughts.
2. To plan for short-term supply shortfalls when State Water or other City water supplies are not available.

The City is in the fortunate position of having numerous potential water supply sources to choose from, however, no single water source will be capable of meeting all of the City's demands. Each of the potentially available water sources is described below.

State Water Project

San Luis Obispo County has additional State Water entitlements and other agencies may make portions of their allocations available in the future.

Additional State Water Project Drought Buffer: The City has benefited from its existing 174 percent drought buffer during reduced SWP delivery years. The City could potentially expand its existing drought buffer in the future to help insure that the City's full allocation of water is delivered when the DWR declares reduced water deliveries due to drought conditions. The City's 1,313 ac-ft/yr entitlement with 2,290 additional drought buffer will allow the City to take the full allotment of water when the DWR declares the supplies to be reduced to 36 percent of normal delivery. Since the County currently has an excess of unallocated State Water entitlement, State Water subcontractors in San Luis Obispo County could make a request to the County for additional drought buffer. Even during severe droughts, State Water deliveries are only unavailable when the State Water transmission facilities are out of service for maintenance or during a disaster. During droughts, or due to environmental conditions at the SWP point of diversion, projected deliveries have been as low as 5 percent. The City would need 24,947 ac-ft or 1,900 percent drought buffer to take the full allotment of water during a 5 percent delivery year, which is greater than the County's

available allocation and would not be economically feasible for the community. The City could purchase an additional 1,313 ac-ft or 100 percent of drought buffer and which would guarantee full deliveries down to 27 percent SWP deliveries which also may not be cost effective in terms of the enhancement to reliability that it provides. The City will track what the County does with its current unallocated allotment of State Water and act accordingly.

Purchase Additional State Water Project Allocation: The County has 17,530 ac-ft/yr of excess capacity in the SWP. Other agencies with State Water contracts may also make a portion of their allocation available in the future. However, the issues of ownership of the additional delivery capacity that exists in the Coastal Branch II aqueduct and the treatment plant capacity in the Polonio Pass Treatment Plant would need to be resolved. Polonio Pass is the plant which treats State Water for San Luis Obispo and Santa Barbara Counties.

This option was not evaluated further for four primary reasons:

1. The high cost of upgrades to the Polonio Pass Treatment Plant to treat the water.
2. The high cost of upsizing Chorro Valley Pipeline or constructing a new pipeline to transport additional water deliveries from the Coastal Branch II aqueduct to the City.
3. The theoretical reliability of the supply would be increased, but the City would still be subject to the delivery system reliability limitations of the SWP.
4. The City cannot rely on another agency making a portion of their allocation or pipeline capacity available in the future.

Pursuit of other agencies' allocations is a possible approach in the future, but cannot be relied upon as a definite future source of water and the cost of the pipeline upgrades in item 2 above would still apply. Therefore, it was not included in this analysis but is not considered a viable option if an opportunity presents itself.

Table 4-13 presents potential water supply project/program that is being pursued by the City. The City plans to upgrade the WWTP to tertiary treatment by 2020. The City may have the ability to provide up to 400 ac-ft/yr of recycled water to potential future customers.

Table 4-13
Future Water Supply Projects

Project Name	Projected start	Projected	Potential project constraints	Normal year supply	Single-dry year supply	Multiple-dry year Supply		
						Year1	Year2	Year3
Water Recycling and Reuse ¹	-	2020	Capital Costs, Energy Costs, Water Quality	TBD	TBD	TBD	TBD	TBD

Notes:

1. Water volumes presented here are accounted for in Table 4-1 (DWR table 16)
2. Table format based on DWR Guidance Document Table 26

Section 5. Water Supply Reliability and Water Shortage Contingency Plan

A detailed evaluation of water supply reliability and water shortage contingency planning are requested by the Act. Sections 10631 (a) through (d) require that (item numbers are from the 2010 UWMP guidebook outline checklist):

#5. An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions (10620(f)).

#23. For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable (10631(c)(2)).

#37. Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster (10632(c)).

#38. Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning (10632(d)).

#39. Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply (10632(e)).

#40. Penalties or charges for excessive use, where applicable (10632(f)).

#41. An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments (10632(g)).

#42. A draft water shortage contingency resolution or ordinance (10632(h)).

#52. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability (10634).

#22. Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following: (A) an average water year, (B) a single-dry water year, (C) multiple-dry water years (10631(c)(1)).

#35. Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage (10632(a)).

#36. *An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply (10632(b)).*

#43. *A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis 10632(i).*

#53. *Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple-dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single-dry water year, and multiple-dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier (10635(a)).*

A comparison of the water supplies and demands for the City of Morro Bay is presented in this section. This section also presents an assessment of overall reliability of future supplies regardless of drought or emergency conditions. It includes discussion of City's planned responses in emergency situations that can affect water supplies. This section presents a drought contingency plan in which the City has laid out the responses in an event of shortage in water supplies.

The City has taken guidance from the following documents/information while preparing this section:

- DWR Urban Drought Guidebook 2008 Updated Edition
- DWR California Drought Contingency Plan (2010)
- DWR SWP Delivery Reliability Report (2009)
- Reliability of Water Supply Data Provided by CCWA (2010)

Water Supply Reliability and Drought Planning

Currently, the City has the available water supply (discussed in Section 4) to meet the projected demands. As discussed in Section 4, the City has the following sources of potable water supply:

- SWP water (imported water)
- Morro well field (Groundwater)
- Chorro well fields (Groundwater)
- Desalination facility (SWRO/BWRO treatment facility)

Because the City's supplies are derived both from local groundwater and the SWP, the conditions in local and distant areas can impact the reliability of supplies. The following discussion summarizes the reliability of the City's water supply sources. The City's total supply is expected to exceed demands through 2035.

City of Morro Bay's Water Supply Reliability

Reliability of the City's water supply is determined based upon the reliability of imported water, groundwater production, and the operation and maintenance of the desalination facility, as discussed previously. City's total water supply and demand are presented in

Section 4 and Section 3, respectively. Comparison of water supply (Table 4-1) with water demand (Table 3-13) shows that excess water supply is available to meet the projected water demand. This supply buffer (available supply in excess of demand) serves to increase reliability of supply.

Table 5-1 presents water supply projections from purchased water, groundwater, and desalination facility during a normal year, single-dry year and multiple-dry years for the City for 2035. To analyze the effect of drought conditions on the water supply, the year with the highest water demands (i.e., 2035) was selected. The normal year supply represents the expected supply under average hydrologic conditions, the dry year supply represents the expected supply under the single driest hydrologic year, and the multiple-dry year supply represents the expected supply during a period of four consecutive dry years. CCWA's water supplies are estimated using 60, 34, and 11 percent for the normal, multiple-dry and a single-dry water year demands, respectively. These supplies are expected to be 100 percent reliable. It is anticipated that the City will use its full imported water supply from SWP during multiple dry water years using the draught buffer. Any water demands, which cannot be met with imported SWP water, are expected to be met by groundwater supplies and the desalination facility.

Table 5-1
Supply Reliability for the City of Morro Bay for Year 2035 (Based on Historic Conditions)

Source	Normal Water Year	Single-Dry Water Year	Multiple-Dry Water Years			
			Year 1	Year 2	Year 3	Year 4
Imported Water from SWP with drought buffer ⁽²⁾	1,313	144	1,223	1,223	1,223	1,223
Morro Groundwater ⁽³⁾	581	581	581	581	581	581
Chorro Groundwater ⁽⁴⁾	1,143	566	566	566	566	566
Recycled Water						
Desalination Facility ⁽⁵⁾	645	645	645	645	645	645
Total	3,682	1,936	3,015	3,015	3,015	3,015
Percent of Normal/Average		53	82	82	82	82

Notes:

1. Unit of measure: ac-ft/yr
2. Single-dry year and multiple-dry year reliability for imported water is 11 and 34 percent, respectively, of contracted amount plus drought buffer. It is assumed that the City will meet the demand during multiple dry water years using the draught buffer for the SWP water.
3. Extractions in Morro Basin are below safe yield of the basin in dry years (Cleath and Associates, 1994)
4. During drought years the productivity of the Chorro well field is reduced to 566 ac-ft/yr based on historical extractions.
5. The desalination facility is assumed to be a drought resistant source.
6. Table format based on DWR Guidance Document Table 28.

Although the single-dry year and multiple-dry year supplies are less than the normal water year supplies, these available supplies under these hydrological conditions still exceed supplies needed to meet projected demands (Table 3-13).

Table 5-2 lists single-dry year and multiple-dry year periods for both groundwater and purchased water supplies. The single-dry year and multiple-dry year periods are based on CCWA's (which are based on SWP) analysis of the lowest average precipitation for a single year and the lowest average precipitation for a consecutive multiple-year period, respectively. The desalination facility is assumed to be a drought resistant source.

Based on the historical records of SWP water and reliability data specific to San Luis Obispo County, CCWA has indicated that 1977 is the single-dry year and the years of 1929 through 1932 are representative of driest four consecutive years (CCWA, 2011). A normal water year is based on the long-term average basis.

Table 5-2
Basis of Water Year Data

Water Year Type	Base Year(s)
CCWA⁽¹⁾	
Normal Water Year	N/A ⁽²⁾
Single-Dry Water Year	1977
Multiple-Dry Water Years	1929 -1932
Groundwater⁽³⁾	
Normal Water Year ⁽⁴⁾	1980
Single-Dry Water Year	1971
Multiple-Dry Water Years	2006 - 2008

Notes:

1. Delivery reliability data provided by CCWA
2. N/A = Not Applicable. Average of the entire hydrologic period.
3. Record of precipitation from WRCC at Morro Bay, CA
4. Normal water year calculated from median precipitation from water year 1949 through water year 2010
5. Table format based on DWR Guidance Document Table 27

CCWA has determined that they can meet their projected water demands for imported water for these years, so the available water supply is expected to meet the demand. In addition, there are other mechanisms that could augment the reliability of supplies during a dry period. For the groundwater reliability analysis, precipitation data from 1959 through 2010 were reviewed. Data for the water year basis were obtained by the WRCC at Morro Bay Fire Department, California. Precipitation data was evaluated from Water Year 1959 to 1960 (October 1, 1959 through September 30, 1960) through water year 2009 and 2010 (October 1, 2009 through September 30, 2010). 1971 to 1972 was the single driest year with 7.1 inches of precipitation. The normal water year was based on DWR's description of the median water year over the period of record. The median annual precipitation between water year 1959 and water year 2009 at the Morro Bay Fire Department was 16.46 inches. Based on the median precipitation, the normal water year was 1964. The multiple-dry year period of water year 2006 through water year 2008 recorded the lowest 3-year total of precipitation.

This overall reliability of total water supply portfolio is a result of the projected reliability of imported water, groundwater supply, and the reliability of treated seawater and brackish water by desalination, as discussed below.

CCWA's Water Supply Reliability

CCWA's sole water supply is imported water from the SWP. The actual amount of water available to be delivered by SWP varies from year to year based on a combination of hydrologic conditions, water available in SWP storage reservoirs, and environmental regulations in the San Francisco Bay/Sacramento-San Joaquin River Delta. SWP water deliveries are subject to reduction when dry conditions occur in northern California or as a result of regulation.

CCWA is a SWP contractor through San Luis Obispo Flood Control and Water Conservation District (SLOFCWCD) with an annual contractual amount of 25,000 acre-feet (ac-ft). Each Contractor annually submits a request to DWR by October 1 of each year for water delivery in the following calendar year, in any amount up to the Contractor's full amount. However, some contractors have never requested delivery of their allotted amounts as a result of factors such as less-than-planned water demand, availability of other water supplies, and water conservation efforts that have held below initial demand projections for full contract amounts (CCWA, 2011).

The SWP Delivery Reliability report (DWR, 2009) concluded that the SWP, using existing facilities operated under current regulatory conditions, and with all contractors asking for their full allotted amount, could deliver 60 percent of total allotted amounts on a long-term average basis. The analysis also projected that SWP deliveries during multiple-dry year periods would be about 36 percent (4-year drought) of the allotted amounts, and possibly about 11 percent of the allotted amounts during an unusually dry single year.

Per CCWA (CCWA, 2011), water supply deliveries to the City are expected to be 63, 62, 61, and 60 percent reliable (based on a long-term average basis) during normal years for 2015, 2020, 2025 through 2030, and 2035, respectively. However, deliveries during multiple-dry year periods could be between 34 and 36 percent of the allotted amounts between 2015 and 2035 and possibly 7 through 11 percent of the allotted amount during an unusually dry single year for the period of 2015 through 2035.

During a drought when the SWP deliveries are reduced and if the full allocation for SLOFCWCD has been claimed by other participants, the City may receive additional SWP reliability through the contracted drought buffer. With the drought buffer, the City will receive 100 percent of its contract entitlement as long as SWP deliveries statewide are approximately 36 percent or more. The City's contracted drought buffer will provide the City with deliveries which are calculated based on an entitlement of 3,598 ac-ft/yr (entitlement with drought buffer) instead of 1,313 ac-ft/yr. When statewide SWP deliveries drop to 5 percent of entitlements during critical drought years, the City would receive 180 ac-ft/yr or 14 percent of its 1,313 ac-ft/yr entitlement held with SLOFCWCD.

In this UWMP, it is assumed that the County will have sufficient unclaimed allocation and/or the SWP will not be reduced below 36 percent in order to provide the City with 100 percent of its contract entitlement during normal years and multiple-dry years. For the single dry years, the water supply from the SWP will be reduced from 7 percent through 11 percent from 2015 through 2035, the City's supply buffer (available supply in excess of demand) will assure reliability of supplies.

City of Morro Bay's Groundwater Supply Reliability

Reliability of Morro Groundwater Basin

The reliability of groundwater supplies is limited by hydrogeologic conditions and the amounts of recharge available. The Morro Groundwater Basin is comprised of a small shallow aquifer with limited storage capability. Due to the size of the Morro aquifer, historical operations indicate that the Morro aquifer could experience salt water intrusion in the event the Morro well field is continuously operated during a 2 to 7 year drought cycle. The BWRO treatment system currently installed in the Morro Basin allows extractions from the basin to continue even with a certain level of salt water intrusion.

The City has firm access to groundwater based on the SWRCB approval of the City's Morro basin water permit. The permitted pumping rate is normally set within the groundwater basin's long-term average yield. The reliability of the Morro Groundwater Basin water supply could be reduced in the event of further or continued groundwater contamination.

Reliability of Chorro Groundwater Basin

The reliability of the Chorro Groundwater Basin is similar to the Morro Groundwater Basin reliability; however, there are several additional issues affecting the Chorro Basin reliability. One major consideration is that Well Nos. 8 and 12 were found to be under the influence of surface water. By order of DHS, these wells cannot be used without full filtration in accordance with the U.S. Environmental Protection Agency's (EPA) Surface Water Treatment Rule. Because of the water quality issues, the City terminated its lease for Well No. 8 and abandoned the well. Well No. 12 is inactive due to its proximity to surface water.

The Ashurst Well Field, comprising of wells 9, 9A, 10, 10A, 12, and 16, is currently inactive due to high nitrate levels. Nitrate levels in the basin have risen and the City currently does not have nitrate treatment facilities capable of reducing nitrate levels below the maximum contaminant level (MCL). Until the City provides treatment or blending, or nitrate levels in the basin subside, the City cannot reliably use the Ashurst Well Field as a potable drinking water supply.

The overall reliability of the Chorro Basin (Table 5-1), however, would increase if the City provides a water treatment facility to remove the nitrate contamination of this water supply source. If treatment were to be installed in the Chorro Basin it could be designed as a surface water treatment facility which would eliminate concerns regarding proximity to surface water and bacteriological contamination. To regain the use of Well No. 8 would require that the City enter into a new lease or drill a new replacement well.

Another potential issue in the Chorro Basin outside of the City's control is the potential for additional upstream diversions for agricultural irrigation. Upstream agricultural activity has had a documented impact on nitrate levels and also increases the Chorro aquifer's susceptibility to contamination common with the application of pesticides, and herbicides (Cleath, 2007).

Chorro Creek flows into the Morro Bay Natural Estuary area. Consequently, environmental groups have focused on the instream flow requirements for Chorro Creek. The City's water permit requires the City to install a permanent instream flow monitoring station. According to the permit, the City can only pump its Chorro wells when the downstream flow is 1.4 cfs

or more. This reliability could be reduced during a drought year although the importation of State water and water from Whale Rock reservoir into the upper basin have augmented natural stream flows.

City of Morro Bay's Desalination Facility Water Supply Reliability

As a water supply, desalination is independent of the weather conditions that cause droughts. Other factors that may affect reliability include short-term and long-term power outages and raw water quality. Currently the facility does not have emergency generator in the event of long-term power outage. The water supply from the desalination facility is expected to be reliable under all hydrologic conditions.

The following sections present the current water sources, normal water year, single-dry year, multiple-dry year water supply, and demand assessments.

Current Water Sources Analysis

The Act requires an estimate of the minimum water supply available during each of the next three water years (2011 through 2013) based on the driest three-year historic sequence for the City of Morro Bay's water supply. Table 5-3 summarizes the minimum volume of water available from each source during the next 3 years based on multiple-dry water years and normal/average water year. The water supply quantities for 2011 through 2013 are based on the groundwater pumping rights and data provided by CCWA (CCWA, 2011). The SWP water reliability is 34 percent in 2010 and 2015; therefore, the multiple-dry year water supply of imported water for 2011 through 2013 is estimated based on 34 percent of the contractual amount.

Overall, the City of Morro Bay's supply is expected to be reliable from 2011 to 2013. This reliability is a result of (1) the projected reliability of imported water and desalination facility and (2) reliable groundwater in the Morro and Chorro Groundwater Basins.

Normal Water Year Analysis

Table 5-4 summarizes the service reliability assessment for a normal water year based on water supply and water demand projections. Note that the water supply presented in this table is the supplies needed to meet the demands. However, the City's projected total water supply is higher than the supplies needed to meet the demands. The demands presented in Table 5-4 include projected water use within the City and unaccounted for water. As discussed previously and in Section 4, local groundwater from Morro and Chorro Groundwater Basins, water supply from the desalination facility, and the total purchased water are expected to be reliable to meet the projected demands through 2035. Any demands that cannot be met with SWP water are expected to be met by native groundwater supplies and the desalination facility.

Table 5-3
Three-Year Estimated Minimum Water Supply

Water Supply Sources	Multiple-Dry Water Year			2010 (Actual)
	2011	2012	2013	
Purchased Water from SWP ⁽¹⁾	1,223	1,223	1,223	873
Morro Groundwater ⁽³⁾	581	581	581	74
Chorro Groundwater ⁽⁴⁾	566	566	566	54
Desalination Facility ⁽⁵⁾	645	645	645	258
Total	3,015	3,015	3,015	1,259

Notes:

1. Reliability of purchased water is calculated based on the 34 percent reliability of contracted amount under the multiple-dry year conditions given in the 2009 CCWA Reliability Report.
2. Unit of measure: ac-ft/yr
3. Extractions in Morro Basin are below safe yield of the basin in dry years.
4. During drought years the productivity of the Chorro well field is reduced to 566 ac-ft/yr based on historical extractions.
5. The desalination facility is assumed to be a drought resistant source.
6. This table is based on the DWR Guidebook Table 31.

Table 5-4
Comparison of Projected Normal Year Supply and Demand for Normal Water Year

	2015	2020	2025	2030	2035
Water Supply Total (ac-ft/yr)	1,454	1,416	1,461	1,505	1,548
Water Demand Total (ac-ft/yr)	1,454	1,416	1,461	1,505	1,548
Difference (supply minus demand)	0	0	0	0	0
Difference as Percent of Supply	0	0	0	0	0
Difference as Percent of Demand	0	0	0	0	0

Notes:

1. Table format based on DWR Guidance Document Table 32
2. The water supplies needed to meet the demands are shown in this table. However, the City's supplies exceed the amount needed to meet the projected demands. Table 4-1 provides details of available total water supplies.

Single-Dry Year Analysis

As noted earlier, the single-dry year reliable supplies for imported water delivered by CCWA may be significantly reduced to about 7 to 11 percent from 2015 through 2035. Any water demand that cannot be met with the SWP water will be met by groundwater supplies and the desalination facility. In addition, the City is planning to have additional supply to be provided in 2020 by the introduction of recycled water, through the upgrade of the existing WWTP.

Table 5-5 demonstrates the reliability of water supplies to meet projected annual water demands for the City of Morro Bay in a single-dry year. It is assumed that the single-dry year supplies will meet or exceed projected demands through 2035 because local

groundwater supply and the desalination facility will offset the deficit in imported water supply in a single-dry year.

Table 5-5
Comparison of Projected Supply and Demand for Single-Dry Year

	2015	2020	2025	2030	2035
Supply Total (ac-ft/yr)	1,454	1,416	1,461	1,505	1,548
Demand Total (ac-ft/yr)	1,454	1,416	1,461	1,505	1,548
Difference (supply minus demand)	0	0	0	0	0
Difference as Percent of Supply	0	0	0	0	0
Difference as Percent of Demand	0	0	0	0	0

Notes:

1. Table format based on DWR Guidance Document Table 33
2. The water supplies needed to meet the demands are shown in this table. However, the City's supplies exceed the amount needed to meet the projected demands. Table 4-1 provides details of available total water supplies.

Multiple-Dry Year Analysis

Table 5-6 presents the projected multiple-dry year water supply and demand assessment. As noted earlier, the multiple-dry year supplies (from CCWA) for imported water are estimated at 34 to 36 percent of available supplies from 2015 through 2035. Any water demands that cannot be met with the SWP water are expected to be met by groundwater supplies and the desalination facility. The third year of the multiple-dry year water supply projection represents the end of each 3-year multiple-dry year period as required for the multiple-dry year analysis. It is assumed that the water demand for the preceding 2 years (of the 3-year multiple-dry year period) will be the same as those in the third year.

The multiple-dry year water supplies are expected to be the same as the supply in normal years as long as SWP deliveries statewide are approximately 36 percent or more. This is because the City's contracted drought buffer will provide the City with additional SWP reliability during a drought when the SWP deliveries are reduced and if the full allocation for San Luis Obispo County has been claimed by other participants. The projected total water supplies are much higher than the projected demands. A combination of groundwater, desalinated water, and purchased water will meet projected water demands under multiple-dry years. Table 5-6 demonstrates that the water supplies are sufficient to meet the projected water demand for each multiple-dry year period because groundwater, desalinated water, and purchased water can supply water reliably through 2035. As a result, the total water supplies to meet the demands under multiple-dry years are expected to be 100 percent reliable.

