City of Solana Beach

DRAFT

CITY OF SOLANA BEACH
PUBLIC RECREATION FEE REPORT
2015

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CITY OF SOLANA BEACH

DRAFT
PUBLIC RECREATION
FEE STUDY

REVISED NOVEMBER 2015

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1. EXECUTIVE SUMMARY

PURPOSE AND CONTEXT

The City of Solana Beach (City) developed its Local Coastal Program (LCP) Land Use Plan (LUP) through a multi-year process with extensive public participation. In February 2013, the Solana Beach City Council adopted the California Coastal Commission (CCC) modified and approved LCP LUP during a public hearing by Solana Beach City Council Resolution 2013-018.

At that public hearing, the City Council also directed City Staff to prepare a LUP Amendment (LUPA) to modify and clarify some of the provisions in the LUP relating to bluff top development, shoreline protection and private beach access ways. The City Council held a public hearing in May 2013 and adopted the draft LUPA for submittal to the CCC. The City Council approved the LUPA with the modifications in June 2014. The Executive Director of the CCC issued the final LUP concurrence approval in August 2014.

City Staff are now preparing the LCP Local Implementation Plan (LIP) which is a companion document to the LUP and will codify and integrate the LUP policies into the Solana Beach Municipal Code. Completion of the LIP is intended to support certification of the City's LCP – an important goal that is shared by the City and the CCC. Once the LIP is approved, the City will have a fully certified LCP, which will enable the transfer of coastal development permit authority to the City of Solana Beach.

The LUP (as amended in 2014) can be viewed online on the City's website and in person at the Community Development Department at the City of Solana Beach City Hall, 635 South Highway 101, Solana Beach, California, 92075. The LCP LUP reflects the collaborative effort of the various stakeholder groups. With the shared goal of identifying long-term solutions to Solana Beach's unique coastal issues, the Certified LCP LUP reflects the effort to achieve a balance of interests, rights and needs.

The Certified LCP LUP, reflecting such balance, provides for the construction of sea walls and notch fills (or other protective devices collectively referred to as "bluff retention devices") under certain defined and limited conditions. One consideration for allowing a bluff retention device is the requirement to pay the City's Sand Mitigation Fee (see LUP Appendix A) and a Public Recreation Fee to compensate for the loss of sand and loss of public recreational use due to the presence of the shoreline protective device.

GOAL OF DRAFT REPORT

The goal of this draft fee study (study or report) is twofold: first, to provide a method for beach valuation for use in determining a public recreation fee should a protective device be constructed in Solana Beach; and secondly, to provide an analysis of potential offsets to the Public Recreation Fee and Sand Mitigation Fee. Although initially considered with this fee study,

the Sand Mitigation Fee is no longer included in this report as the various stakeholder groups and the California Coastal Commission (CCC) recommended using the formula currently applied to projects by the CCC. Specifics of the Sand Mitigation fee are incorporated into the certified LCP LUP Appendix A. However, the potential offset considered in this report applies to both the Sand Mitigation and the Public Recreation fee.

Potential effects of bluff retention devices, such as aesthetic and visual impacts are addressed by policies and design requirements contained within the certified LCP LUP. Therefore, all new bluff retention devices must meet the City's aesthetic and visual design criteria contained in the LUP. The City's LUP aesthetic and design criteria for bluff retention devices are permit conditions that are required to be incorporated into the design for all new seawalls, notch and seacave infills and all other bluff retention devices in the City. The following design criteria are intended to mitigate potential aesthetic and visual effects of bluff retention devices along the shoreline and are requirements for all such devices as outlined in LUP Appendix A:

- All bluff retention devices shall be located as far landward as possible to minimize encroachment on to the public beach;
- All bluff retention devices shall be designed to minimize the size of the device and preserve the maximum amount of native bluff face;
- All bluff retention devices shall be color matched to resemble the native bluff as closely as possible; and
- All bluff retention devices shall be hand-sculpted to resemble the native bluff to the maximum extent.

Potential effects on natural resources are currently being reviewed by the CCC in an analysis underway at San Francisco State University with funding provided by the CCC and the National Oceanic Atmospheric Administration (NOAA). Therefore, these topics are not part of this report. However, a baseline natural resources survey was prepared by the City and is included in Appendix 1 of this report.

RECREATIONAL VALUE OF PUBLIC BEACH IN SOLANA BEACH

PMC[1], referenced as Michael Baker from hereon, with CIC Research, Inc. as a sub-consultant, was retained by the City in June 2008 to prepare the fee study. To determine the recreational value of the beach at various locations, CIC staff conducted random surveys of beach attendees within the City of Solana Beach and performed attendance counts from July 2008 through July 2009. Using the Travel Cost economic model an average visitor trip value of $21.15 was established. In response to public feedback, changes were incorporated into this report (2015 Report), using the original data, whereby the resulting average recreational value of an adult visitor day equals $17.50 during summer months and $13.42 during non-summer months averaged over the entire length of the beach.

The surveys were performed in such a way to analyze small segments of beach area to potentially identify varying value along the length of the beach. The number of visitors within a beach area reveals the preference of one area over another. The more crowded the beach area, the more it is valued and this approach inherently captures the heterogeneity of beach area such as quality, amenities including parking, restrooms, etc. and surf conditions. Figure 1-1

[1] PMC has been acquired by Michael Baker International.

shows the average annual beach visitors along the Solana Beach coast based on the survey results. The preliminary analysis divided the beach into 35 segments. Nine separate areas within Solana Beach were identified based on approximate beach densities. These were subsequently consolidated into a single City-wide zone based on the results of the data and in recognition that the beach is subject to dynamic processes that ultimately affect beach density on a daily, weekly, and yearly basis. The consolidation into a single zone, based on the average recreational values of visitor day of $17.50 and $13.42, yielded an average public recreation value of $2.34 million dollars annually, over the entire 15.5 acres of the beach or $3.46 (2010 dollars) and $3.99 (2015 dollars) per square foot.

SUMMARY OF KEY CHANGES SINCE THE 2010 DRAFT FEE STUDY

A Draft Report (2010 Report) was released in 2010 for public review and comment and the City received comment letters from the following:

- California Coastal Commission Staff
- Phillip King, Ph.D. San Francisco State University, Interested Party
- Jim Jaffee, Solana Beach Resident/Surfrider Foundation
- Shoecraft & Burton, LLP representing Mr. Joseph Steinberg, Solana Beach Property Owner
- Axelson & Corn representing BBC and COOSA, Solana Beach Residents and Property Owners
- David Winkler, Solana Beach Resident
- Tom Cook, Interested Party

The City and the Michael Baker team evaluated the comments and prepared responses which are included in Appendix 2 of this report. The updated, 2015 Report reflects revisions that were required to address many of the comments received on the 2010 draft fee study. A summary of the key changes include the following:

The City's beach area was revised to 15.5 acres (from 8.18 acres) using a 13-year average for Fall and Spring beach profile transect measurements collected by Coastal Frontiers Corporation as part of the SANDAG and Solana Beach Annual Shoreline Monitoring Program instead of a one time "snapshot" of the beach area on a single day.

Beach attendance was revised based on separate non-surfer and surfer expansion factors. The surfer count was revised to 66,800 annually (from 26,700) due to the likelihood that surfers were underrepresented in the original attendance counts due to the time of day that the beach population counts were conducted. The surfer expansion factors were developed from available data of similar beach sites.

Attendance factors are based on 1-hour time blocks (2-hour time blocks were used in 2010) as suggested by stakeholders to reduce potential of "over counting."

Applied seasonal (monthly) expansion factors to the attendance figures then expanded that to an annual estimate. As summer months were sampled more frequently than non-summer months, an annual expansion factor as was performed initially overestimated attendance.

Development of a demand curve to determine consumer surplus (what a persons is willing to pay) for an adult beach visit using 1/3rd of wages (Instead of 100% of wages) yielding an overall value of $14.96 or $13.42 for non-summer visits and $17.50 for summer visits compared to the 2010 figure of $21.15 (cost only and 100% of wages).

Mean sea level impacts on bluff erosion using 0.4' per year per the City's Certified LCP LUP for the first 10 years and 0.673' per year for the next 20 years assuming climate change and rising sea levels.

Area of public beach not available for recreation is based on imminent episodic bluff failure. Block failure of the bluff is likely to occur once erosion has undercut 8.2' of the bluff so the study assumes that this area is imminently available to the public.

Separate factors are used for Consumer Price Index (2.08%) and discount rates (4%). A net of 2% was used in the 2010 fee study.

Increased beach attendance annually by regional growth factor of 0.8047%.

Obligation to pay mitigation fees for 20-year increments instead of to 2081 (up to 75 years) consistent with the Certified LCP LUP policies.

Solana Beach Junior Lifeguard revenues have been added to annual recreational value to capture that program's value. The count surveys did not include those in the program.

The net effect of those changes on the outcome and recommendations of the 2015 Report include:

- The total beach attendance increased to 156,400 (86.2% adults) from 124,700.
- The recreational value of an adult visitor beach trip equals $17.50 for summer visits and $13.42 for non-summer visits.
- The annual recreational value for the entire beach is $2.34 million compared to $2.1 million in 2010 Report.
- The annual recreational value then is $3.99 per square foot in 2015 dollars (adjusted from $3.46 in 2010 dollars)) compared to $6.02 in the 2010 Report.
- The mitigation fee per linear foot of wall is $846 if permitted in 2015 (paid in full up front) compared to $3,100 per linear foot in 2010 Report. The mitigation fee increases to $1,311 per linear foot of wall if permitted in 2026.

Table 1-1 shows the public recreation fee for a 20-year period based on the year of bluff retention device construction.

TABLE 1-1 RECOMMENDED PAYMENT PER LINEAR FOOT OF WALL FOR 20-YEAR PERIOD

Permit Year	Single Payment (per linear foot)
2015	$846
2016	$870
2017	$925
2018	$952
2019	$979
2020	$1,040
2021	$1,070
2022	$1,135
2023	$1,168
2024	$1,239
2025	$1,275
2026	$1,311

The Public Recreation Fee incorporates the annual recreational value of $3.99 per square foot and assumes a constant bluff erosion rate of 0.4 feet per year for the first 10 years and 0.673 feet per year after that, imminent bluff failure, and a seawall thickness of 2 feet. For reference, seawall lengths in Solana Beach are typically 50' long. It also is incorporates a Consumer Price Index (CPI) of 2.08%, regional population growth of 0.8047% based on the SANDAG Regional Growth Forecast and estimates the present value of the fee using a 4% investment rate.

The City currently collects a fee deposit of $1,000 per linear foot for the Public Recreation Fee and assesses a Sand Mitigation Fee per the LCP LUP Appendix A.

Figure 1-1 shows the average annual beach population (by linear foot of shoreline) per segment of beach.

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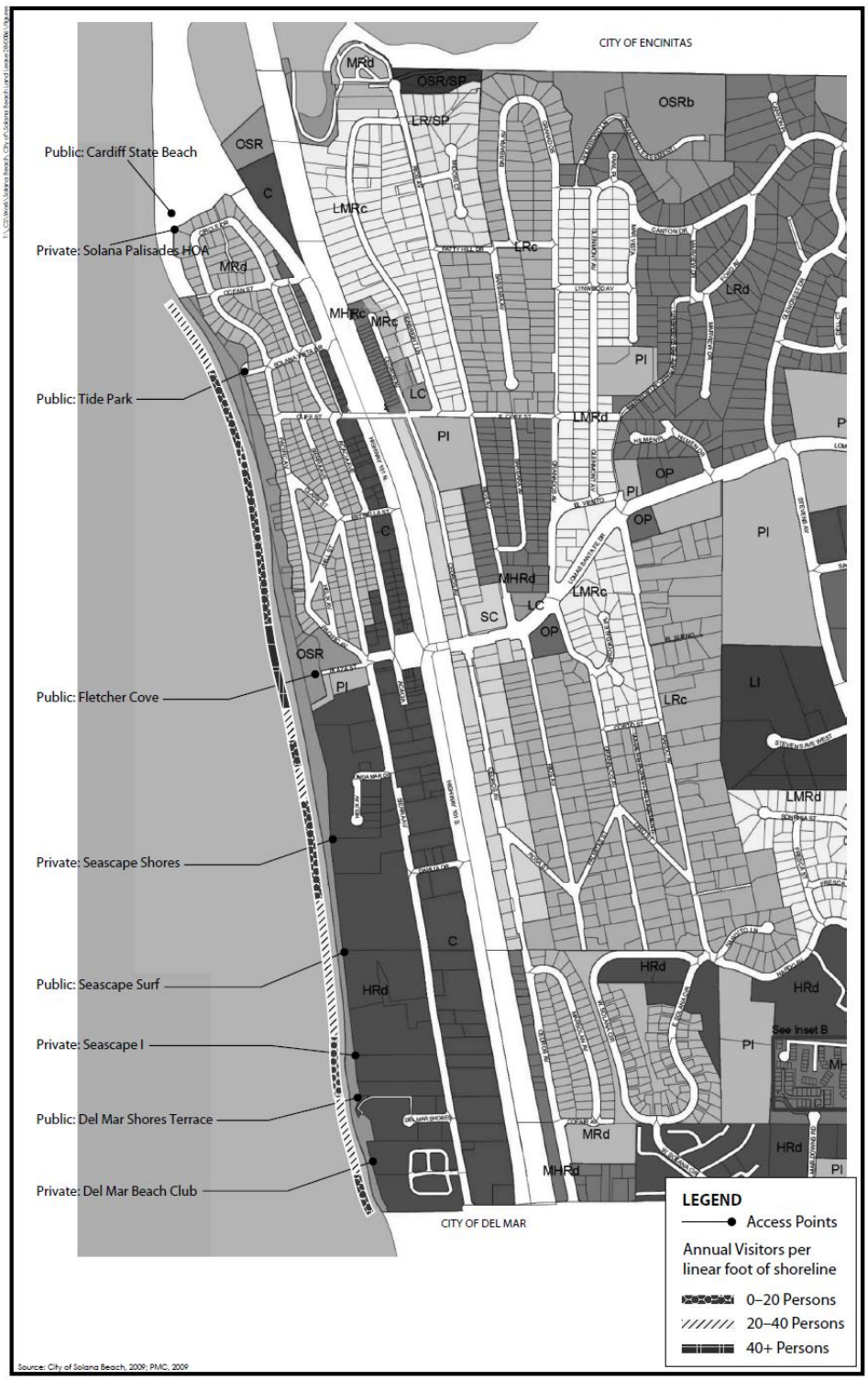
FIGURE 1-1 ANNUAL BEACH ATTENDANCE



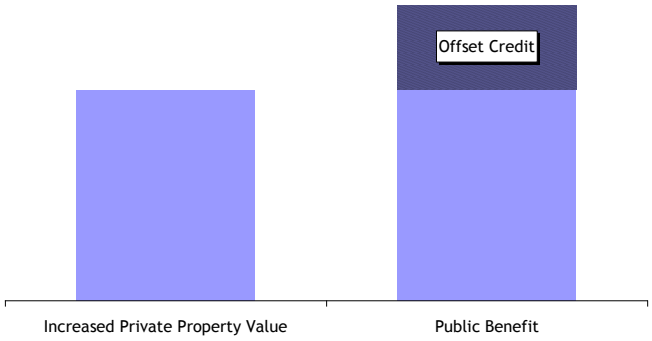
Not to scale

Figure 1-1
2010 Annual Beach Attendance

POTENTIAL OFFSETS TO PUBLIC RECREATION FEES AND SAND MITIGATION FEES

With one approach, the average overall public benefit related to public safety is estimated to be $31 per linear foot of wall per year which is primarily the result of the likelihood of a fatality occurring along any one stretch of beach that is effectively avoided as a result of the installation of the bluff protection device. The other major components of a public benefit would be protection of public property and the potential increased property tax revenue associated with a stabilized site. These amounts are then compared to the private benefit. Where the public benefit exceeds the private benefit, the City Council, at a public hearing, may consider allowing for an offset to the required fees as presented in this report (see Figure 1-2).

