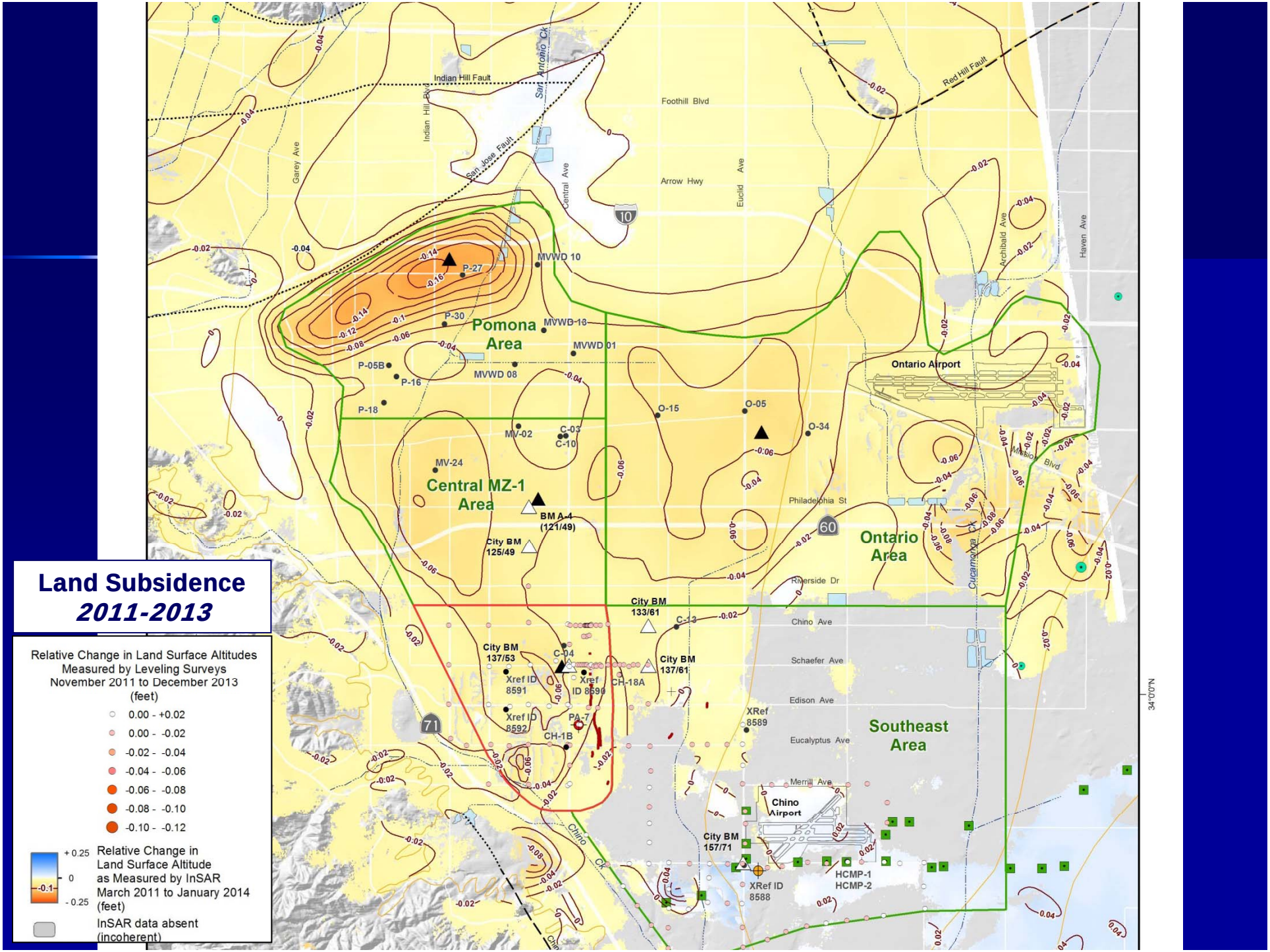
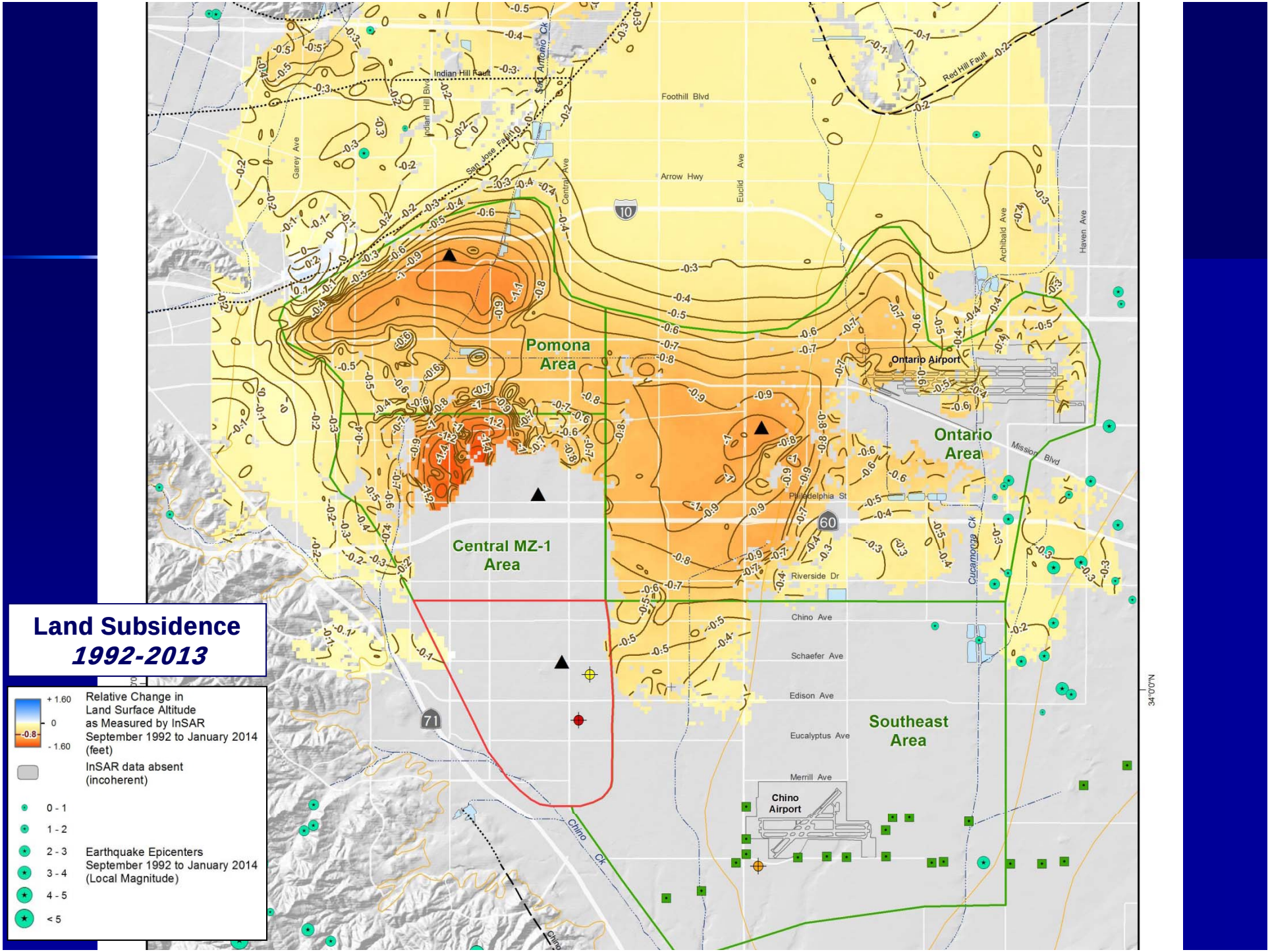
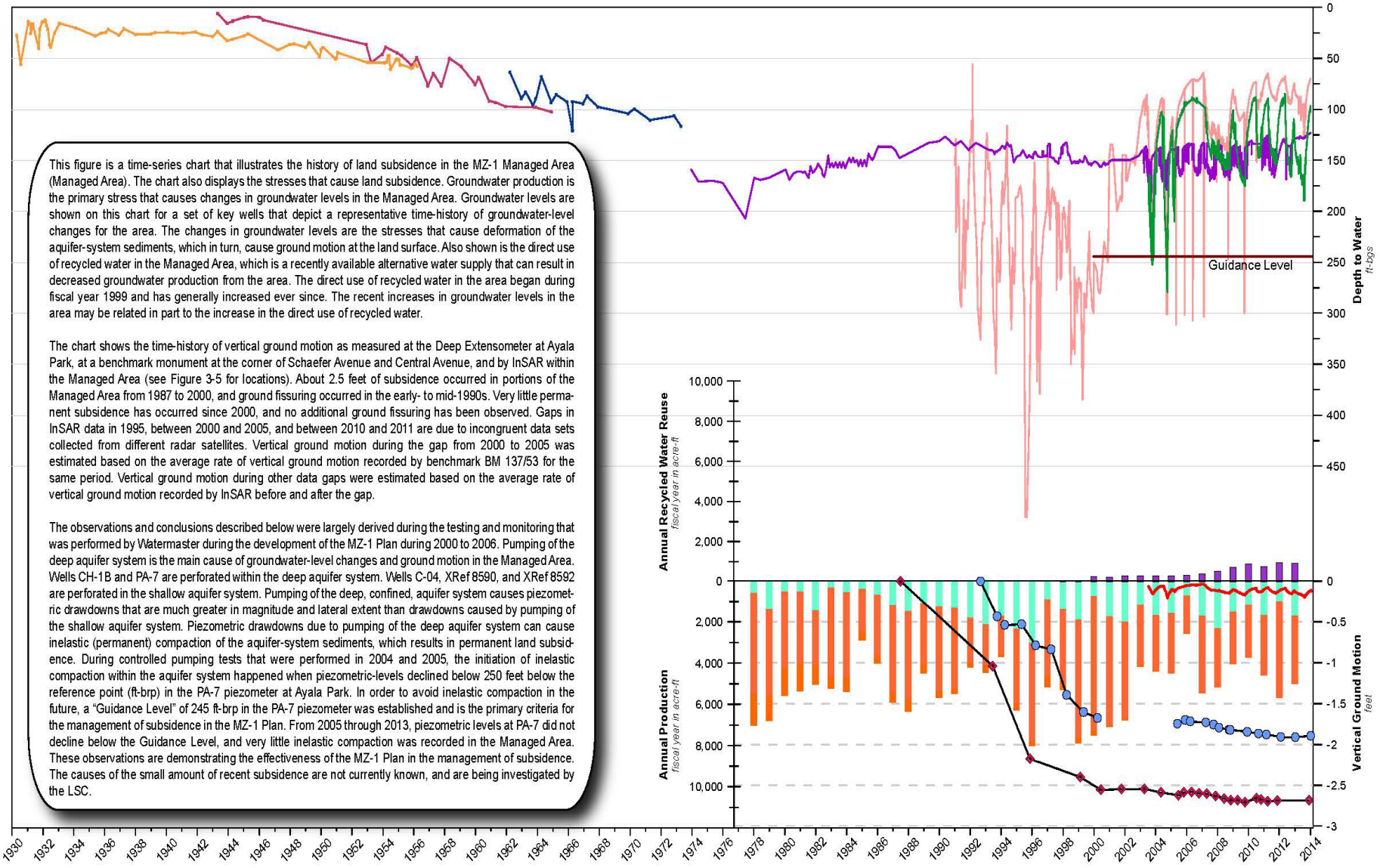

