



GUIDANCE FOR INCORPORATING SEA LEVEL RISE
INTO CAPITAL PLANNING IN SAN FRANCISCO:
ASSESSING VULNERABILITY AND RISK TO SUPPORT ADAPTATION

Prepared by the City and County of San Francisco
Sea Level Rise Committee for the San Francisco Capital Planning Committee

Adopted by the Capital Planning Committee
September 22, 2014

onesanfrancisco.org

Sea Level Rise Technical Committee Recommendations for Revisions to the CPC Sea Level Rise Guidance

David Behar
Climate Program Director, SFPUC
Chair, Sea Level Rise Technical Committee

December 14, 2015



SLR Estimates in 2014 Guidance

Year	Projections	Ranges
2030	6 ± 2 in	2 to 12 in
2050	11 ± 4 in	5 to 24 in
2100	36 ± 10 in	17 to 66 in

Concern: Each year has 5 scenarios associated with it. Too many for analysis, and unnecessary. In practice all 5 were never used.



Eliminating: Standard Deviations on the Projections

Year	Projections	Ranges
2030	6 ± 2 in	2 to 12 in
2050	11 ± 4 in	5 to 24 in
2100	36 ± 10 in	17 to 66 in

Concern Addressed: Standard deviations are controversial and don't add much value to decision making.



Eliminating: Low End of Ranges

Year	Projections	Ranges
2030	6 ± 2 in	2 to 12 in
2050	11 ± 4 in	5 to 24 in
2100	36 ± 10 in	17 to 66 in

Concern Addressed: Low end of ranges rely on highly optimistic assumptions about GHG emissions and are not precautionary.



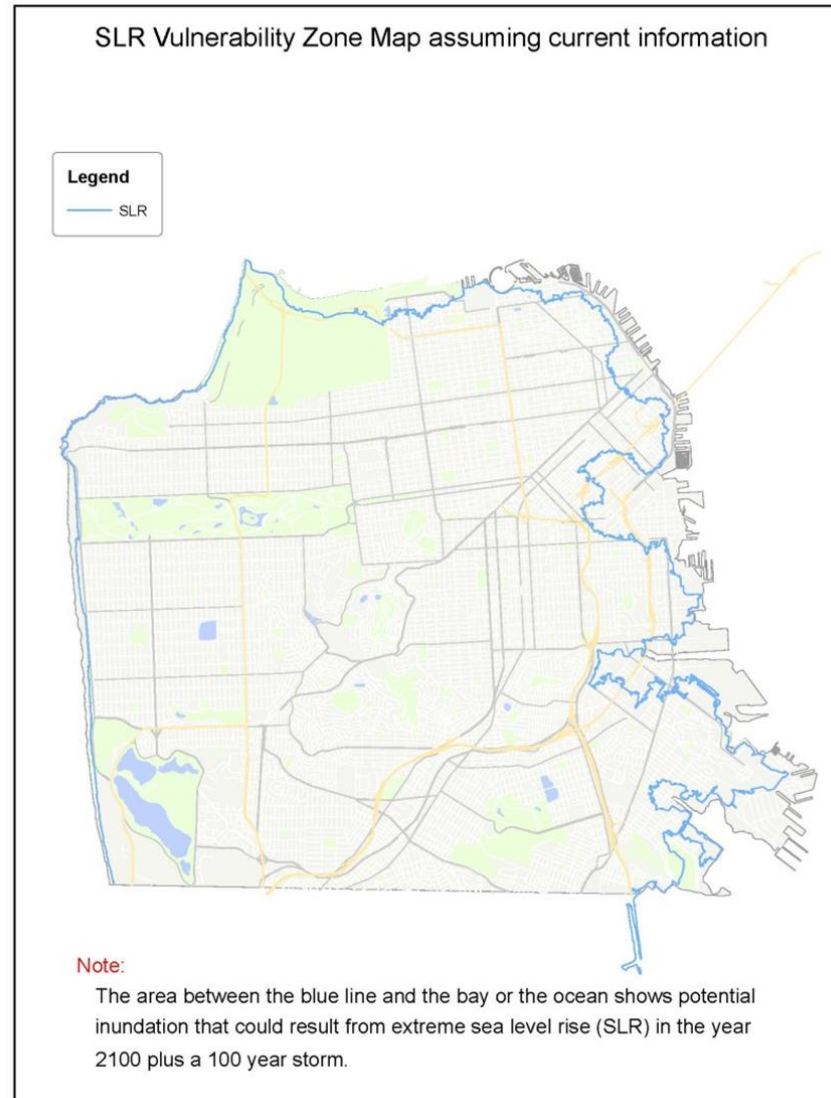
Simplified SLR Projections

(Table 2 in Proposed Revised Guidance)