FIGURE 1-2 POTENTIAL OFFSET CREDIT



2. INTRODUCTION

SOLANA BEACH LOCAL COASTAL PROGRAM LAND USE PLAN

Solana Beach's efforts to establish a Local Coastal Program have been on-going for more than a decade. In June 2008, the City Council approved a Draft Local Coastal Program (LCP) Land Use Plan (LUP) for submittal to the California Coastal Commission (CCC) representing the collaborative planning effort initiated by the City and developed with the participation of various stakeholder groups including local environmental groups and property owners. Shortly thereafter, this fee study began to move forward. A Draft Fee Study was released to the public in March 2010 and a corrected version released in July 2010 for public review and comment. Several comments from interested parties were received during the 60-day comment period. The 2010 Draft Fee Study was subsequently put on hold while the City worked with CCC and stakeholders to prepare revisions to the Draft LCP LUP. In October 2011, the City submitted its 7th draft LCP LUP to the CCC. In March 2012, the CCC rejected the City's LUP and instead approved a modified version of the LUP incorporating CCC staff-initiated changes to the City's LUP. The City Council adopted the CCC-modified LUP in February 2013. City Council also directed staff to begin preparation of LUP Amendment to address policy changes primarily related to blufftop development and shoreline protection. Ultimately the LUP Amendment was approved by CCC in January 2014 with new findings made in April 2014. City Council approved the CCC-modified LUP Amendment in June 2014. The City now has a certified LCP LUP and is in the process of preparing the companion LCP Local Implementation Plan (LIP).

The City's LCP consists of a Land Use Plan and an in–development Local Implementation Plan. As part of the LCP and its implementation, the City of Solana Beach has established a long-term shoreline management plan. Key elements of the City's shoreline management plan are also part of the City's sea level rise adaptation strategies that are outlined in the certified LCP LUP. The primary elements include long-term coastal restoration through beach nourishment, increased bluff top setbacks for new development and a ban on permanent irrigation systems within 100 feet of the coastal bluff edge.

The unique geology of the coastal area, as well as regional sand depletion have all caused the loss of the beach area over time, accelerating the erosion process along the coastal bluffs, threatening public and private property as well as public infrastructure. The City's shoreline management plan is intended to achieve a comprehensive goal of restoring, preserving and enhancing a safe, wide beachfront for use by the public; and protecting and preserving private property rights of individual bluff property owners. A key element of the shoreline management plan is the 50-year Coastal Storm Damage Reduction Project that the City is jointly developing with the City of Encinitas, U.S. Army Corps of Engineers (USACE) and the California Department of Parks and Recreation (State Parks). It is the intent that with the LUP policies, bluff retention devices along the entire shoreline of Solana Beach will not be necessary. For instance, should the City implement a program to construct sand retention or multi-purpose reefs or other

devices such as a living shoreline system and pre-fills the system with sand, the environmental quality of the public beach in Solana Beach may be enhanced. It may also eliminate the long-term need for most additional Bluff Retention Devices.

While the LUP allows the construction of coastal protection structures, on public property, for the protection of private property, as well as public property, it also sets forth the conditions for allowing such construction and the requirement to mitigate impacts. When a bluff retention device is built, it establishes the back beach location with the goal of preventing further bluff erosion. However, without the on-going erosion, bluff sediments are prevented from reaching the beach and the beach area that would have theoretically been created over time by a receding shoreline will not be available to the public for recreation, especially in light of future sea level rise predictions. As outlined in the certified LCP LUP, the City of Solana Beach requires payment of mitigation fees to compensate for the loss of sand and public beach area that is and may be available for public recreation.

As stated, in part, in Policy 4.48 of the certified LCP LUP:

> Mitigation for the impacts to shoreline sand supply, public access and recreation and any other relevant coastal resource impacted by the coastal structure is required and shall be assessed in 20-year increments, starting with the building permit completion certification date. Property owners shall apply for a CDP amendment prior to expiration of each 20-year mitigation period, proposing mitigation for coastal resource impacts associated with retention of the coastal structure beyond the preceding 20-year mitigation period and shall include consideration of alternative feasible measures in which the permittee can modify the coastal structure to lessen the coastal structure's impacts on coastal resources.

And as stated in Policy 4.39 of the certified LCP LUP:

> Provide for reasonable and feasible mitigation for the impacts of all bluff retention devices which consists of the payment of Sand Mitigation Fees and Public Recreation Fees to the City or other assessing agency.

This establishes the basis for developing a Public Recreation Fee as mitigation for the loss of public beach area and corresponding public recreational opportunities. The LCP Land Use Plan identifies the Sand Mitigation Fee formula and therefore is not addressed here. This 2015 Report, then, is focused on determining an appropriate Public Recreation Fee formula that may be used to determine appropriate mitigation fees accounting for the loss of beach area and corresponding public recreational opportunities. As a first step, several economic methods to determine the recreational value of the beach were evaluated.

REVIEW AND SELECTION OF THE ECONOMIC MODEL

Various economic models were considered for establishing the recreational value of the public beach. These included the Random Utility Maximization Model, the Contingent Value approach, Benefits Transfer approach and the Travel Cost Model. Michael Baker, including economist Dr. Gordon Kubota of CIC Research, recommended the Travel Cost Model as the most appropriate method for determining a recreational value for the beach.

Using the Travel Cost Model, based on specific surveys in Solana Beach, a recreational value per beach visitor per day was estimated based on the amount of time traveling to and from the

beach and the associated cost of travel. Using standard mathematical modeling, the value that a visitor places on the beach can be determined. Multiplying that figure by the number of visitors provides an estimate of the recreational value of the beach at Solana Beach which is then used to calculate the annual Public Recreation Fee.

Each of the economic models has both value and limitations in such an application and the comparative advantages and disadvantages of each of these economic models are described below.

Travel Cost Model

Advanges:

- Relatively simple, short, straight forward questionnaire with high percentage of participation;
- Collects data on actual observed actions (revealed preference), not on stated preferences (as in a contingent value approach) therefore is not subject to interviewee bias;
- Valid results with smaller sample size. Sample is collected by surveying on the beach being evaluated;
- Cost of survey is reasonable; and
- Survey is easy to replicate.

Disadvantages:

- It does not account for substitution which means the approach assumes the cost of choosing another beach reflects exactly the value of that other beach;
- Less responsive to measuring quality changes than the Random Utility Maximization Model; and
- Requires an "on site" expansion factor for attendance.

Random Utility Maximization Model

Advantages:

- Captures and evaluates the substitution effect in the site visit decision;
- May evaluate quality differences in sites and impact on value; and
- Frequently used for non-market evaluation.

Disadvantages:

- Requires an extensive, large, and relatively expensive household phone survey to obtain sufficient sample points to provide a value of an individual beach such as Solana Beach;

- Higher percentage of non-respondents;
- Model is complex and may be difficult to resolve;
- Uses a large population for expansion and therefore is subject to large potential errors caused by multiplying any value by a large number;
- Although based on "revealed preference," respondents are sometimes questioned on the importance of selective characteristics used to arrive at that choice; therefore some interviewee bias may be introduced; and
- Cost of the survey is considerably greater than the more simple Travel Cost Model.

Contingent Value Model

Advantage:

- Quantifies value of intangibles, such as views.

Disadvantage:

- Relies on survey of stated preference, instead of actual/revealed preference.

Benefits Transfer Model

Advantages:

- Utilizes available information from studies already completed in another location and/or context; and
- Option in lieu of other expensive and/or time intensive techniques for gross estimates.

Disadvantages:

- Not site specific.

The Travel Cost Model (TCM) was chosen over these other models, in part, due to it being replicable, specific to the needs of the study in Solana Beach, applicable, and cost effective, requiring a reasonable sample size.

PUBLIC OUTREACH AND INVOLVEMENT

City Staff and the Michael Baker/CIC team met with interested parties at a City-hosted workshop in September 2008 to present information regarding the proposed fee study. A subsequent follow-up meeting was conducted in November 2008 with the LCP LUP ad hoc committee. The focus of the November meeting was to discuss the economic model and consider comments to improve the surveys and attendance counts. As a result of that meeting, the survey period was extended through July 2009 to capture an entire year of data and certain adjustments were made to both the survey questions and the count approach.

A draft of the Public Recreation Fee Report was released in March 2010 with a revised (corrected) version released in July 2010 (2010 Draft Report) for a 60-day public comment

period. The City received many comments during this period. The 2010 Draft Report was placed on hold while the City focused its attention on the completion of the LCP LUP which was ultimately approved in 2013 (and amended in June 2014).

In January 2014, the City was awarded a CCC LCP Planning Grant to update the 2010 Draft Report and to include potential effects of sea level rise, separate surfer expansion factors, and other changes in response to stakeholder feedback on the 2010 Draft Report.[2] Preliminary work on the revised Public Recreation Fee Report began in July 2014. At a public meeting in September 2014, City staff and consultants summarized and presented the major comments made by the public on the 2010 Draft Report. As part of the grant, the City and consultants prepared several technical analyses as well as responses to the comments made in 2010 and submitted these to CCC for review. CCC responded in March 2015. Excerpts from these materials are included in Appendices 12, 13, 16 and 17 of this report.

It is anticipated that additional public meetings/hearing will be hosted by the City following the release of this 2015 Report.

SUMMARY OF KEY PROJECT MILESTONES AND OVERALL ANTICIPATED REPORT TIMELINE

The following key dates comprise the schedule for completion of the report:

June 2008	Michael Baker, and CIC Research as a sub-consultant, retained by City to prepare report on Public Recreation Fee (aka Land Lease/Recreation Fee) and Sand Mitigation Fee
July 2008	Michael Baker begins data collection
September 18, 2008	City public workshop conducted
November 6, 2008	City LCP ad hoc committee meeting
July 2009	Michael Baker concludes one year of beach visitor and attendance data collection
September 2009	City Council considers June 2009 LCP LUP
March 2010	Draft Report released to public
July 2010	2010 Draft Report, a corrected version of the March Draft Report, released by the City for public review and comment
February 2013	Certified LCP LUP approved by City Council
January 2014	City awarded CCC LCP Planning Grant
June 2014	Certified LCP LUP Amendment approved by City Council

[2] The grant scope of work anticipated that a concurrent and related study (NOAA/CCC/SFSU Beach Evaluation Study) intended to be applicable statewide, would be completed and results could be reviewed and considered in this study, as applicable and relevant to local conditions in Solana Beach. However, that study remains in-progress and has not been released to date.

September 2014	City conducts Public Workshop on Draft Fee Study process/schedule
October/November 2014	Technical Analyses and response to 2010 comments submitted to CCC for review
March 2015	CCC provides additional feedback to City on 2010 Draft Report and the efforts on the 2015 Draft Report proceeds[3]
Summer 2015	Presentation of 2015 Draft Report to City staff
Fall 2015	City Council Meeting to release 2015 Draft Report and begin 45-day public comment period
March 2016	Public Hearing on Final Draft Report to City Council
April 2016	Submittal of Final Draft Report and related LUP Amendment to CCC for certification

ORGANIZATION OF REPORT

This report is organized as follows:

Chapter 1 – Executive Summary

Chapter 2 – Introduction

Chapter 3 – Methodology and Surveys. This chapter includes the Travel Cost Model methodology, visitor and count (attendance) survey specifics and results, including count expansion factors, and the development of demand curves. From the demand curves, the average recreational value of a visitor day is estimated for summer and non-summer months.

Chapter 4 – Draft Public Recreation Fee Recommendation. This chapter discusses the specifics for calculating the proposed fee using the average recreational value per square foot of beach in Solana Beach and applying that to the estimated beach area lost due to the seawall. The chapter includes discussion of sea level rise based on the Everest International Consultants, Inc. Technical Memorandum and the certified LCP LUP. The chapter provides tables for use in calculating the Public Recreation Fee which is dependent on the year of seawall construction.

Chapter 5 – Analysis of Potential Public Benefit Offsets. This chapter describes and quantifies the potential public benefit offsets that City Council may consider.

Chapter 6 – References and List of Preparers. This chapter cites the references used in the preparation of this report and identifies those entities that assisted in this effort.

This 2015 Draft Report contains the following appendices:

Appendix 1 – Nearshore Marine Resources Existing Conditions
Appendix 2 – Response to Comments on 2010 Draft Report

[3] See Appendix 3 for California Coastal Commission comment letter.

Appendix 3 – California Coastal Commission March 2015 Comment Letter
Appendix 4 – NOAA and Consumer Demand
Appendix 5 – Count Surveys
Appendix 6 – Visitor Surveys
Appendix 7 – Everest International Corporation Sea Level Rise Technical Memorandum
Appendix 8 – Non-Surfer Expansion Factors
Appendix 9 – Counts Excel File
Appendix 10 – Travel Cost Model Excel File
Appendix 11 – Demand Curve Data
Appendix 12 – CIC Research Report
Appendix 13 – Coastal Frontiers Report
Appendix 14 – CCC and City Fee Analysis
Appendix 15 – Related Studies
Appendix 16 – CCC Case Studies
Appendix 17 –Appraisal Critique
Appendix 18 – Additional Offset Information

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3. METHODOLOGY AND SURVEYS

INTRODUCTION

While it may be relatively easy to assign a value to public property that has a market corollary (such as a meeting hall) it is very difficult to assign a value to public land in which no market exists, i.e. cannot be sold in the market. Public beaches in California are not for sale and as such cannot be readily purchased. However, public beaches have an inherent recreational value to the public and therefore, the value must be evaluated using other "non-market" mechanisms.

The four major economic models to evaluate recreational value of a non-market amenity were evaluated by the Michael Baker team: Contingent Valuation, Benefit Transfer, Random Utility and Travel Cost. Based on its relative advantages for this specific application (outlined in Chapter 2 of this report), the Travel Cost Model was recommended to be employed by Michael Baker. The Travel Cost Model, used for the economic analysis, looks at actual (i.e. observable) human behavior and assigns a value based on the behaviors which are expressed in their decisions. In utilizing the Travel Cost Model, actual data is collected on the beach users relative to their travel to and from the activity (visit to the public beach in the City of Solana Beach) and then a value unique to that individual is calculated. The individual value is based on that individual's cost of traveling to the public beach based on their hourly income and specific mode of transportation utilized to get to the public beach. Based on this data collection effort, a demand curve was then developed using regression analysis software to determine the "consumer surplus", or the willingness of individuals to actually pay for an activity that is otherwise free (e.g., there is no entrance or parking fee required to access to the public beach in Solana Beach). See Appendix 4 for typical diagram of a demand curve and consumer surplus.