In summary, water supplies from the desalination facility, local groundwater, and purchased water ensure that the total water demands can be met under normal, single-dry year, and multiple-dry years.

Table 5-6
Projected Multiple-Dry Year Water Supply and Demand Assessment

Year	Supply³ (ac-ft/yr)	Demand (ac-ft/yr)	Difference	Difference as Percent of Supply	Difference as Percent of Demand
2015 (Multiple-Dry Year First Year Supply)	1,454	1,454	0	0	0
2015 (Multiple-Dry Year Second Year Supply)	1,454	1,454	0	0	0
2015 (Multiple-Dry Year Third Year Supply)	1,454	1,454	0	0	0
2020 (Multiple-Dry Year First Year Supply)	1,416	1,416	0	0	0
2020 (Multiple-Dry Year Second Year Supply)	1,416	1,416	0	0	0
2020 (Multiple-Dry Year Third Year Supply)	1,416	1,416	0	0	0
2025 (Multiple-Dry Year First Year Supply)	1,461	1,461	0	0	0
2025 (Multiple-Dry Year Second Year Supply)	1,461	1,461	0	0	0
2025 (Multiple-Dry Year Third Year Supply)	1,461	1,461	0	0	0
2030 (Multiple-Dry Year First Year Supply)	1,505	1,505	0	0	0
2030 (Multiple-Dry Year Second Year Supply)	1,505	1,505	0	0	0
2030 (Multiple-Dry Year Third Year Supply)	1,505	1,505	0	0	0
2035 (Multiple-Dry Year First Year Supply)	1,548	1,548	0	0	0
2035 (Multiple-Dry Year Second Year Supply)	1,548	1,548	0	0	0
2035 (Multiple-Dry Year Third Year Supply)	1,548	1,548	0	0	0

Notes:

1. Table format based on DWR Guidance Document Table 34
2. Total Water Supply includes projected demand within Morro Bay and sales to other agencies
3. The water supplies needed to meet the demands are shown in this table. However, the City's supplies exceed the amount needed to meet the projected demands. Table 4-1 provides details of available total water supplies.

Resource Optimization

Section 10620 (f) asks urban water suppliers to evaluate water management tools and options to maximize water resources and minimize the need for imported water from other regions.

The City is committed to optimize its available water resources, including groundwater and implement water conservation programs throughout its service area. In an effort to expand the breadth of offered programs, the City partners with wholesale suppliers, local retailers, and other agencies that support water conservation programs. The City understands the great importance of water conservation to its future. The City's has water conservation programs to reduce the water demand are in effect at all times within the City. The conservation programs include the following:

- **Irrigation System.** The City initiated a large landscape irrigation efficiency program to improve the efficiency of irrigation programs on the City's parks. Under this program, a state-of-the-art computerized control system was installed at many sites to improve irrigation efficiency.
- **Public Information Programs.** The City also practices a comprehensive public/education program that has led to lower water usage.
- **Voluntary Water Conservation Activities.** The City continues to work with the community to encourage water conservation on a voluntary basis. Water conservation activities include water conservation kits, conservation tip mailers, local television advertisements, and other promotional items.
- **Water Conservation Rate Structure.** The City maintains a water rate structure that encourages and significantly promotes water conservation with each unit of water costing more than the last.

The City maximizes the local water supply sources to the extent possible within the existing constraints to optimize the City's resources. The City has taken several steps in recent years to bolster its ability to supply local groundwater. The installation of the BWRO trains at the desalination facility has allowed for renewed use of Morro Basin Groundwater. By optimizing groundwater and using innovative actions that use water information systems to conserve and use water efficiently, the City aims to reduce dependence on imported water. The City is seeking CDPH Proposition 84 funding to implement additional improvements to the desalination facility to allow for standalone operation of the BWRO treatment system. These improvements will allow the City to put its permitted water use in the Morro Groundwater Basin to full beneficial use.

The increase in the quantity of supply available from groundwater production reduces reliance on any one pipeline, electrical system, which in turn allows the City to successfully meet municipal water needs in acute or chronic water shortage conditions. Conservation and water use efficiency projects help to increase the reliability of City's overall water portfolio and reduces reliance on imported water.

Factors Resulting in Inconsistency of Supply

Table 5-7 presents the factors resulting in inconsistency of supply for the City of Morro Bay. These factors are also discussed in Section 4. The impacts of water quality and permit constraints are factored into the reliability qualities of supplies available from the Morro and Chorro Groundwater Basins.

Table 5-7
Factors Resulting in Inconsistency of Supply

Water Supply Sources	Specific source name, if any	Limitation Quantification	Legal	Environmental	Water Quality	Climatic	Additional Information
Purchased Water	SWP	N/A	None	SWP supply may vary (based on fish species in the Delta) under the state and federal endangered species Act	None	Reliability of imported water supply may vary based on SWP annual water supply	N/A
Groundwater	Morro Groundwater Basin	N/A	None	N/A	Nitrate	None	Anthropogenic
Groundwater	Chorro Groundwater Basin	N/A	Stream Flow/ Permit Constraint	None	Nitrate	Flow constraint	N/A

Notes:

1. Table format based on DWR Guidance Document Table 29
2. N/A = Not applicable
3. The Chorro Groundwater Basin supplies in single-dry year and multiple-dry years may be limited up to 577 ac-ft/yr due to the legal constraints

Water Quality

Water Quality Issues

The quality of the City's water supply depends on the blending proportion of the imported surface water and local groundwater in addition to water quality of imported water and groundwater. In general, imported surface water has a lower TDS concentration than local groundwater. The quality of these two sources is described below.

The local groundwater produced by the City's groundwater wells generally has a TDS concentration ranging from 393 parts per million (ppm) to 637 ppm, with an average of 519 ppm (Morro Bay CCR, 2010). The City's surface water supply imported through the SWP generally has a TDS concentration range of 200 to 615 ppm, with an average of 328 ppm (Morro Bay CCR, 2010).

In general, groundwater represents approximately 28 percent of the City's current water supply. The local groundwater is blended with SWP water resulting in water quality that complies with all state and federal drinking water requirements. Currently, the nitrate contamination issue in the Groundwater Basins affects supply reliability of Chorro

Groundwater wells. The City is working to renew this water supply source by providing nitrate treatment or blending by 2020. In the future, once treatment technologies are in place, the City does not anticipate any future water quality issues that may affect supply or reliability. Annually, the City publishes a water quality report which details the water quality sampling results for the City's wells and SWP water. A recent water quality report (for 2010) is provided in Appendix H.

Surface Water Quality

The City of Morro Bay purchases water from CCWA. The CCWA obtains its water supply from the coastal reach of the SWP California Aqueduct. The source water of the SWP originates in northern California's mountains, rivers and streams, and flows through the Sacramento-San Joaquin Delta before entering the SWP's 444-mile California Aqueduct.

The Coastal Branch Reach II of the SWP consists of a 101-mile-long aqueduct from Kern County to Vandenberg Air Force Base in Santa Barbara County. Water is pumped from the West Branch of the SWP through a series of four pumping stations and ultimately delivered to the Polonial Pass Filtration Plant where the water is treated by conventional surface water filtration techniques. The Polonial Plant is located in the Cholame Hills at an elevation of approximately 1,400 feet. This elevation allows the plant to distribute water from the plant to San Luis Obispo County, which is approximately 100 miles away. Typically, there is no other treatment of the purchased surface water, other than the treatment received at the Polonial Pass Plant. The City provides additional chlorine treatment as needed to keep an active disinfection residual in the distribution system. The interconnection, thorough which Morro Bay accepts water from CCWA, is located downstream of Polonial Pass Plant along the Costal Branch Reach II.

Groundwater Quality

The Morro Groundwater Basin is susceptible to nitrate contamination. The City conducted an analysis to determine the source of the nitrate contamination throughout the basin. The *2007 Morro Valley Nitrate Analysis*, identified nitrate based agricultural fertilizers as the primary source of nitrate contamination in the Morro Groundwater Basin. The City has installed Brackish Reverse Osmosis Treatment to allow continued extractions in light of the degraded water quality and nitrate levels in the Morro Basin.

The Morro Groundwater Basin was previously unavailable to the City due to nearby MTBE contamination in the groundwater basin in 2000. Treatment The City began treatment for MTBE in 2002 and continued this treatment until MTBE contamination levels fell below the RWQCB's monitoring threshold in 2008. Since then the MTBE levels continue to remain below the RWQCB's monitoring threshold.

In the past the Morro Groundwater Basin has experienced intermittent periods of seawater intrusion during long-term droughts. A study on the condition of the Morro Groundwater Basin was conducted (Cleath and Associates, 1994). Based on the study findings, with the City's 581 ac-ft/yr (189 million gallons/year) annual limit on pumping from the Morro Basin, seawater intrusion is less likely to occur in the future. In addition, the Morro wells should be able to produce year round at the maximum 1.2 cfs rate allowed in the City's water right permit (Cleath and Associates, 1994).

Like the Morro Basin, the Chorro Groundwater Basin is susceptible to nitrate contamination. In a study, it was found that nitrate based agricultural fertilizers are the primary source of nitrate contamination in the Ashurst Well Field (Cleath H, 2009). Per the direction of CDPH, the City cannot use the Ashurst wells as a potable drinking water supply until the City provides blending, treatment, or nitrate levels in the basin subside. The City is working on solutions to the degraded water quality in regards to nitrate levels in the Chorro Basin.

The City currently blends the high quality surface water with local groundwater or treats local ground water at the desalination facility, which serves to mitigate any groundwater quality issue.

Desalination Facility Quality

The City operates both a SWRO and BWRO treatment systems at the desalination facility. The SWRO feed water supply wells have high iron concentrations that cause operational difficulties at the treatment plant. These difficulties limit the City's ability to operate the SWRO trains as a routine water supply source. The City is planning to renovate the iron pretreatment system as part of its capital improvement program. Once the iron pretreatment system is complete, the City does not anticipate any future water quality issues that would affect the supply or reliability of the SWRO system. The City does not anticipate water quality issues to affect the supply or reliability of the BWRO system.

Projected Impact of Water Quality

Table 5-8 summarizes the current and projected impact on water supply due to water quality of each supply source in the City of Morro Bay. Most of the City's wells are susceptible to nitrate contamination, causing negative impacts on the City's water supply resulting from water quality issues through 2035. After considering the treatment losses and contamination issues, under typical operating conditions the City can meet current and future demands by blending local groundwater with imported water and treated water from the desalination facility.

Distribution System Water Quality

The City has implemented a number of monitoring programs to ensure that the water quality remains within acceptable ranges. The water quality parameters that are monitored, pursuant to plans approved by the Department of Health Services, include general physical parameters, presence of coliform bacteria, disinfectant and disinfection byproduct levels, and corrosivity of water by monitoring lead and copper levels at customers' water taps. All monitoring parameters and levels currently meet drinking water standards. The ability to continue to meet these standards is not expected to change in the foreseeable future.

In addition to the monitoring programs, the City has implemented a number of operational programs that are designed to maintain water quality within acceptable criteria. The system actively flushes its distribution system while exercising system valves on a routine basis as a means to remove built up sediment within the mains as well as to ensure that aged water is removed from the system. The system also has an active backflow and cross connection prevention program in place to reduce the risk of backflow conditions from a service connection into the distribution system. Also, security measures are in place to protect the distribution system from tampering by unauthorized personnel. All of these programs are

designed to assist with maintaining the water quality within the distribution system and provide some of the tools needed to respond to a water quality emergency.

**Table 5-8
Water Quality – Current and Projected Water Supply Impacts**

Water Sources	Description of Condition	2010	2015	2020	2025	2030	2035
Morro Groundwater Basin	Nitrate Contamination ⁽²⁾	145	0	0	0	0	0
Chorro Groundwater Basin	Nitrate Contamination ⁽³⁾	822	822	0	0	0	0
Imported Water	None	0	0	0	0	0	0
Desalination Facility	Iron Contamination ⁽⁴⁾	155	0	0	0	0	0

Notes:

1. Table format is based on DWR Guidance Document Table 30.
2. The Morro Groundwater Basin was affected by nitrate contamination in 2010. The City installed reverse osmosis treatment (in 2010) that restored this water supply source.
3. CDPH inactivated 5 of the 6 active wells in the Chorro Groundwater Basin in 2010 due to nitrate contamination. The City plans to provide treatment or blending by 2020 to restore this water supply source.
4. Iron contamination in the raw water supply for the desalination facility has precluded the City from using its full production potential. The City anticipates installing iron pretreatment process equipment at the facility by 2015.
5. Units are in ac-ft/year.

Emerging Water Quality Issues

In 2000, there was significant interest in the detection and possible health effects of chromium 6 in drinking water supplies throughout the state. In 2001, the Office of Environmental Health Hazard Assessment (OEHHA) withdrew their previously established Public Health Goal (risk assessment level) of 2.5 micrograms per liter ($\mu\text{g}/\text{L}$) for total chromium. The current MCL enforced by CDPH is 50 $\mu\text{g}/\text{L}$ for total chromium, and OEHHA is in the process of establishing a specific Public Health Goal for chromium 6. Currently, total chromium in the City's well water is 20.0 $\mu\text{g}/\text{L}$ (Morro Bay CCR, 2010).

There is emerging concern related to the presence of pharmaceuticals in drinking water. The EPA is currently conducting research to determine the amount of pharmaceuticals and personal care products (PPCPs) in national water bodies. The EPA is also focused on determining what affects PPCPs may have on the environment and people. As findings are made in the future, through this research, the EPA could set limits on certain PPCPs in drinking water. There currently is no standard treatment technology to remove PPCPs although advanced oxidation processes have shown some potential to treat PCCPs. The water treatment industry will need to work towards treatment solutions for PPCPs as regulatory limits are decided upon in regards to PPCPs. The EPA is advising the public to properly dispose of pharmaceuticals at designated pharmaceutical handling facilities, and not flushing unwanted PPCPs.

Water Shortage Contingency Planning

This section documents the City of Morro Bay's Water Shortage Contingency Plan per requirements of Section 10632 of the Act. The purpose of the Water Shortage Contingency Plan is to provide a plan of action to be followed during the various stages of a water shortage. The plan includes the following elements: action stages, estimate of minimum supply available, actions to be implemented during a catastrophic interruption of water supplies, prohibitions, penalties and consumption reduction methods, revenue impacts of reduced sales, and water use monitoring procedures.

The Urban Drought Guidebook, 2008 updated edition, prepared by DWR, Office of Water Use Efficiency and Transfers was used as a resource in preparing this plan. The City's draft Water Shortage Contingency Plan was used to develop this subsection.

The City has developed a draft Water Shortage Contingency Plan which documents City's water supply and demand conditions. That plan has been developed in collaboration with a Water Shortage Response Team that consists of City staff from the Utilities and Finance Departments, along with assistance from the City Attorney's Office. The previously adopted ordinance (Ord. 417 § 2, 1992) which is a part of City's Municipal Code contains the City's existing water shortage contingency plan. The City prepared a revised draft Water Shortage Contingency Plan and a draft resolution which can be adopted in an event of shortage. Appendix I contains those draft documents.

The City has initiated water conservation programs to reduce the water demand. These programs to reduce the water demands are in effect at all times within the City. The City's water conservation policies promote the more efficient use of the existing water resources. Since the City adopted its water conservation program in the late 1980s, water demand in the City has declined substantially (e.g., from 168 gpcd in 1981 to 121 gpcd in 1992).

Since its inception, the City's water conservation program mandated that developers provide water for new construction by funding retrofits of existing facilities to offset two times the developer's estimated water demand. A new voluntary ULFT rebate program has also been started. In addition to the retrofitting program, the City adopted mandatory water conservation measures intended to reduce overall water consumption by existing customers. These mandatory water conservation measures are described in the City's Municipal Code Sections 13.04.320 to 13.04.345, which are provided in Appendix I. Section 13.04.320 grants the City Council authority to declare when a low water level condition exists. Section 13.04.330 identifies the water conservation powers of the City Council when it is deemed necessary to conserve water during low water level periods. Section 13.04.340 identifies the legal authority of the Public Works Director to enforce water conservation measures if the City Council adopts a resolution declaring a low water level or water system emergency.

Section 13.04.345 identifies the mandatory water conservation requirements for the five increasing levels of conservation as the City's water supplies are reduced during drought conditions. The five classifications for mandatory water restrictions are as noted in the following subsection and are enforceable through financial penalties and/or loss of service.

The City's policy is to maximize use of all of its water resources, each to its best application, to maintain water supply under varying levels of availability, with a focus on ensuring public health and safety.

Action Stages

The Act requires documentation of actions to be undertaken during a water shortage. The City of Morro Bay has developed actions to be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply.

The following section discusses the actions that might be taken depending on the severity of the shortage. The City Council may impose water-rationing requirements as it deems appropriate. Table 5-9 describes the water supply shortage stages and conditions. The stages will be implemented during water supply shortages according to shortage level, ranging from less than 5 percent shortage in Stage 1 to greater than 50 percent shortage in Stage 5. The stage determination and declaration during a water supply shortage will be made by the City.

Table 5-9
Water Shortage Contingency – Rationing Stages to Address Water Supply Shortages

Stage No.	Water Shortage Supply Conditions	% Shortage
1	Normal Water Supply Conditions	less than 5
2	Moderately Restricted Water Supply Conditions	5 to 15
3	Severely Restricted Water Supply Conditions	15 to 25
4	Critical Water Supply Conditions	25 to 50
5	Emergency Water Supply Conditions	greater than 50

Notes:

1. Table format is based on DWR Guidance Document Table 35.

Stage 1

The activities performed by the City during this stage include, but are not limited to:

- Spring-loaded shut-off nozzles are required for outdoor water use.
- Outdoor irrigation resulting in excessive runoff is prohibited.
- Water may be used as needed for washing and cleaning paved surfaces.
- Water is supplied to customers at restaurants only upon request.

Under Stage 1, no additional conservation action is required due to availability of adequate supplies to meet the demand.

Stage 2

Stage 2 will include actions undertaken in Stage 1. The actions to be undertaken by the City during this stage include, but are not limited to:

- Any use that results in excessive gutter runoff is prohibited.

- Water may be used for washing vehicles, boats and buildings with spring-loaded shut-off nozzles, but spraying paved areas is prohibited except for public health or safety.
- Outdoor irrigation is restricted between 10:00 a.m. and 4:00 p.m. and is to be performed only on designated days, except for newly planted landscaping that requires additional water to survive. Excessive gutter runoff is prohibited.
- Water is supplied to customers at restaurants only upon request

Stage 3

Stage 3 is a severely restricted shortage condition that includes all steps taken in prior stages regarding allotments and mandatory conservation rules. The actions to be undertaken by the City include, but are not limited to:

- Washing boats, marinas, buildings and outdoor paved areas is prohibited except for public health or safety reasons.
- Washing cars may be performed only with the use of a bucket and sponge.
- Emptying and refilling swimming pools and commercial spas is prohibited.
- The use of potable water for compaction, dust control and construction purposes is prohibited.
- Dysfunctional or leaking water fixtures in public or commercial facilities are required to be repaired within 3 days.
- All visitor-serving facilities shall prominently display water conservation educational materials and provide handouts, which outline the mandatory conservation measures being taken.

Stage 4

This is a critical shortage condition that includes all steps taken in prior stages regarding allotments and mandatory conservation. The actions to be undertaken by the City include, but are not limited to:

- Any water use that results in gutter runoff is prohibited.
- Any water cleanup for public health and safety shall be performed with a bucket and brush. No use of hoses, even if equipped with a shut-off nozzle is permitted.
- Irrigation is to be performed only once per week, and is not allowed between 9:00 a.m. and 5:00 p.m.
- Use of fresh water to wash down boats or docks or for other incidental activities is prohibited. All hoses shall have spring-loaded shut-offs or similar devices and may be used only to fill water tanks of boats or to flush outboard engines.
- Restaurants shall serve water only in response to specific requests by a customer.
- Emptying and refilling all pools and spas is prohibited.

- Use of potable water for compaction or dust control purposes in construction activities is prohibited.
- Dysfunctional or leaking water fixtures shall be repaired immediately.
- All visitor-serving facilities in the city shall prominently display these mandatory water conservation requirements for the benefit and education of visitors to the community.

Stage 5

This is a emergency water supply condition that includes all steps taken in prior stages regarding allotments and mandatory conservation. The actions to be undertaken by the City include, but are not limited to:

- The City Council may impose water-rationing requirements as it deems appropriate.

In addition to the mandatory water conservation program detailed above, the City has implemented a leakage detection and repair program and is planning to further reduce water losses by calibrating production meters, replacing water meters, and coordinating billing information. An extensive pipe replacement program has also been undertaken such that aged pipe is no longer considered to be a major contributor to the unaccounted for water losses.

The combination of steps outlined in the stages from 1 through 5 will help the City ensure that sufficient supply is available to meet demands with a comfortable margin of safety. For example, the resulting supply at Stage 4 with 50 percent shortage in supply in 2035 would result in supply of 2,041 ac-ft/yr (Table 5-1) which is higher than the anticipated demand in 2035 of 1,548 ac-ft/yr (Table 3-12). As a result, it is not anticipated that the City of Morro Bay will face a chronic shortage condition at which the City would need to implement any additional measures to reduce the demand.

Catastrophic Supply Interruption Plan

The Act requires documentation of actions to be undertaken by the water supplier to prepare for, and implement during a catastrophic interruption of water supplies. A catastrophic interruption constitutes a proclamation of a water shortage and could be any event (either natural or man-made) that causes a water shortage severe enough to classify as a Stage 5 water supply shortage condition. Table 5-10 provides a summary of actions to be undertaken during catastrophic events such as power outage, earthquake, and malevolent acts.

A catastrophic supply interruption can occur when the City loses one or more of its main water supplies. The likelihood of experiencing a simultaneous loss of more than one supply is low. For instance, local power outages may limit use of groundwater, but will not affect imported water delivery.

If the available supply is insufficient to meet the demand and water quality requirements, an emergency notification will be sent to all water customers, to inform them of the condition. The message will include the expected duration of the condition, and restrictions on water use for the duration of the condition.