Land Subsidence
2011-2013
Relative Change in Land Surface Altitudes
Measured by Leveling Surveys
November 2011 to December 2013
(feet)
0.00 - +0.02
0.00 - -0.02
-0.02 - -0.04
-0.04 - -0.06
-0.06 - -0.08
-0.08 - -0.10
-0.10 - -0.12
+ 0.25
0
- 0.25
Relative Change in
Land Surface Altitude
as Measured by InSAR
March 2011 to January 2014
(feet)
InSAR data absent
(incoherent)
Pomona
Area
Central MZ-1
Area
Ontario
Area
Southeast
Area
Ontario Airport
Chino
Airport
Indian Hill Fault
San Jose Fault
Red Hill Fault
Foothill Blvd
Arrow Hwy
Philadelphia St
Riverside Dr
Chino Ave
Schaefer Ave
Edison Ave
Eucalyptus Ave
Merrill Ave
Garey Ave
Central Ave
Euclid Ave
Archibald Ave
Haven Ave
Milliken Ave
Cucamonga Ck
Chino Ck
MVWD 10
MVWD 13
MVWD 01
MVWD 08
P-27
P-30
P-05B
P-16
P-18
MV-02
MV-24
C-03
C-10
C-04
C-13
O-15
O-05
O-34
BM A-4
(121/49)
City BM
125/49
City BM
133/61
City BM
137/53
City BM
137/61
City BM
157/71
Xref ID
8591
Xref ID
8590
Xref ID
8592
CH-18A
CH-1B
PA-7
XRef
8589
XRef ID
8588
HCMP-1
HCMP-2
10
60
71
34°0'0"N


Land Subsidence
1992-2013
+ 1.60
0
-0.8
- 1.60
Relative Change in Land Surface Altitude as Measured by InSAR September 1992 to January 2014 (feet)
InSAR data absent (incoherent)
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5
< 5
Earthquake Epicenters September 1992 to January 2014 (Local Magnitude)
Pomona Area
Central MZ-1 Area
Ontario Area
Southeast Area
Ontario Airport
Chino Airport
Foothill Blvd
Arrow Hwy
Indian Hill Fault
San Jose Fault
Red Hill Fault
Euclid Ave
Central Ave
Archibald Ave
Haven Ave
Mission Blvd
Philadelphia St
Riverside Dr
Chino Ave
Schaefer Ave
Edison Ave
Eucalyptus Ave
Merrill Ave
Cucamonga Ck
Chino Ck
10
60
71
34°0'0"N



This figure is a time-series chart that illustrates the history of land subsidence in the MZ-1 Managed Area (Managed Area). The chart also displays the stresses that cause land subsidence. Groundwater production is the primary stress that causes changes in groundwater levels in the Managed Area. Groundwater levels are shown on this chart for a set of key wells that depict a representative time-history of groundwater-level changes for the area. The changes in groundwater levels are the stresses that cause deformation of the aquifer-system sediments, which in turn, cause ground motion at the land surface. Also shown is the direct use of recycled water in the Managed Area, which is a recently available alternative water supply that can result in decreased groundwater production from the area. The direct use of recycled water in the area began during fiscal year 1999 and has generally increased ever since. The recent increases in groundwater levels in the area may be related in part to the increase in the direct use of recycled water.

The chart shows the time-history of vertical ground motion as measured at the Deep Extensometer at Ayala Park, at a benchmark monument at the corner of Schaefer Avenue and Central Avenue, and by InSAR within the Managed Area (see Figure 3-5 for locations). About 2.5 feet of subsidence occurred in portions of the Managed Area from 1987 to 2000, and ground fissuring occurred in the early- to mid-1990s. Very little permanent subsidence has occurred since 2000, and no additional ground fissuring has been observed. Gaps in InSAR data in 1995, between 2000 and 2005, and between 2010 and 2011 are due to incongruent data sets collected from different radar satellites. Vertical ground motion during the gap from 2000 to 2005 was estimated based on the average rate of vertical ground motion recorded by benchmark BM 137/53 for the same period. Vertical ground motion during other data gaps were estimated based on the average rate of vertical ground motion recorded by InSAR before and after the gap.

The observations and conclusions described below were largely derived during the testing and monitoring that was performed by Watermaster during the development of the MZ-1 Plan during 2000 to 2006. Pumping of the deep aquifer system is the main cause of groundwater-level changes and ground motion in the Managed Area. Wells CH-1B and PA-7 are perforated within the deep aquifer system. Wells C-04, XRef 8590, and XRef 8592 are perforated in the shallow aquifer system. Pumping of the deep, confined, aquifer system causes piezometric drawdowns that are much greater in magnitude and lateral extent than drawdowns caused by pumping of the shallow aquifer system. Piezometric drawdowns due to pumping of the deep aquifer system can cause inelastic (permanent) compaction of the aquifer-system sediments, which results in permanent land subsidence. During controlled pumping tests that were performed in 2004 and 2005, the initiation of inelastic compaction within the aquifer system happened when piezometric-levels declined below 250 feet below the reference point (ft-brp) in the PA-7 piezometer at Ayala Park. In order to avoid inelastic compaction in the future, a "Guidance Level" of 245 ft-brp in the PA-7 piezometer was established and is the primary criteria for the management of subsidence in the MZ-1 Plan. From 2005 through 2013, piezometric levels at PA-7 did not decline below the Guidance Level, and very little inelastic compaction was recorded in the Managed Area. These observations are demonstrating the effectiveness of the MZ-1 Plan in the management of subsidence. The causes of the small amount of recent subsidence are not currently known, and are being investigated by the LSC.

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Groundwater Levels at Wells (Perforated Interval Depth)

Shallow Aquifer System
- C-04 (160-275 ft-bgs)
- XRef 8590 (80-225 ft-bgs)
- XRef 8591 (unknown)
- XRef 8592 (90-230 ft-bgs)

Deep Aquifer System
- CH-1B (440-1,180 ft-bgs)
- PA-7 (438-448 ft-bgs)

Vertical Ground Motion
- BM 137/53 Cumulative Displacement
- Managed Area InSAR
- Ayala Park Deep Extensometer Measurements Between 30 to 1,400 ft-bgs

Recharge and Production
- Recycled Water Reuse Applied in MZ-1 Managed Area

Groundwater Production from Wells in the MZ-1 Managed Area
- Deep or Both Aquifers
- Shallow Aquifer or Unknown

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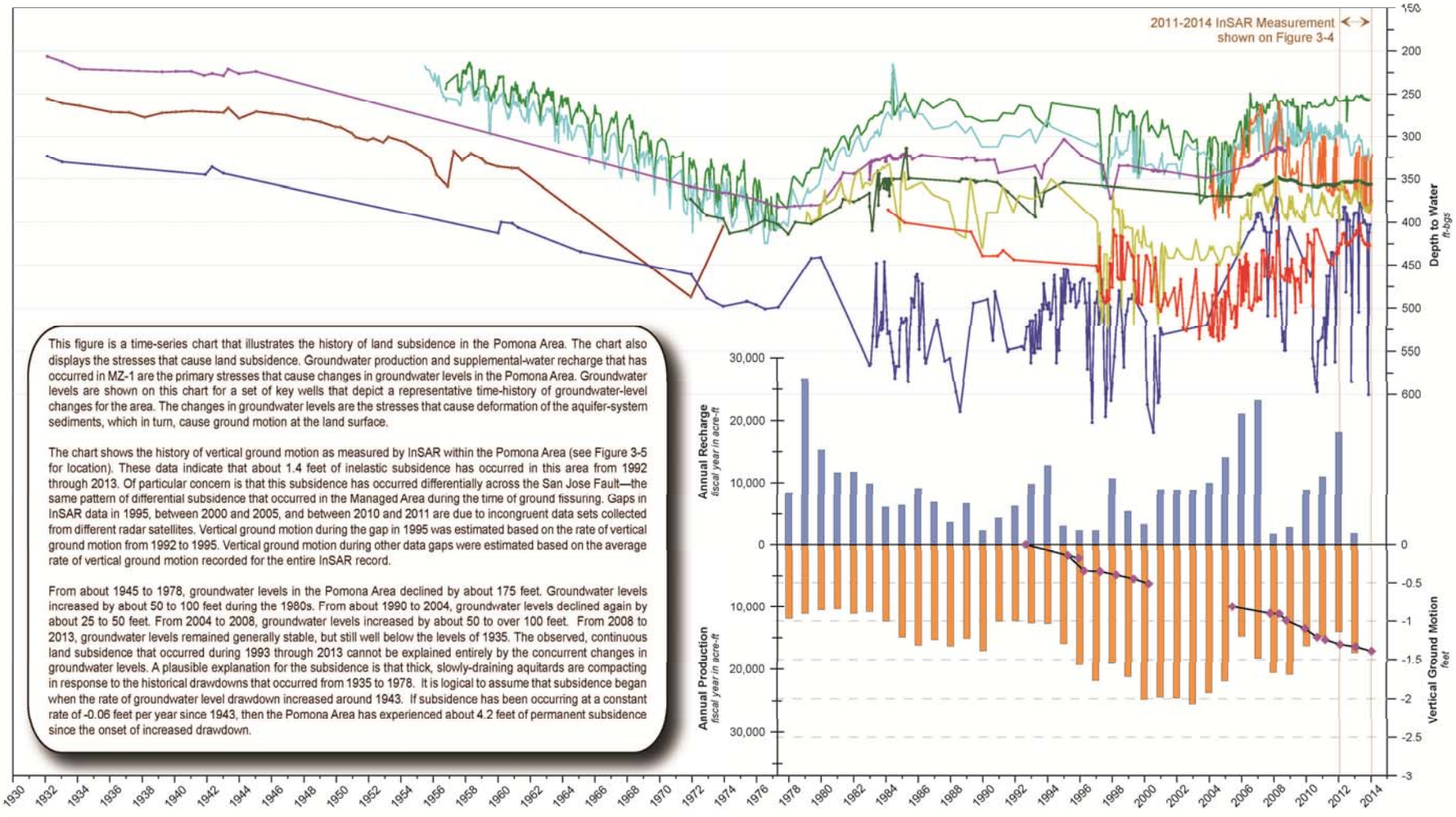
The History of Land Subsidence in the MZ-1 Managed Area

Figure 3-1



This figure is a time-series chart that illustrates the history of land subsidence in the Pomona Area. The chart also displays the stresses that cause land subsidence. Groundwater production and supplemental-water recharge that has occurred in MZ-1 are the primary stresses that cause changes in groundwater levels in the Pomona Area. Groundwater levels are shown on this chart for a set of key wells that depict a representative time-history of groundwater-level changes for the area. The changes in groundwater levels are the stresses that cause deformation of the aquifer-system sediments, which in turn, cause ground motion at the land surface.

The chart shows the history of vertical ground motion as measured by InSAR within the Pomona Area (see Figure 3-5 for location). These data indicate that about 1.4 feet of inelastic subsidence has occurred in this area from 1992 through 2013. Of particular concern is that this subsidence has occurred differentially across the San Jose Fault—the same pattern of differential subsidence that occurred in the Managed Area during the time of ground fissuring. Gaps in InSAR data in 1995, between 2000 and 2005, and between 2010 and 2011 are due to incongruent data sets collected from different radar satellites. Vertical ground motion during the gap in 1995 was estimated based on the rate of vertical ground motion from 1992 to 1995. Vertical ground motion during other data gaps were estimated based on the average rate of vertical ground motion recorded for the entire InSAR record.

From about 1945 to 1978, groundwater levels in the Pomona Area declined by about 175 feet. Groundwater levels increased by about 50 to 100 feet during the 1980s. From about 1990 to 2004, groundwater levels declined again by about 25 to 50 feet. From 2004 to 2008, groundwater levels increased by about 50 to over 100 feet. From 2008 to 2013, groundwater levels remained generally stable, but still well below the levels of 1935. The observed, continuous land subsidence that occurred during 1993 through 2013 cannot be explained entirely by the concurrent changes in groundwater levels. A plausible explanation for the subsidence is that thick, slowly-draining aquitards are compacting in response to the historical drawdowns that occurred from 1935 to 1978. It is logical to assume that subsidence began when the rate of groundwater level drawdown increased around 1943. If subsidence has been occurring at a constant rate of -0.06 feet per year since 1943, then the Pomona Area has experienced about 4.2 feet of permanent subsidence since the onset of increased drawdown.