Two Primary Data Collection Efforts

Early in the development of the methodology for collecting data for the non-market evaluation it became clear that two data collection efforts would be required. One data collection effort would require surveying actual beach goers (beach visitors) to gather specific information related to their travels to the beach as well as income-related questions. Such information is one of the key inputs to the Travel Cost Model. A second data collection effort was needed to develop estimates as to the number of annual visitors to the beach, information not currently collected by Solana Beach. As it would be impractical to count every beach user, 24-hours a day on the beach or in the water for an entire year, this second data collection program utilized periodic counts (typically 2-hour time blocks or less) of visitors to the beach which could then be expanded to estimate the average daily visitors, and then annual visitors, in Solana Beach. Representative survey sample sizes were chosen to accomplish the initial goal of providing an overall estimate of value for all beach activities. The sampling plan was random by month and season, day of the week, and the time of day to reflect such variables as tide conditions, weather, wave heights, month and season, time of day and actual site location. The surveys

were conducted over a one-year, 52-week period from July 2008 through July 2009. The following describes the methodologies used in the two data collection efforts.

BEACH ATTENDANCE SURVEY

The beach was divided into 39 segments (from Encinitas to Del Mar), defined by 40 landmarks and generally identified using GPS supplied coordinates. The 3 northernmost segments were discarded after it was determined they were located outside of the Solana Beach city limits and within the City of Encinitas. One other northern segment was discarded because of similarity with its adjacent northern area (in Solana Beach). On seven randomly selected days per month over the 12 month period, a field data collector counted attendance at the beach. The data collection days were reviewed to make certain that five of the seven days were weekdays and two were weekends. The data collector would enter the beach either from the north or southern most entry point (alternating randomly) and traverse the entire beach counting visitors on the beach or in the water offshore. The attendance counts were then recorded into three categories: on the beach, in the water/swimming, and surfing. In addition, beach attendance counts were further distinguished as to whether the beach use was an adult or a child (e.g. under age 16 by observance) to correspond with our beach visitor survey which was only administered to those over age of 16.

The first beach population data count was conducted on July 25, 2008 and the final one was conducted on July 23, 2009. There were 88 individual counting days over this one-year period. Tally sheets and description of segments are displayed in Appendix 5 of this report.

BEACH VISITORS SURVEY

The beach visitor (or beachgoer) survey was developed by the Michael Baker team to obtain important data that was required to estimate the value that a given adult visitor to the beach places on going to that beach. The questionnaire was designed to obtain data on the mode of transportation used to get to the beach, the travel distance, annual income, occupation, and other information for categorizing the responses. A copy of the survey questionnaires and code book used are displayed in Appendix 6 of this report. As noted above, the selected survey days and times were randomly selected throughout the one year data collection effort. The interviewer would spend approximately four hours on the beach interviewing on any given day. The beach visitor survey was administered beginning on July 23, 2008 and ending on July 31, 2009. During that time a total of 563 surveys were conducted on 34 days throughout the one-year period.

The beach visitor survey was modified after the stakeholder meeting in October 2008 to capture additional information to use in defining "expansion factors" to be applied to the beach population/attendance data. It was recommended that "expansion factors" be developed to expand the sample count data to daily attendance (and then to annual attendance) to better estimate total beach attendance rather than the initial approach of a single periodic mid-day count.

RESULTS OF DATA COLLECTION EFFORTS

Beach Attendance Counts

As stated previously, in order to obtain an estimate of the number of annual beach visitors, a count on random days was conducted. In all, on 88 randomly selected days, beach attendance counts were conducted starting on July 25, 2008 and finishing on July 23, 2009,

capturing one full year of data. The maximum count per day occurred in the summer (623 beach visitors on Saturday August 16, 2008) and, as expected, the lowest per day counts occurred in the winter where there were several days with less than 5 people on the beach at the time of counting. Table 3-1 displays the average count per day by month.

TABLE 3-1
AVERAGE COUNT OF BEACH VISITORS PER DAY BY MONTH

	Children	Adult	Total
July 2008	55.3	175.0	230.3
August 2008	66.8	197.0	263.8
September 2008	13.6	67.9	81.4
October 2008	12.3	60.3	72.6
November 2008	2.6	27.3	29.9
December-2008	4.6	22.1	26.7
January 2009	5.7	48.9	54.6
February2009	3.1	28.3	31.4
March 2009	6.1	42.7	48.9
April 2009	4.9	31.3	36.1
May 2009	21.6	64.6	86.1
June 2009	12.6	69.3	81.9
July 2009	47.9	125.3	173.1

Source: CIC Research, July 2009

Methodology for Developing Attendance Expansion Factors

An important step in estimating the "actual" annual beach attendance count was to determine how many visitors may have been missed on a particular day because they arrived and departed before the count was taken or after the count was taken or visited the beach on a day in which beach attendance data was not collected.

Hourly "expansion" factors for people on the beach or in the water (but excluding surfers) were developed using the visitor survey data. An estimate of the proportion of visitors missed was derived by examining the respondents' arrival time and estimated departure time and determining what proportion would not have been in the area during the counting time period on average. The raw data counts were then adjusted by the expansion factors to establish the estimated attendance for the entire day.

Hourly expansion factors for surfers were developed based on data collected and analyzed by Everest International Consultants, Inc. (EIC) Separate expansion factors were developed because some studies have shown that surfer attendance spikes in the early morning and/or in the early evening which follows a different pattern than other beach goers. The visitor surveys conducted in 2008-2009 did not focus on this variable aspect of beach users. For that reason additional data was developed for use in this report. (See Appendix 7 for the EIC report which details the methodology.) Tables 3-2 and 3-3 below show the attendance expansion factors used in this analysis.

TABLE 3-2
EXPANSION FACTORS FOR BEACH USERS (EXCLUDING SURFERS) BY TIME BLOCK

Time Block	Missed %	Captured %	Expansion Factor = 1/Capture %
6:00–7:59 am	97.6%	2.4%	41.100
8:-00-8:59 am	89.3%	10.7%	9.341
9:00-9:59 am	82.5%	17.5%	5.708
10:00-10:59 am	74.7%	25.3%	3.952
11:00-11:59 am	65.0%	35.0%	2.854
12:00-12:59 pm	59.6%	40.4%	2.476
1:00-1:59 pm	63.0%	37.0%	2.704
2:00-2:59 pm	65.9%	34.1%	2.936
3:00-3:59 pm	68.1%	31.9%	3.137
4:00-4:59 pm	78.3%	21.7%	4.618
5:00-11:59 pm	92.0%	8.0%	12.455

See Appendix 8 for summary data and calculations.

TABLE 3-3
EXPANSION FACTORS FOR SURFERS BY TIME BLOCK

Time Block	Expansion Factor
6:00-6:59 am	4.4
7:00–7:59 am	2.6
8:-00-8:59 am	2.5
9:00-9:59 am	3.3
10:00-10:59 am	4.3
11:00-11:59 am	5.6
12:00-12:59 pm	8.9
1:00-1:59 pm	15.2
2:00-2:59 pm	18.8
3:00-3:59 pm	19.4
4:00-4:59 pm	16.8
5:00-5:59 pm	16.3

Source: Everest International Consultants, Inc. 2015

The differences in expansion factors for non-surfers and surfers indicate that surfers frequent the beach more often during the early morning hours and non-surfers frequent the beach more often around the noon hour.

The following simplified example, tabulated in Table 3-4, illustrates how the expansion factors for non-surfers were developed using information collected in the visitor surveys. (See the EIC report in Appendix 7 for details on development of the surfer expansion factors.)

Example: On a given day, 5 people visit the beach (as shown below in the first column and are on the beach during the time blocks shown. A "Y" (yes) in the column means the visitor was there during that time block and an "N" (no) in the column means the visitor was not on the beach during that time block. For instance, visitor 4 was on the beach from 9:00 am until 11:59 am.

TABLE 3-4
EXAMPLE: BEACH VISITOR TIME BLOCKS

	Time Block				
Counted Visitors	**8am 8:00-8:59**	**9am 9:00-9:59**	**10am 10:00-10:59**	**11am 11:00-11:59**	**12pm 12:00-12:59**
Visitor 1	N	N	Y	Y	N
Visitor 2	Y	N	N	N	N
Visitor 3	N	N	N	N	Y
Visitor 4	N	Y	Y	Y	N
Visitor 5	N	Y	Y	Y	N
Capture # (∑Y)	1	2	3	3	1
Expansion Factor	5	2.5	1.67	1.67	5

The expansion factor for each time block equals the reciprocal of the capture number divided by the total visitor count for the day (1/(capture # for that time block/5). The expansion factors were then applied to the count survey data. According to the above example, if the count for that day occurred during time block 11 (e.g. 11am), three visitors would be counted. To estimate the visitors for the entire day, the figure of three is multiplied by the expansion factor, in this case 1.67, yielding a daily beach count of 5 for that day. Without the expansion factors, the data would not represent all the visitors on the beach on a particular day. The results of applying the time block expansion factors are shown in Table 3-5.

TABLE 3-5
APPLYING TIME BLOCK EXPANSION FACTORS TO BEACH VISITORS – BY SEGMENT

	Beach		Wading/Swimming		Surfing		Total		
Segment	**Adults**	**Children**	**Adults**	**Children**	**Adults**	**Children**	**Adults**	**Children**	**All**
4	657	93	188	34	1,701	0	2,546	127	2,673
5	834	311	82	103	370	0	1,287	413	1,700
6	251	31	34	53	17	9	302	93	395
7	170	55	24	17	67	34	261	106	367
8	172	3	6	3	44	0	222	6	228
9	235	3	27	6	90	0	352	9	361
10	118	8	6	0	35	0	159	8	167

	Beach		Wading/Swimming		Surfing		Total		
Segment	Adults	Children	Adults	Children	Adults	Children	Adults	Children	All
11	180	30	12	0	0	0	191	30	221
12	89	12	3	3	0	0	91	15	106
13	648	103	29	3	781	0	1,458	106	1,565
15	1,994	445	279	269	2,690	38	4,963	751	5,715
16	1,844	702	383	358	632	49	2,859	1,109	3,968
17	268	56	77	36	364	0	710	92	802
18	333	15	72	46	333	0	738	61	799
19	103	11	56	26	220	0	379	37	416
20	16	5	43	5	72	17	130	27	157
21	235	8	5	13	150	0	390	21	411
22	181	19	31	11	74	0	286	30	316
23	241	15	26	14	161	0	428	29	457
24	169	8	21	3	72	0	261	11	272
25	453	44	46	17	112	0	610	61	671
26	640	69	82	58	376	0	1,098	127	1,225
27	432	99	90	84	275	0	797	183	979
28	407	146	93	123	368	0	868	268	1,136
29	469	171	92	106	347	22	908	298	1,207
30	314	145	92	93	461	0	867	238	1,106
31	336	28	83	56	467	15	887	98	985
32	477	17	49	37	718	4	1,243	58	1,301
33	241	33	22	14	911	0	1,173	46	1,219
34	256	24	35	21	645	0	936	45	981
35	152	19	12	13	529	9	692	40	732
36	545	68	25	35	393	0	963	103	1,067
37	474	75	74	34	1,292	19	1,840	129	1,969
38	1,368	414	276	332	1,148	0	2,792	746	3,538
39	149	27	29	40	198	19	376	85	462
Total	**15,451**	**3,310**	**2,506**	**2,062**	**16,110**	**235**	**34,066**	**5.606**	**39,672**[4]

Solana Beach Average Annual Beach Attendance Estimate

The count data represented 88 survey days occurring over a one-year period. To expand 88 days of data collection to a 365-day annual average count, monthly expansion factors were developed and applied to the data in the table above. The monthly expansion factors are

[4] Based on the sample count data, a few of the counts could be identified to be in one of two time blocks. To estimate this impact, calculations were made using two scenarios. The total then varies between 39,672 as shown in the table and 39,747.

shown in Table 3-6 and the results of applying the monthly expansion factors are shown in Table 3-7.

The annual daily attendance for Solana Beach is estimated to be 156,400 and is broken down as follows:

- 58% are non surfers;
- 42% are surfers;
- 86% are adults; and
- 14% are children.

TABLE 3-6
MONTHLY BEACH ATTENDANCE DATA EXPANSION FACTORS (ALL BEACH VISITORS)

Month	Expansion Factor
July	3.100
August	3.875
September	4.286
October	4.429
November	4.286
December	4.429
January	4.429
February	4.000
March	4.429
April	4.286
May	4.429
June	4.286

TABLE 3-7
ESTIMATED NUMBER OF ANNUAL BEACH VISITORS IN EACH SEGMENT AFTER APPLICATION OF EXPANSION FACTORS

	Beach		Wading/Swimming		Surfing		Total		
Segment	Adults	Children	Adults	Children	Adults	Children	Adults	Children	All
4	2,450	388	750	140	6,938	0	10,139	527	10,666
5	3,284	1,231	317	405	1,533	0	5,135	1,636	6,770
6	982	115	131	193	70	34	1,183	343	1,526
7	688	235	99	71	253	144	1,040	449	1,489
8	674	13	24	12	190	0	889	25	914
9	897	14	107	26	358	0	1,363	40	1,403
10	499	25	24	0	130	0	654	25	678
11	714	132	41	0	0	0	755	132	887
12	383	53	13	13	0	0	396	66	462

	Beach		Wading/Swimming		Surfing		Total		
Segment	Adults	Children	Adults	Children	Adults	Children	Adults	Children	All
13	2,584	395	116	13	3,265	0	5,965	408	6,373
15	7,706	1,767	1,039	988	11,007	152	19,753	2,907	22,659
16	7,190	2,689	1,479	1,366	2,644	212	11,314	4,267	15,581
17	1,052	230	310	138	1,364	0	2,726	369	3,095
18	1,250	60	265	152	1,224	0	2,739	212	2,951
19	412	35	212	87	843	0	1,467	122	1,589
20	63	21	177	20	291	74	531	115	646
21	998	35	17	46	631	0	1,646	81	1,727
22	697	71	112	33	281	0	1,090	104	1,194
23	937	60	89	55	594	0	1,619	115	1,734
24	668	30	79	13	283	0	1,030	43	1,074
25	1,752	165	168	57	448	0	2,368	222	2,590
26	2,580	275	339	235	1,477	0	4,396	510	4,905
27	1,664	380	347	297	1,061	0	3,072	677	3,749
28	1,557	529	337	415	1,512	0	3,406	944	4,350
29	1,851	698	324	399	1,384	91	3,559	1,188	4,747
30	1,215	561	340	329	1,906	0	3,461	890	4,351
31	1,270	97	298	200	1,855	47	3,424	345	3,769
32	1,770	64	185	147	2,952	13	4,907	224	5,131
33	881	108	82	42	3,725	0	4,688	150	4,838
34	946	93	131	79	2,627	0	3,703	172	3,875
35	597	77	41	52	2,035	28	2,673	157	2,830
36	2,047	272	93	146	1,549	0	3,689	418	4,107
37	1,863	296	283	126	5,202	83	7,348	505	7,853
38	5,268	1,560	1,209	1,232	4,747	0	11,045	2,792	13,837
39	580	96	100	137	805	58	1,485	291	1,777
Total	**59,971**	**12,871**	**9,502**	**7,663**	**65,186**	**937**	**134,659**	**21,471**	**156,130**

Based on the sample count data, a few of the counts could be identified to be in one of two time blocks[5]. To estimate this impact, calculations were made using two scenarios to determine a range of values between 156,130 as shown in the table and 156,785. The rounded figure of 156,400 represents the average between the two figures (to the nearest 100).[6] The annual attendance figure of 156,400 annually was then used in all subsequent calculations contained within this report. Additional detail is provided in Appendix 9.