Table 5-10
Summary of Actions for Catastrophic Events

Possible Catastrophe	Summary of Actions
Regional Power outage	<ul style="list-style-type: none"> • Assess the condition and ensure demands can be met. For example, continue supply water from its some of its largest wells using generator power if the State Water is not available • Depending on the expected length of the outage, evaluate the amount of storage available, production with available supplies, and the projected demand to determine whether existing demands can be met while the outage persists. • Contact the largest water users, including the City's Parks and Recreation Department, to determine if demand on large meters, such as for large irrigated landscapes like parks and schools, can be reduced sufficiently to last through the expected outage. • Arrange to provide emergency water. • Assess areas that will take the longest to repair. • Establish water distribution points and ration water if necessary. • Depending on the length of outage, assess and conduct bacteriological tests to determine possible contamination. • Arrange for alternate power supply to operate pumps. The City may request aid from adjacent water agencies for use of portable generators to power additional production wells to meet higher demands • If water service is restricted, attempt to provide potable water tankers or bottled water to the area
Earthquake	<ul style="list-style-type: none"> • Assess the condition of the water supply system. Arrange to provide emergency water (e.g., use of groundwater supplies in the event of non-availability of the SWP water). • Identify priorities including hospitals, schools and other emergency operation centers. • Complete the damage assessment checklist for reservoirs, water treatment plants, wells and boosters, system transmission and distribution. • Coordinate with fire district to identify immediate fire fighting needs. • Determine any health hazard of the water supply and issue any notification to the customers, if necessary. • Make arrangements to conduct bacteriological tests, in order to determine possible contamination.
Other Disasters (e.g., Malevolent acts)	<ul style="list-style-type: none"> • Assess threat or actual intentional contamination of the water system. • Notify local law enforcement to investigate the validity of the threat. • Get notification from public health officials of potential water contamination • Determine any health hazard of the water supply and issue any notification to the customers, if necessary • Isolate areas affected and assess any structural damage to the facility/water distribution system. Arrange to provide emergency water

Prohibitions, Penalties, and Consumption Reduction Methods

The Act requires an analysis of mandatory prohibitions, penalties, and consumption reduction methods against specific water use practices, which may be considered excessive during water shortages.

The City can set forth water use violation fines, charges for removal of flow restrictors, as well as establish the period during which mandatory conservation and rationing measures will be in effect. In addition to the restrictions placed on metered water use, other water use practices that will be prohibited during water shortages include the City's systematic water main flushing. In addition, street sweeping will be prohibited from using the City's domestic supply. Table 5-11 summarizes the various prohibitions and the stages during which the prohibition becomes mandatory.

Table 5-11
Water Shortage Contingency – Mandatory Prohibition

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Outdoor irrigation resulting in excessive runoff	1
Using potable water for street washing	2
Any use that results in excessive gutter runoff	2
Washing boats, marinas, buildings and outdoor paved areas	3
Emptying and refilling swimming pools and commercial spas	3
The use of potable water for compaction, dust control and construction purposes	3
Any water use that results in gutter runoff	4

Notes:

1. Table format is based on DWR Guidance Document Table 36.

Based on the requirements of the Act, Table 5-12 summarizes the methods that can be used by the City to enforce a reduction in consumption, where necessary. As mentioned earlier, various water conservation programs have been initiated the City and the County to reduce the water demand. Additional measures can be phased in to provide additional demand reductions and increase public awareness of the need to conserve water. Conservation is a permanent and long-term application used within the City at all times.

Table 5-12
Water Shortage Contingency – Consumption Reduction Methods

Consumption Reduction Method	Stage when Method Takes Effect	Projected Reduction (%)
Water is supplied to customers at restaurants only upon request	1	1
Outdoor irrigation is restricted between 10 am and 4 pm and is to be performed only on designated days	2	2
Washing cars may only be performed only with the use of a bucket and sponge	3	5
Any water cleanup for public health and safety shall be performed with a bucket and brush	4	10
No use of hoses, even if equipped with a shut-off nozzle is permitted	4	10
Public education/information programs	All Stages	N/A
Demand reduction program	All Stages	N/A
Upgrade irrigation systems	All Stages	2
Plumbing fixture replacement	All Stages	4
Replace antiquated lines, heads, and valves	All Stages	N/A
Install high-efficiency retrofit kits	All Stages	N/A
Water conservation kits	All Stages	N/A
Conduct audits	All Stages	N/A

Notes:

1. Table format is based on DWR Guidance Document Table 37.

The City sets forth penalties for violations of prohibited uses mentioned previously. Table 5-13 summarizes the penalties and charges and the stage during which they take effect. The City adopts two processes through which complaints of water wasting are handled: (1) the code enforcement process and (2) the Water Division work order process. If a code enforcement complaint is received it will be logged and investigated. The Public Services Director has the ability after providing written warning to terminate water service per section 13.04.330 of the Morro Bay Municipal Code. If a complaint is received directly by the Water Division a work order is issued. Water Division staff then investigate the issue. This occurs on average several times per year. In the case of an actual waste of water, the case would be forwarded on for code enforcement. Termination of water service with a fee to subsequently reinstate the service is the sole remedy outlined in the code for violating the water conservation provisions. There are several complaints about water that have been resolved through the work order process during 2009-2010. Note that in those years no complaint was resolved through the code enforcement process, although there was one in 2011. The penalties consist of a written warning and a surcharge for the violation. A flow-

restrictor or possible shutoff may be imposed after the violation notice, depending on the amount of water use.

Table 5-13
Water Shortage Contingency – Penalties and Charges

Penalties or Charges	Stage When Penalty Takes Effect
Flow restriction orifices for customers not meeting Stage 4 allocations	4
Flow restriction orifices for customers not meeting Stage 3 allocations	3
Termination of Supplies through code enforcement process	All stages

Notes:

1. Table format is based on DWR Guidance Document Table 38.

Revenue Impacts

Revenue reduction due to reduced water usage will cut into reserves during the shortage, and will be reflected in future rate setting discussions to re-establish acceptable water fund reserve levels after the water shortage period is over. The City's existing pro forma already reflects the resulting revenue drop associated with past conservation and therefore is already accounted for in establishing future rate adjustments. The City has taken measures to provide the financial ability to respond to a water shortage emergency by placing into reserves excess revenues. Using reserves as a water shortage reserve fund will cover potential impacts of a water shortage such as:

- Offsetting decreases in water sales income if water consumption declines due to mandated water conservation measures.
- Paying for higher cost emergency water supplies.

Since additional water supplies are either purchased or pumped and require only disinfection and fluoridation, there are little additional operations and maintenance costs to augment water supplies.

Monitoring Plan Effectiveness

The City tracks the actual reductions in water use based on the Water Shortage Contingency analysis, by monitoring system demands at each of the City's five water tank sites. The City's SCADA system allows the Water Division to track current production as well as tank levels giving information on demands. Water use analysis could be performed on a daily, weekly basis depending on monitoring needs.

Section 6. Demand Management Measures

The evaluation of DMMs occupies a significant portion of the Act. The required elements for this section include (item numbers are from the 2010 UWMP guidebook outline checklist):

#26. (Describe and provide a schedule of implementation for) each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following: (A) water survey programs for single-family residential and multifamily residential customers; (B) residential plumbing retrofit; (C) system water audits, leak detection, and repair; (D) metering with commodity rates for all new connections and retrofit of existing connections; (E) large landscape conservation programs and incentives; (F) high-efficiency washing machine rebate programs; (G) public information programs; (H) school education programs; (I) conservation programs for commercial, industrial, and institutional accounts; (J) wholesale agency programs; (K) conservation pricing; (L) water conservation coordinator; (M) water waste prohibition; (N) residential ultra-lowflush toilet replacement programs (10631(f)(1) and (2).

#27. A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan (10631(f)(3)).

#28. An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand (10631(f)(4)).

#29. An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following: (1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors; (2) Include a cost-benefit analysis, identifying total benefits and total costs; (3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost; (4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation (10631(g)).

This section presents a comprehensive description of the City's past, current and future water conservation activities for the Morro Bay water system in compliance with the above listed sections of the Act. The water conservation practices, as defined by the Act, are comprised of 14 DMMs. The DMMs are functionally equivalent to urban water conservation best management practices (BMPs) administered by the California Urban Water Conservation Council (Council). The City of Morro Bay is currently not a member of the Council. However, for meeting the requirements of this section of the Act, the City has followed the Council's requirements. Table 6-1 lists the DMMs.

Table 6-1
Water Conservation Best Management Practices

A	Water Survey Programs for Single-Family Residential and Multifamily Residential Customers
B	Residential Plumbing Retrofit
C	System Water Audits, Leak Detection, and Repair
D	Metering with Commodity Rates
E	Large-Landscape-Conservation Programs and Incentives
F	High-Efficiency-Washing-Machine Rebate Programs
G	Public Information Programs ⁽¹⁾
H	School Education Programs ⁽¹⁾
I	Conservation Program for Commercial, Industrial, Institutional (CII) Accounts
J	Wholesale-Agency Assistance Programs ⁽¹⁾
K	Conservation Pricing ⁽¹⁾
L	Water Conservation Coordinator ⁽¹⁾
M	Water Waste Prohibition ⁽¹⁾
N	Residential ULFT Replacement Programs

Notes:

1. Economic benefits of these BMPs are considered non-quantifiable.

Documentation of DMMs

The goal of this subsection is to provide a comprehensive description of the City's water conservation programs that are currently being implemented and those planned to be implemented. General information on the effectiveness of the conservations measures to reduce demand and effect on the water use target is included. Specifically, this subsection includes the following information for each DMM:

- A comprehensive description of each DMM
- Description of activities, specific actions, and steps taken by the City to comply with the UWMP DMM requirements
- Implementation schedule
- Status of implementation for each DMM
- Description of the methods used to evaluate the effectiveness of DMM
- Description of marketing or advertising strategy
- Quantification (e.g., number of devices provided, washers rebated)
- Estimates of conservation savings and effects of the savings on the City's ability to further reduce demand
- Economic evaluation of DMMs that the City is not currently implementing

The implementation status for each DMM was assessed based on historical information and tracking of DMM activities undertaken by the City. The City intends to implement all

DMMs that are cost effective to the community. The DMM reports were used to assess whether the target implementation schedule, as defined by the Council, for each DMM is met. The City tracks the DMMs through several ongoing programs. These programs include:

- Residential Plumbing Retrofit Program (Planning and Building Division)
- Leak Detection Program (Water Division)
- Water Audits (Utility Billing Division)
- Work order tracking (Public Services Department)
- Water Billing (Utility Billing Division)
- Washing Machine Rebate Program (Planning and Building Division)
- Water Waste Prohibition (Code Enforcement Group)
- Toilet Retrofit Program (Planning and Building Division)

For the DMMs that are not implemented, where applicable, the following information is included:

- Economic and non-economic factors
- Environmental, social, health and technological factors
- Customer impact
- Legal authority
- Description of available funding available to implement any planned water supply project providing water at a higher unit cost
- Description of City's legal authority and ability to work with other agencies to implement the DMM

The City has taken a position to focus on the DMMs that are cost effective and are critical elements of water resources strategy. The City's efforts are geared towards improving outcomes from the conservation efforts rather than focusing on one type of DMM.

DMM A - Water Survey Programs

The City is not currently implementing this DMM as the City determined, using the economic analysis that this DMM is not cost effective. The economic analysis of this DMM is discussed in the Cost Benefit Analysis subsection below. The City will implement this DMM if it becomes cost effective in the future. To implement this DMM the City would need to provide resources and staffing to prepare and conduct residential water audits/surveys, tracking of implementation activities, calculations of water savings, and coordination with residential water users.

Since this DMM is not currently implemented, the evaluation takes into account the economic and noneconomic factors. The benefit cost analysis for DMM A along with a description of economic and legal considerations and cost share partners are included later in this section.

DMM B - Residential Plumbing Retrofit

The City has been implementing this DMM through the City's retrofit upon sale ordinance, which requires sellers of residential properties in the City to retrofit existing toilets, faucets, and showerheads with aerators and low flow equipment prior to sale. The City's retrofit upon sale ordinance is included in Appendix J. The City had historically allowed developers to offset the new water demand that will be generated by a proposed development, by retrofitting existing homes in the community that have not already been retrofitted. The City's Planning and Building Department oversees the inspection and implementation of this DMM implementation. This residential plumbing retrofit program consists of marketing, rebate program administration, tracking of rebates, and calculation of water savings. The City maintains a retrofit list with the customer names and addresses of retrofitted residences. Table 6-2 provides details of DMM B. Table 6-3 provides a summary of the residential plumbing retrofits conducted from 1992 through 2010 and planned retrofits from 2011 - 2015.

Table 6-2
Summary of Status of DMM B

Implementation Status	Fully implemented. The program was started in 1985. As of December 2010, approximately 83 percent of the City's residential addresses have been retrofitted with low flow equipment
Implementation Schedule	Table 6-2 summarizes the implementation of the Residential Plumbing Retrofit Program between 1992 and 2010, as well as the projected program implementation schedule in the future
Devices provided to customers	Retrofit existing toilets, faucets, and showerheads with aerators, and low flow equipment
Ordinance:	City's retrofit upon sale ordinance
Quantification	Table 6-2 includes the quantification of devices
Steps necessary to implement measures	Since its inception, the City's water conservation program mandated that developers provide water for new construction by funding retrofits of existing facilities to offset two times the developer's estimated water demand. The City developed a water equivalency program to quantify proposed water conservation measures and ensure that reduced water demands will offset water needed for new construction. In practice, retrofitting has generally been for the toilet replacement. Typically developers were required to fund 14 toilet retrofits for each proposed new residential service. The developer mandated toilet retrofit program ceased in 2001 since the City believes all willing toilet retrofit candidates have been funded and that the remaining candidates would not provide adequate water savings for the additional expense. A new voluntary ULFT rebate program has begun.
Method used to evaluate the effectiveness of this DMM	The City estimates the reductions in water use based on the residential plumbing retrofits. The evaluation is based on the effectiveness of devices such as toilets, aerators, and low flow showerheads.
Estimates of existing conservation savings	Water savings are estimated to be about 0.066536 ac-ft/yr for each residential plumbing retrofit from various devices such aerators and low flow showerheads. (see Table 6-3 for total water savings on annual basis). Water savings from toilet retrofits are estimated and reported under DMM N: Residential ULFT Replacement Program. and are not included in the estimate of water savings for this DMM. Water savings from showerhead retrofits are estimated based on 2.2 people per residence, 15 minutes shower change from 4 gpm to 2.2 gpm.

Table 6-3
Summary of Residential Plumbing Retrofits – Actual (1992 – 2010) and Planned (2011 – 2015)

Actual					
	1992-2006⁽¹⁾	2007	2008	2009	2010
# of Single Family Devices	225	12	9	38	33
# of Multi-Family Devices	60	6	3	5	5
Actual Water Savings (ac-ft/yr) ⁽²⁾	18.96	1.20	0.80	2.86	2.53
Planned					
	2011	2012	2013	2014	2015
# of Single Family Devices	20	20	20	20	20
# of Multi-Family Devices	5	5	5	5	5
Projected Water Savings (ac-ft/yr) ⁽²⁾	1.66	1.66	1.66	1.66	1.66

Notes:

1. The number of pre-1992 single family and multi-family accounts is estimated to be 3,324 and 320 respectively. There were 4,840 total residential accounts as of December 2010. The residential retrofit program has been 83 percent implemented as of December 2010.
2. Water savings are estimated to be about 0.066536 ac-ft/yr for each residential plumbing retrofit.

DMM C - System Water Audits, Leak Detection, and Repair

The City implements this DMM by conducting audits of water production and delivery records to determine any losses within the distribution/transmission system. By comparing the production amount and total deliveries to customers, an overall water balance is calculated to identify possible meter problems or to detect leaks. City staff actively determine the sources of water loss through the system and prioritize system repairs and replacements.

The City began implementing of DMM C in 2000. This DMM will continue to be implemented with an annual leak survey and a water system audit. The City has replaced a large number of older and leaking water pipes and has reduced the system water losses as shown in Table 3-12 (in Section 3). The last audit was performed in 2010. The City historically had high water losses resulting from pipeline leakage and unaccounted for use. The City's extensive pipeline replacement program has reduced pipeline losses. Unaccounted-for water includes system losses due to leaks, reservoir overflows, and inaccurate meters, as well as water used in operations, hydrant flushing, street sweeping, line breaks etc. For the period from 2005 through 2010, annual average losses ("unaccounted for water") is about 9 percent.

Table 6-4 provides the details of this DMM and Table 6-5 summarizes the historic implementation of the System Water Audits, Leak Detection, and Repair Programs between 2006 and 2010, as well as the projected program implementation between 2011 and 2015.

**Table 6-4
Summary of Status of DMM C**

Implementation Status	Fully implemented. The implementation of this DMM was started in 2000.
Implementation Schedule	Table 6-23 summarizes the implementation of this DMM from 2006 through 2010, as well as the projected program implementation schedule in the future.
Whether a water audit is performed to determine unaccounted-for water loss; year last audit performed	The City conducts water audits on an annual basis. Last audit was performed in 2010.
Percentage of unaccounted-for water	Table 6-5 contains the percentage of unaccounted for water
Does the City has an active leak detection program (as opposed to only fixing leaks when found)	The City has developed and implemented a program to determine the leaks in the distribution/transmission system.
Description of the leak detection program	The City conducts a leak detection survey on approximately 30 percent of its water distribution system annually. Each year the survey covers areas where leaks are thought to exist or where audits have not been conducted recently. The City also conducts water audits on individual meters routinely to highlight potential consumer side leaks. The City notifies the customer when a potential leak has been found during the audit process. The City also typically bills on a monthly basis to limit the amount of time that a metered leak may go unnoticed.
An estimate of water savings from repair of leaks	The amount of water saved with each audit indicates a reduction in loss due to effective management strategy. .In 2010 the estimated savings from leaks were found to be 1.2 ac-ft/yr.
Method used to evaluate the effectiveness of this DMM	The effectiveness of this DMM is being evaluated by calculating the reduction in water losses in the distribution system.
Estimates of existing conservation savings	Typical measured system losses should be less than 10 percent per year. An audit revealing higher uses will result in an investigation to determine the source of the loss if possible with a strategy to reduce them. Current estimated savings from this program are 2-3 percent of total water production.

Table 6-5
Summary of System Water Audits, Leak Detection, and Repairs

Actual	2006	2007	2008	2009	2010
% of Unaccounted Water ⁽¹⁾	9	14	12	9	<1
Miles of Mains Surveyed	16.5	No Record ⁽²⁾	No Record ⁽²⁾	20	20
Miles of Lines Repaired ⁽³⁾	As Needed	As Needed	As Needed	As Needed	As Needed
Actual Water Savings (ac-ft/yr)	varies	varies	varies	varies	varies
Planned					
	2011	2012	2013	2014	2015
% of Unaccounted Water ⁽¹⁾	2	4	5	7	8
Miles of Mains Surveyed	20	20	20	20	20
Miles of Lines Repaired ⁽³⁾	As Needed	As Needed	As Needed	As Needed	As Needed
Projected Water Savings (ac-ft/yr)	varies	varies	varies	varies	varies

Notes:

1. Total percentage of unaccounted water is shown. The City's Estimates for the system losses from leaks are 2-3 percent of total annual production.
2. Water audit records for 2007 and 2008 are not available.
3. Repairs are made when distribution system leaks are determined through system water audits or leak detection surveys.

N/A = Not available

DMM D - Metering with Commodity Rates

The City has fully implemented this DMM. The City requires that all long-term and short-term water connections be metered.

**Table 6-6
Summary of Status of DMM D**

System fully metered	Yes
Residential meter installation or retrofit program Implementation Status	Fully implemented. The implementation of this DMM was started in 1964.
Implementation Schedule	All of the connections in Tables 3-5 through 3-9 in Section 3 of this plan are metered with commodity rates. Table 6-7 summarizes the historic implementation of metering with commodity rates between 2006 and 2010, as well as the projected program implementation between 2011 and 2015. Since this DMM was fully implemented prior to 2006, Table 6-7 is blank.
Number of connections in 2010 and number of unmetered connections	DMM was fully implemented since the City's incorporation in 1964.
Rate of meter retrofit for unmetered connections	All the City connections are currently metered
Expected year of completion to meet AB306	Not applicable
Number of connections billed by volume-of-use	All City's connections are billed by volume-of-use
Quantification of meters installed	Fully implemented. Total of 5,384 metered connections in 2010
Steps necessary to implement measure – marketing/method of tracking number of meters installed	Administration of water meter installations is conducted by the Utility Billi
Method used to evaluate the effectiveness of this DMM	Research studies conducted by the Urban Water Conservation Council.
Estimates of existing conservation savings	Water savings are estimated to be about 20 percent to 30 percent water savings overall from unmetered uses.

**Table 6-7
Summary of Metering with Commodity Rates**

Actual					
	2006	2007	2008	2009	2010
Number of unmetered accounts	0	0	0	0	0
Number of retrofit meters installed	0	0	0	0	0
# of accounts w/o commodity rates	0	0	0	0	0
Actual Water Savings (ac-ft/yr)	0	0	0	0	0
Planned					
	2011	2012	2013	2014	2015
Number of unmetered accounts	0	0	0	0	0
Number of retrofit meters installed	0	0	0	0	0
# of accounts w/o commodity rates	0	0	0	0	0
Projected Water Savings (ac-ft/yr)	0	0	0	0	0

Notes:

1. DMM has been fully implemented since the City's incorporation in 1964.

DMM E - Large Landscape Conservation Programs and Incentives

Currently, no large landscape conservation program exists; however, the City plans to implement a non-potable water program for irrigation of turf areas at the high school and Leila Keiser Park in 2011. Additionally, the golf course in the City, which is one of the largest landscaped areas in the service area, uses recycled water from the California Men's Colony for irrigation. The use of non-potable water for irrigation will reduce demands on the potable water system and should facilitate future reclamation implementation.

Since the City is proposing no new water sources, the cost for implementing this demand measure would greatly exceed the cost of implementing non-existent supply augmentation projects. Therefore, implementing a large landscape conservation program is not currently a cost-effective DMM for the City.

The benefit cost analysis for DMM E is discussed later in this section.

DMM F - High-efficiency Washing Machine Rebate Programs

This DMM is met through the City's ongoing washer rebate program. Each residential address in the City is eligible for a rebate for the replacement of a standard or high water use washing machine with an approved energy efficient unit. The City plans to continue this program as long as funds remain available. This program consists of marketing, rebate program administration, tracking of rebates, and calculation of water savings. Table 6-8 provides a status summary of DMM F. Table 6-9 summarizes the historic implementation of the High-efficiency Washing Machine Rebate Program between 2006 and 2010, as well as the projected program implementation between 2011 and 2015.