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Groundwater Levels at Wells (Perforated Depth Interval)

- MV-01 (245-472 ft-bgs)
- MV-08 (225-447 ft-bgs)
- MV-10 (520-1084 ft-bgs)
- MV-13 (203-475 ft-bgs)
- P-5B (457-615 ft-bgs)
- P-16 (270-328 ft-bgs)
- P-18 (307-660 ft-bgs)
- P-27 (472-849 ft-bgs)
- P-30 (565-875 ft-bgs)

Vertical Ground Motion

- Pomona Area InSAR

Recharge and Production

- Recharge of Recycled Water, Storm Water*, and Imported Water at the College Heights, Upland, Montclair, and Brooks Basins; and at MWD ASR Wells.
  *Storm Water is an estimated amount prior to Fiscal Year 04/05
- Groundwater Production from Wells in the Pomona Area

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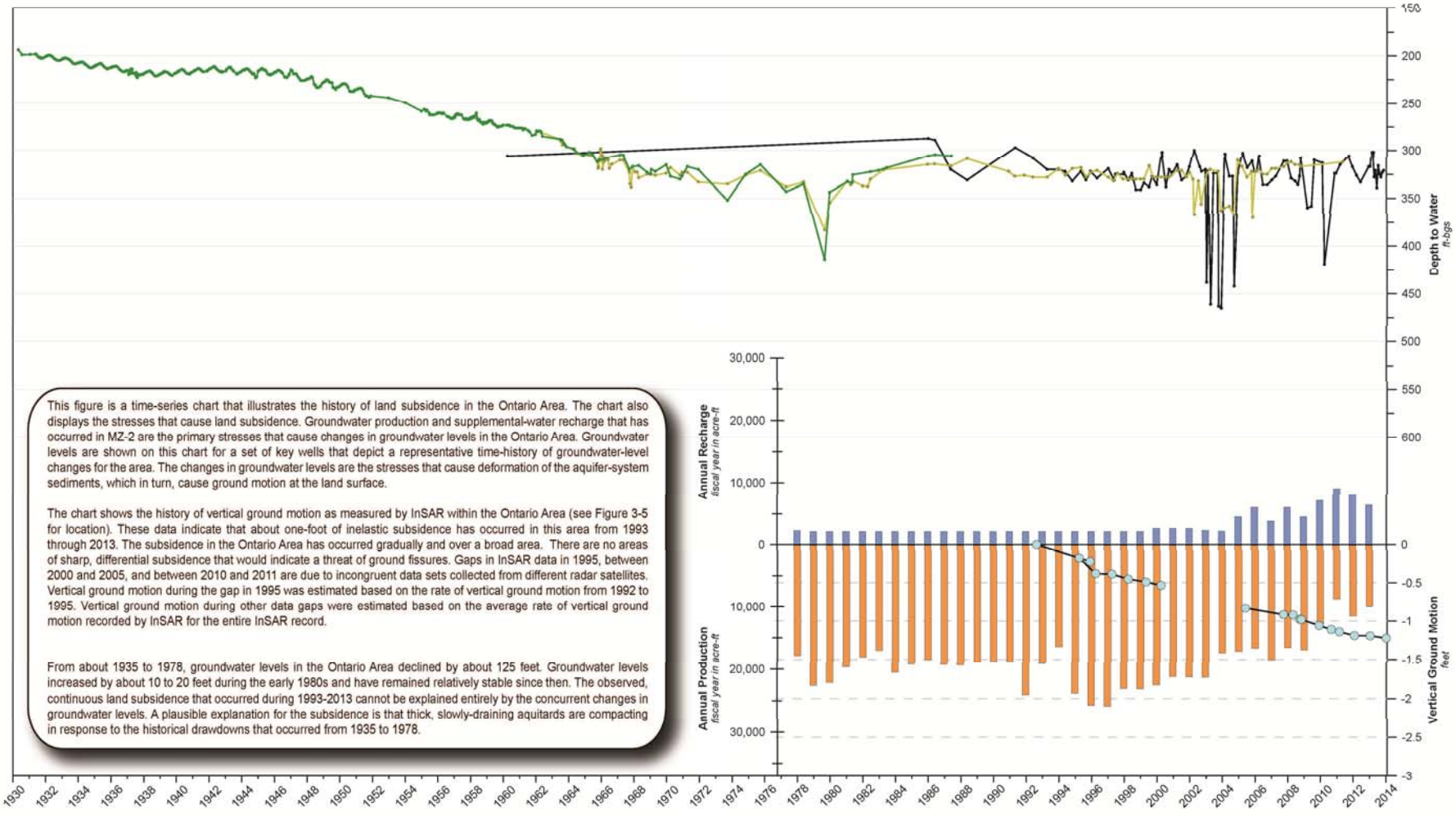
2013 Annual Report

The History of Land Subsidence in the Pomona Area

Figure 3-9



This figure is a time-series chart that illustrates the history of land subsidence in the Ontario Area. The chart also displays the stresses that cause land subsidence. Groundwater production and supplemental-water recharge that has occurred in MZ-2 are the primary stresses that cause changes in groundwater levels in the Ontario Area. Groundwater levels are shown on this chart for a set of key wells that depict a representative time-history of groundwater-level changes for the area. The changes in groundwater levels are the stresses that cause deformation of the aquifer-system sediments, which in turn, cause ground motion at the land surface.

The chart shows the history of vertical ground motion as measured by InSAR within the Ontario Area (see Figure 3-5 for location). These data indicate that about one-foot of inelastic subsidence has occurred in this area from 1993 through 2013. The subsidence in the Ontario Area has occurred gradually and over a broad area. There are no areas of sharp, differential subsidence that would indicate a threat of ground fissures. Gaps in InSAR data in 1995, between 2000 and 2005, and between 2010 and 2011 are due to incongruent data sets collected from different radar satellites. Vertical ground motion during the gap in 1995 was estimated based on the rate of vertical ground motion from 1992 to 1995. Vertical ground motion during other data gaps were estimated based on the average rate of vertical ground motion recorded by InSAR for the entire InSAR record.

From about 1935 to 1978, groundwater levels in the Ontario Area declined by about 125 feet. Groundwater levels increased by about 10 to 20 feet during the early 1980s and have remained relatively stable since then. The observed, continuous land subsidence that occurred during 1993-2013 cannot be explained entirely by the concurrent changes in groundwater levels. A plausible explanation for the subsidence is that thick, slowly-draining aquitards are compacting in response to the historical drawdowns that occurred from 1935 to 1978.

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Groundwater Levels at Wells
(Perforated Depth Interval)
- O-05 (360-470 ft-bgs)
- O-15 (474-966 ft-bgs)
- O-34 (522-1092 ft-bgs)

Vertical Ground Motion
- Ontario Area InSAR

Recharge and Production
- Recharge of Recycled, Storm Water*, and Imported Water at the Ely, Grove, Turner, 7th Street, 8th Street, and 15th Street Basins
  *Storm Water is an estimated amount prior to Fiscal Year 04/05
- Groundwater Production from Wells in the Ontario Area

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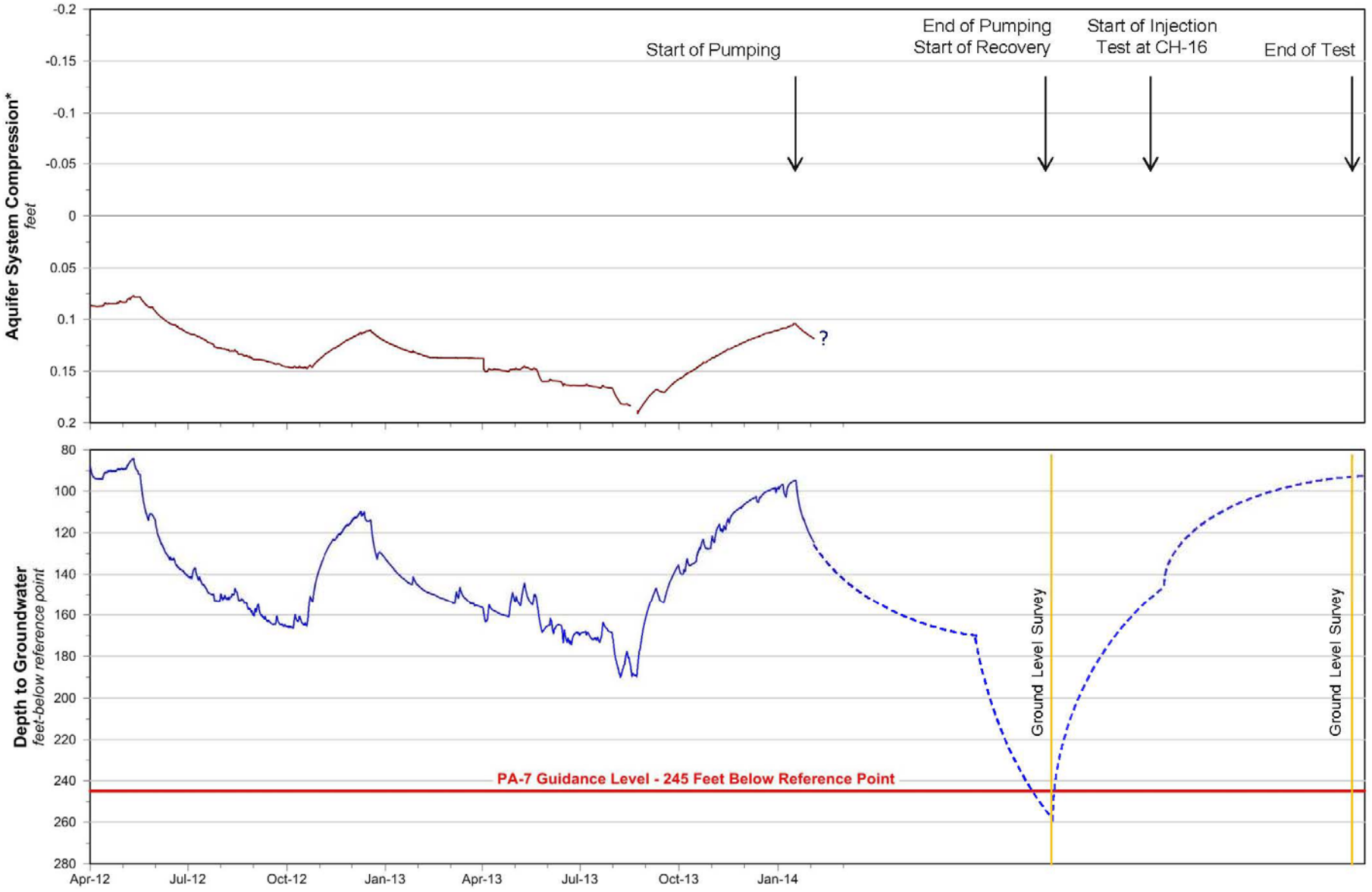
2013 Annual Report

The History of Land Subsidence in the Ontario Area

Figure 3-10



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Filename: Figure_4-2_report.grf

Aquifer System Compression (Aquifer System Depth Interval)

Ayala Park Deep Extensometer (30-1,400 feet-bgs)

Groundwater Levels at Wells (Perforated Depth Interval)

PA-7 (438-448 feet-bgs)

Predicted Record for PA-7 During Test

*Positive compression values represent compression of soils, negative compression values represent expansion of soils.