[5] The issue arose when adjusting the count survey from 2-hour time blocks in the 2010 Report to 1-hour time blocks in the 2015 Report, all based on the original survey data.

[6] The attendance figure equals 156,400 ± 8,343 at a 95% confidence interval.

Beach Visitor Surveys and Travel Cost Model

For one year, starting in July 2008, 563 beach visitors (representing 0.36% of the estimated annual beach visitors) were interviewed while on the beach. The survey data was used to collect information necessary for determining the beach value and to collect other general information about visitors to the public beach in Solana Beach.

As a first step to determining the beach value via the Travel Cost Model (TCM), the visitor survey data was utilized to estimate the cost of the beach trip. This was accomplished by calculating a cost per day based on the distance traveled (*D*), mode of transportation, and annual individual salary (*I*). The individual calculations per questionnaire are:

$$T = D * fM$$

And

$$V = I/2080*T + fC(T)$$

Where V = Value per Beach Visitor

T = Travel Time

D = Distance

I = Income

fM = Mode of Transportation Travel Time Factor as follows:

- For Auto (including dropped off) less than 6 miles distance $fM= 2 \text{ min/mile}*2/60$
- Auto more than 6 miles $fM= 1.5 \text{ min/mile}*2/60$
- Walking/Skateboarding $fM= 30 \text{ min/mile}*2/60$
- Bike and Public Transportation $fM= 7.5 \text{ min/mile}*2/60$

fC(T) = Cost of Transportation Factor as follows:

- For Auto (including dropped off) $fC(T)= \$0.54/\text{mile}*D*2$
- Bike/Walking/Skateboarding $fC(T)= 0$
- Public Transportation $fC(T)= \$5.00$

See Appendix 10 for the TCM calculations. This data was then used to create a demand curve in order to calculate "consumer surplus," using the cost as the independent variable and number of visits as the dependent variable. Consumer surplus is the difference between the total amount that consumers are willing and able to pay for a good or service (indicated by the demand curve) and the total amount that they actually do pay (in this case the travel cost

associated with getting to the beach.[7]) The resulting demand curves, using standard mathematical modeling, are shown in Figures 3-1 and 3-2 below and are based on applying 33% of stated wages. Summary data for the regression analysis is provided in Appendix 11.

FIGURE 3-1
DEMAND CURVE FOR SOLANA BEACH USING 33% OF WAGES – SUMMER VISITS

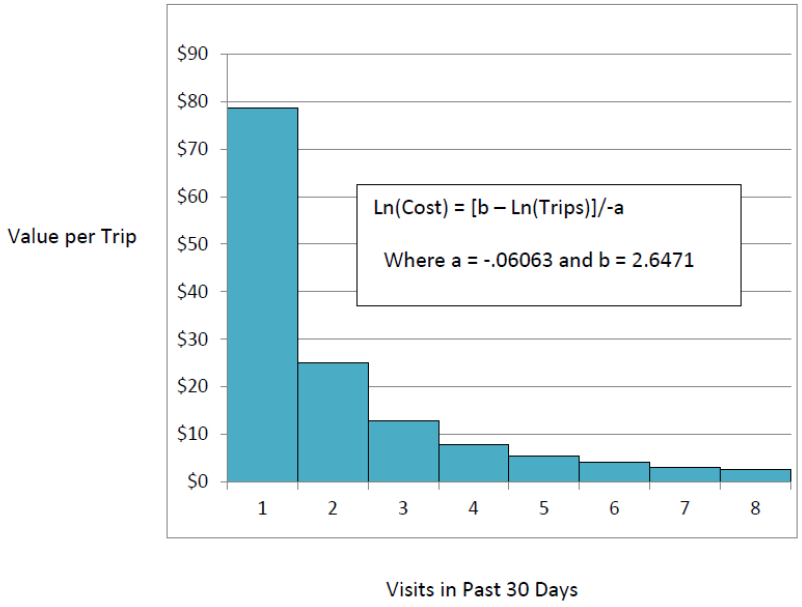
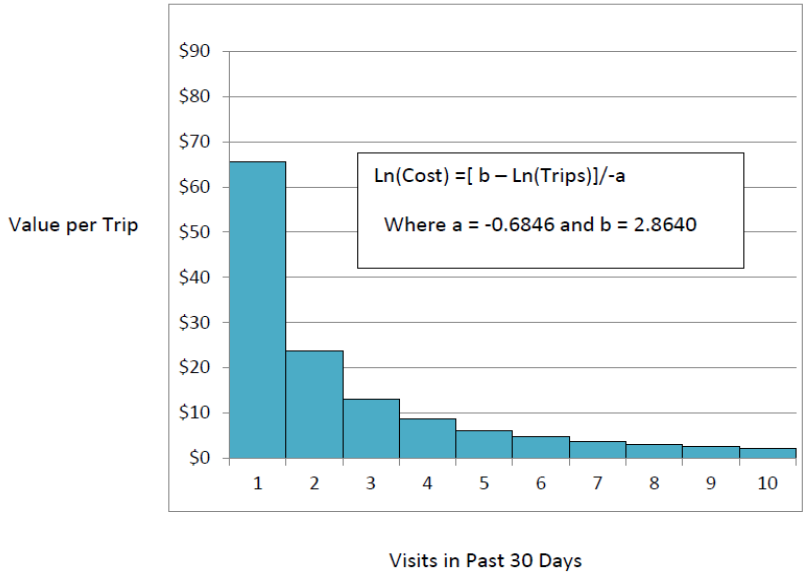


FIGURE 3-2
DEMAND CURVE FOR SOLANA BEACH USING 33% OF WAGES – NON - SUMMER VISITS



[7] See Appendix 4 for an example demand curve and consumer surplus.

The area under the demand curve represents the consumer surplus which is then divided by the average number of visits in a 30-day period (8 for summer and 10 for non-summer visits)) to determine the average consumer surplus per visit. A summary is provided in Table 3-8 which shows that the summer months' consumer surplus is higher than the non-summer months, meaning that summer demand is greater than non-summer months (people are more willing to travel farther during the summer season). The analysis was performed using 33%, 67% and 100% of wages to provide a range of values.

TABLE 3-8
MEAN VALUE OF A BEACH VISIT BASED ON PERCENT OF WAGES

Wage Percentage	Mean Beach Visit Cost	Summer/Non-Summer	Average Consumer Surplus Per Visitor
33%	$12.18 ± $1.18	All Months	$ 14.96
		Summer	$ 17.50
		Non-Summer	$ 13.42
67%	$16.69 ± $1.53	All Months	$ 21.18
		Summer	$ 32.33
		Non-Summer	$ 19.09
100%	$21.15 ± $1.89	All Months	$ 33.14
		Summer	$ 53.67
		Non-Summer	$ 25.52

There is not general agreement in the literature as to how to measure the opportunity cost of time. In King's "*Economic Analysis of Beach Spending and the Recreational Benefits of Beaches in Solana Beach*[8]," he uses 33% of the respondent's wage rate which he identifies as convention (referencing "*Economic Valuation of the Environment*"[9]). Using the low-range figures resulting from using 33% of wages in the Travel Cost Model represents the best curve fit for our data and therefore the average values of $17.50 and $13.42 per visit are recommended for estimating the annual recreational value of the public beach in Solana Beach. The values at 33% of wages also compare well to King's figure of $17.35 estimated in his report.

Summer attendance of 72,500 (multiplied by 86.2%) and non-summer attendance of 83,900 (multiplied by 86.2%) are multiplied by the average visitor value of $17.50 and $13.42, respectively. The annual adult attendance, representing 86.2% of total attendance, is used because the children's value is assumed to be captured in the adult values. The result is an estimated public beach recreational value of $2,065,400 (in 2010 dollars). However, children in the City of Solana Beach Junior Lifeguard Program were not captured in the 2008-2009 attendance counts and therefore the fee study recommends adding the value of that program's annual fee revenues to the City to the annual beach value calculated above.

[8] Circa 2001.

[9] Garrod, Guy, and Willis, Kenneth G. (1999). Edward Elgar, Northampton, MA, pp.70-73.

Including the Junior Lifeguard Program revenues yields an annual beach value of $2.336 million (in 2010 dollars).[10]

Beach Visitor Survey Findings

An analysis of the data obtained in the visitor surveys provided other interesting information about the Solana Beach visitor. Over one quarter (26%) said that their primary purpose for being at the beach was surfing (Table 3-9). This was closely followed by sunning/lying on the beach (24%) and walking/running on the beach (22%).

TABLE 3-9
PRIMARY PURPOSE FOR BEACH VISIT

Stated Primary Purpose	Percent
Surfing/Water sports	26%
Sunning/lying on beach	24%
Walk/run on beach	22%
People watching	9%
Swimming/play in water	7%
Collecting shells, beachcombing, etc.	5%
Fishing	3%
Special event	3%
Picnic	1%
Total	**100%**

Source: CIC Research, July 2009

Nearly a third of those interviewed were from Solana Beach. As indicated from Table 3-10, nearly a third were from outside of San Diego County (23% other U.S. and 6% foreign).

TABLE 3-10
LOCATION OF RESIDENCE

Residence	Percent
Solana Beach	30%
Other location in San Diego County	41%
Other U.S. location	23%
Foreign	6%
Total	**100%**

Source: CIC Research, July 2009

[10] At 67% of wages the Solana Beach recreational value increases to $3.4 million and at 100% of wages the Solana Beach recreational value increases to $5.2 million, excluding the Junior Lifeguard Program (2010 dollars).

The median age of respondents was 39 years old. As can be seen in Table 3-11, those over 65 made up 13 percent of the respondents which correspond to the 13 percent who stated they were retirees.

TABLE 3-11
AGE OF BEACH SURVEY RESPONDENTS

Age of Respondent	Percent
16-18	3%
18 - 24 years	14%
25 - 34 years	23%
35 - 44 years	23%
45 - 54 years	16%
55 - 64 years	8%
65 years or over	13%
	100%

Source: CIC Research, July 2009

Additional results of the beach visitor surveys are presented in Appendix 12 of this report.

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4. DRAFT PUBLIC RECREATION FEE RECOMMENDATION

RECREATIONAL VALUE

The purpose of the Public Recreation Fee is to compensate the public for the loss of recreational use of the beach due to the presence of a seawall. To determine the value per square foot of beach area for use in the Public Recreation Fee, the annual estimated recreational value of $2.336 million is applied to the beach area within Solana Beach based on the results described in Chapter 3 of this report.

BEACH AREA ZONES

The beach attendance, or count, survey was conducted along 35 north-to-south beach segments in order to assess whether there were substantial differences in attendance, and any heterogeneity in the value of the beach. Michael Baker initially considered consolidating these beach areas into 9 zones based on estimated beach density. According to the beach attendance data collected as part of this fee study, the highest density of people on the beach for the survey period is Fletcher Cove and the lowest is the area located just north of Fletcher Cove.

Michael Baker also considered an alternate approach whereby all of Solana Beach was considered a single zone and all property owners building seawalls would be subject to the same Public Recreation Fee. This approach eliminates the disparity between adjoining neighbors' obligations and recognizes that the beach, and consequently the beach population density, along the Solana Beach coast is likely dynamic, not static, on a daily, weekly, yearly or other time measurement basis. The dispersion of beach visitors is also dependent on beach access, width and quality of beach, parking availability, presence of public restrooms and other factors. These factors may change during the seawall permit period due to local, regional and federal beach nourishment projects being planned by the City thereby affecting future beach densities among other variables.

Beach walkers and other recreational users may also move north and south through the different areas of the beach within the City. For these reasons, Michael Baker recommended an aggregation of all of the beach areas into a single zone, averaging the attendance over the entire Solana Beach beach area. Such averaging is further justified when considering the interdependence of bluff retention devices. A seawall constructed by one property owner may assist in protecting its neighbor's property as well, if the neighbor's property has been protected by a bluff protection device already. In recognition of these dynamic and interdependent processes, it is recommended that a single Citywide Public Recreation Fee be established in Solana Beach. Such an approach then averages all of the data to calculate a single per square foot value for the Public Recreation Fee, adjusted and assessed annually.

The initial 36 photo points (creating 35 segments) are shown in Figures 4-1 through 4-5. These points were initially chosen based in part on a subjective estimation of similar access, beach width, sand, wall location, as well as being locations that were easily identifiable to the survey

team. A greater or lesser number of points could have been chosen but these were the starting point for this analysis. See Chapter 3 for the attendance data associated with the 35 beach segments.