Table 6-8
Summary of Status of DMM F

Description of the high efficiency washing machine rebate program	The City offers a \$100 onetime rebate to each residential household that replaces a non energy efficient washing machine with a high efficiency washing machine.
Implementation Status	Coverage requirements are being met. The implementation of this DMM was started in 2001.
Implementation Schedule	In 2001, the City adopted an Energy Star washing machine rebate program that was added to the existing rebate program for ULFTs. Table 6-9 provides the implementation schedule
Whether City or any other agency provides rebates	City of Morro Bay
Quantification of rebates	Table 6-9 provides the quantification of rebates
Steps necessary to implement measure – marketing/targeting strategy for rebates; method of tracking rebates; Methods for calculating water savings after rebate	This program consists of marketing, rebate program administration, tracking of rebates, and calculation of water savings.
Method used to evaluate the effectiveness of this DMM	Estimate of water reduction due to lower water use washing machine on an annual basis.
Estimates of existing conservation savings	Water savings based on 10 gallons per load, 2.2 people per household, and 1.5 loads per person per week.

Table 6-9
Summary of High-efficiency Washing Machine Rebate Program

Actual					
	2006	2007	2008	2009	2010
\$ per Rebate	100	100	100	100	100
# of Rebates Paid	11	10	26	46	30
Actual Water Savings (ac-ft/yr) ⁽¹⁾	0.06	0.05	0.15	0.25	0.16
Planned					
	2011	2012	2013	2014	2015
\$ per Rebates	100	100	100	100	100
# of Rebates Paid	20	20	20	20	20
Projected Water Savings (ac-ft/yr) ⁽¹⁾	0.1	0.1	0.1	0.1	0.1

Notes:

1. Water savings based on 10 gallons per load, 2.2 people per household, and 1.5 loads per person per week.

DMM G - Public Information Programs

This DMM is fulfilled through the City's conservation outreach program. The City incorporates conservation minded articles routinely in its utility newsletters, public conservation notices, announcements at public meetings, television advertisements on the public access channel, and press releases. A recent City of Morro Bay Utility Newsletter is included in Appendix K. Current newflashes and public notices can be found on the City's website at www.morro-bay.ca.us. The implementation of this DMM consists of administering public advertising/notices, tracking program implementation, and participating with the San Luis Obispo Partners in Water Conservation group.

Table 6-10 provides a status summary of DMM G. Table 6-11 summarizes the public information program between 2006 and 2010, as well as the projected program implementation between 2011 and 2015. The benefits of this DMM are considered non-quantifiable.

Table 6-10
Summary of Status of DMM G

Implementation Status	Coverage requirements are being met. The implementation of this DMM was started in 2001.
Implementation Schedule	Table 6-11 provides the implementation schedule
Description of publications, venues, demonstration garden, other public information programs	<p>The City began preparing brochures which address drought resistant landscaping in 2001 and continues to make is information available to the public. These brochures are available upon request at the Public Services counter. In addition to the generally available information at the counter the City prepares water bill inserts and direct mailings on a semi-regular basis to inform the public about water issues.</p> <p>In addition the City provides water conservation tips and resources on the City's website, distribution of water conservation kits, and support through the San Luis Obispo Partners in Water Conservation Group.</p>
Steps necessary to implement measure – method for publicizing public information activities	Preparation of utility newsletters, preparation of bill inserts, website maintenance and updating,
Whether attendance to public activities is tracked	The City does not track attendance at public activities.

DMM H - School Education Programs

This DMM is not currently being implemented by the City. The City does not have the legal authority to administer curriculum within the educational school system. The Morro Bay School District has State mandated educational curriculum it must provide to its students. The school district has informed the City it does not have available class time to add additional coursework at this time. As the City does not have the legal authority to fully implement the DMM, the City continues to find alternate ways to disseminate the message for this DMM. The strategy includes providing water conservation materials to the local schools and at the Morro Bay Community Library, and continuing to administer public information programs covered by DMM G. The City's overall goal is to implement this measure in the near future.

To implement this DMM the City would need legal authority to administer the program, provide resources and staffing to cover coordination of an educational program, develop educational materials, and perform implementation tracking. Due to the lack of legal authority for implementation of this DMM, the City is focusing on educating water users using different platforms, e.g. the public information program which educates young water users of water conservation tips and descriptions of water saving BMPs. It's anticipated that the measures taken in DMM G will achieve the goals of this DMM as well. The benefits of this DMM are considered non-quantifiable.

Table 6-11
Summary of Public Information Program

Actual					
	2006	2007	2008	2009	2010
a. Paid advertising ⁽¹⁾	No	No	Yes	Yes	Yes
b. Public Service announcement ⁽²⁾	No	Yes	Yes	Yes	Yes
c. Bill Inserts/Newsletters/Brochures ⁽²⁾	Yes	Yes	Yes	Yes	Yes
d. Bill comparing previous water usage	No	No	No	No	Yes
e. Demonstration Gardens	No	No	No	No	No
f. Special Events, Media Events	No	No	No	No	No
g. Speaker's Bureau	No	No	No	No	No
h. Program to coordinate with other govt ⁽³⁾	No	No	Yes	Yes	Yes
Planned					
	2011	2012	2013	2014	2015
a. Paid advertising ⁽¹⁾	Yes	Yes	Yes	Yes	Yes
b. Public Service announcement ⁽²⁾	Yes	Yes	Yes	Yes	Yes
c. Bill Inserts/Newsletters/Brochures ⁽²⁾	Yes	Yes	Yes	Yes	Yes
d. Bill comparing previous water usage	Yes	Yes	Yes	Yes	Yes
e. Demonstration Gardens	No	No	No	No	No
f. Special Events, Media Events	No	No	No	No	No
g. Speaker's Bureau	No	No	No	No	No
h. Program to coordinate with other govt ⁽³⁾	Yes	Yes	Yes	Yes	Yes

Notes:

1. Water conservation articles in newsletters, bill inserts, and advertisements on the local public access channel, the City has partnered with other local agencies to deliver a regional waterwise gardening website for San Luis Obispo County.
2. Public service announcements are made through the public postings, the City's website, and email notifications.
3. The City coordinates with other government agencies to conduct multi-agency programs to leverage agency resources through the San Luis Obispo Partners in Water Conservation Group.

DMM I - Conservation Programs for Commercial, Industrial, and Institutional (CII)

The City is not currently implementing this DMM. Because of the limited number of commercial, industrial, and institutional accounts and high water rates, the City has determined that developing a conservation program for non-residential accounts is not a cost-effective approach to demand management at this time.

The benefit cost analysis for DMM I along with a description of economic and legal considerations and cost share partners are included later in this section.

The City will implement this DMM if it becomes cost effective in the future. To implement this DMM the City would need to provide resources and staffing to cover CII conservation programs, implementation tracking, calculations of water savings, and coordination with CII users.

DMM J - Wholesale Agency Program

The City of Morro Bay is not a wholesale water agency and therefore this DMM is not applicable.

DMM K - Conservation Pricing

DMM K is fully implemented. Water meters are used to determine volumetric water use and customers are billed in accordance with the City's established water rate structure, which is attached in Appendix L. Table 6-12 provides a status summary of DMM K.

The City has an increasing tier rate schedule (higher unit cost with increased consumption) which, combined with information explaining the rate structure, encourages water conservation. A summary of the City's water rate structures is provided in Table 6-13.

**Table 6-12
Summary of Status of DMM K**

Implementation Status	Coverage requirements are being met.
Implementation Schedule	Implementation of this DMM started in 1995.
Identification of water rate structure for each sector and effective date of rate	Progressively tiered water rate structure attached in Appendix L. Enacted in 1995.
Steps necessary to implement measure – conservation pricing etc.	Establish and monitor rate structure, maintain and read meters, conduct water billing based on rate structure.
Method used to evaluate the effectiveness of this DMM	It is difficult to quantify the water savings associated with this DMM. The City did notice a reduction in per capita water usage due to the implementation of conservation pricing.
Estimates of existing conservation savings on water use	The benefits of this DMM are considered non-quantifiable. The exact amount of water savings from this DMM cannot be separated from the effects of other implemented DMMs over the same time period.

Table 6-13
Summary of Status of DMM K

Residential			
Water rate structure	Progressive	Sewer rate structure	Fixed/Variable
Year rate effective	1995	Year rate effective	2008
Commercial			
Water rate structure	Progressive	Sewer rate structure	Fixed/Variable
Year rate effective	1995	Year rate effective	2008
Industrial			
Water rate structure	Progressive	Sewer rate structure	Fixed/Variable
Year rate effective	1995	Year rate effective	2008
Institutional/Government			
Water rate structure	Progressive	Sewer rate structure	Fixed/Variable
Year rate effective	1995	Year rate effective	2008
Irrigation			
Water rate structure	Progressive		
Year rate effective	1995		
Other			
Water rate structure	Progressive	Sewer rate structure	Fixed/Variable
Year rate effective	1995	Year rate effective	2008

DMM L - Water Conservation Coordinator

The implementation of this DMM started in early 1990s after the City started conservation efforts. The City's resources did not hire a full-time Water Conservation Coordinator due to limited resources. However, the City has taken an approach of fulfilling the need for this DMM by utilizing the resources to continue the conservation efforts through the staffing in the City's Public Services Department. The City has designated the Public Services Director as the acting Water Conservation Coordinator. A significant portion of the Public Services Director's time and job duties include administrating the water conservation program for the City. Other tasks include conservation program planning, implementation, evaluation, coordination with stakeholders, tracking of conservation ordinances and integrating them into the program, development of materials for outreach, public events, and other forms of communications with the public, DMM implementation and tracking, enforcement of water waste ordinance, management of water conservation stages, public notification and outreach, and other water conservation related activities as needed. Additional staff members in the department assist the Director in these duties. In 2010, these supporting positions included the Utilities/Capital Projects Manager, Assistant Engineer, Utilities/Administrative Technician, Building Inspector, Engineering Tech III, Engineering Intern, and Permit Technician.

Table 6-14
Summary of Status of DMM L

Implementation Status/year program implemented	Implementation started in 1990
The number of full time and part time staff that perform conservation coordinator activities	The City has 8 full time employees that work part-time on conservation coordination activities in 2010. These positions are summarized earlier in this section.
The responsibilities of the staff and activities performed	Coordination of water conservation programs, conservation program planning, implementation, evaluation, coordination with stakeholders, tracking of conservation ordinances and integrating them into the program, development of materials for outreach, public events, and other forms of communications with the public, DMM implementation and tracking, enforcement of water waste ordinance, management of water conservation stages, public notification and outreach, and other water conservation related activities as needed.
The approximate number of hours spent on conservation activities	City staff members are assigned to this work as need to administer the City's various water conservation tasks. These hours are not tracked independently from other tasks.
Description of events in which the conservation coordinator participates.	Programs and events organized through the participation with the San Luis Obispo Partners in Water Conservation Group are attended by City staff when available.
Steps necessary to implement measure	Provide staffing and other resources to cover the program responsibilities listed above.
Method used to evaluate the effectiveness of this DMM	The benefits achieved through all other DMMs are reflective of the outcome of this DMM.
Estimates of existing conservation savings on water use	The benefits of this DMM are considered non-quantifiable. The exact amount of water savings from this DMM cannot be separated from the effects of other implemented DMMs over the same time period.

Table 6-15
Summary of Water Conservation Coordinator Positions

Actual					
	2006	2007	2008	2009	2010
Number of full-time positions	0	0	0	0	0
Number of full/part time positions ⁽¹⁾	7	9	9	9	8
Planned					
	2011	2012	2013	2014	2015
Number of full-time positions	0	0	0	0	0
Number of full/part time positions ⁽¹⁾	7	8	8	8	8

Notes:

1. Number of full-time staff that conduct conservation coordination activities part-time as needed and as available.

DMM M - Water Waste Prohibition

The City restricts nuisance and wasteful water use through its municipal code and storm water ordinance. During severe water supply shortages the City strictly enforces these regulations using a complaint-based approach to preserve water. This program is implemented through two processes. The code enforcement process and the Water Division work order process. If a code enforcement complaint is received it is logged and investigated. The Public Services Director has the ability after providing written warning to terminate water service per section 13.04.330 of the Morro Bay Municipal Code. If a complaint is received directly by the Water Division a work order is issued. Water Division staff then investigate the issue. This occurs on average several times per year. In the case of an actual water waste incident, the case would be forwarded on to code enforcement. Termination of water service with a fee to subsequently reinstate the service is the sole remedy outlined in the code for violating the water conservation provisions.

Regulations of water use during normal supply conditions include:

1. Spring-loaded shut-off nozzles are required for outdoor water use.
2. Outdoor irrigation resulting in excessive runoff is prohibited.
3. Water may be used as needed for washing and cleaning paved surfaces.
4. Water is supplied to customers at restaurants only upon request.

Table 6-16
Summary of Status of DMM M

Implementation Status/year program implemented	Coverage requirements are being met.
Implementation Schedule	Fully implemented
Does your agency have a water waste prohibition	Yes, included in Appendix M. Implemented through municipal code and storm water ordinance.
Whether this water waste prohibition is enforced at all times or only during water shortage	The City implements stricter water waste usage regulations during periods of reduced water supply. These restrictions are stated in the City's Municipal Code Section 13.04.345 - Mandatory Water Conservation Requirements, included in Appendix M.
Provide a list of the prohibited water uses	Included in Appendix M
Provide a copy of the ordinance	See Appendix M
Steps necessary to implement measure – targeting strategy for water waster, methods for receiving information regarding water waste (e.g. phone line, website, etc), methods for tracking numbers of warnings issued, methods for follow-up to warnings to assure compliance	The City implements this program through complaint tracking, enforcement, follow-up site visits, and compliance tracking.
Method used to evaluate the effectiveness of this DMM	It is difficult to quantify the water savings associated with this DMM.
Estimates of existing conservation savings on water use	Estimates of water saves are not currently available for this DMM. The exact amount of water savings from this DMM cannot be separated from the effects of other implemented DMMs over the same time period.

Table 6-17
Summary of Water Waste Prohibition

Actual	2006	2007	2008	2009	2010
	Water Waste Ordinance in Effect	Yes	Yes	Yes	Yes
Estimated Number of Onsite visits	2	2	3	2	2
Planned	2011	2012	2013	2014	2015
Water Waste Ordinance in Effect	Yes	Yes	Yes	Yes	Yes
Estimated Number of Onsite visits	3	2	2	2	2

DMM N - Residential Ultra-Low-Flush Toilet Replacement Programs

This rebate program started as an incentive to replace existing standard flush toilets with low-flush toilets in single and multi-family residences. This program was later updated to require the replacement of standard flush toilets with ULFT. When the new ULFT technology was available the City updated the rebate program to cover replacement of standard flush toilets with ULFTs. The minimal water savings to extend the toilet retrofit program to cover replacement of low-flush toilets with ULFTs did not justify the expansion of this program to cover the replacement of low-flush toilets with ULFTs. Table 6-17 summarizes the implementation status of this DMM which is implemented in conjunction with the residential plumbing retrofit program. Table 6-18 summarizes the historical and projected combined low-flow toilet and ULFT rebates between 2006 and 2015

Table 6-18
Summary of Status of DMM N

Implementation Status	Fully Implemented.
Implementation Schedule	The low flush toilet program has been implemented since 1985. The ultra-low flush toilet program has been implemented since 2001.
Devices provided to customers	Retrofit existing toilets, faucets, and showerheads with aerators, and low flow equipment
Ordinance:	City's retrofit upon sale ordinance
Quantification	Table 6-19 includes the quantification of devices
Steps necessary to implement measures	Since its inception, the City's water conservation program mandated that developers provide water for new construction by funding retrofits of existing facilities to offset two times the developer's estimated water demand. The City developed a water equivalency program to quantify proposed water conservation measures and ensure that reduced water demands will offset water needed for new construction. In practice, retrofitting has generally been for the toilet replacement. Typically developers were required to fund 14 toilet retrofits for each proposed new residential service. The developer mandated toilet retrofit program ceased in 2001 since the City believes all willing toilet retrofit candidates have been funded and that the remaining candidates would not provide adequate water savings for the additional expense. A voluntary ULFT rebate program has begun.
Method used to evaluate the effectiveness of this DMM	The City estimated the water savings to be about 0.01468 ac-ft/year for each residential plumbing retrofit. This estimate includes savings from various water saving devices such as toilets, aerators, and low flow showerheads.
Estimates of existing conservation savings	Water savings are estimated to be about 0.01468 ac-ft/yr for each ULFT retrofit, The estimate for ULFT is based on 2.2 people per residence, 44 flushes per person per day and a reduction of 1.5 gallons per flush (replacement of a 3 gallons per flush toilet with 1.5 gallons per flush). This water savings accounts for a portion of the total water savings of the Residential Plumbing Retrofit Program.

Table 6-19
Summary of ULFT Rebate Program

Rebates disbursed (2006-2010)					
Actual	2006	2007	2008	2009	2010
Number of ULF rebates	18	18	12	43	38
Estimated water savings (ac-ft/yr)	0.26	0.26	0.18	0.63	0.56
Rebates to be disbursed (2011-2015)					
Planned	2011	2012	2013	2014	2015
Number of ULF rebates	18	18	18	18	18
Projected water savings (ac-ft/yr)	0.26	0.26	0.26	0.26	0.26

Note:
 ULF = ultra low flush

Cost Benefit Analysis

An economic analysis, including a benefit-cost analysis, was completed for the quantifiable DMMs that are not currently implemented (DMMs A, E, and I). The benefit-cost analysis was completed with consideration of all economic factors. Non-economic factors, including environmental, social, health, and new technology, are not believed to be quantifiable and were not considered in the analysis.

The basis and assumptions used in the economic analysis of each DMM are included in Table 6-20. Common assumptions for all DMMs are a real discount rate of 6.0 percent and a value of conserved water of \$120 per ac-ft. The value of conserved water provided by the City is estimated based on the cost incurred for the next increment of developed water. The real discount rate is based on the DWR's economics guidelines. Other assumptions with supporting references are described in Table 6-21.

Table 6-20
Summary of DMM General Assumptions used for the Economic Analysis

Source:	
City of Morro Bay	
Common Assumptions Across DMMs:	
Value of Conserved Water (incremental cost of a developed ac-ft of water)	\$120
This estimate includes incremental acquisition (groundwater pumping), treatment, distribution, and wastewater costs for an ac-ft of developed water. The \$120 is composed of \$74 of energy costs (assumed for pumping, treatment and distribution), \$1 of treatment costs (chemicals), and \$45 of wastewater treatment costs.	
Real Discount Rate	6.0%
Six percent based on the City's cost of borrowing. This is consistent with the DWR. http://www.water.ca.gov/economics/guidance.cfm	

The economic analysis was performed using a spreadsheet program developed by the Council. A separate, customized worksheet for each DMM is presented in Tables 6-22, 6-23, and 6-24 for DMM A, E, and I, respectively. Each DMM's economic analysis spreadsheet projects on an annual basis the number of interventions and the dollar values of the benefits and costs that would result from fully implementing a particular DMM. The definition of terms and formulas that are common to all worksheets are presented in Table 6-25.

Table 6-26 summarizes the results of the economic analysis. The table presents the total discounted costs and benefits, the benefit-cost ratio, the simple pay-back period, the discounted cost per ac-ft of water saved, and the net present value (NPV) per ac-ft of water saved for each DMM.

The economic analysis shows that these three DMMs yield benefit-cost ratios less than one, which indicates that the costs of conservation are in excess of the benefits from implementation of these conservation measures.