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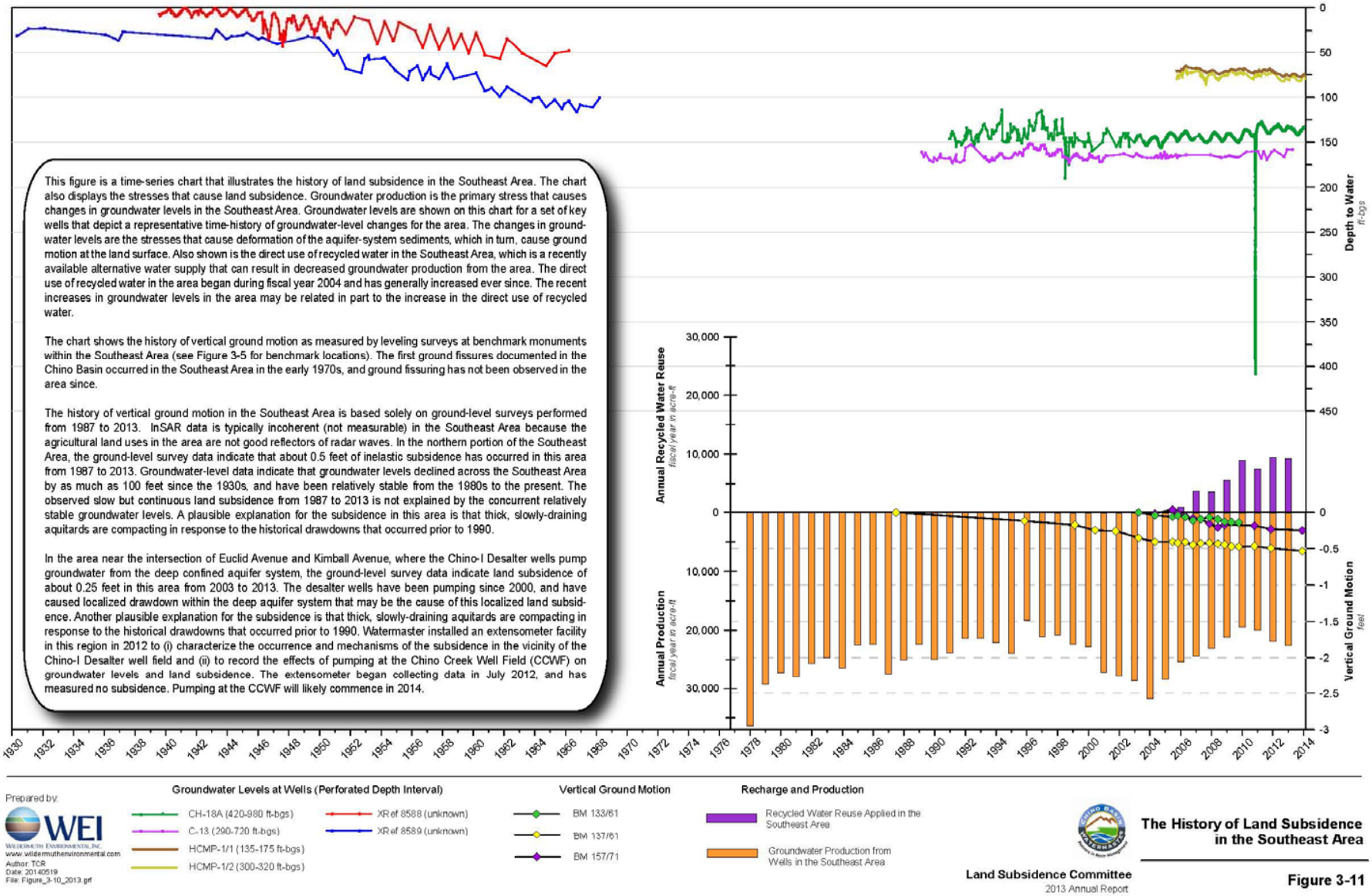
Long-Term Pumping Test
Managed Area

Figure 4-2

End


This figure is a time-series chart that illustrates the history of land subsidence in the Southeast Area. The chart also displays the stresses that cause land subsidence. Groundwater production is the primary stress that causes changes in groundwater levels in the Southeast Area. Groundwater levels are shown on this chart for a set of key wells that depict a representative time-history of groundwater-level changes for the area. The changes in groundwater levels are the stresses that cause deformation of the aquifer-system sediments, which in turn, cause ground motion at the land surface. Also shown is the direct use of recycled water in the Southeast Area, which is a recently available alternative water supply that can result in decreased groundwater production from the area. The direct use of recycled water in the area began during fiscal year 2004 and has generally increased ever since. The recent increases in groundwater levels in the area may be related in part to the increase in the direct use of recycled water.
The chart shows the history of vertical ground motion as measured by leveling surveys at benchmark monuments within the Southeast Area (see Figure 3-5 for benchmark locations). The first ground fissures documented in the Chino Basin occurred in the Southeast Area in the early 1970s, and ground fissuring has not been observed in the area since.
The history of vertical ground motion in the Southeast Area is based solely on ground-level surveys performed from 1987 to 2013. InSAR data is typically incoherent (not measurable) in the Southeast Area because the agricultural land uses in the area are not good reflectors of radar waves. In the northern portion of the Southeast Area, the ground-level survey data indicate that about 0.5 feet of inelastic subsidence has occurred in this area from 1987 to 2013. Groundwater-level data indicate that groundwater levels declined across the Southeast Area by as much as 100 feet since the 1930s, and have been relatively stable from the 1980s to the present. The observed slow but continuous land subsidence from 1987 to 2013 is not explained by the concurrent relatively stable groundwater levels. A plausible explanation for the subsidence in this area is that thick, slowly-draining aquitards are compacting in response to the historical drawdowns that occurred prior to 1990.
In the area near the intersection of Euclid Avenue and Kimball Avenue, where the Chino-I Desalter wells pump groundwater from the deep confined aquifer system, the ground-level survey data indicate land subsidence of about 0.25 feet in this area from 2003 to 2013. The desalter wells have been pumping since 2000, and have caused localized drawdown within the deep aquifer system that may be the cause of this localized land subsidence. Another plausible explanation for the subsidence is that thick, slowly-draining aquitards are compacting in response to the historical drawdowns that occurred prior to 1990. Watermaster installed an extensometer facility in this region in 2012 to (i) characterize the occurrence and mechanisms of the subsidence in the vicinity of the Chino-I Desalter well field and (ii) to record the effects of pumping at the Chino Creek Well Field (CCWF) on groundwater levels and land subsidence. The extensometer began collecting data in July 2012, and has measured no subsidence. Pumping at the CCWF will likely commence in 2014.
Depth to Water
ft-bgs
0
50
100
150
200
250
300
350
400
450
Annual Recycled Water Reuse
fiscal year in acre-ft
30,000
20,000
10,000
0
Annual Production
fiscal year in acre-ft
10,000
20,000
30,000
Vertical Ground Motion
feet
0
-0.5
-1
-1.5
-2
-2.5
-3
1930
1932
1934
1936
1938
1940
1942
1944
1946
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
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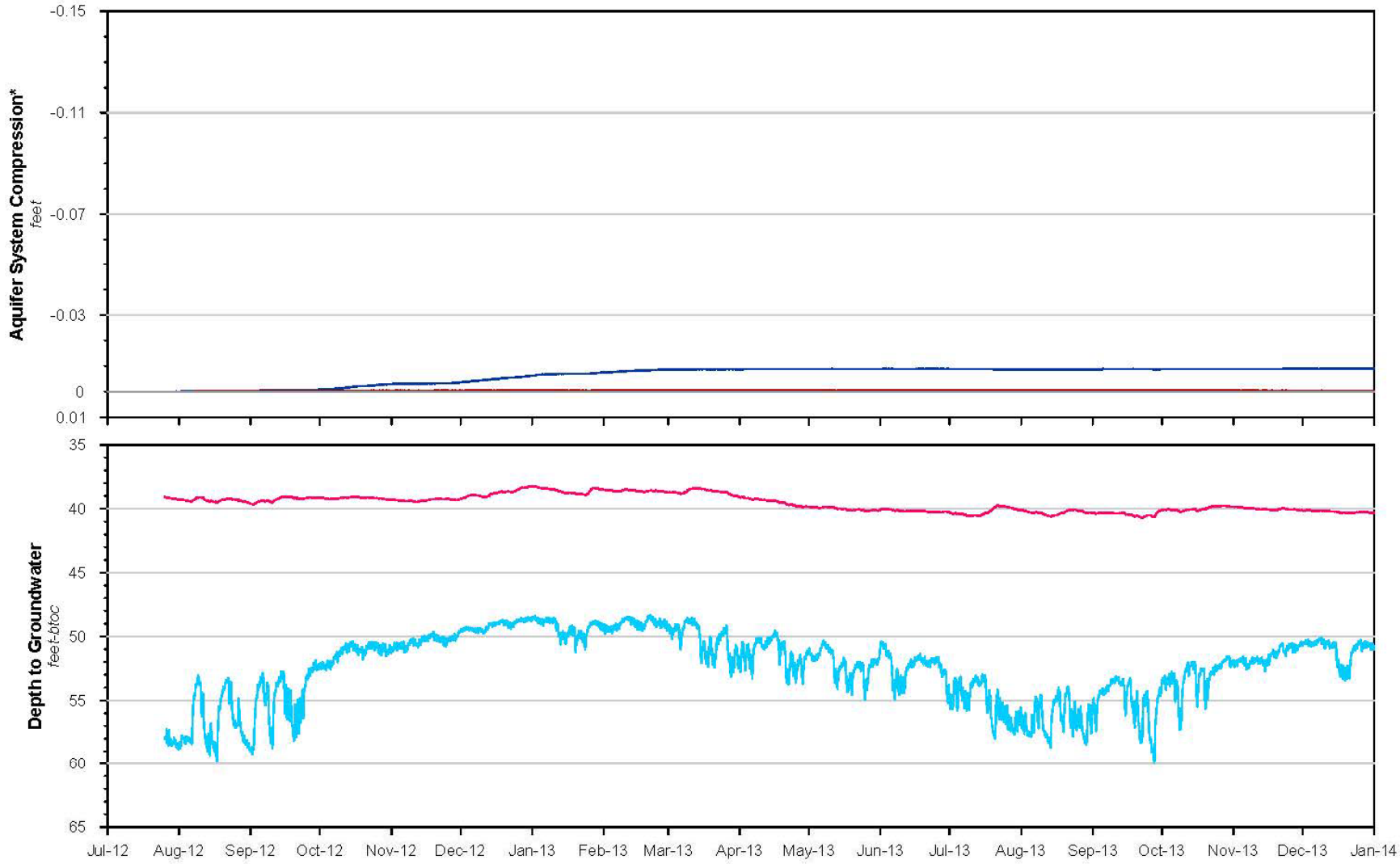
File: Figure_3-10_2013.grf
Groundwater Levels at Wells (Perforated Depth Interval)
CH-18A (420-980 ft-bgs)
C-13 (290-720 ft-bgs)
HCMP-1/1 (135-175 ft-bgs)
HCMP-1/2 (300-320 ft-bgs)
XRef 8588 (unknown)
XRef 8589 (unknown)
Vertical Ground Motion
BM 133/61
BM 137/61
BM 157/71
Recharge and Production
Recycled Water Reuse Applied in the Southeast Area
Groundwater Production from Wells in the Southeast Area
Land Subsidence Committee
2013 Annual Report
The History of Land Subsidence in the Southeast Area
Figure 3-11



Shallow Aquifer System

Aquifer System Deformation
(Extensometer Depth Interval)

CCX-1 Extensometer
(50-140 ft-bgs)

Depth to Groundwater
(Perforated Depth Interval)

CCPA-1 Piezometer
(100-130 ft-bgs)

Deep Aquifer System

Aquifer System Deformation
(Extensometer Depth Interval)

CCX-2 Extensometer
(50-610 ft-bgs)

Depth to Groundwater
(Perforated Depth Interval)

CCPA-2 Piezometer
(235-295 ft-bgs)

*Positive compression values represent compression of soils, negative compression values represent expansion of soils