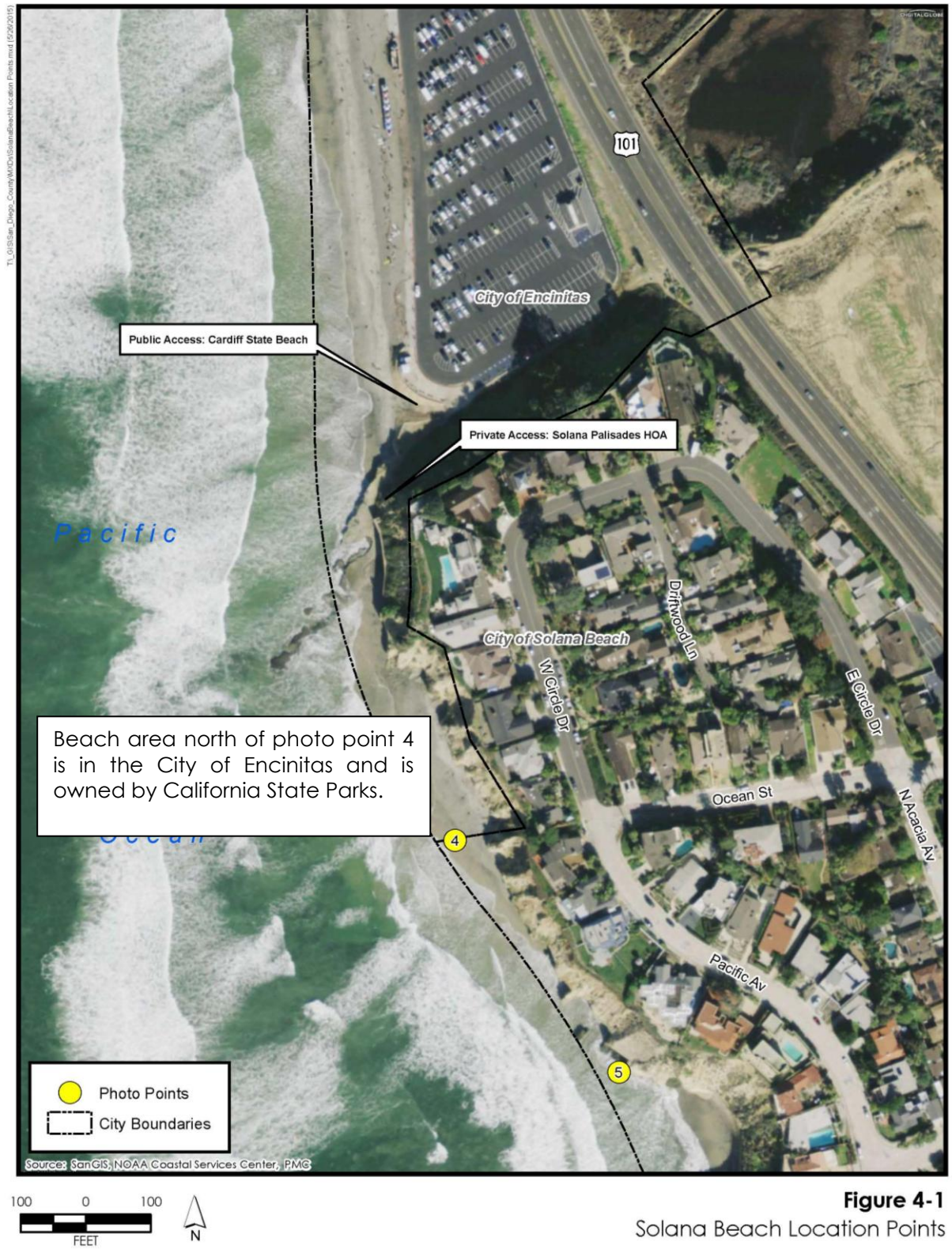

Figure 4-1
Solana Beach Location Points

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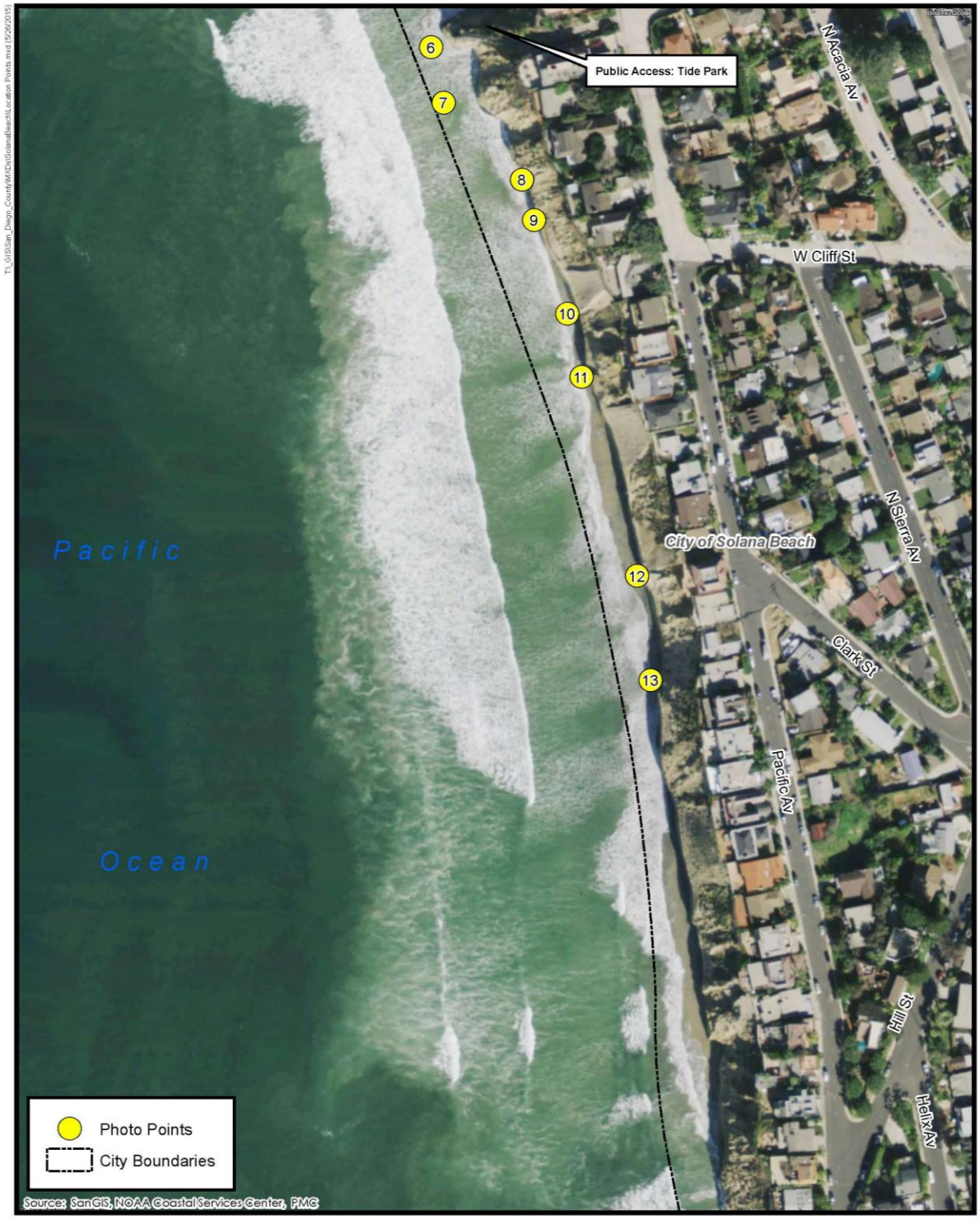

Figure 4-2
Solana Beach Location Points

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Figure 4-3
Solana Beach Location Points

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Figure 4-4
Solana Beach Location Points

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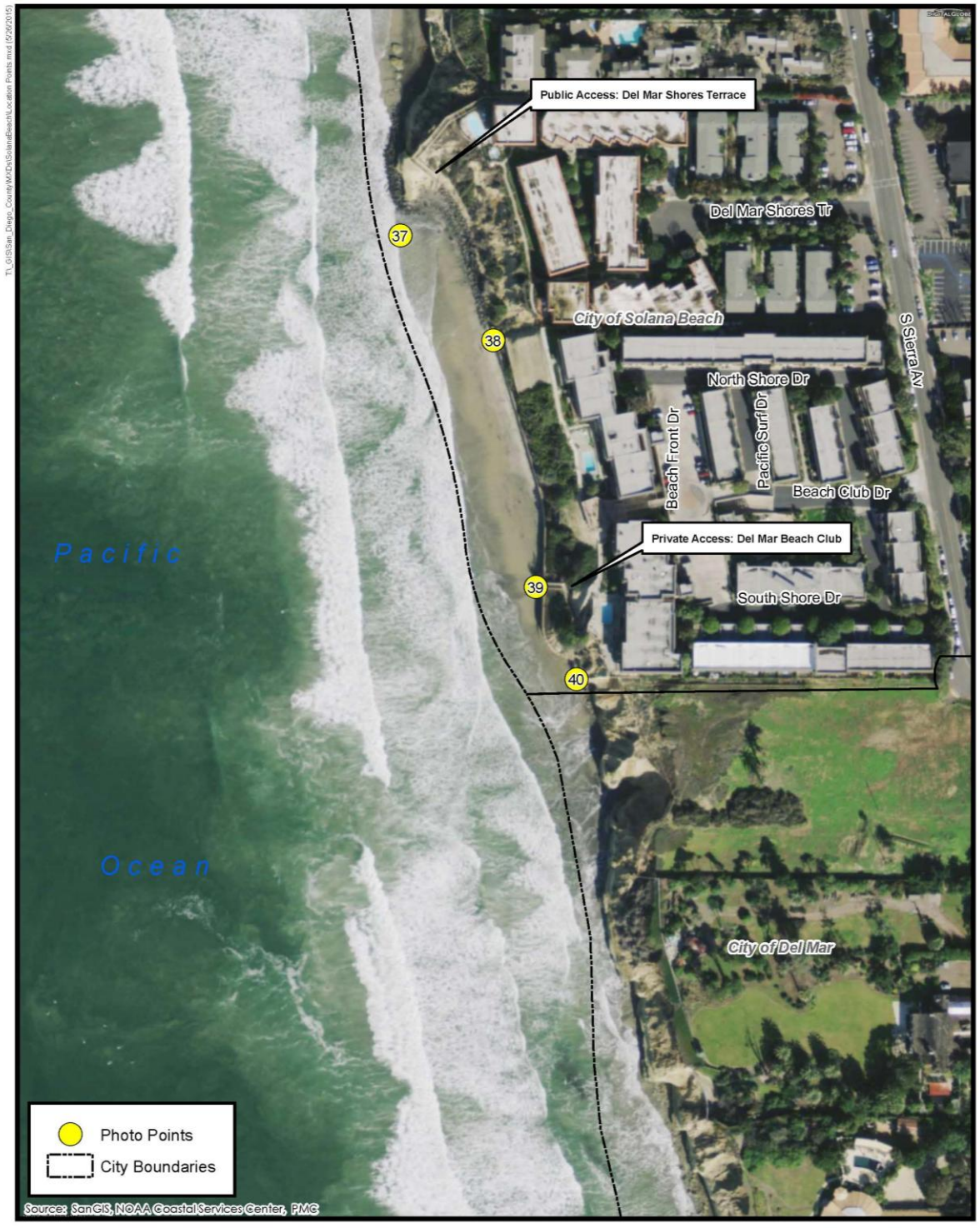

Figure 4-5
Solana Beach Location Points

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PUBLIC BEACH AREA ESTIMATES

A critical factor in determining the recreational value per square foot of beach is the area of public beach available. The width of the beach changes throughout the day and year depending on tides, beach nourishment, weather and volume and movement of sand. Over the long-term, if sea level rises, this would also affect the beach area available to the public. Conversely, long-term beach nourishment as proposed by the City would increase the average area of the public beach.

Several methods were considered to determine beach availability, such as aerial mapping, direct measurement and evaluating beach topography and tide elevation data. Coastal Frontiers Corporation, Inc. (CFC) under contract with SANDAG and other coastal cities has been monitoring the regional shoreline (including Solana Beach shoreline) since 1999 prior to the first SANDAG Regional Beach Sand Project in 2001).

Table 4-1 shows the variation of beach widths within Solana Beach in Fall (October) and Spring (May), measured to mean sea level, over a 13-year period and reflects the impact of two replenishment projects in 2001 and 2012. (See Appendix 13 for the CFC report for details of the measurements.) Data prior to Spring 2002 is not used as transect locations were modified by SANDAG after Regional Beach Sand Project 2001 which have been consistent since that time.

TABLE 4-1
FALL AND SPRING BEACH AREAS ABOVE MEAN SEA LEVEL

Survey Timing	Beach Area Above MSL (acres)
Spring 2002	10.3
Fall 2002	18.6
Spring 2003	7.6
Fall 2003	16.6
Spring 2004	11.7
Fall 2004	16.1
Spring 2005	13.1
Fall 2005	14.0
Spring 2006	12.4
Fall 2006	19.6
Spring 2007	9.3
Fall 2007	13.6
Spring 2008	12.6
Fall 2008	17.9
Spring 2009	10.3
Fall 2009	19.6
Spring 2010	10.7
Fall 2010	19.0
Spring 2011	14.3

Survey Timing	Beach Area Above MSL (acres)
Fall 2011	18.0
Spring 2012	12.2
Fall 2012	19.5
Spring 2013	20.9
Fall 2013	24.1
Spring 2014	19.0
Fall 2014	21.3
Minimum	*7.6 (Spring 2003)*
Maximum	*24.1 (Fall 2013)*
Average	*15.5*

The beach area shown in Table 4-1 is reflective of the entire Solana Beach coast within city limits and are based on multiple transects located within the City as part of the Regional Shoreline Monitoring Program managed by SANDAG.

The average beach area is 15.5 acres as measured in 26 seasonal shoreline profile analyses since 2002.[11] Using the estimated annual recreational value of the beach within city limits of $2.336 million (2010) and dividing that figure by 15.5 acres yields a square foot value of $3.46 per square foot (1 acre equals 43,560 square feet).

FUTURE POTENTIAL CHANGES IN MEAN SEA LEVEL

In order to apply a recreational value to the public beach area lost due to the installation of shoreline protective devices, the loss in beach area must be estimated. To get at this figure, the average annual erosion rate affecting the Solana Beach shoreline and bluffs must be estimated using the best estimate for sea level rise during the life of the seawall. The City of Solana Beach retained Everest International Consultants, Inc. (EIC) to recommend the likely mean sea level rise rates and corresponding erosion rates for use in this Public Recreation Fee study.

The EIC Technical Memorandum dated April 2015 (See Appendix 7 of this report)) considers various sea level rise scenario predictions. The EIC Technical Memorandum looks at the range of mean sea level projections and recommends using the mid-range of values. The erosion rate is then estimated based on an approximate linear rate of erosion of 0.7 feet per year. However, the certified LCP LUP references a rate of 0.4 ft per year for the first ten years as an average bluff erosion rate based on work by Group Delta (1988) for the LCP LUP. Preparation of the LCP LUP was developed with significant coordination and input of CCC staff. In all, the City's LUP went through eight iterations with CCC staff with reference to 0.4 feet per year being the average bluff erosion rate for the near term (first ten years) which has remained consistent throughout the planning process. Therefore, consistent with the certified Solana Beach LCP LUP, this report recommends using 0.4 feet per year for the first ten years. The EIC Technical Memorandum

[11] The beach area estimates will be updated to include 2015 data, assuming data becomes available in December 2015.

indicates that the erosion rate based on most recent data would be 0.673[12] feet per year and if using 0.4 feet per year for the first ten years, then to apply a higher erosion rate for the subsequent years of 0.8 feet per year. However, doing so would intentionally overcharge a later fee payer which is not permitted in a fee program; the fee must be proportional. Therefore Michael Baker recommends applying the actual estimated rate of 0.673 feet per year from 2026 through 2046 consistent with the findings of the EIC Technical Memorandum. Prior to a permit extending beyond 2046, the City should consider any additional data that may have affected erosion rates and any impact it may have on the Public Recreation Fee program.

ESTIMATED LOSS IN PUBLIC BEACH AREA

While erosion of the bluff may be an on-going occurrence, typically bluff failures tend to occur episodically. This is estimated to occur when the depth of the cliff undercutting reaches 8.2 feet. The failure analysis for this is provided in Chapter 5 of this report. For the initial beach area loss, it is assumed that failure is imminent, consistent with the timing for seawall permit application which typically occurs once a principal bluff top structure is in imminent danger of erosion and has an associated geologic factor of safety approaching 1.0.

As installation of a seawall is intended to prevent bluff failure from occurring, the direct impact of the seawall on the public beach is the loss of physical beach area for public recreation equal to the notch depth plus the seawall thickness, assuming imminent bluff failure, multiplied by the length of the seawall. The notch depth at imminent failure is estimated to be 8.2 feet (see Appendix 18 for calculation), the thickness of the seawall is estimated to be 2 feet (per the City's design guidelines for seawalls as contained in LUP Appendix B) and the length of the seawall equal to the bluff frontage of the property which is typically 50 feet. Therefore the initial loss of public beach area equals 10.2 feet multiplied by the length of the seawall. Refer to Figures 4-6A and 4-6B.

Had a sea wall not prevented ongoing erosion, each subsequent year, erosion may occur and a second bluff failure may result over time. The fee then has to take into account future erosion rates to determine when a subsequent bluff failure may occur. Using the average annual bluff erosion rates of 0.4 feet per year through 2025 and 0.673 feet per year through 2046, the estimated beach area that theoretically would not be available for public recreation due to the presence of the seawall designed to stop erosion is calculated for each year over a 20-year period, consistent with Policy 4.49 of the certified LCP LUP which states that mitigation for the impacts to the shoreline and sand supply, public access and recreation shall be assessed in 20-year increments, starting with the building permit completion certification date.

The estimated beach area also will depend on the year in which the seawall is completed, noted as "Permit Year" in this report and as building permit completion certification in the certified LCP LUP.

[12] EIC provided the erosion rate to PMC to 3 significant digits while its technical memorandum rounded to 0.7 feet per year.