Table 6-21
Summary of DMM Specific Assumptions

DMM A: Water Survey Programs for Single-family Residential and Multifamily Residential Customers	
Single-family survey water savings (gpd/unit)	3.39
Multi-family survey water savings (gpd/unit)	6.78
Annual savings decay	25%
Annual single-family surveys	150
Annual multifamily surveys	20
Single-family customer expenditures per survey	\$20
Multifamily customer expenditures per survey	\$40
Total customer benefit per ac-ft (energy savings)	\$1,067
Annual program costs	\$17,190
DMM E(a): Large Landscape Conservation Programs and Incentives	
Average acres per survey	2
Average water use per acre (ac-ft)	0.5
Annual water savings	20%
Annual number of large landscape surveys	8
Annual savings decay	5%
Customer participation costs (per survey)	\$550
Annual program costs	\$3,110
DMM E(b): Large Landscape Conservation Programs and Incentives	
Number of CII sites with dedicated irrigation meters	42
Total budgets implemented for CII sites with dedicated irrigation meters	38
Average annual water use of CII sites with dedicated irrigation meters (ac-ft)	13
Average annual water use per site (ac-ft)	0.31
Percent annual reduction per site	20%
Annual water savings per site (ac-ft)	0.06
Customer participation costs (per site)	\$3,000
Initial program setup costs (first year of program only)	\$60,000
Annual program costs (first 4 years of program only)	\$6,836
Budget development costs per site	\$175
Per site follow-up cost (10 percent of sites per year)	\$125
Implementation year	2013
DMM I: Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	
Average savings per survey (ac-ft)	0.02
Annual number of large landscape surveys	5
Annual savings decay	5%
Customer benefit per survey per year (energy savings)	\$1
Customer participation costs (per survey)	\$1,500
Annual program costs	\$3,609

gpd = gallon(s) per day

Table 6-22
DMM A Analysis: Water Survey Programs for Single-family Residential and Multifamily Residential Customers

Calendar Year	Water Saving Calculations				Benefits				Costs				NPV
	Single Family Surveys	Multi Family Surveys	Single Family Water Savings (ac-ft/Yr)	Multi Family Water Savings (ac-ft/Yr)	Avoided Agency Capital Costs	Avoided Agency Variable Costs	Avoided Customer Energy Costs	Total Discounted Benefits	Agency Capital Costs	Agency Operating Expenses	Customer Participation Costs	Total Discounted Costs	
2010													
2011	150	20	0.57	0.15	0	87	769	808	0	17,190	3,800	19,802	-18,995
2012	150	20	1.00	0.27	0	152	1,347	1,333	0	17,190	3,800	18,681	-17,348
2013	150	20	1.32	0.35	0	200	1,779	1,662	0	17,190	3,800	17,624	-15,962
2014	150	20	1.56	0.42	0	237	2,104	1,854	0	17,190	3,800	16,626	-14,772
2015	150	20	1.74	0.46	0	264	2,347	1,952	0	17,190	3,800	15,685	-13,734
2016	150	20	1.87	0.50	0	285	2,530	1,984	0	17,190	3,800	14,797	-12,813
2017	150	20	1.97	0.53	0	300	2,667	1,973	0	17,190	3,800	13,960	-11,986
2018	150	20	2.05	0.55	0	312	2,770	1,933	0	17,190	3,800	13,170	-11,236
2019	150	20	2.11	0.56	0	321	2,847	1,875	0	17,190	3,800	12,424	-10,549
2020	150	20	2.15	0.57	0	327	2,904	1,805	0	17,190	3,800	11,721	-9,916
2021	150	20	2.18	0.58	0	332	2,948	1,728	0	17,190	3,800	11,057	-9,330
2022	150	20	2.21	0.59	0	336	2,980	1,648	0	17,190	3,800	10,432	-8,784
2023	150	20	2.22	0.59	0	339	3,005	1,567	0	17,190	3,800	9,841	-8,274
2024	150	20	2.24	0.60	0	341	3,023	1,488	0	17,190	3,800	9,284	-7,796
2025	150	20	2.25	0.60	0	342	3,037	1,410	0	17,190	3,800	8,759	-7,349
2026	150	20	2.26	0.60	0	343	3,047	1,335	0	17,190	3,800	8,263	-6,928
2027	150	20	2.26	0.60	0	344	3,055	1,262	0	17,190	3,800	7,795	-6,533
2028	150	20	2.27	0.60	0	345	3,060	1,193	0	17,190	3,800	7,354	-6,161
2029	150	20	2.27	0.60	0	345	3,065	1,127	0	17,190	3,800	6,938	-5,811
2030	150	20	2.27	0.61	0	346	3,068	1,064	0	17,190	3,800	6,545	-5,481
Totals:	3,000	400	38.75	10.33	\$0	\$5,898	\$52,351	\$31,002	\$0	\$343,808	\$76,000	\$240,758	-\$209,756
												Benefit Cost Ratio:	0.13
												Simple Pay-Back Period (years):	155
												Discounted Cost / Water Saved (\$/ac-ft):	\$4,905
												NPV / Water Saved (\$/ac-ft):	-\$4,274

Table 6-23
Analysis of DMM E(a): Large Landscape Conservation Programs and Incentives

Calendar Year	Water Saving Calculations		Benefits			Costs				Net Present Value
	Number of Large Landscape Surveys	Water savings (ac-ft/yr)	Avoided Agency Capital Costs	Avoided Agency Variable Costs	Total Discounted Benefits	Agency Capital Costs	Agency Operating Expenses	Customer Participation Costs	Total Discounted Costs	
2010										
2011	8	1.60	0	192	181	0	3,110	4,400	7,085	-6,904
2012	8	3.12	0	375	334	0	3,110	4,400	6,684	-6,350
2013	8	4.56	0	548	460	0	3,110	4,400	6,306	-5,845
2014	8	5.94	0	713	565	0	3,110	4,400	5,949	-5,384
2015	8	7.24	0	870	650	0	3,110	4,400	5,612	-4,962
2016	8	8.48	0	1,019	718	0	3,110	4,400	5,294	-4,576
2017	8	9.65	0	1,160	771	0	3,110	4,400	4,995	-4,223
2018	8	10.77	0	1,294	812	0	3,110	4,400	4,712	-3,900
2019	8	11.83	0	1,422	842	0	3,110	4,400	4,445	-3,604
2020	8	12.84	0	1,543	862	0	3,110	4,400	4,194	-3,332
2021	8	13.80	0	1,658	873	0	3,110	4,400	3,956	-3,083
2022	8	14.71	0	1,768	878	0	3,110	4,400	3,732	-2,854
2023	8	15.57	0	1,871	877	0	3,110	4,400	3,521	-2,644
2024	8	16.39	0	1,970	871	0	3,110	4,400	3,322	-2,450
2025	8	17.17	0	2,064	861	0	3,110	4,400	3,134	-2,273
2026	8	17.92	0	2,153	848	0	3,110	4,400	2,956	-2,109
2027	8	18.62	0	2,238	831	0	3,110	4,400	2,789	-1,958
2028	8	19.29	0	2,318	812	0	3,110	4,400	2,631	-1,819
2029	8	19.92	0	2,394	791	0	3,110	4,400	2,482	-1,691
2030	8	20.53	0	2,467	769	0	3,110	4,400	2,342	-1,573
Totals:	160	250.0	\$0	\$30,038	\$14,608	\$0	\$62,204	\$88,000	\$86,141	-\$71,533
Benefit Cost Ratio: 0.17										
Simple Pay-Back Period (years): 118										
Discounted Cost / Water Saved (\$/ac-ft): \$345										
NPV / Water Saved (\$/ac-ft): -\$286										

Table 6-24
Analysis of DMM E(b): Large Landscape Conservation Programs and Incentives

Calendar Year	Water Saving Calculations			Benefits			Costs				
	CII Accounts with Developed Budgets	CII Accounts with Active Budgets	Water savings (ac-ft/yr)	Avoided Agency Capital Costs	Avoided Agency Variable Costs	Total Discounted Benefits	Agency Capital Costs	Agency Operating Expenses	Customer Participation Costs	Total Discounted Costs	NPV
2010											
2011	0	0	0.00	0	0	0	0	0	0	0	0
2012	0	0	0.00	0	0	0	0	0	0	0	0
2013	9	0	0.00	0	0	0	0	68,411	27,000	80,109	-80,109
2014	9	9	0.56	0	67	53	0	8,524	27,000	28,138	-28,085
2015	9	18	1.11	0	134	100	0	8,636	27,000	26,629	-26,529
2016	11	27	1.67	0	201	142	0	9,099	33,000	29,678	-29,536
2017	0	38	2.35	0	283	188	0	475	0	316	-128
2018	0	38	2.35	0	283	177	0	475	0	298	-121
2019	0	38	2.35	0	283	167	0	475	0	281	-114
2020	0	38	2.35	0	283	158	0	475	0	265	-107
2021	0	38	2.35	0	283	149	0	475	0	250	-101
2022	0	38	2.35	0	283	140	0	475	0	236	-96
2023	0	38	2.35	0	283	133	0	475	0	223	-90
2024	0	38	2.35	0	283	125	0	475	0	210	-85
2025	0	38	2.35	0	283	118	0	475	0	198	-80
2026	0	38	2.35	0	283	111	0	475	0	187	-76
2027	0	38	2.35	0	283	105	0	475	0	176	-71
2028	0	38	2.35	0	283	99	0	475	0	166	-67
2029	0	38	2.35	0	283	93	0	475	0	157	-64
2030	0	38	2.35	0	283	88	0	475	0	148	-60
Totals:	38		36	\$0	\$4,359	\$2,147	\$0	\$101,320	\$114,000	\$167,667	-\$165,520
Benefit Cost Ratio: 0.01 Simple Pay-Back Period (years): 1,562 Discounted Cost / Water Saved (\$/ac-ft): \$4,622 NPV / Water Saved (\$/ac-ft): -\$4,563											

Table 6-25
Analysis of DMM I: Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts

Calendar Year	Number of CII Surveys	Water Savings (ac-ft/yr)	Benefits				Costs				NPV
			Avoided Agency Capital Costs	Avoided Agency Variable Costs	Avoided Customer Energy Costs	Total Discounted Benefits	Agency Capital Costs	Agency Operating Expenses	Customer Participation Costs	Total Discounted Costs	
2010											
2011	5	0.10	0	12	4	15	0	3,609	7,500	10,480	-10,465
2012	5	0.20	0	23	4	24	0	3,609	7,500	9,887	-9,863
2013	5	0.29	0	34	4	32	0	3,609	7,500	9,327	-9,295
2014	5	0.37	0	45	4	38	0	3,609	7,500	8,799	-8,761
2015	5	0.45	0	54	4	43	0	3,609	7,500	8,301	-8,258
2016	5	0.53	0	64	4	47	0	3,609	7,500	7,831	-7,784
2017	5	0.60	0	73	4	51	0	3,609	7,500	7,388	-7,337
2018	5	0.67	0	81	4	53	0	3,609	7,500	6,970	-6,917
2019	5	0.74	0	89	4	55	0	3,609	7,500	6,575	-6,520
2020	5	0.80	0	96	4	56	0	3,609	7,500	6,203	-6,147
2021	5	0.86	0	104	4	56	0	3,609	7,500	5,852	-5,795
2022	5	0.92	0	110	4	57	0	3,609	7,500	5,521	-5,464
2023	5	0.97	0	117	4	57	0	3,609	7,500	5,208	-5,152
2024	5	1.02	0	123	4	56	0	3,609	7,500	4,913	-4,857
2025	5	1.07	0	129	4	55	0	3,609	7,500	4,635	-4,580
2026	5	1.12	0	135	4	54	0	3,609	7,500	4,373	-4,318
2027	5	1.16	0	140	4	53	0	3,609	7,500	4,125	-4,072
2028	5	1.21	0	145	4	52	0	3,609	7,500	3,892	-3,840
2029	5	1.25	0	150	4	51	0	3,609	7,500	3,672	-3,621
2030	5	1.28	0	154	4	49	0	3,609	7,500	3,464	-3,415
Totals	100	15.62	\$0	\$1,877	\$71	\$954	\$0	\$72,172	\$150,000	\$127,415	-\$126,461
Benefit cost ratio = 0.01 Simple pay-back period (years) = 2.672 Discounted Cost / Water Saved (\$/ac-ft): \$8,156 NPV / Water Saved (\$/ac-ft): -\$8,095											

Table 6-26
Definitions of Terms Used in the Economic Analysis

Term	Definition	Comments
Benefits:		
Avoided Capital Costs	Capital costs that are avoided by implementing the BMP	Example is the cost of a well that would not have to be installed due to implementation of the BMP.
Avoided Variable Costs	Variable costs that are avoided by implementing the BMP.	Example is the cost of electricity that would be saved if the BMP were implemented.
Avoided Purchase Costs	Purchase costs that are avoided by implementing the BMP.	Example is the cost of purchasing water that would not be required due to implementation of the BMP.
Total Undiscounted Benefits	The sum of avoided capital, variable, and purchase costs.	
Total Discounted Benefits	The present value of the sum of avoided capital, variable, and purchase costs.	The discount rate is used to calculate the present value of avoided costs.
Costs:		
Capital Costs	Capital costs incurred by implementing the BMP.	
Financial Incentives	Financial incentives paid to customers.	Example is the rebate for purchasing low-flow plumbing devices.
Operating Expenses	Operating expenses incurred implementing the BMP.	Example is the administrative cost of conducting surveys.
Total Undiscounted Costs	The sum of capital, financial incentives and operating expenses.	
Total Discounted Costs	The present value of the sum of capital, financial incentives and operating expenses.	The discount rate is used to calculate the present value of incurred costs.
Results:		
NPV	Total discounted benefits minus total discounted costs.	A value greater than zero indicates an economically justifiable BMP.
Benefit/Cost Ratio	The sum of the total discounted benefits divided by the sum of the total discounted costs.	A ratio greater than one indicates an economically justifiable BMP.
Simple Pay-Back Period	The sum of the total discounted costs divided by the average annual total discounted benefits.	Indicates the number of years required for the benefits to pay back the costs of the BMP.
Discounted Cost/Water Saved	The sum of the total discounted costs divided by the total ac-ft of water saved over the study period.	Indicates the present-value cost to save one acre-foot of water. A low value is considered economically attractive.
NPV/Water Saved	The sum of the NPV divided by the total ac-ft of water saved over the study period.	Indicates the net value of saving one acre-foot of water. A high value is considered economically attractive.

Table 6-27
Results of Economic Analysis for BMPs Currently not Meeting Coverage Requirements

BMP Description	Total Discounted Cost ⁽¹⁾	Total Discounted Benefits ⁽²⁾	Total Water Saved (ac-ft) ⁽³⁾	Benefit/Cost Ratio ⁽⁴⁾	Simple Payback Analysis (years) ⁽⁵⁾	Discounted Cost / Water Saved (\$/c-ft) ⁽⁶⁾	NPV / Water Saved (\$/ac-ft) ⁽⁷⁾
A Water Survey Programs for Single-family Residential and Multifamily Residential Customers	\$240,758	\$31,002	49	0.13	155	\$4,905	-\$4,274
E Large Landscape Conservation Programs and Incentives	\$253,808	\$16,755	286	0.07	303	\$887	-\$828
I Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	\$127,415	\$954	16	0.01	2,672	\$8,156	-\$8,095

Notes:

1. Present value of the sum of financial incentives and operating expenses - using discount rate of 6.0 percent.
2. Present value of the sum of avoided purchased water costs - using discount rate of 6.0 percent.
3. Achieved water savings for the implemented DMM.
4. Total discounted benefits divided by total discounted costs.
5. Time horizon in years required for benefits to pay back costs of the DMM.
6. Total discounted costs divided by total water saved.
7. Total discounted benefits less discounted costs divided by total water saved.

Recommended Conservation Program

The results of the economic analysis show DMMs A, E, and I yielding benefit-cost ratios less than one, which indicates that the costs of conservation are in excess of the benefits and implementation of these conservation measures is not cost effective. Water purveyors are not required to implement DMMs that are not cost beneficial. Therefore, the City is not required to continue implementation of these DMMs.

When implementing water conservation programs, the City is subject to economic and legal constraints that need to be considered as they may affect the cost effectiveness of each DMM.

Economic Considerations

The cost of water is an important economic factor that needs to be considered when implementing conservation programs. Higher cost of water increases the economic viability of DMM implementation. Currently, there are no water projects planned in the City that would result in higher unit costs of water, thus increasing the economic feasibility of water conservation measures.

Legal Considerations

The City has the legal authority to implement cost beneficial DMMs in its capital/operating budget. When developing programs that advance water conservation, the City can offer financial incentives, information or educational programs in its service area and has legal authority to enforce urban codes or plumbing codes for new or existing connections that pertain to implementation of efficient devices, or reduction of water use.

The only DMM that may not be able to be implemented by the City is the School Education Program. The City will continue to explore the possibilities for the implementation of this BMP.

Cost Share Partners

The City partners with other agencies that support conservation programs to expand the breadth of offered programs. Joint participation offers opportunity for cost sharing and development of more effective conservation strategies. The San Luis Obispo Partners in Water Conservation is a joint group of water purveyors that focus on developing conservation programs and incentives regionally, and discuss individual efforts of its members. The partnership also leverages voluntary money from its members to support regional conservation programs and awareness. The City is an active member of this group.

To avoid placing a disproportionate burden on any customer sector, the City has actively been pursuing outside sources of funding to complement the City's resources. As an example, the City pursued various grant funding opportunities over the last 5 years to reduce costs to its rate paying public.

Section 7. References

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AGENDA NO: D-1

MEETING DATE: 06/28/2011

Staff Report

TO: Honorable Mayor and City Council **DATE:** June 28, 2011
FROM: Susan Slayton, Administrative Services Director/City Treasurer
SUBJECT: Consideration of Resolution No. 42-11 Amending the Parameters for the Use of the General Fund Emergency Reserve

RECOMMENDATION:

Council to adopt Resolution No. 42-11.

FISCAL IMPACT:

None

SUMMARY:

Resolution No. 27-10 was enacted on May 24, 2010, and set the parameters for the General Fund Emergency Reserve Fund. Staff feels that an additional comment needs to be added that recommends Council's annual review of excess reserves for programming/designating them for use in the upcoming year. Resolution No. 42-11 amends Resolution No. 27-10.

DISCUSSION:

On May 10, 2010, City Council requested that staff bring forward a Resolution establishing the General Fund Emergency Reserve, and setting the parameters for its balance and use. Resolution No. 27-10 was prepared and enacted on May 24, 2010, and sets the guidelines for this Fund. At that time, there was no language included to require Council to annually review the excess balance in the reserve, and program or designate that money. While Council and staff understand that any excess reserve funds are to be used for one-time projects or purposes, staff is concerned that without a designation, these excess funds could be interpreted as "extra money" that could be used in the collective bargaining process.

Staff has prepared and is presenting Resolution No. 42-11, which amends Resolution No. 27-10 by adding the following language:

Amounts greater than the 27.5% target balance, or minimum of \$2,750,000 (whichever is greater), will be programmed/designated by Council during the annual budget adoption process, at Council's discretion.

Prepared By: _____ **Dept Review:** _____
City Manager Review: _____
City Attorney Review: _____

RESOLUTION NO. 42-11

**RESOLUTION OF THE CITY COUNCIL
OF THE CITY OF MORRO BAY, CALIFORNIA, AMENDING THE PARAMETERS
FOR THE USE OF THE GENERAL FUND EMERGENCY RESERVE**

**THE CITY COUNCIL
City of Morro Bay, California**

WHEREAS, on May 24, 2010, the Morro Bay City Council adopted Resolution No. 27-10, which established the parameters for the use of the General Fund Emergency Reserve; and

WHEREAS, staff wishes to amend that Resolution to include the requirement to annually designate/program all excess funds in the General Fund Emergency Reserve at Council's discretion.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Morro Bay, California, that Resolution 27-10 be amended to read as follows:

GENERAL FUND (ACCUMULATION) RESERVE

1. The General Fund (Accumulation) Reserve must meet or exceed either 27.5% of the General Fund operating budget or a minimum of \$2,750,000, whichever is greater.
2. Any amount greater than 27.5% of the General Fund operating budget or the minimum of \$2,750,000 (whichever is greater), may be used for budgetary purposes.
3. **Amounts greater than the 27.5% target balance, or minimum of \$2,750,000 (whichever is greater), will be programmed/designated by Council during the annual budget adoption process, at Council's discretion.**
4. Use of ~~the amount described in #2~~ reserves must be approved by the City Council.
5. The General Fund (Accumulation) Reserve will be renamed and listed in the budget as the General Fund Emergency Reserve.

PASSED AND ADOPTED by the City Council of the City of Morro Bay at a regular meeting thereof held on the 28th day of June 2011, by the following vote:

AYES:

NOES:

ABSENT:

William Yates, Mayor

ATTEST:

Bridgett Kessling, City Clerk



AGENDA NO: D-2

MEETING DATE: June 28, 2011

Council Report

TO: Honorable City Council

DATE: June 23, 2011

FROM: Councilmember Borchard & Councilmember Smukler

SUBJECT: Report on the Cambria Voluntary Community Bus Program

RECOMMENDATION

Councilmembers Borchard and Smukler recommend the City Council discuss the next steps for a Volunteer- run Community Bus Program.

DISCUSSION

Councilmembers Borchard, Smukler and City Manager Lueker met with the Cambria Bus Program volunteer coordinator in early June and discussed the program offered in Cambria. A review of the program is attached as well as a schedule for the program.

With the significant reduction of the transit programs, a community bus program may be a viable option, with volunteer support, to provide further transit opportunities to the senior and disabled community of Morro Bay.

Tonight's discussion should include potential one-time and ongoing City support including staff time, insurance, vehicle acquisition, recruitment of the program coordinator, maintenance, storage and funding.

u.w.council.staff report community bus program

Prepared By: _____

Dept Review: _____

City Manager Review: _____

City Attorney Review: _____

MB Volunteer Community Bus Program

Case Study: Cambria Community Bus Program

- Administered through Cambria Community Council of Non-Profits
- Started in 1980 with focus on Seniors & Disabled (Pet friendly)
- No Fee, Door-Door Service: M-F (8-4:30), T (SLO), Monthly (AG), No Holidays
 - Rides Scheduled 9-11am daily w/ message option through dispatch
 - Same day allowed but reserved rides have priority
 - Multiple stops encouraged w/ call to bus when ready for pickup
- \$42k annual Budget raised by yearly Mail-in Donation Campaign
 - Donations tax deductible, Special events = extra revenue/donation option
 - ~ 35 Volunteer Drivers + Volunteer Coordinator (30hrs/month) & Assistant
 - Training provided, annual breakfast & phone on bus
 - Contracted Dispatcher (\$700/Month) sets monthly driver schedule via email
 - Insurance: \$6,800/Yr – clears volunteers
 - 2 Buses w/ seatbelts in Operation paid for by Endowments & Grants
 - Buses ≤ 9 seats (1 wheelchair seat required) = Class C license
 - Maintenance/Fuel via local stations and support of RideOn
 - Stored @ Cal Fire Station
- Warren (Coordinator) is available for further council & training in MB

Next Steps for Morro Bay

- Identify potential City Resources: One-time/Ongoing Support options/funding
 - Staff Time, Insurance, Bus Funds, Recruitment, Maintenance, Storage
- Identify potential Community Organization(s)
 - Rotary
 - Kiwanis
 - Lions
 - Friends of PD/FD
 - PWAB
 - Meals on Wheels
 - Seniors
 - Church Communities
- Present concept to potential organizations and invite feedback / exploration

\$900,000 per year.

An evaluation of the overall street system was also performed as part of this scope of work. The analysis showed that the City's overall weighted average PCI is 63. This is below the PCI value of 70 that most California cities try to maintain. The City's arterial system PCI is better than average, but the other three street categories (collectors, commercial/industrial, and residential) rank below the 70 PCI benchmark.

The City's arterial system PCI is better than average, while the other three street categories (collectors, commercial/industrial, and residential) rank below this benchmark as shown in the table below.

Street Category	Miles	PCI
Arterial	7.9	78
Collector	3.2	60
Local Commercial/Industrial	5.5	64
Local/Residential	36.2	59
Total	53.4	63

TOP POLICY RECOMMENDATIONS

1. Achieve and maintain a PCI of 70 for all City streets
2. Regularly update the MicroPaver street condition database

TOP PROGRAM RECOMMENDATIONS

1. Institute a regular global maintenance (street sealing) program
2. Implement an effective pothole repair program
3. Implement a regular crack sealing program
4. Create a comprehensive 10-year Pavement Maintenance and Rehabilitation Program

ATTACHMENT

City of Morro Bay's - Pavement Management Plan, June 2011

PAVEMENT MANAGEMENT PLAN (PMP)
FOR
THE CITY OF MORRO BAY



Prepared by:

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Rob Livick, P.E./P.L.S., City Engineer/Director of Public Services

June 2011



EXECUTIVE SUMMARY

This Pavement Management Plan (PMP) has been developed for the City to implement a systematic program of maintenance, repair and improvement of the streets of Morro Bay. Based on American Public Works Association's (APWA) MicroPaver Program, the PMP sets out optimal strategies and estimated costs for overall improvement to pavement conditions within City limits.