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Filename: Figure_3-11.grf

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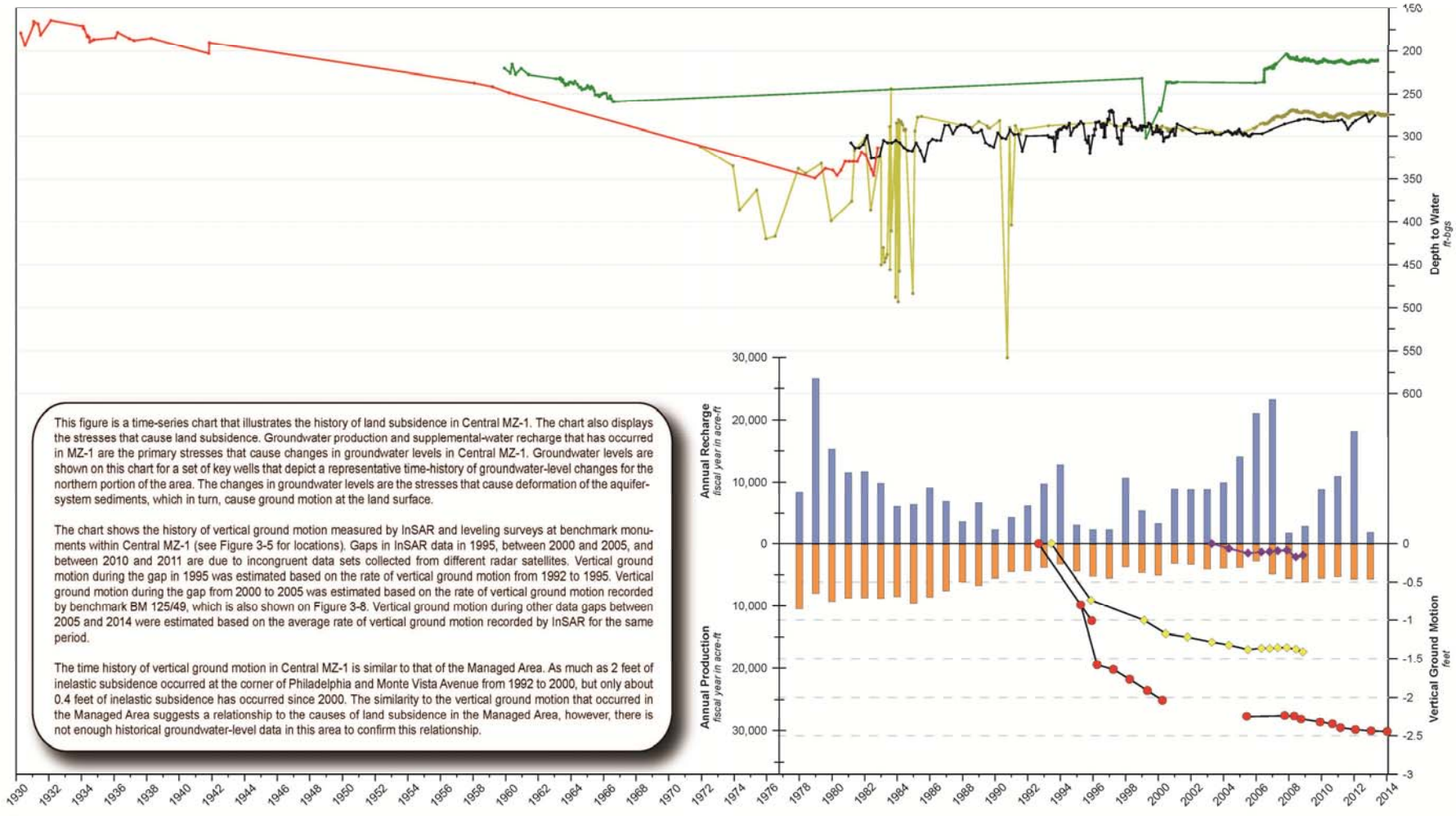
Stress and Strain
Chino Creek Extensometer

Figure 3-12



This figure is a time-series chart that illustrates the history of land subsidence in Central MZ-1. The chart also displays the stresses that cause land subsidence. Groundwater production and supplemental-water recharge that has occurred in MZ-1 are the primary stresses that cause changes in groundwater levels in Central MZ-1. Groundwater levels are shown on this chart for a set of key wells that depict a representative time-history of groundwater-level changes for the northern portion of the area. The changes in groundwater levels are the stresses that cause deformation of the aquifer-system sediments, which in turn, cause ground motion at the land surface.

The chart shows the history of vertical ground motion measured by InSAR and leveling surveys at benchmark monuments within Central MZ-1 (see Figure 3-5 for locations). Gaps in InSAR data in 1995, between 2000 and 2005, and between 2010 and 2011 are due to incongruent data sets collected from different radar satellites. Vertical ground motion during the gap in 1995 was estimated based on the rate of vertical ground motion from 1992 to 1995. Vertical ground motion during the gap from 2000 to 2005 was estimated based on the rate of vertical ground motion recorded by benchmark BM 125/49, which is also shown on Figure 3-8. Vertical ground motion during other data gaps between 2005 and 2014 were estimated based on the average rate of vertical ground motion recorded by InSAR for the same period.

The time history of vertical ground motion in Central MZ-1 is similar to that of the Managed Area. As much as 2 feet of inelastic subsidence occurred at the corner of Philadelphia and Monte Vista Avenue from 1992 to 2000, but only about 0.4 feet of inelastic subsidence has occurred since 2000. The similarity to the vertical ground motion that occurred in the Managed Area suggests a relationship to the causes of land subsidence in the Managed Area, however, there is not enough historical groundwater-level data in this area to confirm this relationship.

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Groundwater Levels at Wells (Perforated Depth Interval)
- C-03 (230-450 ft-bgs)
- MV-24 (244-420 ft-bgs)
- MV-02 (397-962 ft-bgs)
- C-10 (355-1090 ft-bgs)

Vertical Ground Motion
- Central MZ-1 InSAR
- BM A-4
- BM 125/49

Recharge and Production
- Recharge of Recycled Water, Storm Water*, and Imported Water at the College Heights, Upland, Montclair, and Brooks Basins; and at MWD ASR Wells
  *Storm Water is an estimated amount prior to Fiscal Year 04/05
- Groundwater Production from Wells in Central MZ-1 Area

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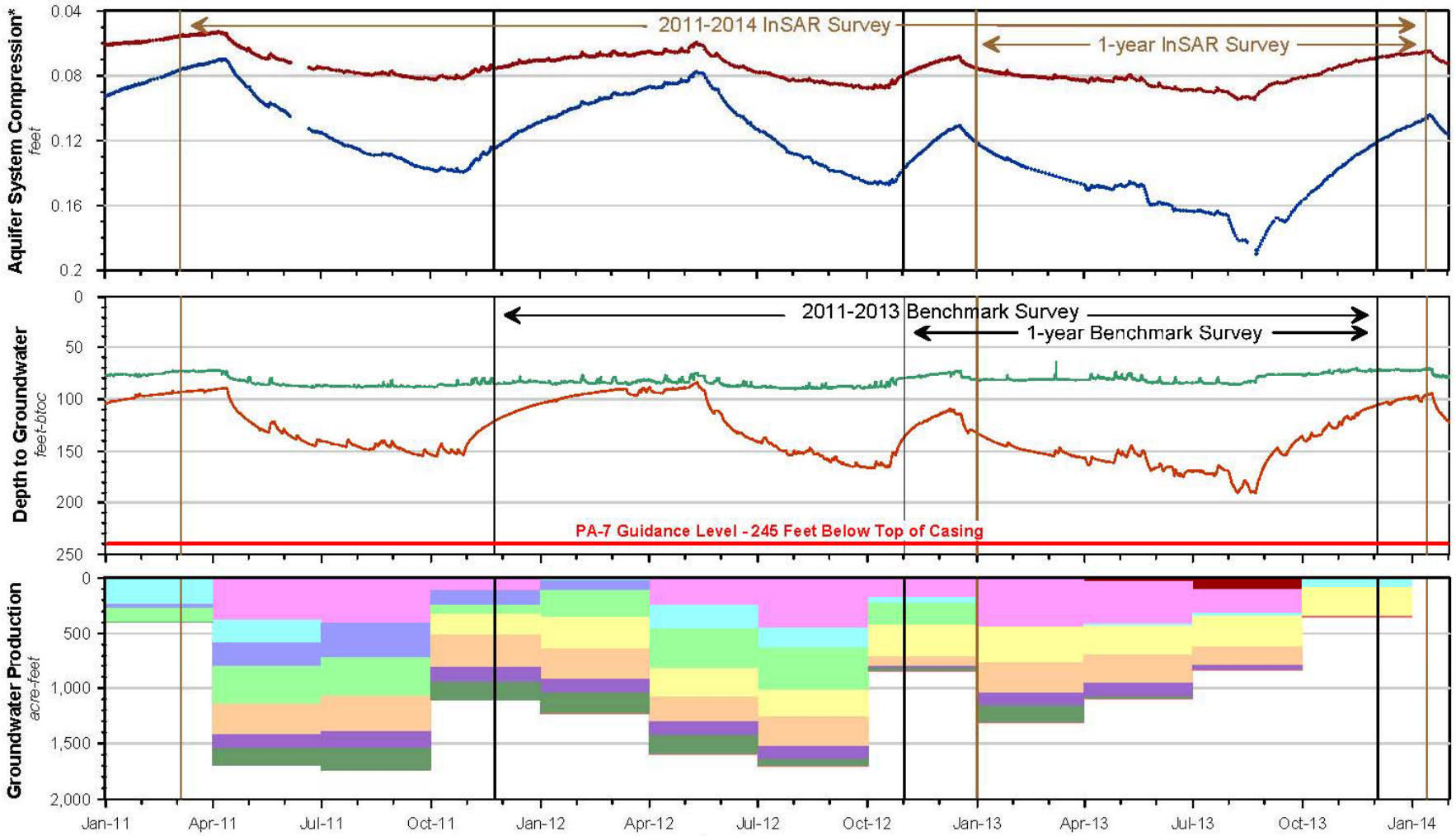
The History of Land Subsidence in Central MZ-1

Figure 3-8



Shallow Aquifer System

Aquifer System Deformation (Extensometer Depth Interval)
- Shallow Extensometer (30-550 ft-bgs)

Depth to Groundwater (Perforated Depth Interval)
- PA-10 Piezometer (213-233 ft-bgs)

Groundwater Production (Perforated Depth Interval)
- C-4 (160-275 ft-bgs)
- C-6 (200-375 ft-bgs)
- CIM-1 (118-357 ft-bgs)
- CH-1A (166-317 ft-bgs)
- CH-7A (135-290 ft-bgs)
- CH-7B (120-360 ft-bgs)
- XRef 8730 (unknown)

Deep Aquifer System

Aquifer System Deformation (Extensometer Depth Interval)
- Deep Extensometer (30-1,400 ft-bgs)

Depth to Groundwater (Perforated Depth Interval)
- PA-7 Piezometer (438-448 ft-bgs)

Groundwater Production (Perforated Depth Interval)
- CH-15B (360-900 ft-bgs)
- CH-17 (300-980 ft-bgs)
- CIM-11A (135-540 ft-bgs)

*Positive compression values represent compression of soils, negative compression values represent expansion of soils