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FIGURE 4-6A
TYPICAL BLUFF CROSS-SECTION (USACE)

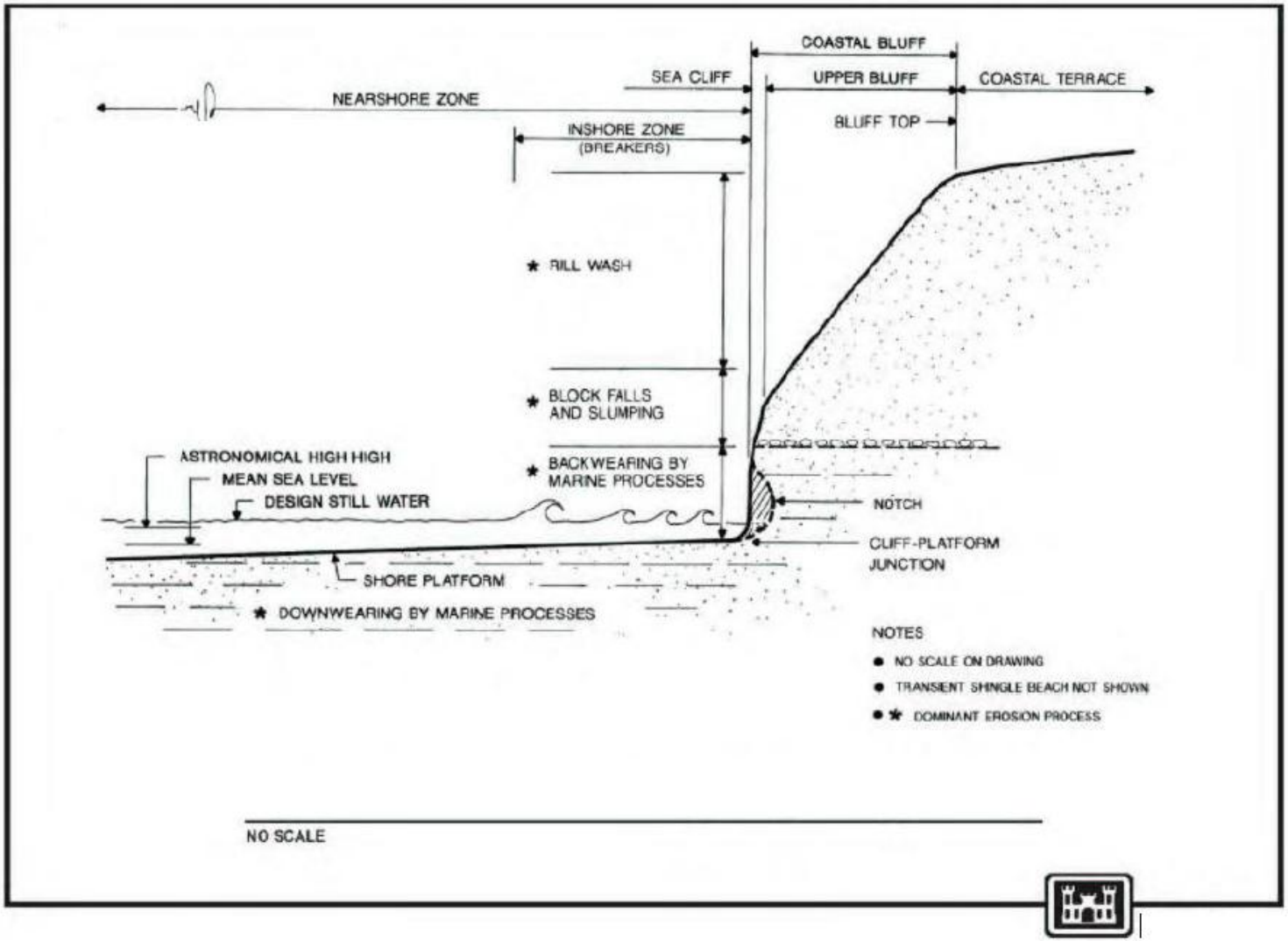

FIGURE 4-6B
INITIAL BEACH AREA NO LONGER AVAILABLE FOR RECREATION ASSUMING IMMINENT BLOCK FAILURE

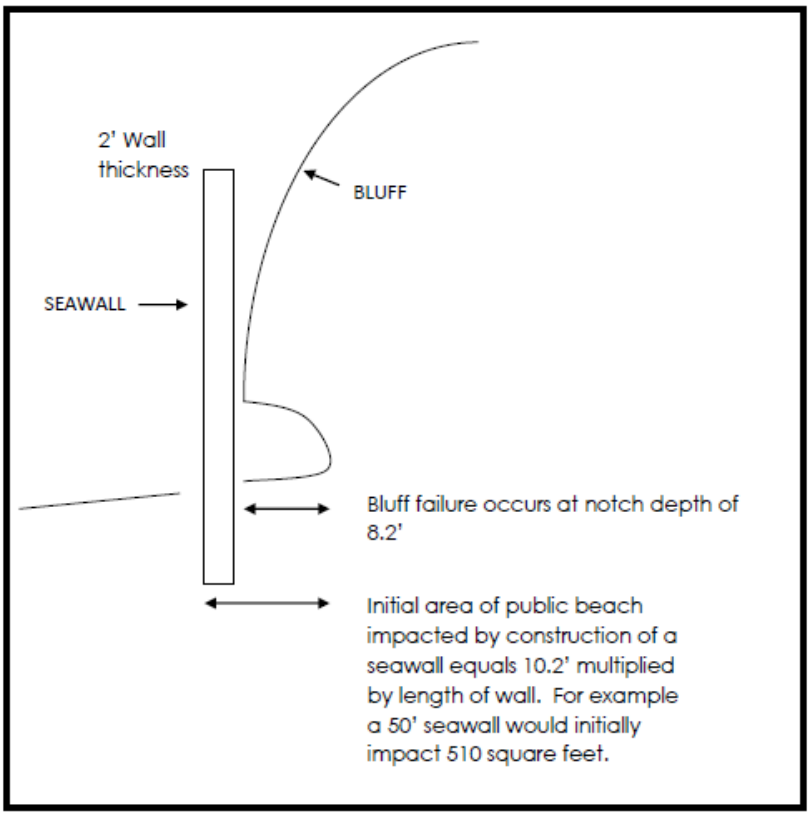

Table 4-2 identifies the Permit Year and the theoretical public beach loss area for the 20-year period. Additional mitigation fees will be assessed in 20-year increments as required by the certified LCP LUP. The table extends through Permit Year 2026 assuming that an update to this report will occur before then.

TABLE 4-2
LOSS OF PUBLIC BEACH RECREATION AREA FOR EACH YEAR OF A 20-YEAR PERIOD BASED ON PERMIT YEAR

Theoretical or Potential Cumulative Loss of Public Beach Recreation Area (square footage) By Year (per linear foot of wall)	Permit Year											
	2015	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26
2015	10.2											
2016	10.2	10.2										
2017	10.2	10.2	10.2									
2018	10.2	10.2	10.2	10.2								
2019	10.2	10.2	10.2	10.2	10.2							

Theoretical or Potential Cumulative Loss of Public Beach Recreation Area (square footage) By Year (per linear foot of wall)	Permit Year											
	2015	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26
2020	10.2	10.2	10.2	10.2	10.2	10.2						
2021	10.2	10.2	10.2	10.2	10.2	10.2	10.2					
2022	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2				
2023	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2			
2024	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2		
2025	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	
2026	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
2027	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
2028	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
2029	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
2030	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
2031	18.4	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
2032	18.4	18.4	18.4	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
2033	18.4	18.4	18.4	18.4	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
2034	18.4	18.4	18.4	18.4	18.4	18.4	10.2	10.2	10.2	10.2	10.2	10.2
2035		18.4	18.4	18.4	18.4	18.4	18.4	18.4	10.2	10.2	10.2	10.2
2036			18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	10.2	10.2
2037				18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	10.2
2038					18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4
2039						18.4	18.4	18.4	18.4	18.4	18.4	18.4
2040							18.4	18.4	18.4	18.4	18.4	18.4
2041								18.4	18.4	18.4	18.4	18.4
2042									18.4	18.4	18.4	18.4
2043										18.4	18.4	18.4
2044											18.4	18.4
2045												18.4

For a seawall whose construction was completed in 2015, the table reflects that an initial bluff failure would have theoretically occurred and a second bluff failure would theoretically occur in 2031, thereby increasing the public recreation area from 10.2 square feet (per linear foot of wall) to 18.4 square feet. For a 50-foot wide seawall then, the initial public beach area no longer available for public recreation would equal 510 square feet. The Public Recreation Fee would then be based on 510 square feet increasing to 920 square feet in 2031 for a seawall with Permit

Year 2015. Note that the area is not limited by the property line because had beach/bluff erosion been allowed to continue, the property line would have migrated easterly as well.

DRAFT PUBLIC RECREATION FEE CALCULATION

The public recreation value per square foot (SF) in 2010 dollars was determined to be $3.46. This figure does not take into account population growth or wage and travel cost increases. Data from SANDAG indicates that the regional population growth estimate is 0.8047% annually.[13] Based on data from California Department of Finance, the annual Consumer Price Index (CPI) is 2.08%.[14] The 2010 value of $3.46 is then increased by these factors resulting in a 2015 value of $3.99 per SF. This report assumes population growth and CPI rates of 0.8047% and 2.08%, respectively through the year 2045. Table 4-3 reflects the public recreation values by year.

TABLE 4-3
PUBLIC BEACH RECREATION VALUE IN SOLANA BEACH BY YEAR

Year	Value of the Public Beach (SF)
2015	$3.99
2016	$4.11
2017	$4.23
2018	$4.35
2019	$4.48
2020	$4.61
2021	$4.74
2022	$4.88
2023	$5.02
2024	$5.16
2025	$5.31
2026	$5.46
2027	$5.62
2028	$5.78
2029	$5.95
2030	$6.12
2031	$6.30
2032	$6.48
2033	$6.67
2034	$6.86

[13] Population growth estimated from the SANDAG 2050 Regional Growth Forecast (SANDAG 2050 RGF) with a population of 4,384,867 persons in 2050 and 3,131,552 persons in 2008 where $3{,}131{,}552 \times (1+r)^{42} = 4{,}384{,}867$; solving for r = 0.008047.

[14] CPI based on CPI for US and California, All Urban Consumers Series for California.

Year	Value of the Public Beach (SF)
2035	$7.06
2036	$7.26
2037	$7.47
2038	$7.69
2039	$7.91
2040	$8.14
2041	$8.37
2042	$8.61
2043	$8.86
2044	$9.12
2045	$9.38

The values in Table 4-3 are then applied to the public beach areas shown in Table 4-2. Table 4-4 reflects the recommended public recreation value for each year over a 20-year period.

TABLE 4-4
ESTIMATED VALUE OF PUBLIC BEACH RECREATION LOSS DUE TO SEAWALLS BY YEAR (PER LINEAR FOOT OF WALL)

	Permit Year											
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
2015	$ 40.70											
2016	$ 41.92	$ 41.92										
2017	$ 43.15	$ 43.15	$ 43.15									
2018	$ 44.37	$ 44.37	$ 44.37	$ 44.37								
2019	$ 45.70	$ 45.70	$ 45.70	$ 45.70	$ 45.70							
2020	$ 47.02	$ 47.02	$ 47.02	$ 47.02	$ 47.02	$ 47.02						
2021	$ 48.35	$ 48.35	$ 48.35	$ 48.35	$ 48.35	$ 48.35	$ 48.35					
2022	$ 49.78	$ 49.78	$ 49.78	$ 49.78	$ 49.78	$ 49.78	$ 49.78	$ 49.78				
2023	$ 51.20	$ 51.20	$ 51.20	$ 51.20	$ 51.20	$ 51.20	$ 51.20	$ 51.20	$ 51.20			
2024	$ 52.63	$ 52.63	$ 52.63	$ 52.63	$ 52.63	$ 52.63	$ 52.63	$ 52.63	$ 52.63	$ 52.63		
2025	$ 54.16	$ 54.16	$ 54.16	$ 54.16	$ 54.16	$ 54.16	$ 54.16	$ 54.16	$ 54.16	$ 54.16	$ 54.16	
2026	$ 55.69	$ 55.69	$ 55.69	$ 55.69	$ 55.69	$ 55.69	$ 55.69	$ 55.69	$ 55.69	$ 55.69	$ 55.69	$ 55.69
2027	$ 57.32	$ 57.32	$ 57.32	$ 57.32	$ 57.32	$ 57.32	$ 57.32	$ 57.32	$ 57.32	$ 57.32	$ 57.32	$ 57.32
2028	$ 58.96	$ 58.96	$ 58.96	$ 58.96	$ 58.96	$ 58.96	$ 58.96	$ 58.96	$ 58.96	$ 58.96	$ 58.96	$ 58.96
2029	$ 60.69	$ 60.69	$ 60.69	$ 60.69	$ 60.69	$ 60.69	$ 60.69	$ 60.69	$ 60.69	$ 60.69	$ 60.69	$ 60.69
2030	$ 62.42	$ 62.42	$ 62.42	$ 62.42	$ 62.42	$ 62.42	$ 62.42	$ 62.42	$ 62.42	$ 62.42	$ 62.42	$ 62.42
2031	$ 115.92	$ 64.26	$ 64.26	$ 64.26	$ 64.26	$ 64.26	$ 64.26	$ 64.26	$ 64.26	$ 64.26	$ 64.26	$ 64.26
2032	$ 119.23	$ 119.23	$ 119.23	$ 66.10	$ 66.10	$ 66.10	$ 66.10	$ 66.10	$ 66.10	$ 66.10	$ 66.10	$ 66.10
2033	$ 122.73	$ 122.73	$ 122.73	$ 122.73	$ 68.03	$ 68.03	$ 68.03	$ 68.03	$ 68.03	$ 68.03	$ 68.03	$ 68.03
2034	$ 126.22	$ 126.22	$ 126.22	$ 126.22	$ 126.22	$ 126.22	$ 69.97	$ 69.97	$ 69.97	$ 69.97	$ 69.97	$ 69.97
2035		$ 129.90	$ 129.90	$ 129.90	$ 129.90	$ 129.90	$ 129.90	$ 129.90	$ 72.01	$ 72.01	$ 72.01	$ 72.01
2036			$ 133.58	$ 133.58	$ 133.58	$ 133.58	$ 133.58	$ 133.58	$ 133.58	$ 133.58	$ 74.05	$ 74.05
2037				$ 137.45	$ 137.45	$ 137.45	$ 137.45	$ 137.45	$ 137.45	$ 137.45	$ 137.45	$ 76.19
2038					$ 141.50	$ 141.50	$ 141.50	$ 141.50	$ 141.50	$ 141.50	$ 141.50	$ 141.50
2039						$ 145.54	$ 145.54	$ 145.54	$ 145.54	$ 145.54	$ 145.54	$ 145.54
2040							$ 149.78	$ 149.78	$ 149.78	$ 149.78	$ 149.78	$ 149.78
2041								$ 154.01	$ 154.01	$ 154.01	$ 154.01	$ 154.01
2042									$ 158.42	$ 158.42	$ 158.42	$ 158.42
2043										$ 163.02	$ 163.02	$ 163.02
2044											$ 167.81	$ 167.81
2045												$ 172.59

Michael Baker has calculated the payment of fees, at City staff direction, if paid in full initially, or amortized at 4% Annualized Percentage Rate at 10-year intervals or 5-year intervals, assuming payment at the beginning of those periods. City Council and the approving resolution shall be the controlling document regarding payment options and terms, if not paid in full prior to/during the Permit Year. To make this calculation, a discount rate of 4% is used, the City's current best investment rate. The discount rate is applied to the annual stream of payments, excluding the first year as it is already in the present value[15] (2015 dollars). Table 4-5 provides the three options depending on the Permit Year.