Four general maintenance and rehabilitation categories were used for this PMP program; reconstruction, overlays (heavy and light), maintenance (street sealing) and no action. Annual pavement maintenance and rehabilitation projects were developed for the next five years as part of the program. Care was taken to select streets using a critical PCI (Pavement Condition Index) approach and to group streets geographically to promote reduced construction costs using budget ranges of \$250,000 to \$900,000 per year.

An evaluation of the overall street system was also performed as part of this scope of work. The analysis showed that the City's overall weighted average PCI is 63. This is below the PCI value of 70 that most California cities try to maintain. The City's arterial system PCI is better than average, while the other three street categories (collectors, commercial/industrial, and residential) rank below this benchmark as shown in the table below.

Street Category	Miles	PCI
Arterial	7.9	78
Collector	3.2	60
Local Commercial/Industrial	5.5	64
Local/Residential	36.2	59
Total	53.4	63

POLICY RECOMMENDATIONS

1. Achieve and maintain a PCI of 70 for all City streets
2. Regularly update the MicroPaver street condition database
3. Encourage use of new technologies and materials in pavement design

PROGRAM RECOMMENDATIONS

1. Institute a regular global maintenance (street sealing) program
2. Implement an effective pothole repair program
3. Implement a regular crack sealing program
4. Create a Green Streets program
5. Implement a street subsurface evaluation program
6. Upgrade or Install ADA curb ramps
7. Modify and/or enforce trench cut standards
8. Coordinate with other programs and departments
 - a. Utility Master Planning and scheduled repairs
 - b. City Trees

- c. Bicycle Traffic
 - d. Non-City Utilities (Cayucos, AT&T, PG&E, etc
 - e. Fire
 - f. Police
 - g. Businesses and Residents
9. Create a comprehensive 10-year Pavement Maintenance and Rehabilitation Program

Ideally, an annual budget of \$900,000 for the street program will be sufficient to improve the street system beyond its current level and that the average PCI will reach the goal of 70 in ten years. While an annual budget of \$900,000 is the optimal funding level in order to improve the City's average pavement condition index to 70, this amount may be unrealistic given today's financial climate; and lower annual budgets will have less effective results. A more realistic compromise is proposed with initial expenditures of \$500,000 during the first year and \$250,000 annually thereafter, with the intention of supplementing with grants and other external resources. The actual amount will be approved with each annual budget process.

**DEVELOPMENT
OF A
PAVEMENT MANAGEMENT SYSTEM
FOR
THE CITY OF MORRO BAY**

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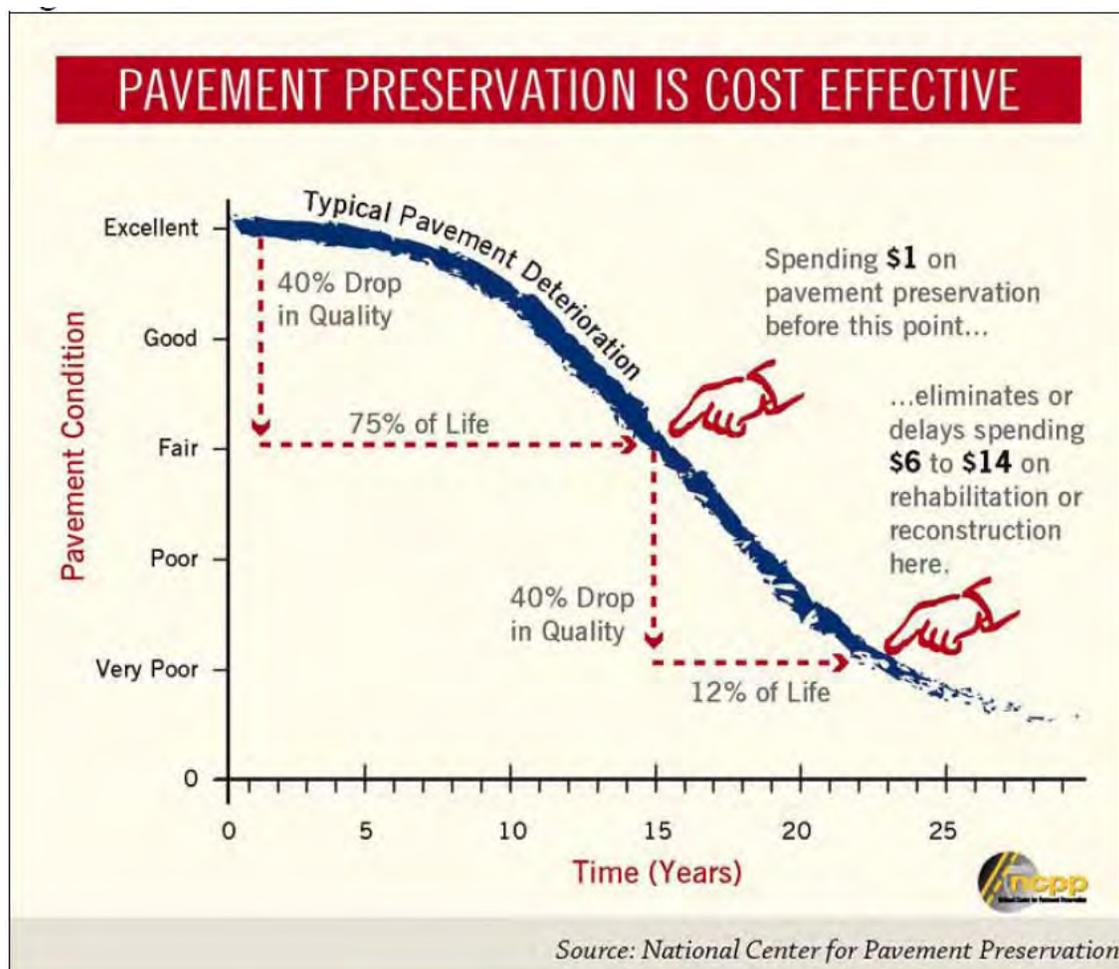
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SECTION I: INTRODUCTION

This project consisted of setting up a Pavement Management System (PMS) for the City of Morro Bay. MicroPAVER, version 6.1, an American Public Works supported PMS software package, was used for this project.

A PMS program has several distinctive uses as a budgeting and inventory tool, while also providing a record of pavement condition. The primary use of any PMS is a budgeting tool with the aim of maximizing the cost effectiveness of every dollar spent on city streets. The graphic below illustrates how critical it is to allocate funds for street repair in a timely manner. The system provides project rehabilitation costs and timing based on nationwide research which provides average pavement deterioration rates. Unit costs are based on recently bid projects. As an inventory tool, it provides a quick and easy reference on pavement areas and usages. As a pavement condition record, it provides age, load-related, non-load related and climate related pavement condition and deterioration information.



A PMS is not capable of providing detailed engineering designs for each street. The PMS instead helps to identify potential repair and maintenance candidate streets. Further investigation, or project level analysis, of these candidate streets is used to optimize the City's pavement management dollars. Project level pavement analysis and engineering is an essential feature of future pavement maintenance and rehabilitation projects. Project level engineering examines the pavements in significantly more detail than the visual evaluation required for the

PMS system and provides optimization of the design given all of the peculiar constraints of the project streets.

The PMS software assumes average construction and material quality. Pavement life is very sensitive to materials and workmanship quality. Poor quality new construction may result in up to a 50 percent loss in the pavement life. In other words, poor quality new construction may last 10 to 15 years, whereas excellent quality construction may last 20 to 30 years. Investing in quality, both in design and construction, provides significant returns in extended pavement life resulting in lowered annual maintenance costs.

The PMP for the City of Morro Bay has five primary goals as follows:

1. Provide an accurate and complete inventory of the City's pavements and condition.
2. Identify and quantify maintenance and rehabilitation needs for the street system.
3. Identify prioritization and optimization criteria for the street system.
4. Develop a set of pavement management policy guidelines.
5. Develop a ten year plan and budget for the City street system.

A full appreciation of a pavement management system and the value of its data and cost projections depends on a basic understanding of pavement design basics. These are provided in Section II: Background. Section III provides information on the PMS Program Specifics incorporated into the program. Section IV provides Summarized System Information in the form of easy to read tables and figures. Section V provides a set of policy and program recommendations for future pavement management. Two appendices detail the proposed ten-year pavement management program and a list of description of pavement distresses.

SECTION II: BACKGROUND

This section is intended to introduce important pavement design definitions and calculations as a background for understanding the Pavement Management System (PMS) assumptions.

PAVEMENT DESIGN BASICS

Pavements are a structural support system generally considered to act like a beam. But unlike beams in buildings which generally have static loads, the pavement structure is flexed many times from traffic loading. Cars and light trucks have little impact on the pavement structure. Larger/Heavier trucks have very significant impacts to the pavement due to the high axle weights. The impact of trucks is measured in equivalent single 18,000 pound axle loads (ESALs). The total ESALs are converted into a design Traffic Index (TI) by an exponential formula. For example, a design TI of 5 is equal to 7,160 ESALs. A design TI of 8 is equal to 372,000 ESALs. Therefore, the design TI is related to the total number of ESALs that the pavement will support before it begins to fail, regardless of the passage of time. Normally for a new pavement, the ESALs over a 20-year period are used. For rehabilitation procedures such as overlays, 10 years is generally used.

The other element of pavement design is the support of the beam. The support is provided by the subgrade soils. The support value is designated by the R-value test, which is performed by a soils engineer.

Using the design TI and R-value, the pavement designer chooses various materials to construct the structural section. The most common pavement section is a thin layer of asphalt concrete over aggregate base(s)

Many options are available depending on specific project requirements and conditions.

The design method used in California is based on a 50 percent reliability. This means that the average pavement life of all pavements constructed using the design procedure will last the design life. It also means that about half will not last that long and the other half will last longer. To express this concept, a design life is often expressed in a span of years, such as 17 to 23 years for 20-year design life.

PAVEMENT DETERIORATION

Pavement deteriorates from two processes: fatigue and aging. The processes occur simultaneously. In a well designed and constructed pavement, the two processes result in the need to rehabilitate the pavement at approximately the same time. This is called the design life. The design life for most new pavements is 20 years. Each aging process has its own set of pavement defects which are related to the process.

Fatigue

The first deterioration process is fatigue from heavy axle loads. As the pavement structure flexes or bends from heavy wheel loads, the asphalt concrete layer's ability to flex is consumed. With sufficient bending, the asphalt concrete layer begins to break at the bottom. This cracking progresses upward until it reaches the surface and appears as alligator cracking. If left unattended, they will produce a pothole. These areas are repaired by removal and replacement of the asphalt concrete in the affected areas. These repairs are commonly called digouts.

Pavement structure and durability are also impacted by utility trenches. When total cumulative quantity of digouts and utility patches reaches approximately 5 percent of the total area, the pavement is considered to have reached its design life and requires major rehabilitation.

Aging

The major element of the pavement structure which ages is the asphalt concrete layer. To a minor extent, aggregate bases can age if contaminated by fine soil particles which are transported from the subsoil into the aggregate base.

Asphalt concrete is composed of aggregates and asphalt cement. The aggregates used are generally of fair quality and do experience some breakdown over time. Aggregate aging problems need to be addressed in maintenance procedures. The asphalt concrete binder ages as well. As the asphalt binder ages, it loses volume through loss of volatile components in the asphalt. As the volume decreases, the pavement will progressively crack from the resulting tensile strain in the layer. Normally, these cracks first show up as transverse cracks. They also show up at weak areas such as paving joints. These cracks widen and increase over time until the pavement has a checkerboard appearance.

The aging process also causes the pavement to become more brittle. The increased stiffness results in additional cracking from loaded vehicles. This load induced cracking from the brittleness of the asphalt concrete is very similar to fatigue cracking in appearance. The major agent for deterioration of the asphalt concrete binder is oxygen. The carrier of the oxygen is water. Water enters the pavement either from the surface or as water vapor from underneath.

TYPICAL PAVEMENT DEFECTS

MicroPAVER identifies nineteen different distress types. Some of these distress types are not applicable to the City of Morro Bay. Using our knowledge of California coastal streets, we have reduced the number of distress types to fifteen. These fifteen are:

1. Alligator Cracking (Fatigue)
2. Block Cracking
3. Bumps and Sags
4. Depressions
5. Edge Cracking
6. Joint Reflection Cracking
7. Lane/Shoulder Drop-off
8. Longitudinal and Transverse Cracking
9. Patching and Utility Cut Patching
10. Polished Aggregate
11. Potholes
12. Rutting
13. Shoving
14. Swell
15. Weathering and Raveling

These defects are common to virtually all of the pavements as aging progresses.

For purposes of understanding the character and levels of these distresses, the pavement defect descriptions from the rating manual are included in Appendix 2.

PAVEMENT MAINTENANCE PROCEDURES

Pavement maintenance procedures are designed to slow the pavement aging process. Mainly, the procedures are designed to protect the pavement from the adverse effects of water and to some extent vehicle traffic.

Maintenance procedures which protect the pavement from aging are crack sealing, digouts, slurry seals, and cape seals. When pavements have extensive cracking and are beyond their design life, sealing can also be used as an interim holding measure or stop gap prior to major rehabilitation.

Crack Sealing

Crack sealing prevents surface water from getting beneath the asphalt concrete layer into the aggregate bases. Crack sealing is generally performed using hot rubberized crack sealing material. The procedure includes routing small cracks, cleaning and sealing. The City owns and operates its own crack sealing equipment.

Digouts (Patching)

Digouts are small areas of deteriorated pavements (usually potholes) which are removed and replaced with new asphalt concrete. Pavement removal is accomplished by cold planing or sawcutting and excavation. New asphalt is installed in at least two lifts. The digout depth is determined depending on the severity and type of distress, as well as street type and construction. Shallow patching is often used on low to medium severity distressed areas of pavement where the underlying base is sound, while a full depth digout is required when the failure of the base material is detected. Digouts are generally performed by the City crew, though digouts repairs are often required in preparation for a contracted slurry seal.

Slurry Seals and Micro-surfacing

Slurry seals consist of a combination of fine aggregate and emulsified oil used on relatively good streets to preserve and extend pavement life. Slurry seals are also a cost effective treatment for streets whose major form of distress is severe weathering or raveling. Micro-surfacing is similar to a slurry seal with added polymers that allow the application of thicker layers and added service life. The added thickness of micro-surfacing makes it a good choice to correct rutting. Micro-surfacing is used exclusively by the City of San Luis Obispo for routine street sealing providing excellent results with a life expectancy of 8 years. The City of Morro Bay used micro-surfacing for the first time in November, 2010 on a one-mile stretch of North Main Street between Atascadero Road and San Jacinto.

Cape Seals

Cape seals consist of a chip seal overcoated with a slurry seal. A chip seal is an application of small angular rock (chips) approximately 1/4" to 3/8" in maximum size embedded into a thick application of asphalt emulsion. Most chips seals incorporate polymer modified binders.

Cape seals are used on residential and collector streets to maintain a pavement which may need an overlay, but there are not sufficient funds available. Chip seals are placed over low to moderate alligator cracks and block shrinkage cracking. Due to the distress covered by the chip seal, small areas of disbonding or failure may occur and will require patching.

Cape sealed surfaces are fairly coarse compared to new paving. Due to this characteristic, they may not be acceptable to some segments of the public.

Though chip seals were used extensively in Morro Bay prior to incorporation, many of the streets that received this treatment did not have a stable base and subsequent deterioration has resulted. Cape seals have never been used in Morro Bay but are being considered as a pavement treatment option in the near future on streets with a stable base. They may also be used as an interim holding measure to “hold” the pavement together until funds become available for major rehabilitation.

PAVEMENT REHABILITATION PROCEDURES

Pavement rehabilitation consists of procedures used to restore the existing pavement quality or to add additional structural support to the pavement. Rehabilitation procedures include conventional overlays; heavy overlays; and reconstruction.

Conventional Overlays

Conventional overlays generally consist of surface preparation, the optional installation of pavement fabric, followed by the application of varying thicknesses of asphalt concrete. Surface preparation can consist of crack filling, pavement repairs of base failures and leveling courses.

Pavement fabric is often used as a water inhibiting membrane and to retard reflective cracking. Care must be used with fabric to avoid intersections with heavy truck braking, steep grades (generally over 8 percent), and areas where subsurface water might be trapped.

The overlay thickness is determined by the structural requirement of the deflection analysis and reflective cracking criteria. The reflective cracking criteria requires the thickness of the overlay to be a minimum 1/2 the thickness of the existing bonded layers. Pavement fabric can account for 0.10 ft of asphalt for reflective cracking criteria if the structural requirements from the deflection analysis are met.

Conventional overlays have an expected service life of 7 to 13 years if they are designed to meet structural and reflective cracking criteria and are well constructed.

Heavy Overlay: Pulverization and Resurfacing

Pulverization and resurfacing (also known as Cold in-Place Recycling) is an alternative to conventional overlays for streets that are structurally adequate but exhibit sufficient cracking to warrant improvement to the asphalt surface. Pulverization and resurfacing is an intermediate step between overlays and reconstruction. The existing asphalt concrete is pulverized, mixed with an engineered emulsion and reapplied over the existing aggregate base. The total structural section is increased by the recycled base. A final seal coat or thin overlay completes the resurfacing process. This method eliminates the stress history and cracking of the old asphalt concrete pavement, thus eliminating negative impacts on the new asphalt concrete surface.

Pulverization and resurfacing has a life expectancy of 13 to 18 years. The life expectancy is slightly less than full reconstruction because some residual deficiencies in thickness or quality of the unaffected layers may still exist. Additional testing is necessary to determine if pulverization is a viable alternative. This testing includes measuring the existing structural section and testing the native soil for bearing capacity (R-value).

Heavy Overlay: AC Removal and Replacement (Mill and Fill)

On some thick asphalt concrete pavements, the most economical approach to rehabilitating the pavement is to remove some of the existing asphalt concrete surface by cold planing and to place new asphalt concrete surface which matches the existing profile. This method may be

required if the pavement profile is already so thick that the additional thickness obtained from recycling the existing pavement is unacceptable due to drainage, street geometry, or other concerns. The removed asphalt can often be recycled and reused on other streets if concurrent projects are planned appropriately. Depending on existing conditions, this method should have a life of 15 to 20 years.

Reconstruction

When the pavement has severe cross section deficiencies or requires significant structural strengthening, reconstruction may be the only alternative. Generally, existing pavement materials are recycled and incorporated into the new pavement structure in a process called Full Depth Reclamation. This method minimizes the importation of new base material and virtually eliminates export of material to landfill sites. Engineered emulsion binders are mixed with the existing materials to form a base that is equal to or superior in strength to new aggregate base. The final surface is then applied, typically 3 to 4 inches of hot mix asphalt. Many of the residential streets on the north side of town require reconstruction due to the poor quality of the original construction prior to incorporation.

SECTION III: THE PMS PROGRAM

This section discusses the characteristics of the PMS program and its application to the City of Morro Bay.

BACKGROUND

During the early years of PMS software development, many companies developed private PMS software packages focused on management of municipal street systems. Though these programs were versatile and sophisticated, the user was also dependent upon the software vendor for training, program updates, and software servicing. Many of the vendors had difficulty maintaining their software, leaving agencies stranded after making a substantial investment.

The American Public Works Association identified the need for a publicly supported PMS program independent of private vendors. The association chose the Paver program as a basis for a municipal version. The original Paver PMS program was developed by the Army Corp of Engineers for management of military pavements, particularly air fields. Working with the Army Corp of Engineers, APWA-MicroPAVER was developed.

The program has features which make it applicable for a wide range of municipal pavements throughout the country. In order to make it user friendly, the program lacks much of the sophistication of private programs. However, it does provide good system wide models and budgeting capacity. It also provides an inventory of pavements.

For this project, the City decided to update their MicroPAVER software to the latest version, 6.1. It is also used by many other municipalities and counties in the region, including the Cities of Pismo Beach and San Luis Obispo and the County of San Luis Obispo.

SYSTEM ASSUMPTIONS

The PMS program makes several basic assumptions regarding the degradation of pavements. The basis of the system is the Pavement Condition Index (PCI). New pavements with no defects receive a score of 100. From this score, the program deducts points based on defect type and severity identified during the visual review. After the initial PCI for a street segment is determined, the program reduces the PCI on an annual basis using preset deterioration curves. Placement on the deterioration curve is determined by the date of original construction or most recent overlay. The PCI is increased when a maintenance or rehabilitation activity is performed.

The APWA-MicroPAVER PMS program does not have the capacity to include much historic information beyond the date of original construction or most recent overlay in determining the current PCI or initial score. Thus, a pavement without defects is scored at 100, regardless of age. Most pavements within the first 5 to 8 years of their life have few if any defects. Therefore, a PCI of 100 may be applied to pavements from 0 to 8 years old. At 8 years, the pavement is approximately 1/3 through its initial life. As the system is maintained with maintenance activity and condition updates, the system adjusts itself to correct for these initial input variances.

The system uses standard treatments to raise the PCI based on the original PCI. The treatment strategies include localized maintenance, global maintenance, and major rehabilitation. Localized maintenance includes such activities as digouts and crack sealing. Global maintenance includes activities such as slurry, micro-surfacing and cape seals. Major rehabilitation activities include overlays and reconstruction.

The system ratings do not take into account geometric constraints in the system such as

excessive crowns or lack of median curb height. These geometric constraints often make some procedures inapplicable. An example is lack of curb height. At some point, the pavement will have to be milled off prior to placement of a new surface layer. The system does not contain this alternate. Neither does the system include miscellaneous costs, such as associated concrete repairs or sidewalk improvements.

Maintenance treatment recommendations are based on certain PCI and pavement distress level thresholds, some of which are adjustable by the user and others are not. Due to these assumptions and program simplifications, the PMS program designated maintenance treatment for a given street may not be precisely what that particular street requires. For example, the program suggests major rehabilitation if the surface area of alligator cracking exceeds 0.5% of the total street surface. Such streets can often be patched and resurfaced at a lower cost. Making these determinations is project level engineering. The PMS program identifies candidate streets for various treatment types. The project engineer then visually reviews the streets. Depending on the condition, a specific maintenance treatment can be specified, or in the case of major rehabilitation, additional testing may need to be performed to identify which specific maintenance or rehabilitation approach may be most economical.