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Filename: Figure_3-1.grf

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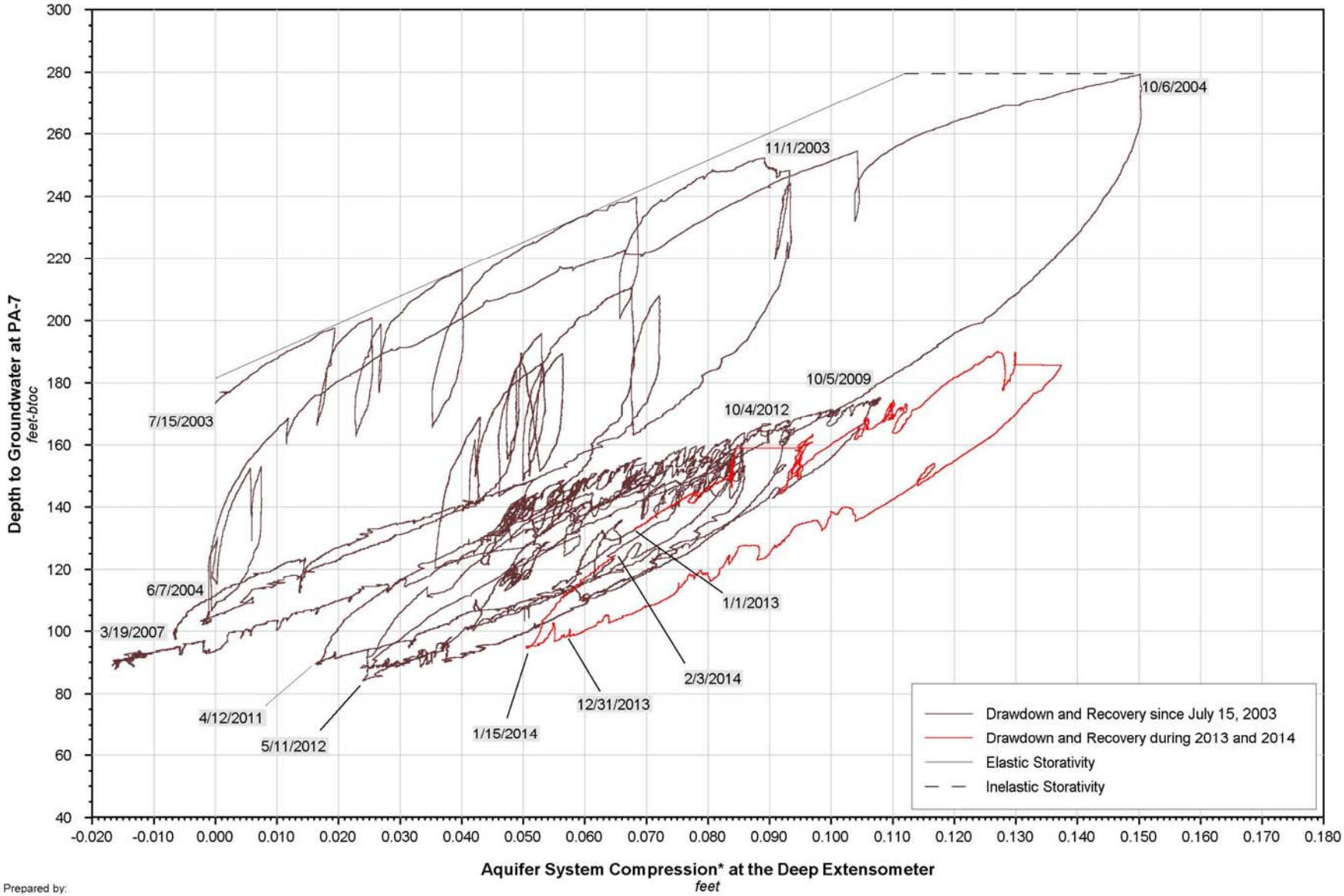
Stress and Strain within the Managed Area

Figure 3-2



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Date: 20140116
Filename: Figure_3-2.grf

Depth Interval of PA-7 Perforations
= 438-448 ft-bgs

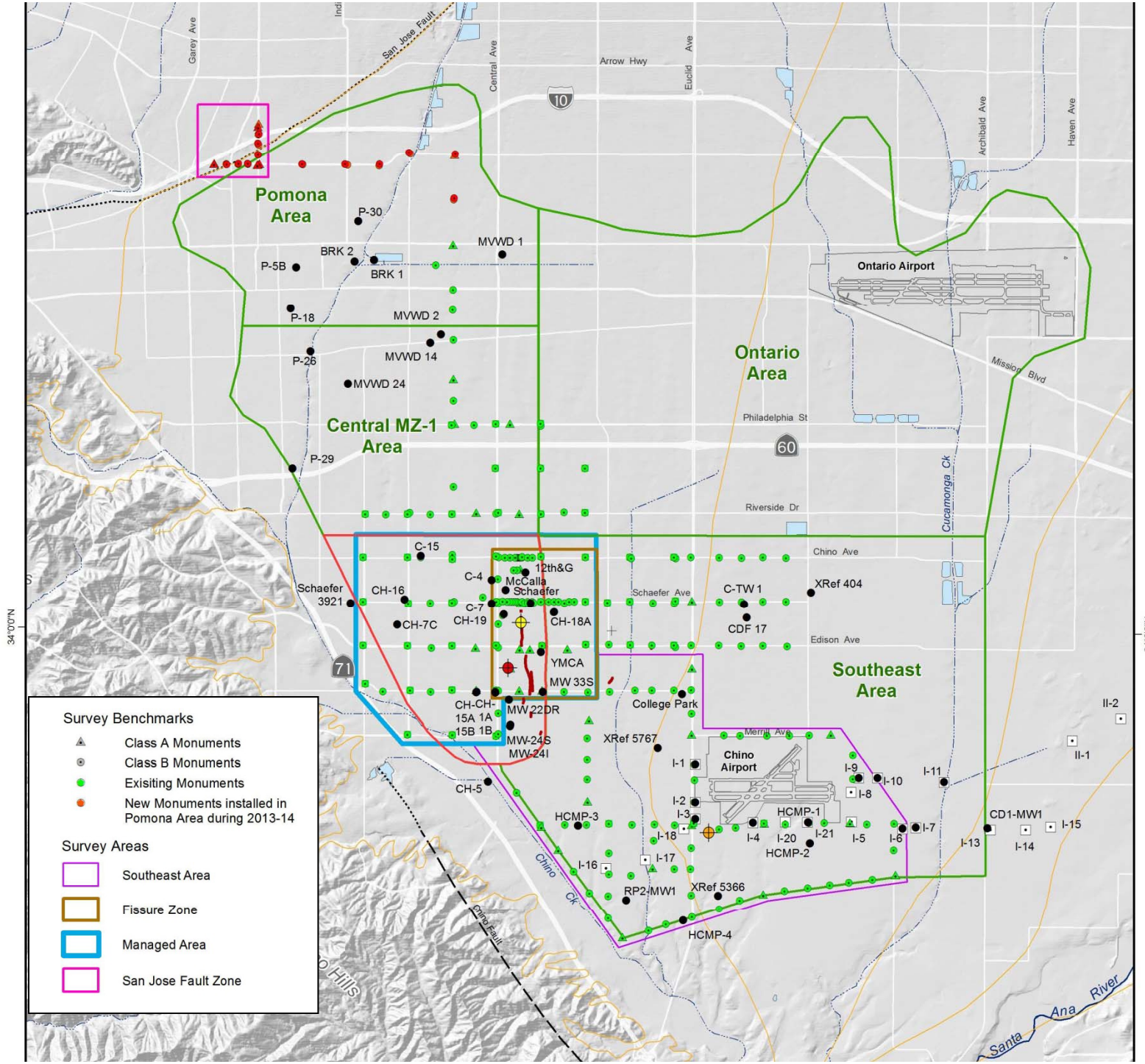
Depth Interval of the Deep Extensometer
= 30-1,400 feet-bgs

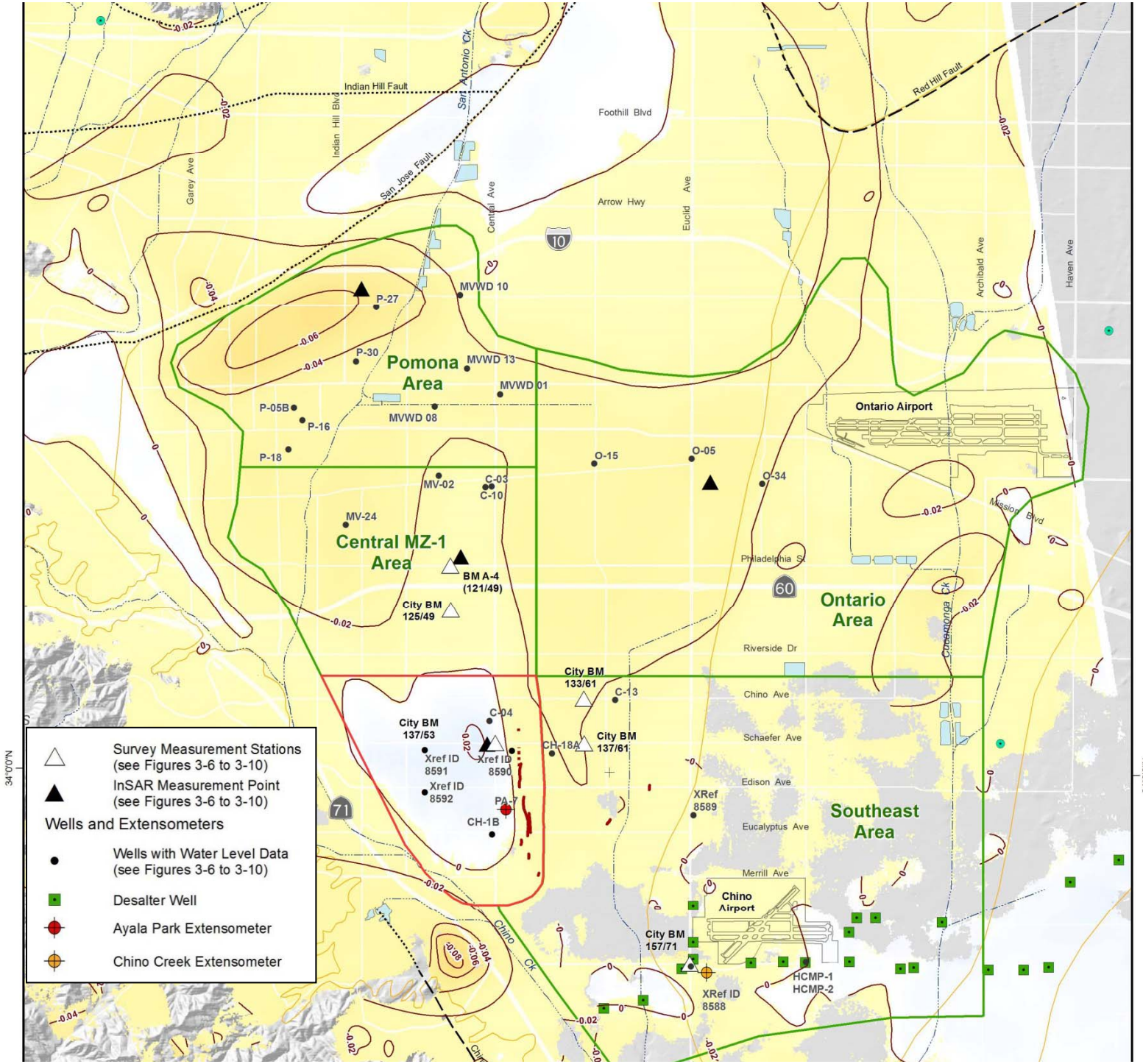
*Positive compression values represent compression of soils, negative compression values represent expansion of soils