[15] Present valuing takes into account that a lesser amount may be paid today for a payment due in the future because of its investment opportunity. If a dollar is due one year from now, but is paid today, one year in advance, the payment need be only $0.96. That $0.96 invested at 4% annually for one year would yield $1.00 a year from today.

TABLE 4-5
PAYMENT SCHEDULE (PER LINEAR FOOT OF WALL)

Permit Year	Single Payment	Pay in 1st and 10th Year[16]		Pay in 1st, 5th 10th and 15th Year[17]			
2015	$ 846	$ 748	$ 748	$ 337	$ 337	$ 337	$ 337
2016	$ 870	$ 769	$ 769	$ 347	$ 347	$ 347	$ 347
2017	$ 925	$ 817	$ 817	$ 369	$ 369	$ 369	$ 369
2018	$ 952	$ 841	$ 841	$ 379	$ 379	$ 379	$ 379
2019	$ 979	$ 865	$ 865	$ 390	$ 390	$ 390	$ 390
2020	$ 1,040	$ 919	$ 919	$ 415	$ 415	$ 415	$ 415
2021	$ 1,070	$ 945	$ 945	$ 427	$ 427	$ 427	$ 427
2022	$ 1,135	$ 1,003	$ 1,003	$ 453	$ 453	$ 453	$ 453
2023	$ 1,168	$ 1,032	$ 1,032	$ 466	$ 466	$ 466	$ 466
2024	$ 1,239	$ 1,095	$ 1,095	$ 494	$ 494	$ 494	$ 494
2025	$ 1,275	$ 1,126	$ 1,126	$ 508	$ 508	$ 508	$ 508
2026	$ 1,311	$ 1,159	$ 1,159	$ 523	$ 523	$ 523	$ 523

Note that the table reflects the payment amount per linear foot of wall. As an example, a 50 foot wall permitted in 2015, under the single payment option, would require payment of a Public Recreation Fee of 50 multiplied by $846 or $42,288. For installment payments due in 2015 and 2025, the Public Recreation Fee for a 50 foot wall would be $37,400 and $37,400. For installment payments due in 2015, 2020, 2025 and 2030, the Public Recreation Fee for a 50 foot wall would be $16,850, $16,850, $16,850 and $16,850, respectively. The above table applies a discount rate of 4% for the pre-payment of the fee.

The following chapter (Chapter 5) discusses the potential for an offset credit to the Public Recreation Fee and Sand Mitigation Fee based on potential public benefits that may be derived from seawall construction. The following section discusses potential credit to future mitigation fees should actual sea level rise vary from the report assumptions.

CREDITS TO FUTURE MITIGATION FEE PAYMENTS

There is some uncertainty in predicting sea level rise and thus the corresponding future bluff erosion rates. In addition, the City is actively pursuing a long-term (50-year) coastal storm damage reduction project in conjunction with the City of Encinitas and the USACE that would enhance sand volumes on the beach.

According to LCP LUP Policy 4.51, sea level rise predictions and bluff erosion rates should be revisited in ten year intervals. Changes in the rate of sea level rise would impact the mitigation fees. To ensure that each owner subject to a mitigation fee pays only its proportional amount, it

[16] Assumes 4% APR or 21.67% at 5 year intervals..

[17] Assumes 4% APR or 48.02% at 10 year intervals.

is recommended that the Public Recreation Fee program include a process to account for subsequent sea level changes. If sea level rise is less than predicted in this report, an overpayment of mitigation fees would have been made for the first 20-year period. To account for this potential overpayment, a credit to subsequent mitigation fees could be applied. If sea level rise is greater than predicted in this report, an underpayment of mitigation fees would have been made for the first 20-year period. To account for this potential underpayment, the difference could be required with payment of any subsequent 20-year-interval mitigation fee. A simplified example is shown below.

Based on an average annualized bluff erosion rate in the City which is estimated at 0.4 feet per year per the certified LCP LUP (and increasing in 2026 to 0.673 feet per year as recommended in this report), the payment of mitigation fees for a seawall permit issued in Permit Year 2015 would be $846 per linear foot of wall. Twenty years later (2036), the mitigation fee for the next 20-year period is to be assessed. However, based on observed data, the erosion rate remained constant at 0.4 feet per year or is reduced due to the implementation of the City's 50-year Coastal Storm Damage Reduction Project.

Had that information been known in Permit Year 2015, the amount due as mitigation fees in 2015 would have equaled 14% less or $728 per linear foot of wall. The difference of $118 per linear foot of wall then shall be applied as a credit to the mitigation fees due for the second 20-year interval (2036 through 2056). This element would only be implemented as a credit (or additional payment) to subsequent fees. Implementing language would be included in subsequent report updates and approving resolutions as this report covers only a ten-year timeframe. Table 4-6 provides a summary by Permit Year of the percent of fee due to sea level rise and the resulting 0.673 foot per year erosion rate.

TABLE 4-6
PERCENT OF EROSION DUE TO INCREASE OF SEA LEVEL RISE
INCREASING EROSION RATE ESTIMATES FROM 0.4'/ YEAR TO 0.673'/YEAR

Permit Year	Percent due to sea level rise & corresponding increase in bluff erosion rate
2015	14%
2016	14%
2017	17%
2018	17%
2019	17%
2020	19%
2021	19%
2022	22%
2023	22%
2024	24%
2025	24%
2026	24%

In other words, in Permit Year 2015, if the fee is $846, 14% of that or $118 would be due to erosion exceeding 0.4 feet per year.

USE OF CITY COLLECTED FEES

According to Policy 4.50 in the City's certified LCP LUP, a Sand Mitigation Fee shall be collected by the City which shall be used for beach sand replenishment and/or retention purposes. The mitigation fee shall be deposited in an interest-bearing account designated by the City Manager of Solana Beach in lieu of providing sand to replace the sand that would be lost due to the impacts of any proposed protective structure. The methodology used to determine the appropriate mitigation fee has been approved by the CCC and is contained in LUP Appendix A. The funds shall solely be used to implement projects which provide sand to the City's beaches, not to fund other public operations, maintenance, or planning studies.

Sand Mitigation Fees must be expended for sand replenishment and potentially for retention projects as a first priority and may be expended for public access and public recreation improvements as secondary priorities where an analysis done by the City determines that there are no near-term, priority sand replenishment Capital Improvement Projects (CIP) identified by the City where the money could be allocated. The Sand Mitigation funds shall be released for secondary priorities only upon written approval of an appropriate project by the City Council and the Executive Director of the Coastal Commission.

Public Recreation Fee – Similar to the methodology established by the CCC for the sand mitigation fee, the City and the CCC are jointly developing a methodology for calculating a statewide public recreation fee. To assist in the effort, the City has shared the results of their draft study with the CCC to support their development of a uniform statewide Public Recreation Fee. Until such time as an approved methodology for determining this fee has been established, and the methodology and payment program has been incorporated into the LCP through an LCP amendment, the City will collect a $1,000 per linear foot interim fee deposit. In the interim period, CCC will evaluate each project on a site-specific basis to determine impacts to public access and recreation, and additional mitigation may be required. The City shall complete its public recreation fee study within 18 months of effective certification of the LUP.

Project applicants have the option of proposing a public recreation/access project in lieu of payment of Public Recreation Fees (or interim deposits) to the City. At the City's discretion, these projects may be accepted if it can be demonstrated that they would provide a directly-related recreation and/or access benefit to the general public.

Public Recreation Fees must be expended for public access and public recreation improvements as a first priority and for sand replenishment and retention as secondary priorities where an analysis done by the City determines that there are no near-term, priority public recreation or public access CIP identified by the City where the money could be allocated. The Public Recreation funds shall be released for secondary priorities only upon written approval of an appropriate project by the City Council and the Executive Director of the Coastal Commission.

FEES COLLECTED BY OTHER AGENCIES

The LCP LUP (Policy 4.50) states that the Solana Beach mitigation fees shall not be duplicative of other agency fees, specifically, the Sand Mitigation Fee collected by CCC and the lease payments collected by the California State Lands Commission (CSLC). A technical analysis providing details of the mitigation fees is included in the Appendix 14. The analysis shows that

the Public Recreation Fee is not duplicative of the City's Sand Mitigation Fee because the City's Sand Mitigation Fee does not include a "loss of recreation component." However, the Public Recreation Fee would be duplicative of the CCC Sand Mitigation Fee, which does include a loss of recreation component. Therefore, the City as the first permitting entity shall assess and collect the Sand Mitigation Fee per the LCP LUP.

In addition, the California State Lands Commission (CSLC) requires lease payments for the use of public land. The CLSC staff has stated that what the CSLC collects for seawall encroachments on state sovereign land in the Solana Beach area (among others) is annual rent for the use of the state's property. Rents of this type are based on the square footage of the encroachment, and go directly into the state's General Fund. The setting and payment of rent is accomplished through the CSLC's surface leasing process, which allows the CLSC broad discretion in the methods used and the amount of rent that is charged. In the Solana Beach area (as well as other areas throughout the state), the CSLC uses a "benchmark" value, specific to leases in the Solana Beach area, because of the numbers of leases maintained there. This approach saves the CSLC from the need to conduct a new appraisal every time a new lease is authorized, or when rent is revised for existing leases. The benchmark value is based on an appraisal of the upland property (land value only, no improvements included), and so provides a means for rent to reflect market value.

While these seem very similar in nature to the Public Recreation Fee, the CSLC lease is a rent for use of the land; the Public Recreation Fee is a mitigation fee for the loss of public recreation. The CSLC staff has indicated that they do not believe the fees imposed by the City for Sand Mitigation per the certified LCP LUP and Public Recreation would be redundant or duplicative.

RELATED STUDIES AND CCC CASE STUDIES

Numerous studies have been performed over the years in/or near Solana Beach addressing the economic benefits of the beach as well as the recreational value of the beach in connection with the permitting of seawalls. A summary of these related studies is presented in Appendix 15 for informational purposes.

CCC Coastal Development Permit (CDP) Case Studies

Several CDP cases were also reviewed as part of this fee study. The full analysis is included in Appendix 16 and is summarized here.

When issuing a CDP, the CCC considers on-site mitigation as a first choice, off-site mitigation as its second choice and then in-lieu mitigation fees. For the sand component of the mitigation fee it is typically based on the volume of sand that will not reach the public beach/ littoral cell due to the seawall which is then multiplied by a unit cost of sand. To mitigate for the loss of beach area due to encroachment and fixing the back beach location, the CCC has recently used four strategies to determine the amount of in lieu fees as described below.

Sand Volume Approach – CCC identifies the impacts of seawalls as loss of beach area due to encroachment on the public beach and fixing the back beach location preventing long term erosion. The beach area loss is then converted to an equivalent volume of sand, based on certain assumptions. The volume is then multiplied by the unit cost of sand to determine an in-lieu fee amount. However, more recent CCC reports found that this approach underestimates the actual impacts and therefore now uses other methods to determine a better estimate for the loss of recreational value and public access due to loss of beach area.

Appraisal Approach – CCC identifies the impacts as encroachment on the public beach and fixing the back beach location preventing long term erosion. For the loss of beach area due to encroachment and fixing the back beach location, the CCC applies a unit cost of land, based on nearby coastal land values or an appraisal of the bluff top land value, to the area lost.[18]

Negotiated – CCC identifies the impacts as encroachment on the public beach and fixing the back beach location preventing long term erosion. The CCC may consider a payment and make comparison to other recent and relevant projects to determine the reasonableness of the proposed in lieu fee and/or compare it to an appraisal based approach.

Recreational Valuation – CCC again identifies the impacts as encroachment on the public beach and fixing the back beach location preventing long term erosion which creates a loss of beach area available for public recreation and public access. To determine the value of public recreation and public access, several tools and methods have been developed by economists to measure "non-market" environmental resources. These approaches include Contingent Valuation, Benefit Transfer, Random Utility, and Travel Cost, each with advantages and disadvantages. These methods can then be used to determine a recreational value per square foot or acre of beach.

The following table summarizes the mitigation for impacts to recreation and public access (not loss of sand to littoral cell) of the case studies described in the Appendix 16. The cost per square foot for loss of beach area due to encroachment and/or fixing the back beach location have been estimated by the CCC staff to be as low as $25 and as high as $181.

TABLE 4-7
SELECTED STATEWIDE CCC CDP RECREATION/PUBLIC ACCESS MITIGATION FEE OVERVIEW

Project Name	Location/ CDP #	Year filed	Mitigation Approach/Years	In Lieu Fee	Area loss (sf)	Cost per square foot (sf)
Ocean Harbor House	Monterey County 3-02-024	2005	In Lieu-Recreational 50 years	$5,300,000	43,500	$122
Las Brisas	Solana Beach 6-05-72	2005	In Lieu-Recreational 22 years	$248,681	1,372.8	$181
Sea Breeze	Santa Cruz County 3-08-019	2009	Project Based	~	0	~
Oceanus	San Diego 6-11-010	2010	In Lieu-Negotiated 20 years	$86,000[19]	780	$110
O'Neill	Santa Cruz County 3-09-042	2010	In Lieu-Sand Volume compared to Project Based 20 years	$93,000-$190,000	3,716	$25 - $50
Li	Encinitas 6-07-133	2010	In Lieu-Appraisal 20 years	$136,606	801	$170

[18] See Appendix 17 for a critique of the appraisal approach.

[19] Total in-lieu payment equaled $86,000 of which $5,000 was for sand loss to public beach and littoral cell.

Project Name	Location/ CDP #	Year filed	Mitigation Approach/Years	In Lieu Fee	Area loss (sf)	Cost per square foot (sf)
City of Pacifica	Pacifica 2-11-009	2011	In Lieu-Appraisal or Project Based 17 years	$263,581	7,944	$33
Lands End	Pacifica 2-11-039	2011	In Lieu-Appraisal and Project Based[20]	$1,600,000	37,895	$42
Lynch/Frick	Encinitas 6-88-464	2011	Project Based[21]	~	~	~
Caltrans	Ventura County 4-11-26	2012	Project Based	~	~	~
Lampl/Baskin	Encinitas 6-12-041	2012	In Lieu-Appraisal 20 years	$122,716	796.8	$154
Bannasch	Solana Beach 6-13-0948	2013	In Lieu-Interim Deposit 20 years	$31,000	241	$129

FUTURE FEE STUDY UPDATE CONSIDERATIONS

It is anticipated that this fee study will be reviewed for necessary updates at approximately every 10 years or earlier if necessary by changed conditions or changes in any of the key assumptions on which this fee study is predicated. Any update to the program should take into consideration refinements to the survey process. These may include:

1. Beach attendance counts and visitor surveys should consider that there are two daily peaks in attendance, one for surfers and one for non-surfers.

2. Visitor surveys should be developed and conducted to reduce bias to the maximum extent practicable. Improvement to the survey protocols may include larger sample size and sampling the surfer population.