Year	Projections	Upper End of Range
2030	6 in	12 in
2050	11 in	24 in
2100	36 in	66 in






Supplemental Document: SLR Vulnerability Zone (no changes)





SLR Checklist: New and Improved Version



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CAPITAL PLANNING PROGRAM

Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco
Sea Level Rise Checklist (Version 2.0)

This checklist should be used in conjunction with the SLR Guidance document ("Guidance") for use by City departments to guide the evaluation of capital planning projects in light of sea level rise.

Pre-Checklist check:
The checklist is only required if the following 3 conditions are ALL met. If the answer is 'No' to ANY of these questions, do not complete the SLR checklist. The pre-checklist should be retained for your records.

- Project has a location identified** (some projects are so early in planning that they do not yet have a specific location within CCSF) Yes ☐ No ☐
- Project is within the SLR Vulnerability Zone** Yes ☐ No ☐
(see the Supplementary Document "SLR Vulnerability Zone Map" at:
<http://onesanfrancisco.org/staff-resources/sea-level-rise-guidance/>; contact Hemiar Alburati (hemiar.alburati@sfgov.org) to request a Geodatabase (GIS file) of the SLR Vulnerability Zone Map (overlaid on San Francisco base layers).
- Anticipated total project costs¹ equal or exceed 5 million dollars** Yes ☐ No ☐

Department Name:

Project Name:

Project ID:

Name of Project Mgr:

Name of Preparer:

Date prepared:

Only projects answering 'Yes' for questions 1, 2 AND 3 must complete the following checklist.
As noted above, if the answer to questions 1, 2 OR 3 is 'No', the SLR checklist does not need to be submitted. However, it is recommended that the project manager retain this document in their project records.

¹ Project costs include planning, design, and construction costs.

Department Name: Project ID (if available):

Date prepared:



Supplemental Document: Scenario Selection and Design Tide Calculation

SUPPLEMENTAL DOCUMENT

SEA LEVEL RISE SCENARIO SELECTION AND DESIGN TIDE CALCULATION

FOR THE

GUIDANCE FOR INCORPORATING SEA LEVEL RISE INTO CAPITAL PLANNING IN SAN FRANCISCO: ASSESSING VULNERABILITY AND RISK TO SUPPORT ADAPTATION

Prepared by the City of San Francisco

Sea Level Rise

for the San Francisco

Project Design Tide Elevation Worksheet

1. Project Planning Horizon:

- ☐ 1a. Year construction complete _____
- ☐ 1b. Functional lifespan _____
- ☐ 1c. Project Planning Horizon = 1a + 1b = _____

• 1a + 1b = (Write sum on line A)

2. Sea Level Scenario. Choose one:

- ☐ 2a. If project is sensitive to periodic flooding and/or adaptive capacity cannot easily be included in project design, calculate **upper range** sea level rise. Write answer on line B:
 - $t = 1a + 1b - 2000$
 - Sea level rise = $(0.0093t^2 + 0.7457t)/30.48$

- ☐ 2b. If project is not sensitive to periodic flooding, and adaptive capacity can be included within project design for later modifications, calculate **most likely** sea level rise. Write answer on line B:
 - $t = 1a + 1b - 2000$
 - Sea level rise = $(0.000045t^2 + 0.0037t) + 0.428(30.48)$

3. Is the project located on the Bayside (including SFO)? If Yes, is it sensitive to periodic flooding? Choose one:

- ☐ 3a. No. Go to Question 4.

- ☐ 3b. Yes, and the project is NOT sensitive to periodic flooding. From Figure 1, find point closest to the project location. Write answer on line C. From either Table 1 (ft-SFCD) or Table 2 (ft-NAVD88) find the MHHW elevation at that point. This is the base elevation. Error: Base mark not defined. Write answer on line D.