Land Subsidence Committee
2013 Annual Report

Stress-Strain Diagram
PA-7 Piezometer vs. Deep Extensometer

Figure 3-3


Pomona Area
Central MZ-1 Area
Ontario Area
Southeast Area
Ontario Airport
Chino Airport
P-30
P-5B
BRK 2
BRK 1
MVWD 1
P-18
MVWD 2
P-26
MVWD 14
MVWD 24
P-29
C-15
C-4
12th&G
McCalla
Schaefer
Schaefer 3921
CH-16
C-7
CH-19
CH-7C
CH-18A
YMCA
MW 33S
CH-CH-15A 1A 15B 1B
MW 22DR
MW-24S
MW-24I
CH-5
C-TW 1
XRef 404
CDF 17
College Park
XRef 5767
HCMP-3
HCMP-1
HCMP-2
HCMP-4
I-1
I-2
I-3
I-4
I-5
I-6
I-7
I-8
I-9
I-10
I-11
I-13
I-14
I-15
I-16
I-17
I-18
I-20
I-21
CD1-MW1
RP2-MW1
XRef 5366
II-1
II-2
Survey Benchmarks
Class A Monuments
Class B Monuments
Exisiting Monuments
New Monuments installed in Pomona Area during 2013-14
Survey Areas
Southeast Area
Fissure Zone
Managed Area
San Jose Fault Zone
San Jose Fault
Chino Fault
Chino Ck
Cucamonga Ck
Santa Ana River
Garey Ave
Central Ave
Euclid Ave
Archibald Ave
Haven Ave
Arrow Hwy
Mission Blvd
Philadelphia St
Riverside Dr
Chino Ave
Schaefer Ave
Edison Ave
Merrill Ave
10
60
71
34°0'0"N


Survey Measurement Stations
(see Figures 3-6 to 3-10)
InSAR Measurement Point
(see Figures 3-6 to 3-10)
Wells and Extensometers
Wells with Water Level Data
(see Figures 3-6 to 3-10)
Desalter Well
Ayala Park Extensometer
Chino Creek Extensometer
Pomona Area
Central MZ-1 Area
Ontario Area
Southeast Area
Ontario Airport
Chino Airport
Indian Hill Fault
San Jose Fault
Red Hill Fault
San Antonio Ck
Chino Ck
Cucamonga Ck
Foothill Blvd
Arrow Hwy
Philadelphia St
Riverside Dr
Chino Ave
Schaefer Ave
Edison Ave
Eucalyptus Ave
Merrill Ave
Mission Blvd
Garey Ave
Central Ave
Euclid Ave
Archibald Ave
Haven Ave
Indian Hill Blvd
P-27
P-30
P-05B
P-16
P-18
MVWD 10
MVWD 13
MVWD 01
MVWD 08
MV-02
MV-24
C-03
C-10
O-15
O-05
O-34
BM A-4
(121/49)
City BM
125/49
City BM
133/61
C-13
C-04
City BM
137/53
City BM
137/61
CH-18A
Xref ID
8591
Xref ID
8590
Xref ID
8592
PA-7
CH-1B
XRef
8589
City BM
157/71
XRef ID
8588
HCMP-1
HCMP-2
10
60
71
34°0'0"N
-0.02
-0.04
-0.06
-0.08
0

Discussion

- Comments?
- Questions?

2013 Annual Report
of the Land Subsidence Committee

- LSC submit final comments electronically to Watermaster:

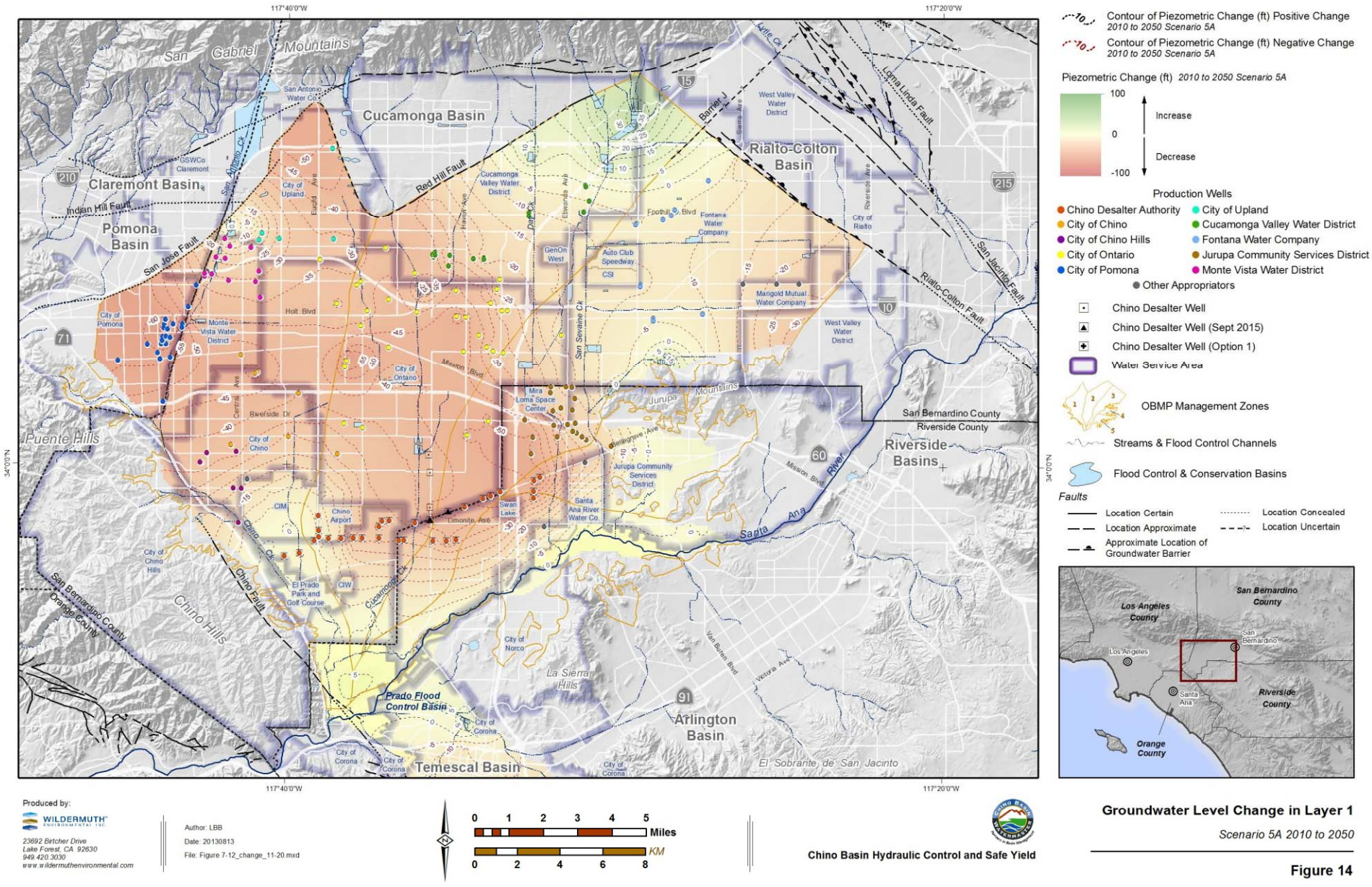
  Tuesday, June 24, 2014

- Final draft submitted for the Watermaster Pool Process to approve, approve with revisions, or not approve:

  July 2014

- Submission of final report to Court:

  August 2014



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Chino Basin Hydraulic Control and Safe Yield