3. The City may want to consider performing on-going beach attendance counts.

[20] The project based improvements were valued at $1.2 million which offset the in lieu fee.

[21] The project made an additional 425 square feet of beach available to the public because the seawall was located landward of the existing bluff.

5. ANALYSIS OF POTENTIAL PUBLIC BENEFIT OFFSET CREDITS

OVERVIEW

As part of the fee determination process, draft versions of the LCP LUP contemplated an offset to those fees for any proven quantified monetary public benefit flowing from a Coastal Structure, Sea Cave or Notch Infill (collectively referred to as a bluff retention device (BRD)) that exceeds the quantified monetary private benefit.

This chapter analyzes the potential for offset credits to the Public Recreation Fee and Sand Mitigation Fee. It should be noted though, that the chapter ultimately finds that the private benefit exceeds any potential public benefit and therefore no offsets will be realized in most cases. The chapter identifies the potential offset credits for Council consideration based on:

- Public Safety
- Protection of Public infrastructure/Access
- Property tax revenue increase

Based on a typical example provided in this chapter, where the Public Recreation Fee is assumed to be $42,300 (single payment for a 50 foot BRD permitted in 2015), the private benefit is estimated at $250,000 and the public benefit at $71,600 including increased property taxes and public safety benefits. Consequently, no offset would be applied to the payment of the Sand Mitigation and Public Recreation Fees. Also note that the example assumed a Public Recreation Fee payment of $846 per linear foot; it does not address the Sand Mitigation Fee. From 2007 through 2012, the City collected $1,000 per linear foot deposit toward both the Sand Mitigation Fee and the Public Recreation Fee. Since approval of the LCP LUP in 2013, the City collects a Sand Mitigation Fee based on the methodology contained in LUP Appendix A as well as $1,000 per linear foot fee deposit to be applied toward the Public Recreation Fee once established.

BASIS OF THE PUBLIC BENEFITS OFFSET CREDIT

While the certified LCP LUP no longer contains a policy regarding the potential for "offset credits," the intent of the collaborative process was to have the fee study consider offsets such that:

> The Sand Mitigation and Public Recreation Fees shall be offset over time by an amount determined by the City Council, after a public hearing to account for any proven quantified monetary public benefit flowing from the bluff retention device that exceeds the quantified monetary private benefit (e.g., the increase in the value of the bluff

> property). Any such credit … shall not exceed the dollar amount of the total of the Sand Mitigation and Public Recreation Fee paid by the Bluff Property Owner.

The public benefit offset credit is therefore associated with the private benefit realized from the construction of a bluff retention device (BRD) and is limited by two quantities:

- The amount which the public benefit exceeds the private benefit, and;
- The total of the Sand Mitigation and Public Recreation Fees.

The first limiting quantity derives from the presumption that while the public may benefit from the BRD, the bluff top property owner also benefits from the BRD which is placed on public property and enhances the stability of the bluff and therefore the value of the bluff top property. If these two benefits are equal there should be no offset, since the public and the property-owner are deriving the same utility from the BRD. However, if the public's benefit exceeds the private benefit then the property owner is seen as subsidizing the public (or, conversely, the public is benefiting at the property-owner's expense and as a result of their actions) in the amount of the difference. This subsidy is eliminated if the Sand Mitigation and Public Recreation Fees (mitigation fees) are offset by the amount of the difference.

From the above considerations, at least two potential outcomes arise:

- The real increase in property values attributable to the BRD will exceed any quantifiable public benefit and thus no offset would ensue.
- Public benefits will exceed any increase in real property values attributable to the BRD; therefore an offset in the amount of the difference should be applied, even to the extent that the net fee is zero.

FIGURE 5-1
POTENTIAL OFFSET CREDIT

Derivation of the Offset Credit

To establish the applicable offset credit requires that public benefits be quantified. The most direct way to quantify these benefits is to evaluate the costs that the public would have incurred over a period of time had the BRD not been in place. Therefore benefits may be assumed as stemming from the avoidance of costs absorbed by the public (either the general public or the City itself). The public costs correspond to the quantifiable public benefits created by constructing a BRD, which may include:

- Public safety;
- Protection of public property and infrastructure, including but not limited to public beach access stairways, parking lots, public roads etc;
- Increased taxable, assessed private property valuation.

The corresponding real costs from bluff erosion and eventual failure include: injury and loss of life, damage and/or destruction to city property and infrastructure (access stairways, roadways, utilities, city-owned buildings) potential loss of sales tax revenues from fewer visitors and private property losses leading to reduced assessed property valuations and taxes collected.

These costs are due to episodic geologic events: damage to public infrastructure and claims due to loss of life and limb that may occur from a single bluff failure episode or series of episodes over the course of time.

Episodic Cost Evaluation – Probabilistic Event Modeling

Evaluation of the expected episodic cost involves the likelihood that a bluff failure causing a specified loss occurs within a given period of time and the quantification of that loss. In any one year, the cost can be represented by the following formula, which is specific to a particular bluff location:

Expected cost in year (i) = Probability of a cost-incurring event in year (i) x Cost of Event

For some costs, damage to infrastructure or bluff-top homes for example, the probability will be zero throughout many of the earlier years[22] until progressive bluff retreat begins to threaten landward infrastructure and properties.

On the other hand, for any given location along the bluff face there is a non-zero probability of a bluff failure in any one year having the potential to cause injury or death. The probability of failure is a function of the bluff stability which is related to the bluff factor of safety and may be assigned a value (from zero to 1) based on the geologic characteristics of the particular section of bluff. The likelihood of a bluff failure causing injury or death is increased by the density of beach users. The loss due to injury or death may be formulated as follows:

Expected cost due to injury or death = P(SF) x M x D x C

[22] The fee assumes bluff failure is imminent when the notch depth reaches 8.2 feet.

Where:

P(SF) = Probability of bluff failure in a location as a function of a bluff stability conditions described by a site geologic assessment[23];

M = Mortality factor, is the rate at which bluff failure causes death or injury. It is determined by dividing total number of documented bluff failures that have occurred over a given period of time in a given section of beach by the number of fatalities or injuries as a direct result of bluff failures over that same period within the same section;

D = Beach occupancy density factor that shall be defined as the ratio of the average occupancy per unit length of beach at the particular location, as determined by the zonal beach survey data, to the average occupancy per unit length of the entire relevant study area;

C = Mortality cost factor is the cost of a single death. The Environmental Protection Agency's statistical value of $10.1 million is used as the cost factor.[24]

Average Fatality Loss over Encinitas-Solana Beaches 1990-2009

An average fatality loss analysis requires two sets of data:

- the number of bluff failures that have occurred during a specified period of time; and
- the number of fatalities that occurred as a result of the bluff failures.

No bluff-related fatalities have occurred along Solana Beach since documentation of bluff failures began. Therefore, in order to obtain failure-fatality data upon which to base an average fatality loss analysis it is necessary to extend the analysis beyond Solana Beach to include Encinitas where both failures and fatalities (one) have occurred. Over the 19 year period between 1990 and 2009 there were approximately 126 documented bluff failures along the Encinitas and Solana Beach coastlines, or about 6.6 failures per year[25] One of these failures resulted in a fatality for a mortality rate per documented failure of 1/126 = 0.008.[26]

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[23] The probability of failure at a given bluff location may be related to the probability that internal resisting forces or capacity is less than the load or driving force at that location. Resistance and load are variables which are dependant on a basic set of site-specific parameters that are fundamentally uncertain, such as presence of internal cracks, water and sand lenses *(Lu, Qin and Williams pg 2746)*.

[24] "Guidelines for Preparing Economic Analyses, *Appendix B: Mortality Valuation Estimates*", Environmental Protection Agency, December 2010. The recommended value is $7.4 million in 2006 dollars updated to current year using the GDP deflator inflation index, which increased 13.7% since 4th quarter 2006.

[25] USACE 2000d, cited in California Beach Restoration Study report, Jan. 2002 and Solana Beach bluff failure log 2002-2009. The City of Solana Beach maintains a bluff failure log that is current to April, 2015. However the City of Encinitas does not, so comprehensive data for Encinitas is limited to what the USACE has reported.

[26] Other bluff failures, resulting in fatalities, have occurred along the coast. See Appendix 18 for analysis.

The combined length of bluffs from Batiquitos Lagoon (South Carlsbad State Beach, at the southerly parking lot) to the southerly end of Solana Beach is approximately 17,300 feet[27]. From this data, a bluff failure rate for a segment of bluff corresponding to the width of a typical bluff property in Solana Beach, 50 feet, is approximately 0.019 failures per year (6.6/346 50-foot segments). This is the overall failure rate along the bluff face in any given year and does not consider the specific bluff conditions with respect to failure at any particular location. The product of the rate of bluff failure, the mortality rate and the statistical value of life equals the expected cost per year due to loss of life from bluff failures generally over the entire Encinitas-Solana Beach bluff frontage: 0.019 x 0.008 x $10,100,000 = $1,535 per year per 50 foot section of bluff, or $30.70 per foot per year (in 2015 dollars).

Potential Public Benefit Credit Offset to the Mitigation Fee

The calculation of potential offset to the mitigation fee requires an evaluation of the private as well as the public benefits attributable to the BRD. An example offset calculation is presented below that assumes the private benefit is equivalent to the construction cost of the BRD. We assume that whether a BRD is constructed or not, is an economic decision where the cost of the BRD is compared to the before and after differential of the value of the property that is to be protected. Presumably, one would not pay more to have a BRD constructed than the value such construction adds to the property. Consider the extreme case, where the before-BRD property value is zero (as in the case where, due to the geologic hazard, there would be no offers to purchase the property) and the after-BRD value is equal to the market value of similar, BRD-protected, bluff-top homes which is, for example, $3.5 million. The net property value increase/private benefit is $3.25 million (market value less the cost of a 50 foot BRD at $5,000 per foot)[28]. However, the extreme case neglects the latent value of the property that is inherent due to the possibility of remedying the geologic hazard by obtaining all necessary permit and approvals constructing a BRD. Therefore, the market would dictate that a minimum value exists for the market value of a bluff-top property before installation of a BRD that is equivalent to difference between full market value and the cost of a BRD that, if constructed, would restore the property to that full market value. A possible additional value-added increment that may also be considered is the current market differential between BRD-protected and non-BRD protected properties, if any such differential is found to exist among otherwise comparable properties.

In the following example, the public safety benefit calculated above is added to the present value of the potential increased property tax revenue stream (due to the increase in property value) over 20 years -- $40,900 -- and compared to the private benefit:

[27] Only beach frontage along sandstone bluffs that are geologically similar to those along Solana Beach were included in this total; measurements were taken from Google Earth and the California Coastal Records Project series of oblique photos.

[28] The U.S. Army Corps of Engineers uses a total sea-wall construction cost of $13,400 per lineal foot in *Encinitas-Solana Beach Coastal Storm Damage Reduction Project*, *Appendix E. A figure of $5,000 is conservatively used here for the analysis (as the lower boundary).*

Offset Calculation

Potential Public Safety Benefit = Expected Avoided Loss over 20 years (50 ft x $30.70 per ft. per yr. x 20) :	$30,700
Potential increased property tax revenue over 20 yrs (present valued)[b]:	$40,900
Total Public Benefit:	$71,600
Private Benefit (increased property value) attributable to BRD[a]:	$250,000
Potential Offset: Private Benefit of $250,000 > Public Benefit of $71,600	$0

[a] Valuation based on cost of BRD assuming 50 foot length, $5,000 per foot

[b] Total of property tax revenue (1% of the increase in assessed valuation) present value discounted at 2%)

In this example the private benefit exceeds the total public benefit by $178,400, thus there would be no offset to the mitigation fee. Note, also that the increased property value is assumed to occur following construction of the BRD. However, the trigger for assessing increased property value likely would not occur until after the sale of the property.

Expected Loss of Public improvements from Future One-time Episode

The probabilistic model described above is used to evaluate the public's stream of benefits stemming from the avoidance of one type of episodic cost from the cyclical failure events: avoidance of risk due to an on-going hazard to life and limb. The timing of single-episode events that occur at some point in the future which cause either total or partial damage to pubic or private improvements (the latter resulting in a loss to the public of property tax revenues), depend on: 1) distance of the public or private improvements from the top of the upper bluff slope that would be protected by the proposed BRD, and 2) the geologic characteristics affecting bluff stability and retreat (notch depth, thickness and integrity of the sandstone, presence of sand lens, slope angle, etc.). An initial assessment of the existing conditions would reveal the relative imminence of bluff failure and also the longer-term prognosis for bluff failures that would threaten improvements.

The first step in evaluating the potential loss due to damage to improvements is to assess the level of risk that public or private improvements are subject given the site configuration, distance of improvements from bluff, condition of bluff (notch or sea cave depth, steepness of upper bluff, presence of exposed sand lens, etc.). The expected loss — the probability-weighted cost of damage that would have occurred had the BRD not been in place — is calculated over the 20 year period and is dependent on location of the improvements relative to the bluff. Most public improvements may fall into one of two categories based on location and risk timeframe:

Near-term risk – Near term risk involves threats to improvements from bluff failures that may occur within a 1 to 4 year period--similar to the episodic evaluation in that failure is fairly imminent. Impending failure such as this would be indicated by a factor of safety approaching or less than 1. Improvements such as the public beach access stairways, and walkways; bluff top improvements such as public parking lots, structures, pedestrian viewpoints, railings, and drainage facilities are exposed to bluff failure risk in public areas such as Fletcher Cove and Tide Park and the three public access points south of Fletcher Cove. In Fletcher Cove, potential damage to the lifeguard station and the Community Center on Pacific Avenue that may occur within a few years if measures are not taken. These measures may include some type of BRD;

however a BRD that is constructed to protect adjacent private property would not necessarily benefit the Fletcher Cove improvements unless the BRD were extended specifically to benefit the public improvements. In fact, there exists no situation along the bluff face where the installation of a BRD for the primary purpose of protecting a private bluff-top property would also provide direct protection to any public improvement.

Long-term risk – Other improvements, such as Pacific Avenue and other public streets in the vicinity, are threatened only in the long term -- after several bluff failure cycles have occurred. An example is a section of Pacific Avenue north of Fletcher Cove. There is a section of the 300 block of Pacific Avenue that is about 65 feet from edge of pavement to top of slope and could potentially benefit from a BRD constructed for the sole purpose of protecting the adjacent bluff top principal structure. At the accelerated bluff retreat rate of 0.673 ft per year, this section of Pacific Avenue would not be threatened for approximately 96.6 years (65'/0.673' per yr.), well beyond the 20-year period. Adjacent private properties, however, could be threatened much sooner. Due to end erosion effects, even private properties protected by a BRD would be threatened if either adjacent property were not also protected. Depending on the position of the private improvements, the threat to adjacent property could become imminent within the next failure cycle.

Near-term Risk Evaluation

Near term impacts are those that would occur within the initial failure cycle, typically within one to four years depending on geologic parameters of the slope or bluff face. The only public asset that is potentially threatened in the near-term are the public improvements located in and adjacent to Fletcher Cove. However the protection measures for these public improvements would be the City's responsibility and intended to be of entirely public benefit.

Conclusion

The analysis in this chapter represents a conservative approach to the calculation of potential offset credits, conservative in that the lower boundary of private benefit is considered. In response to comments received in 2010, additional analysis has been completed and is included in Appendix 18. However, the outcome is the same. It is not likely that there will be any offset credits realized by property owners for constructing a seawall or BRD.

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