- ☐ 3c. Yes, and the project IS sensitive to periodic flooding. From Figure 1, find point closest to the project location. Write answer on line C. From either Table 1 (ft-SFCD) or Table 2 (ft-NAVD88), find the 100-year extreme tide elevation at that point. This is the base elevation. Error: Base mark not defined. Write answer on line D.

4. For Westside projects: Choose one.

- ☐ 4a. Use Figure 2 to find the location closest to the planned project. Write answer on line C. Use Table 3 to select the 1% annual chance DWL (or 1% annual change TWL if appropriate) at that point. This is the base elevation. Error: Base mark not defined. Write answer on line D.

5. Calculate design tide elevation

Add line B to line D. Write answer on line E. This is the design tide elevation.

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Supplemental Information for the Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco

December 2015

Answers:
Project Planning Horizon (year)
A. _____
($t = \text{Line A} - 2000 =$ _____)
Sea Level rise (feet)
B. _____
Project Location (point id)
C. _____
Base elevation or (ft-SFCD) or (ft-NAVD88)
D. _____
Design Tide Elevation (B + D)
E. _____



Figure 1: Tide Calculation Locations for the Bayside of the City

Point ID	Coordinates		Tidal Datums						Extreme Tide Elevations							
			FT-NAVD88						FT-NAVD88							
	Lat.	Long.	MLLW	MLW	MSL	MTL	MHW	MHHW	2-Yr	5-Yr	10-Yr	20-Yr	25-Yr	50-Yr	100-Yr	500-Yr
864	37.805	-122.369	-0.12	0.96	3.26	3.31	5.67	6.24	7.79	8.18	8.48	8.79	8.90	9.25	9.63	10.67
890	37.813	-122.356	-0.12	0.95	3.27	3.31	5.67	6.25	7.79	8.19	8.49	8.80	8.91	9.26	9.64	10.68
918	37.807	-122.374	-0.11	0.95	3.23	3.30	5.66	6.22	7.76	8.16	8.46	8.77	8.88	9.23	9.61	10.66
934	37.817	-122.357	-0.12	0.97	3.28	3.32	5.67	6.23	7.79	8.18	8.48	8.80	8.91	9.26	9.64	10.69
952	37.818	-122.361	-0.11	0.97	3.28	3.32	5.66	6.24	7.79	8.18	8.48	8.80	8.91	9.26	9.65	10.70
964	37.812	-122.376	-0.09	0.97	3.24	3.30	5.64	6.20	7.74	8.14	8.44	8.76	8.86	9.22	9.61	10.67
973	37.820	-122.360	-0.10	0.97	3.28	3.32	5.66	6.23	7.78	8.18	8.48	8.80	8.90	9.26	9.64	10.69
1009	37.817	-122.376	-0.07	0.99	3.26	3.31	5.62	6.19	7.73	8.12	8.42	8.74	8.85	9.21	9.61	10.68
1021	37.825	-122.361	-0.09	0.98	3.27	3.31	5.65	6.22	7.76	8.16	8.47	8.79	8.89	9.25	9.64	10.70
1053	37.821	-122.379	-0.06	1.00	3.27	3.30	5.61	6.17	7.71	8.11	8.41	8.73	8.84	9.20	9.60	10.68
1060	37.829	-122.363	-0.07	0.99	3.27	3.31	5.64	6.21	7.75	8.15	8.45	8.77	8.88	9.24	9.64	10.71
1088	37.825	-122.382	-0.04	1.01	3.27	3.30	5.60	6.16	7.69	8.09	8.40	8.72	8.83	9.19	9.59	10.69
1098	37.833	-122.366	-0.06	1.00	3.27	3.31	5.63	6.19	7.73	8.13	8.44	8.76	8.87	9.24	9.64	10.73
1173	37.830	-122.382	-0.03	1.03	3.28	3.31	5.59	6.15	7.69	8.09	8.40	8.73	8.84	9.21	9.63	10.77
1186	37.835	-122.373	-0.04	1.01	3.27	3.31	5.61	6.17	7.71	8.11	8.42	8.75	8.86	9.24	9.65	10.80
1197	37.834	-122.378	-0.03	1.02	3.29	3.31	5.60	6.17	7.70	8.10	8.41	8.74	8.85	9.23	9.65	10.83