The goal of the PMS program is to furnish budgetary amounts in order to achieve system wide improvements in the overall pavement condition. The goal of project engineering is to obtain the maximum economical impact for a given subset of the system to be maintained. Using the PMS program, management is able to realistically budget for economically maintaining the City's pavement system. Annually updating maintenance activity and costs keep the system current.

PAVEMENT MAINTENANCE PRIORITIES

Though the initial selection of streets, scheduling of work, and choice of treatment is made by the MicroPAVER program with the goal of maximizing the impact of pavement management dollars, several user-defined criteria guide the program in the way it processes data. These key criteria include:

1. Achieve and maintain an average PCI of 70 or higher for all city streets with no street below a PCI of 55.
2. Give priority to more heavily traveled streets. The order of priority has been set as arterial, collector, industrial, and residential, in that order.
3. Preventative maintenance on streets with a low surface area percentage of distresses is the best use of funds. Digout repairs followed by cape seals or micro-surfacing treatment measures can be used as appropriate. Priority is given to streets that are in the lower PCI range to prevent them from dropping down into a distress category that requires more expensive rehabilitation.
4. Rehabilitation measures are generally required for streets with a PCI in the range of 55 to 70 or high surface area percentage of distresses. Priority is given to streets that are in the lower PCI range to prevent them from dropping down into a distress category that requires more expensive reconstruction.
5. Streets that have fallen below a critical PCI level of 55 and have known base deficiencies shall be scheduled for reconstruction on a "worst first" basis. Stopgap measures shall be used to keep streets safe for travel until reconstruction can take place.

SYSTEM INVENTORY

The street classifications (arterial, collector, industrial, and residential) assigned in this report were determined by city staff. Since pavement life is directly proportional to the types and weight of vehicles, the City should periodically review and upgrade the classification of streets

so the PMP can correctly identify rehabilitation and maintenance strategies and account for the increased truck traffic.

All streets were measured using a vehicle mounted measuring device for length and a hand held measuring wheel for width. Length was measured from center of intersection to center of intersection on residential and collector streets. Intersections of arterials and collectors were measured in only one direction unless two arterials adjoined each other, in which case the intersection length was included in both directions. Measuring from centerline to centerline creates an increased area in the program. This increase helps adjust for additional costs of maintaining intersections. In the case of cul-de-sacs, lengths were adjusted to account for the additional pavement area in the cul-de-sacs bulbs. Widths were measured from face of curb to face of curb to provide a small amount of contingency. Widths of collectors and arterials were adjusted to account for pavement in turn pockets.

PAVEMENT MAINTENANCE AND REHABILITATION UNIT COSTS

The following costs were used to develop the indicated budget numbers for each street segment reviewed. The costs include miscellaneous work such as transitions, striping, digouts, etc.

The costs are averages. Small programs will have higher unit costs and large programs will have lower unit costs. The larger the annual program size, the better the economies of scale. Timing is also important. Bidding the work in early spring will result in significantly lower prices than bids solicited in the late summer or fall. If small packages are used, costs could be 25 to 50 percent higher.

The costs reflect prices for work completed within the county over the past few years, including data from within the City and estimated costs from other agencies using MicroPaver. The developed unit costs include striping and other lump sum project costs for each street. The costs per street were then averaged and rounded to produce the indicated unit costs. The unit costs include a 10% contingency and a 15% allowance to account for engineering design fees and inspection. These prices are in today's dollars (December, 2010) and do not account for inflation.

PAVEMENT MAINTENANCE & REHABILITATION UNIT COSTS

Treatment Description	Street Classification (Cost/SF*)		
	Arterial	Collector	Residential
Reconstruct	\$5.00	\$5.00	\$4.50
Thick Overlay	\$3.50	\$3.50	\$3.00
Thin overlay	\$2.50	\$2.50	\$2.00
Heavy Maintenance (Cape Seal)	\$0.60	\$0.60	\$0.60
Light Maintenance(Micro-surface)	\$0.38	\$0.38	\$0.38

*All Costs Include Surface Preparation, Design and Inspection

Since life cycle cost analysis is part of developing annual maintenance and rehabilitation programs, some general life expectancies should be identified. For a typical light maintenance treatment, a service life of 5 to 8 years can be assumed. A heavy maintenance treatment may provide a service life of 7 to 10 years. A typical conventional overlay, whether light or heavy, has an expected service life of 8 to 13 years. Depending on the existing pavement and soil conditions, other rehabilitation options can be applied that will provide a service life of up to 18 years. A reconstructed pavement is expected to provide a service life of 20 years.

Depending on the existing conditions, the identified service life may vary. The projections of future life are given to provide a broad outline for pavement maintenance budgeting. They should not be interpreted as providing definitive predictions of future pavement performance.

VISUAL EVALUATIONS

All of the pavements were evaluated by a Cal Poly student working as an intern for the City. The streets were rated based on the *Paver Asphalt Distress Manual*, which is part of the APWA-MicroPAVER system described in Section II. Once the data were entered into the program, Rob Livick completed a quality assurance review of the system and verified the results in the field. The street inventory was based on visual evaluations. Recent street maintenance procedures could be masking the pavement's true condition. For this reason, the City should commit to maintaining the PMP by reviewing the system's pavements at least every three years.

SYSTEM UPDATES

The Pavement Management System is a dynamic program. It is expected that the City will continue to visually rate the street network and update the database at least every three years. It is recommended that the arterial, collector and industrial streets be re-rated annually. This constant review of the system will refine the deterioration curves used to predicate future work. In addition to the visual review, the City should update the database by adding new streets incorporated into the City as well as and new maintenance work performed to a particular street segment.

SECTION IV: SUMMARIZED SYSTEM INFORMATION

The City of Morro Bay currently maintains approximately 53.4 centerline miles of roadways (approximately 8,030,178 square feet of pavement). This represents an asset with a replacement value of approximately \$40,000,000.

Data were collected for the entire street system using MicroPAVER PMS version 6.1. An alphabetical listing is provided in Section V. The current weighted average PCI (Pavement Condition Index) for the street system is 63.4. While it is up to the City of Morro Bay to determine at what condition level (PCI) they want their pavements to be, most cities in California are trying to maintain their entire street system with an average PCI of 70 or above.

The street system for the City of Morro Bay currently breaks down as follows:

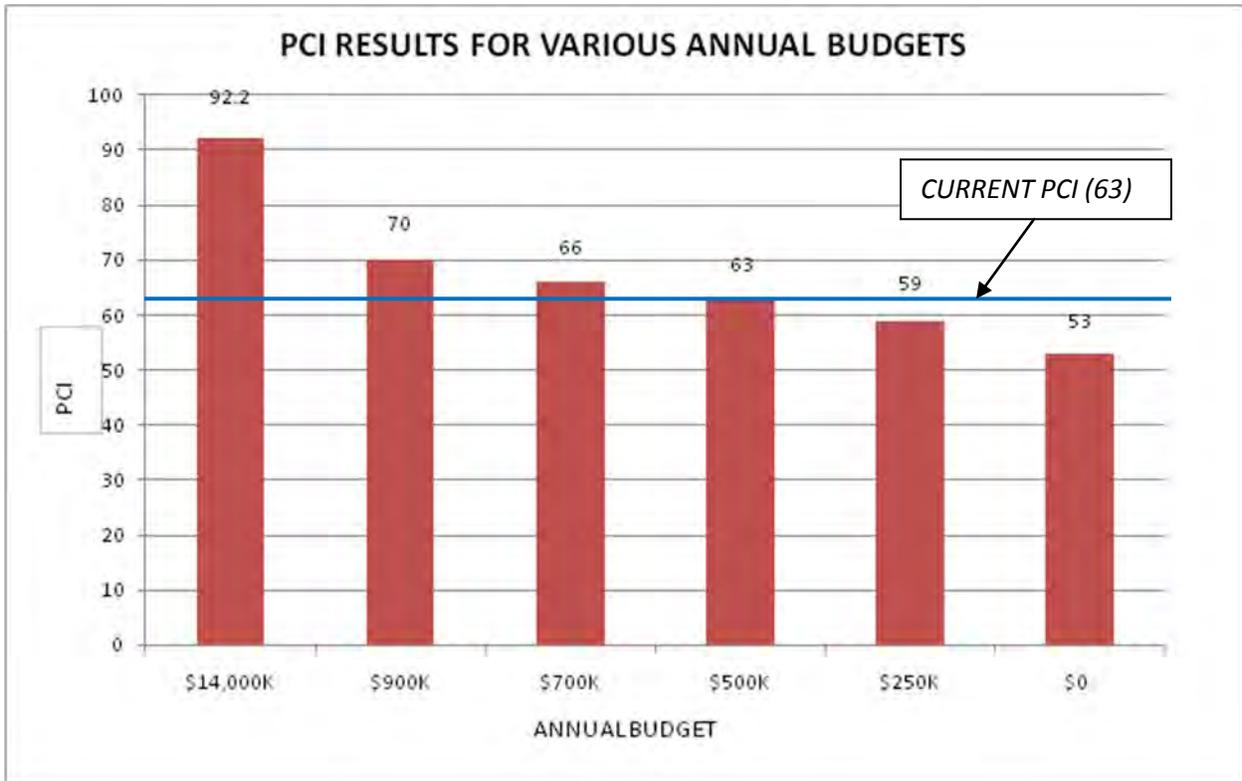
Street Classification	Centerline Miles	Area (Square Feet)	Percent of System	Average PCI
Arterials	7.9	1,531,968	19%	78
Collectors	3.2	526,700	7%	60
Local Industrial/Commercial	5.5	1,016,700	13%	64
Local Residential	36.9	4,954,810	62%	59
Total	53.4	8,030,178	100%	63

To assist with further analysis and project development, the City was divided into four zones: North, EastCentral, Downtown and South (see attached zone map). A summary of the pavements in these zones is presented in the table below:

Zone	Centerline Miles	Area (Square Feet)	Percent of System	Average PCI
North	11.8	1,435,800	18%	56.7
EastCentral	16.3	2,479,460	31%	59.9
Downtown	12.6	2,427,950	30%	68.6
South	12.8	1,686,968	21%	66.1
Total	53.4	8,030,178	100%	63.3

For this PMP, each street was assigned a treatment action and budget based on the pavement's current rating and construction history. The cost or need has been calculated at \$14.4 million to provide the recommended treatments to all streets. Spending this amount would result in the total system having an average PCI of well over 70. While it is recognized that the City of Morro Bay does not have the means, budget or resources to spend that amount of money, the number provides a bench mark for future analysis.

As part of the analysis, the anticipated PCI at various budget levels over 10 years was projected using the MicroPAVER software. The analysis showed that a yearly funding level of about \$500,000 is required to maintain the street system at its current average condition and it would require \$900,000 annually to increase the overall PCI to 70. Anything less than \$500,00 will mean continued degradation of pavement conditions in the City. The analysis is summarized on the graph below.



- The \$14 Million budget amount is the total expenditure required to provide all recommended repairs.

SECTION V: PAVEMENT MANAGEMENT PLAN RECOMMENDATIONS

POLICY RECOMMENDATIONS

1. **Achieve and maintain a PCI of 70 for all City streets:** The current level of 63.3 is below the average condition that most California cities try to maintain. It is also evident from the level of citizen complaints that our streets need improvement. Achieving an average PCI of 70 will not eliminate all poor streets, but it will reduce citizen complaints and provide a more attractive and efficient transportation network.
2. **Regularly update the MicroPaver street condition database:** All maintenance, repair and rehabilitation activities should be entered into the MicroPaver database so that current street conditions can be tracked and project planning facilitated. Coordination with the Streets Department, who are responsible for pothole repairs and other minor maintenance activities, will be necessary. A complete reevaluation of the entire street system should be performed every five years.
3. **Encourage use of new technologies and materials in pavement design:** For example, pavement recycling technologies have greatly improved in the last decade, providing street rehabilitation treatments that are durable, economical and less damaging to the environment. Micro-surfacing is a relatively new form of slurry seal that has proven to work well in nearby cities. In Morro Bay, it was used as a maintenance treatment on North Main Street in November 2010. Staff should keep abreast of new developments in pavement technologies and incorporate them in future work where feasible.

PROGRAM RECOMMENDATIONS

1. **Institute a regular global maintenance (street sealing) program:** The expected life of a good micro-surface treatment is eight years and a cape seal can be expected to last 10 years. Every street in the City should be sealed every 8 to 10 years unless it is scheduled for major rehabilitation. Such a maintenance program will need to be phased in over time, as there are many streets that already exceed this interval and budget does not allow to treat them all immediately.
2. **Implement an effective pothole repair program:** Pothole repair prevents water intrusion into the supporting soil and can also serve as a “stop gap” repair until major maintenance can be performed. Pothole repair can sometimes involve a simple removal and replacement of the top layer of asphalt, but more often requires full digout of the underlying base and reconstruction of the entire pavement profile. Once the area of pothole patch repairs exceeds 5% of the street area, the street is a candidate for major rehabilitation. The Streets Division is responsible for pothole repair, which can be performed either by City crews or by private contractors. Pothole repair requests usually originate from citizens but a more pro-active approach coordinated with the street sealing program will enhance both the life of the pothole repair and the seal coat.
3. **Implement a regular crack sealing program:** Older pavements tend to crack even if the subgrade is stable. Cracks, however, will allow water to enter the supporting soil and destabilize the pavement base. A regular crack sealing program will increase the longevity of streets and delay more costly maintenance and repairs. The Streets Division has the equipment to perform this task. Unlike potholes, which are often reported by citizens, cracks are best identified during periodic inventories. The MicroPaver PMS catalogues cracks that need attention. Sealing cracks prior to microsurfacing or chip

seals will extend the life of the new surface.

4. **Create a Green Streets program:** Street reconstruction is an opportunity to “go green” through the use of recycled pavement materials and in redesigning drainage to reduce the amount of polluted runoff that enters our creeks and the storm drain system. Green streets usually have bike and pedestrian-friendly components. Such a program is often a good candidate for external grant funding to help stretch City budget dollars. A City Council- approved grant application to develop a Green Streets program was submitted to Caltrans in early 2011.
5. **Implement a street subsurface evaluation program:** Streets that are scheduled for reconstruction may have adequate materials in the pavement profile to warrant full-depth reclamation of these materials. Depending on the quality and thickness of the existing materials that make up the pavement profile, and a suitable binder material can be designed to be added during the reclamation process to form a strong base. An evaluation of the pavement profile will provide the necessary data for engineering design of the recycled base.
6. **Install or Upgrade ADA curb ramps:** Street repairs are also a good time to update and add ADA curb ramps to current standards. In some cases, requirements attached to funding sources or the project is a significant improvement, ADA ramps need to be updated. Typically, when a street rehabilitation project requires ¾-inch or greater overlay, then curb ramp upgrades are installed.
7. **Modify and/or enforce trench cut standards:** Trench cuts can have a significant impact on street durability. Internal coordination with utility master plan projects will help reduce damage to recently paved streets due to planned activities, but trenching for emergency repairs and new developments are inevitable. Diligent enforcement of current engineering standards for trench backfill including the one-year warranty against settlement will help minimize trenching impacts to the pavement. The City standards should also be updated to conform to current material specifications and trench repair technologies.
8. **Coordinate with other programs and departments:** Street repair and maintenance often impacts other activities, programs and City operations. At a minimum, the following activities should be coordinated with street repair and maintenance:
 - a. **Utility Master Planning and scheduled repairs:** Coordination of proposed street and utility work can avoid counterproductive efforts such as trenching in newly repaved streets.
 - b. **City Trees:** Urban trees are a valuable resource and often the object of passionate feelings in the City of Morro Bay. Street work may require trimming or removal of trees to accommodate repairs or work within the drip line. All street work should comply with the City Tree Regulations within the Municipal Code.
 - c. **Bicycle Traffic:** Class 2 bicycle lanes share the paved area of City streets, often on the outside edge or shoulder. Pavement maintenance and overlays should be performed such that sharp edges and ridges in the bicycle lane are avoided. Pavement repair may also present an opportunity to correct or enhance bicycle lane markings.
 - d. **Non-City Utilities (Cayucos, AT&T, PG&E, etc.):** Street work often requires excavation into the underlying soil or impacts utility poles and holes. Coordination with impacted utilities is a must.
 - e. **Fire:** The Fire department must be notified of street closures during construction and should be consulted when street work may impact fire hydrants. Blue

reflectors adjacent to fire hydrants may need to be replaced where maintenance or repair results in their damage or removal.

- f. **Police:** The police department must be notified of street closures and parking restrictions during construction and any long-term changes to parking restrictions or traffic flow due to street work.
 - g. **Businesses and Residents:** Notification of street work should be made well in advance of the project, especially if any long-term changes are to be made (e.g parking restrictions). Feedback from impacted business owners and residents can often be more easily incorporated into the design phase rather than in the middle of project implementation. Typically, work on streets within the business district that impacts parking shall be conducted between Labor Day and Memorial Day.
9. **Create a comprehensive 10-year Pavement Maintenance and Rehabilitation Program:** Based on the above policy recommendations, pavement management system reports, and preliminary field evaluations of the City street system, a comprehensive plan should be prepared for the upkeep, maintenance and rehabilitation of the streets of Morro Bay. The program should have several budget alternatives including the use of current budget amounts projected forward. City Council can then choose amongst the alternatives with an understanding of how the adopted program will impact the long term condition of City streets. Though the Program lists projects over a five-year period, budgeting should plan for ten years of work.

A preliminary street maintenance and repair plan has been created and is included in Appendix 1 to illustrate how recommended policies and priorities will translate into a comprehensive program.

APPENDIX 1

TEN-YEAR PAVEMENT MAINTENANCE AND REHABILITATION PROGRAM

The annual programs were developed utilizing the MicroPAVER calculated PCI and pavement management priorities outlined above. An effort was also made to group streets by treatment type and geographical location. The optimal annual budget for a program that complies with the policy recommendations of this report is \$900,000. Plans for a \$500,000 and \$250,000 annual budget have also been developed, as well as a budget that spends \$900,000 in the first year, followed by \$250,000 annually thereafter.

The street maintenance and repair plan for the next ten years is based on the policy that seeks to maximize the impact for every dollar spent on street improvements. Since it is less costly to maintain good streets than to repair failed streets, the plan initially targets streets that can be brought up to a very good condition (PCI > 80) at the least unit cost. In later years, streets that are more severely degraded can be repaired or reconstructed as budget permits.

ANNUAL BUDGET: \$900,000

Year One:

The focus of the first year will be on pavement maintenance (micro-surfacing and cape seals) on streets with minimal to moderate level of distress. The streets selected for the first year of the program are located in the south and downtown zones of the City. By targeting a constrained geographic area and using only two treatment methods, we can expect more favorable bids. Most of the streets to be treated will also require crack sealing and/or site-specific digout repairs in preparation for the seal coat. Cost of these site-specific repairs are included in the budget.

In addition to pavement maintenance, a "Green Streets" program for reconstruction of streets in the north side residential areas will be started. It is expected that grant funding will be available to partially fund this program.

Year Two:

The second year plan is similar to the first, targeting the remaining streets to be given micro-surface treatment maintenance in the south and downtown zones and doing cape seals of streets in the north and eastcentral zones. One street is scheduled for an overlay.

Year Three to Year Five

The next three years will target streets that are due for overlays.

Years Six to Ten

At the end of Year Five, the entire street system will be reevaluated and projects will be prioritized based on that evaluation.

5-Year Plan @ 900,000/year									
2011		2012		2013		2014		2015	
Street	Treatment	Street	Treatment	Street	Treatment	Street	Treatment	Street	Treatment
Marina3	CapeSeal	Toro1	CapeSeal	Beach2	HOverlay	Bonita1	HOverlay	Greenwood1	HOverlay
Oak1	CapeSeal	Formosa1	CapeSeal	Pacific2	HOverlay	Bernardo1	HOverlay	Marina1	HOverlay
Olive3	CapeSeal	Java2	CapeSeal	Main8	HOverlay	Kern1	Overlay	Elena2	HOverlay
Pacific1	CapeSeal	Clarabell1	CapeSeal	Hemlock1	Overlay	Ironwood1	Overlay	Seaview1	HOverlay
Napa1	CapeSeal	Sequoia1	CapeSeal	Cedar	Overlay	Beachcomb2	Overlay	Market2	HOverlay
Shasta1	CapeSeal	Capri1	CapeSeal	Ironwood3	Overlay				
Estero1	CapeSeal	Tahiti2	CapeSeal	West1	Overlay				
Quintana3	CapeSeal	Downing1	CapeSeal	Casitas1	Overlay				
Harbor1	CapeSeal	SunsetCt1	CapeSeal	Errol1	Overlay				
Butte1	CapeSeal	Damar1	CapeSeal	Dunbar1	Overlay				
Barlow1	CapeSeal	Koa1	CapeSeal	Norwich1	Overlay				
Madera1	CapeSeal	Main7	CapeSeal	Avalon1	Overlay				
Pecho1	CapeSeal	Sandalwoo2	CapeSeal						
Ridgeway1	CapeSeal	Hillcrest1	CapeSeal						
Center1	MicroSurf	Azure1	CapeSeal						
Merengo1	MicroSurf	SequoiaCt1	CapeSeal						
SurfAlley1	MicroSurf	Sunset3	CapeSeal						
Dana1	MicroSurf	Park1	CapeSeal						
Fresno1	MicroSurf	Mimosa1	CapeSeal						
Marina2	MicroSurf	Monterey4	MicroSurf						
Bayshore1	MicroSurf	QuintanaP1	MicroSurf						
Quintana2	MicroSurf	BellaVist1	MicroSurf						
Scott1	MicroSurf	Dunes2	MicroSurf						
South2	MicroSurf	Acacia1	MicroSurf						
Embarcade1	MicroSurf	Walnut1	MicroSurf						
Alta1	MicroSurf	Scott2	MicroSurf						
Balboa1	MicroSurf	Vista1	MicroSurf						
LasTunas	MicroSurf	Driftwood2	MicroSurf						
Morro2	MicroSurf	Monterey3	MicroSurf						
Dunes1	MicroSurf	Main10	MicroSurf						
Quintana4	MicroSurf	Beach1	MicroSurf						
Quintana1	MicroSurf	Morro5	MicroSurf						
		Fairview1	MicroSurf						
		PineyLn1	MicroSurf						
		Bay1	MicroSurf						
		Luista1	MicroSurf						
		Embarcadr3	MicroSurf						
		Carmel1	MicroSurf						
		Main13	MicroSurf						
		Olive2	MicroSurf						
		Driftwood1	MicroSurf						
		Main9	MicroSurf						
		Bradley1	MicroSurf						
		Monterey2	MicroSurf						
		Main12	MicroSurf						
		Palm1	MicroSurf						
		Morro1	MicroSurf						
		Kings1	Overlay						

ANNUAL BUDGET: \$500,000

Years One and Two:

The focus of the first two years will be on pavement maintenance (micro-surfacing and cape seals) on streets with minimal to moderate level of distress. The streets selected for the first year of the program are located in the south and downtown zones of the City. By targeting a constrained geographic area and using only two treatment methods, we can expect more favorable bids. Most of the streets to be treated will also require crack sealing and/or site-specific digout repairs in preparation for the seal coat. Cost of these site-specific repairs are included in the budget.

In addition to pavement maintenance, a "Green Streets" program for reconstruction of streets in the north side residential areas will be started. It is expected that grant funding will be available to partially fund this program.

Year Three to Year Five

The next three years will target streets that are due for overlays and Microsurfacing on Main Street in the downtown area.

Years Six to Ten

At the end of Year Five, the entire street system will be reevaluated and projects will be prioritized based on that evaluation.

5-Year Plan @ 500,000/year									
2011		2012		2013		2014		2015	
Street	Treatment	Street	Treatment	Street	Treatment	Street	Treatment	Street	Treatment
Marina3	CapeSeal	Butte1	CapeSeal	Beach2	HOverlay	Greenwood1	HOverlay	Ironwood1	Overlay
Oak1	CapeSeal	Barlow1	CapeSeal	Bonita1	HOverlay			Beachcomb2	Overlay
Olive3	CapeSeal	Madera1	CapeSeal	Marina1	HOverlay			Beach1	MicroSurf
Pacific1	CapeSeal	Pecho1	CapeSeal	Pacific2	HOverlay			Main7	MicroSurf
Napa1	CapeSeal	Ridgeway1	CapeSeal	Main8	HOverlay			Main9	MicroSurf
Shasta1	CapeSeal	Center1	MicroSurf					Main10	MicroSurf
Estero1	CapeSeal	Merengo1	MicroSurf					Main11	MicroSurf
Quintana3	CapeSeal	SurfAlley1	MicroSurf					Main12	MicroSurf
Harbor1	CapeSeal	Dana1	MicroSurf					Main13	MicroSurf
		Fresno1	MicroSurf						
		Marina2	MicroSurf						
		Bayshore1	MicroSurf						
		Quintana2	MicroSurf						
		Scott1	MicroSurf						
		South2	MicroSurf						
		Embarcade1	MicroSurf						
		Alta1	MicroSurf						
		Balboa1	MicroSurf						
		LasTunas	MicroSurf						
		Morro2	MicroSurf						
		Dunes1	MicroSurf						
		Quintana4	MicroSurf						
		Quintana1	MicroSurf						
		Monterey4	MicroSurf						
		QuintanaP1	MicroSurf						
		BellaVist1	MicroSurf						
		Dunes2	MicroSurf						
		Acacia1	MicroSurf						
		Walnut1	MicroSurf						
		Scott2	MicroSurf						
		Vista1	MicroSurf						
		Driftwood2	MicroSurf						

ANNUAL BUDGET: \$250,000

Years One to Four:

The focus of the first four years will be on pavement maintenance (micro-surfacing and cape seals) on streets with minimal to moderate level of distress. The streets selected are located in the south and downtown zones of the City. By targeting a constrained geographic area and using only two treatment methods, we can expect more favorable bids. Most of the streets to be treated will also require crack sealing and/or site-specific digout repairs in preparation for the seal coat. Cost of these site-specific repairs are included in the budget.

In addition to pavement maintenance, a “Green Streets” program for reconstruction of streets in the north side residential areas will be started. It is expected that grant funding will be available to partially fund this program.

Year Five:

The fifth year targets two arterial streets due for heavy overlays.

Years Six to Ten

At the end of Year Five, the entire street system will be reevaluated and projects will be prioritized based on that evaluation.

5-Year Plan @ 250,000/year									
2011		2012		2013		2014		2015	
Street	Treatment	Street	Treatment	Street	Treatment	Street	Treatment	Street	Treatment
Marina3	CapeSeal	Shasta1	CapeSeal	Butte1	CapeSeal	Bayshore1	MicroSurf	Pacific2	HOverlay
Oak1	CapeSeal	Quintana3	CapeSeal	Barlow1	CapeSeal	Alta1	MicroSurf	Main8	HOverlay
Olive3	CapeSeal	Harbor1	CapeSeal	Madera1	CapeSeal	Balboa1	MicroSurf		
Pacific1	CapeSeal			Pecho1	CapeSeal	LasTunas	MicroSurf		
Napa1	CapeSeal			Ridgeway1	CapeSeal	Morro2	MicroSurf		
Estero1	CapeSeal			Center1	MicroSurf	Dunes1	MicroSurf		
				Merengo1	MicroSurf	Quintana4	MicroSurf		
				SurfAlley1	MicroSurf	Quintana1	MicroSurf		
				Dana1	MicroSurf	Monterey4	MicroSurf		
				Fresno1	MicroSurf	QuintanaP1	MicroSurf		
				Marina2	MicroSurf	BellaVist1	MicroSurf		
				Quintana2	MicroSurf	Dunes2	MicroSurf		
				Scott1	MicroSurf	Acacia1	MicroSurf		
				South2	MicroSurf	Walnut1	MicroSurf		
				Embarcade1	MicroSurf	Scott2	MicroSurf		
						Vista1	MicroSurf		
						Driftwood2	MicroSurf		

ANNUAL BUDGET: \$500,000/\$250,000

This budget, which includes a high level of expenditures in the first year, uses accumulated Measure Q funds during the first year to maximize impact on high use streets. Following years are funded with general funds.

Year One:

The focus of the first year will be on pavement maintenance (micro-surfacing and cape seals) on streets with minimal to moderate level of distress. The streets selected for the first year of the program are located in the south and downtown zones of the City. By targeting a constrained geographic area and using only two treatment methods, we can expect more favorable bids. Most of the streets to be treated will also require crack sealing and/or site-specific digout repairs in preparation for the seal coat. Cost of these site-specific repairs are included in the budget.

In addition to pavement maintenance, a "Green Streets" program for reconstruction of streets in the north side residential areas will be started. It is expected that grant funding will be available to partially fund this program.

Year Two to Year Five:

The remaining year plans are similar to the first, targeting the remaining streets to be given micro-surface treatment maintenance in the south and downtown zones and doing cape seals of streets in the north and eastcentral zones.

Years Six to Ten

At the end of Year Five, the entire street system will be reevaluated and projects will be prioritized based on that evaluation.

5-Year Plan @ 500,000 in Year 1, \$250,00 in Years 2-5									
2011		2012		2013		2014		2015	
Street	Treatment	Street	Treatment	Street	Treatment	Street	Treatment	Street	Treatment
Marina3	CapeSeal	Harbor1	CapeSeal	Madera1	CapeSeal	Main10	MicroSurf	Toro1	CapeSeal
Oak1	CapeSeal	Butte1	CapeSeal	Pecho1	CapeSeal	Beach1	MicroSurf	Formosa1	CapeSeal
Olive3	CapeSeal	Barlow1	CapeSeal	Ridgeway1	CapeSeal	Morro5	MicroSurf	Java2	CapeSeal
Pacific1	CapeSeal	Scott1	MicroSurf	Dunes1	MicroSurf	Fairview1	MicroSurf	Clarabell1	CapeSeal
Napa1	CapeSeal	South2	MicroSurf	Quintana4	MicroSurf	PineyLn1	MicroSurf	Sequoia1	CapeSeal
Shasta1	CapeSeal	Embarcade1	MicroSurf	Quintana1	MicroSurf	Bay1	MicroSurf	Capri1	CapeSeal
Estero1	CapeSeal	Alta1	MicroSurf	Monterey4	MicroSurf	Luista1	MicroSurf	Tahiti2	CapeSeal
Quintana3	CapeSeal	Balboa1	MicroSurf	QuintanaP1	MicroSurf	Embarcadr3	MicroSurf	Downing1	CapeSeal
Center1	MicroSurf	LasTunas	MicroSurf	BellaVist1	MicroSurf	Carmel1	MicroSurf	SunsetCt1	CapeSeal
Merengo1	MicroSurf	Morro2	MicroSurf	Dunes2	MicroSurf	Main13	MicroSurf	Damar1	CapeSeal
SurfAlley1	MicroSurf			Acacia1	MicroSurf	Olive2	MicroSurf	Koa1	CapeSeal
Dana1	MicroSurf			Walnut1	MicroSurf	Driftwood1	MicroSurf	Main7	CapeSeal
Fresno1	MicroSurf			Scott2	MicroSurf	Main9	MicroSurf	Azure1	CapeSeal
Marina2	MicroSurf			Vista1	MicroSurf	Bradley1	MicroSurf	Monterey2	MicroSurf
Bayshore1	MicroSurf			Driftwood2	MicroSurf	Palm1	MicroSurf	Main12	MicroSurf
Quintana2	MicroSurf			Monterey3	MicroSurf			Morro1	MicroSurf

APPENDIX 2: PAVEMENT DEFECT DESCRIPTIONS

1. Alligator Cracking (Fatigue)

Description:

Alligator or fatigue cracking is a series of interconnecting cracks caused by fatigue failure of the asphalt concrete surface under repeated traffic loading. Cracking begins at the bottom of the asphalt surface (or stabilized base) where tensile stress and strain are highest under a wheel load. The cracks propagate to the surface initially as a series of parallel longitudinal cracks. After repeated traffic loading, the cracks connect, forming many sided, sharp-angled pieces that develop a pattern resembling chicken wire or the skin of an alligator. The pieces are generally less than 0.5 m (1.5 ft) on the longest side. Alligator cracking occurs only in areas subjected to repeated traffic loading, such as wheel paths. (Pattern-type cracking that occurs over an entire area not subjected to loading is called “block cracking,” which is not a load-associated distress.)

Severity Levels:

- L Fine, longitudinal hairline cracks running parallel to each other with no, or only a few interconnecting cracks. The cracks are not spalled.
- M Further development of light alligator cracks into a pattern or network of cracks that may be lightly spalled.
- H Network or pattern cracking has progressed so that the pieces are well defined and spalled at the edges. Some of the pieces may rock under traffic.

2. Block Cracking

Description:

Block cracks are interconnected cracks that divide the pavement into approximately rectangular pieces. The blocks may range in size from approximately 0.3 by 0.3 m (1 by 1 ft) to 3 by 3 m (10 by 10 ft). Block cracking is caused mainly by shrinkage of the asphalt concrete and daily temperature cycling (which results in daily stress/strain cycling). It is not load-associated. Block cracking usually indicates that the asphalt has hardened significantly. Block cracking normally occurs over a large portion of the pavement area, but sometimes will occur only in non-traffic areas. This type of distress differs from alligator cracking in that alligator cracks form smaller, many-sided pieces with sharp angles.

Severity Levels:

- L Blocks are defined by low-severity* cracks.
- M Blocks are defined by medium-severity* cracks.
- H Blocks are defined by high-severity* cracks.

*See definitions of longitudinal transverse cracking.

3. Bumps and Sags

Description:

Bumps are small, localized, upward displacements of the pavement surface. They are different from shoves in that shoves are caused by unstable pavement. Bumps, on the

other hand, can be caused by several factors, including:

1. Buckling or bulging of underlying PCC slabs in AC overlay over PCC pavement.
2. Infiltration and buildup of material in a crack in combination with traffic loading (sometimes called “tenting”)

Sags are small, abrupt, downward displacements of the pavement surface. If bumps appear in pattern perpendicular to traffic flow and are spaced at less than 3 m (10 ft) , the distress is called corrugation. Distortion and displacement that occur over large areas of the pavement surface, causing large and/or long dips in the pavement should be recorded at “swelling.”

Severity Levels:

- L Bump or sag causes low-severity ride quality.
- M Bump or sag causes medium-severity ride quality.
- H Bump or sag causes high-severity ride quality.

4. Depressions

Description:

Depressions are localized pavement surface areas with elevations slightly lower than those of the surrounding pavement. In many instances, light depressions are not noticeable until after a rain, when ponded water creates a “birdbath” area; on dry pavement, depressions can be spotted by looking for stains caused by ponding water. Depressions are created by settlement of the foundation soil or are a result of improper construction. Depressions cause some roughness, and when deep enough or filled with water, can cause hydroplaning.

Severity Levels:

Maximum depth of depression

- L ½ to 1 inch
- M 1 to 2 inches
- H more than 2 inches

5. Edge Cracking

Description:

Edge cracks are parallel to and usually within 1 to 1.5 feet of the outer edge of the pavement. This distress is accelerated by traffic loading and can be caused by a weak base or subgrade near the edge of the pavement. The area between the crack and pavement edge is classified as raveled if it is broken up.

Severity Levels:

- L Low or medium cracking with no breakup or raveling.
- M Medium cracks with some breakup and raveling.
- H Considerable breakup or raveling along the edge.

6. Joint Reflection Cracking (from PCC slabs)

Description:

Joint reflection cracking occurs in a flexible overlay over an existing crack or joint in a PCC slab. The cracks occur directly over the underlying cracks or joints.

Severity Levels:

- L One of the following conditions exists: (1) non-filled crack width is less than 3/8 in, or (2) filled crack of any width (filler in satisfactory condition)
- M One of the following conditions exists: (1) non-filled crack width is greater than or equal to 3/8" and less than 3 in.; (2) non-filled crack is less than or equal to 3 in. surrounded by light and random cracking, or (3) filled crack is of any width surrounded by light random cracking.
- H One of the following conditions exists: (1) any crack filled or non-filled surrounded by medium- or high-severity random cracking, (2) non-filled crack greater than 3 in., or (3) a crack of any width where approximately 4 in. of pavement around the crack is severely broken.

7. Lane/Shoulder Drop-off

Description:

Lane/shoulder drop off is a difference in elevation between the pavement edge and the shoulder. This distress is caused by shoulder erosion, shoulder settlement, or by building up the roadway without adjusting the shoulder level.

Severity Levels:

- L The difference between the pavement edge and shoulder is 1 to 2 in.
- M The difference between the pavement edge and shoulder is 2 to 4 in.
- H The difference between the pavement edge and shoulder is > 4 in.

8. Longitudinal and Transverse Cracking (Non-PCC Slab Joint Reflective)

Description:

Longitudinal cracks are parallel to the pavement's centerline or laydown direction. They may be caused by:

1. A poorly constructed paving lane joint.
2. Shrinkage of the AC surface due to low temperatures or hardening of the asphalt and/or daily temperature cycling.
3. A reflective crack caused by cracking beneath the surface course, including cracks in PCC slabs (but not PCC joints)

Transverse cracks extend across the pavement at approximately right angles to the pavement centerline or direction of laydown. These types of cracks are not usually load-associated.

Severity Levels:

- L One of the following conditions exists: (1) non-filled crack width is less than 3/8 in, or (2) filled crack of any width (filler in satisfactory condition)
- M One of the following conditions exists: (1) non-filled crack width is greater than or equal to 3/8" and less than 3 in.; (2) non-filled crack is less than or equal to 3 in. surrounded by light and random cracking, or (3) filled crack is of any width surrounded by light random cracking.
- H One of the following conditions exists: (1) any crack filled or non-filled surrounded by medium- or high-severity random cracking, (2) non-filled crack greater than 3 in., or (3) a crack of any width where approximately 4 in. of pavement around the crack is severely broken.

9. Patching and Utility Cut Patching

Description:

A patch is an area of pavement that has been replaced with new material to repair the existing pavement. A patch is considered a defect no matter how well it is performing (a patched area or adjacent area usually does not perform as well as an original pavement section). Generally, some roughness is associated with this distress.

Severity Levels:

- L Patch is in good condition and satisfactory. Ride quality is rated as low severity or better.
- M Patch is moderately deteriorated and/or ride quality is rated as medium severity.
- H Patch is badly deteriorated and/or ride quality is rated as high severity. Needs replacement soon.

10. Polished Aggregate

Description:

Areas of pavement where the portion of aggregate extending above the asphalt binder is either very small or there are no rough or angular aggregate particles. A polished road surface will have a reduced level of skid resistance.

Severity Levels:

Not defined

11. Potholes

Description:

Potholes are small, usually less than 30 inches in diameter, bowl shaped depressions in the pavement surface. They generally have sharp edges and vertical sides near the top of the hole.

Severity Levels:

The levels of severity for potholes less than 30 inches in diameter are based on both the diameter and the depth of the pothole, according to the following table.

	Average Diameter (in.)
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Maximum Depth of Pothole	4 to 8 in.	8 to 18 in.	18 to 30 in.
1/2 to 1 in.	L	L	M
1 to 2 in.	L	M	H
2 in.	M	M	H

12. Rutting

Description:

A rut is a surface depression in the wheel paths. Pavement uplift may occur along the sides of the rut, but, in many instances, ruts are noticeable only after a rainfall when the paths are filled with water. Rutting stems from a permanent deformation in any of the pavement layers or subgrades, usually caused by consolidated or lateral movement of the materials due to traffic load.

Severity Levels:

Mean Rut Depth;

L 1/4 to 1/2 in.

M 1/2 to 1 in.

H >1 in.

13. Shoving

Description:

Shoving is a permanent, longitudinal displacement of a localized area of the pavement surface caused by traffic loading. When traffic pushes against the pavement, it produces a short, abrupt wave in the pavement surface. This distress normally occurs only in unstable liquid asphalt mix (cutback or emulsion) pavements.

Shoves also occur where asphalt pavements abut PCC pavements; the PCC pavement increase in length and push the asphalt pavement, causing the shoving.

Severity Levels:

L Shove causes low-severity ride quality.

M Shove causes medium-severity ride quality.

H Shove causes high-severity ride quality.

14. Swell

Description:

Swell is characterized by an upward bulge in the pavement's surface. A swell may occur sharply over a small area or as a longer, gradual wave. Either type of swell can be accompanied by surface cracking. A swell is usually caused by soil swelling in the subgrade.

Severity Levels:

L Swell is barely visible and has a minor effect on the pavement's ride

- quality.
- M Swell can be observed without difficulty and has a significant effect on the pavement's ride quality.
- H Swell can be readily observed and severely affects the pavement's ride quality.

15. Weathering and Raveling

Description:

Weathering and raveling are the wearing away of the pavement surface due to a loss of asphalt or dislodged aggregate particles. These distresses indicate that either the asphalt binder has hardened appreciably or that a poor-quality mixture is present. In addition, raveling may be caused by certain types of traffic, e.g., tracked vehicles. Softening of the surface and dislodging of the aggregates due to oil spillage are also included under raveling.

Severity Levels:

- L Aggregate or binder has started to wear away. In some areas, the surface is starting to pit. In the case of oil spillage, the oil spillage, the oil stain can be seen, but the surface is hard and cannot be penetrated with a coin.
- M Aggregate or binder has worn away. The surface texture is moderately rough and pitted. In the case of oil spillage, the surface is soft and can be penetrated with a coin.
- H Aggregate or binder has been worn away considerably. The surface texture is very rough and severely pitted. The pitted areas are less than 4 inches in diameter and less than ½ inch deep; pitted areas larger than this are counted as potholes. In the case of oil spillage, the asphalt binder has lost its binding effect and the aggregate has become loose.



AGENDA NO: D-4

MEETING DATE: June 28, 2011

Staff Report

TO: Honorable Mayor and City Council **DATE:** June 20, 2011
FROM: Rob Livick, PE/PLS – Public Services Director/City Engineer
SUBJECT: Discussion of Improvements to the “Rock” Parking Lot, Located at the end of Coleman Drive, Morro Bay

RECOMMENDATION:

Discuss the Project and provide direction to staff to schedule this item for review at the Recreation and Parks Commission, Harbor Advisory Board and the Public Works Advisory Board, and return to City Council with recommendations.

FISCAL IMPACT:

Development of the entire “Rock” parking including the “Target Rock” portion into a paved parking is estimated to cost upwards of \$2 million. While paving a portion of the lot and allowing a large dirt overflow area could cost approximately \$500,000 for the development of 140 parking spaces and associated facilities for drainage and access.

SUMMARY:

At the December 13, 2010 meeting of the City Council, Councilperson Leage requested that the subject of paving the rock parking lot be agenized and brought back to council for discussion.

BACKGROUND/DISCUSSION:

Since the late 1800's, quarrying had taken place on the sides of Morro Rock to provide material for breakwaters such as the one at Port San Luis Obispo. In 1933, the Rock was again jolted by blasts as the WPA began construction on a jetty to connect the Rock with the mainland. The jetty closed the north entrance to the harbor, but the south channel was dredged and a breakwater protecting the entrance was constructed. The jetty and construction of the naval facilities are what we now use as the “Rock” parking lot.

In the early 1990's the City developed the Waterfront Master Plan that identified certain improvements for the “Rock” parking lot area. The improvements identified in the Plan include providing improved parking at the North side of the “Rock” lot including a paved access road to the parking. The Waterfront Master Plan was approved by City Council on May 28, 1996 by the adoption of Resolution No. 43-96.

Prepared By: RL

Dept Review: RL

City Manager Review: _____

City Attorney Review: _____

By paving approximately a 700 foot by 65 foot area, there would be 140 parking spaces developed. Additionally, by paving an access road to the parking area, the dirt surface would be preserved for use as “overflow” parking and would require a lower maintenance level to preserve the surface, since the regular traffic on the dirt area would be nearly eliminated. Once approved, staff would seek funding for the preparation of a detailed preliminary plan for permitting, and the necessary environmental document and also develop detailed construction cost estimates. Additional benefits include: a defined entrance to the lot and a reduction in potential traffic conflicts, improved drainage, a reduction in dust generation by driving on the dirt area and

CONCLUSION:

The development of a double loaded paved parking area along the North side of the “Rock” parking lot is consistent with the approved Waterfront Master Plan. The paved area would provide a paved access to the area that is regularly uses and preserves the large dirt area for overflow parking. Staff recommends that this item be reviewed at the Recreation and Parks Commission and the Public Works Advisory Board and then return to City Council with recommendations.

ATTACHMENT

Conceptual “Rock” Parking Lot Paving Plan



Conceptual "Rock" Parking Lot Paving