Groundwater Level Change in Layer 1

Scenario 5A 2010 to 2050

Figure 14

Table 1
Work Breakdown Structure
Land Subsidence Monitoring Program -- FY2014-15

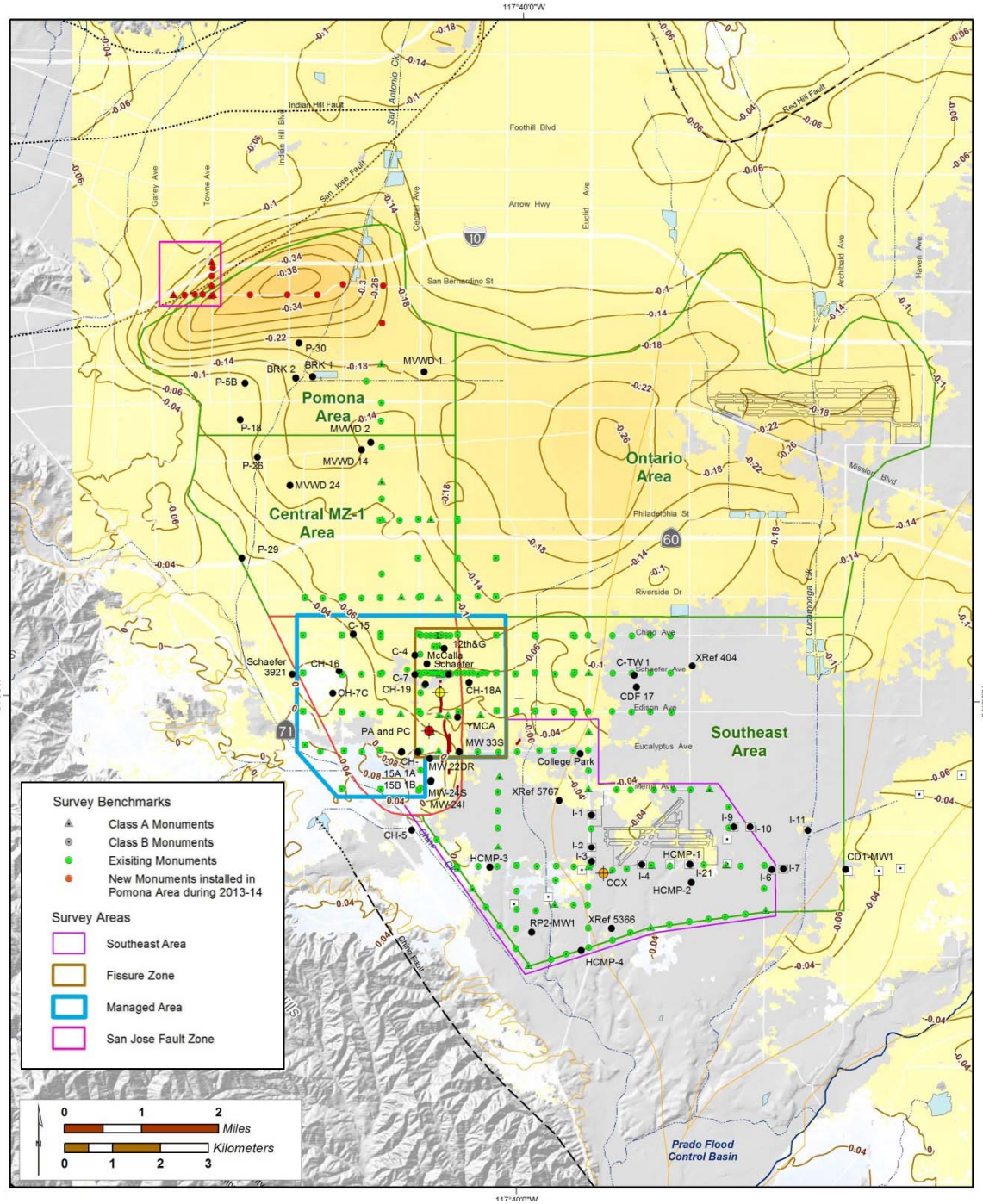
Task/Subtask/Description	Notes	Labor		Total Labor	Other Direct Costs					Total ODC	Totals					2014-15 Budget Compared to 2013-14 Budget		
		Task Repetition Multiplier	Person Days		Travel	Equip and Expend	Subs	Repro	Misc.		Recommended Tasks *2014-15*	Potential Carryover from 2013-14	Budget *2014-15*	Estimated Future O & M	Potential Future Tasks	Approved Budget *2013-14*	Variance with Carryover	Variance without Carryover
Task 1 -- Setup/Maintenance of Monitoring Network											**$63,593**	**$0**	**$63,593**	**$36,992**	**$57,192**	**$56,214**	**$7,379**	**$7,379**
1.1 Equipment maintenance	(1)																	
Routine maintenance of Ayala Park/CCWF extensometer facilities		12	12	$9,330	$384	$278				$662	$9,992		$9,992	$9,992		$9,942	$50	$50
Maintenance at horizontal extensometer site		2	4	$3,940	$64		$11,400			$11,464	$15,404		$15,404	$15,404		$17,264	-$1,860	-$1,860
Replacement/repair of equipment at extensometer facilities		1	17	$18,420	$32	$13,435	$3,000			$16,467	$34,887		$34,887	$10,000		$27,412	$7,475	$7,475
1.2 Annual lease fees for CCWF extensometer site	(1)	1	0	$0					$1,596	$1,596	$1,596		$1,596	$1,596		$1,596	$0	$0
1.3 Maintenance of PB facility	(3)																	
Remove in situ equipment from the wells		1	2	$1,650	$64					$64	$1,714		$1,714		$57,192	$0	$1,714	$1,714
Task 2 -- MZ-1: Aquifer-System Monitoring and Testing											**$198,761**	**$191,608**	**$7,153**	**$16,371**	**$19,030**	**$83,841**	**-$76,688**	**$114,920**
2.1 Groundwater-level and extensometer data collection and organization	(1)																	
Download data from the Ayala Park facility		4	2.5	$1,960	$128	$48				$176	$2,136		$2,136	$2,136		$2,948	-$813	-$813
Download data from the Daniels Horizontal Extensometer facility		3	1.125	$983	$96	$21				$117	$1,100		$1,100	$1,100		$2,898	-$1,798	-$1,798
Download data from the CCWF facility		4	2.5	$1,960	$128	$48				$176	$2,136		$2,136	$2,136		$2,298	-$163	-$163
Process, check, and upload data to database		4	9	$11,000						$0	$11,000		$11,000	$11,000		$5,320	$5,680	$5,680
2.2 Conduct Long-Term Pumping Test in the Managed Area	(1)																	
Coordinate testing with pumpers		1	1	$1,320						$0	$1,320		$1,320			$1,320	$0	$0
Collect field data; process and upload to database		1	2.8	$2,823						$0	$2,823		$2,823			$7,290	-$4,468	-$4,468
Prepare, analyze, and distribute stress-strain diagrams to LSC		4	2.5	$3,500				$200		$200	$3,700		$3,700			$4,760	-$1,060	-$1,060
Adjust Extensometer Hardware		2	1	$1,970						$0	$1,970		$1,970				$1,970	$1,970
2.3 Conduct Injection Test in Managed Area	(1)																	
Well rehabilitation and retrofit		2	1.5	$1,310			$141,640			$141,640	$142,950	$142,950	$0			$41,655	-$41,655	$101,295
Quarterly reports - LGA Grant		3	9	$11,880						$0	$11,880	$11,880	$0			$10,340	-$10,340	$1,540
Project administration - LGA Grant		1	4.4	$5,868						$0	$5,868	$5,868	$0				$0	$5,868
Prepare final report for LGA Grant		1	8.9	$11,880						$0	$11,880	$11,880	$0				$0	$11,880
Injection pilot testing - collect and process data from transducer network 1 time during cycle testing and contribute the analysis of data.		1	7.9	$8,987	$44					$44		$9,031	-$9,031		$9,031	$5,012	-$14,043	-$5,012
Analyze data collected during cycle tests and contribute interpretation to LSC Annual Report		1	7.8	$9,999						$0		$9,999	-$9,999		$9,999		-$9,999	$0
Task 3 -- Basin Wide: InSAR											**$92,830**	**$0**	**$92,830**	**$92,830**	**$0**	**$92,830**	**$0**	**$0**
3.1 InSAR data collection	(1)	1	1	$1,320			$90,000			$90,000	$91,320		$91,320	$91,320		$91,320	$0	$0
3.2 Process and upload data to database/GIS	(1)	1	1.25	$1,510						$0	$1,510		$1,510	$1,510		$1,510	$0	$0
Task 4 -- Ground-Level Surveys											**$123,955**	**$37,260**	**$86,695**	**$86,695**	**$44,265**	**$121,880**	**-$35,185**	**$2,075**
4.1 Replace destroyed benchmarks	(2)	1	0	$0			$5,000			$5,000	$5,000		$5,000	$5,000		$5,400	-$400	-$400
4.2 Conduct Fall 2014 ground-level and EDM survey in Managed Area	(1)	1	0.25	$330			$34,770			$34,770	$35,100		$35,100	$35,100		$28,560	$6,540	$6,540
4.3 Conduct Fall 2014 ground-level survey in Central MZ-1 Area	(3)	1	0.25	$330			$19,855			$19,855					$20,185			
4.4 Conduct Fall 2014 ground-level survey in Southeast Area (CCWF)	(3)	1	0.25	$330			$26,315			$26,315	$26,645		$26,645	$26,645		$27,700	-$1,055	-$1,055
4.5 Conduct Fall 2014 ground-level and EDM survey in Pomona Area (Ayala Park start)	(3)	1	0.25	$330			$23,750			$23,750					$24,080	$29,480	-$29,480	-$29,480
4.6 Conduct Fall 2014 ground-level and EDM survey at the Pomona Fault Zone	(3)	1	0.25	$330			$17,860			$17,860	$18,190		$18,190	$18,190			$18,190	$18,190
4.7 Conduct Spring 2015 ground-level and EDM survey in Managed Area	(1)	1	0.5	$660			$36,600			$36,600	$37,260	$37,260	$0			$28,560	-$28,560	$8,700
4.8 Process and upload data to database	(1)	1	1.5	$1,760						$0	$1,760		$1,760	$1,760		$2,180	-$420	-$420
Task 5 -- Data Analysis and Reporting											**$68,720**	**$0**	**$68,720**	**$68,720**	**$15,840**	**$68,770**	**-$50**	**-$50**
5.1 Data analysis in Managed Area	(1)																	
Production/piezometric/extensometer		1	6	$7,360			$20,000			$20,000	$27,360		$27,360	$27,360		$27,590	-$230	-$230
EDM and ground-level survey data		1	5	$5,180						$0	$5,180		$5,180	$5,180		$8,000	-$2,820	-$2,820
InSAR data		1	1	$1,160						$0	$1,160		$1,160	$1,160		$1,160	$0	$0
Tectonic data		1	0.5	$500						$0	$500		$500	$500		$500	$0	$0
Recycled water reuse data		1	3.5	$3,660						$0	$3,660		$3,660	$3,660		$660	$3,000	$3,000
5.2 Prepare MZ-1 Annual Report	(1)																	
Prepare draft technical memorandum		1	20	$23,560				$200		$200	$23,760		$23,760	$23,760		$23,760	$0	$0
Prepare final technical memorandum		1	5.5	$6,800				$300		$300	$7,100		$7,100	$7,100		$7,100	$0	$0
5.3 Update MZ-1 Plan (if necessary)	(1)	1	10.5	$15,640				$200		$200					$15,840		$0	
Task 6 -- Meetings and Administration											**$28,077**	**$0**	**$28,077**	**$28,077**	**$0**	**$27,675**	**$402**	**$402**
6.1 Prepare for and attend Land Subsidence Committee meetings	(1)	2	6	$8,720	$91					$91	$8,811		$8,811	$8,811		$9,630	-$819	-$819
6.2 Ad hoc meetings	(1)	1	3	$4,360	$46					$46	$4,406		$4,406	$4,406		$3,186	$1,220	$1,220
6.3 Project Administration and Financial Reporting	(1)	12	7.5	$10,500						$0	$10,500		$10,500	$10,500		$10,500	$0	$0
6.4 Scope and Budget for FY2015/16	(1)	1	3	$4,360						$0	$4,360		$4,360	$4,360		$4,360	$0	$0
Totals											**$575,936**	**$228,868**	**$347,067**	**$329,684**	**$136,327**	**$451,210**	**-$104,143**	**$124,726**

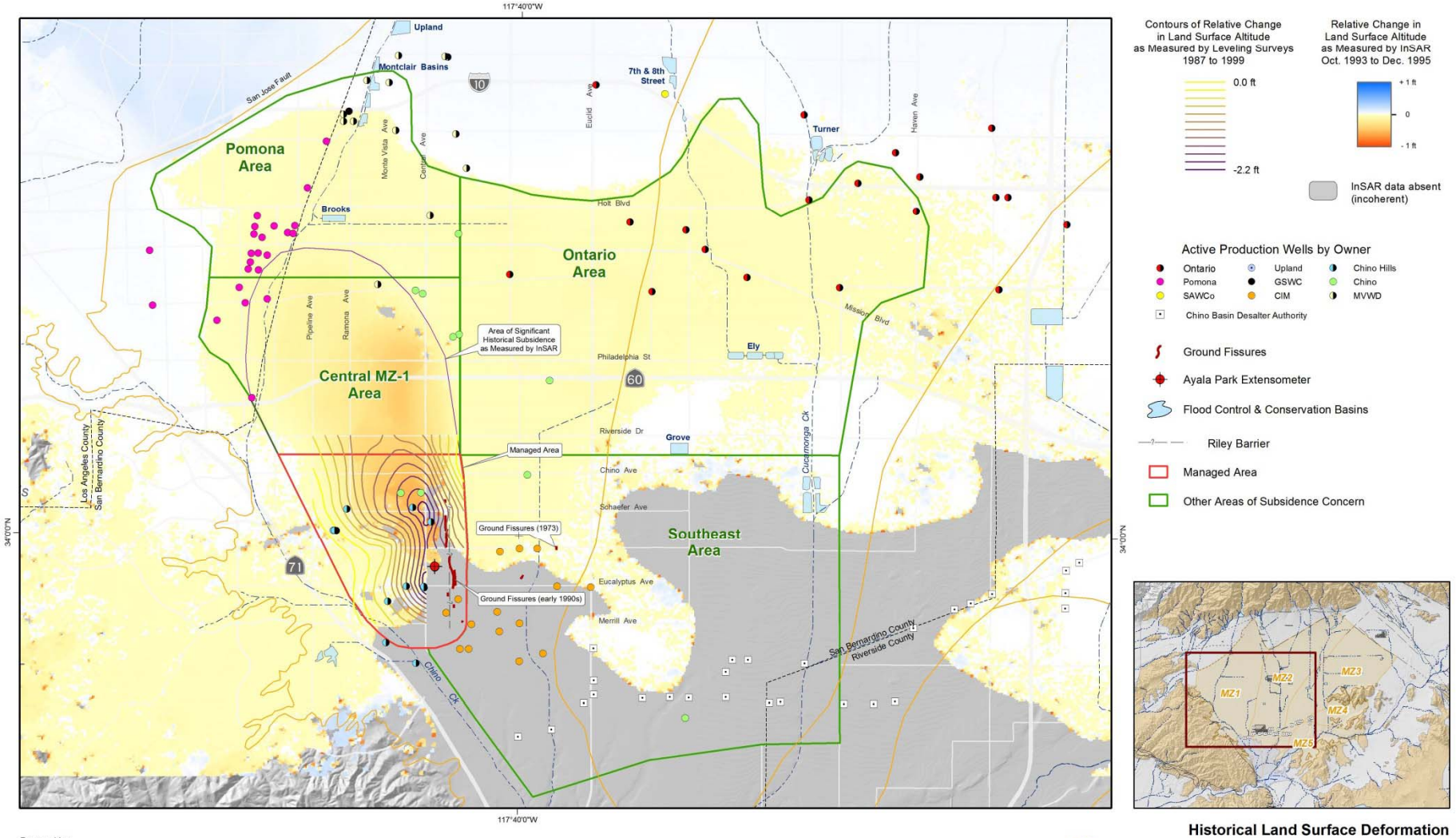
Notes:

(1) Required by MZ-1 Plan and/or Peace Agreement

(2) Contingency budget. Spent only if necessary.

(3) Discretionary task. Performed if recommended by the Land Subsidence Committee


117°40'0"W
34°0'0"N
Pomona Area
Central MZ-1 Area
Ontario Area
Southeast Area
Prado Flood Control Basin
Survey Benchmarks
Class A Monuments
Class B Monuments
Exisiting Monuments
New Monuments installed in Pomona Area during 2013-14
Survey Areas
Southeast Area
Fissure Zone
Managed Area
San Jose Fault Zone
0 1 2 Miles
0 1 2 3 Kilometers



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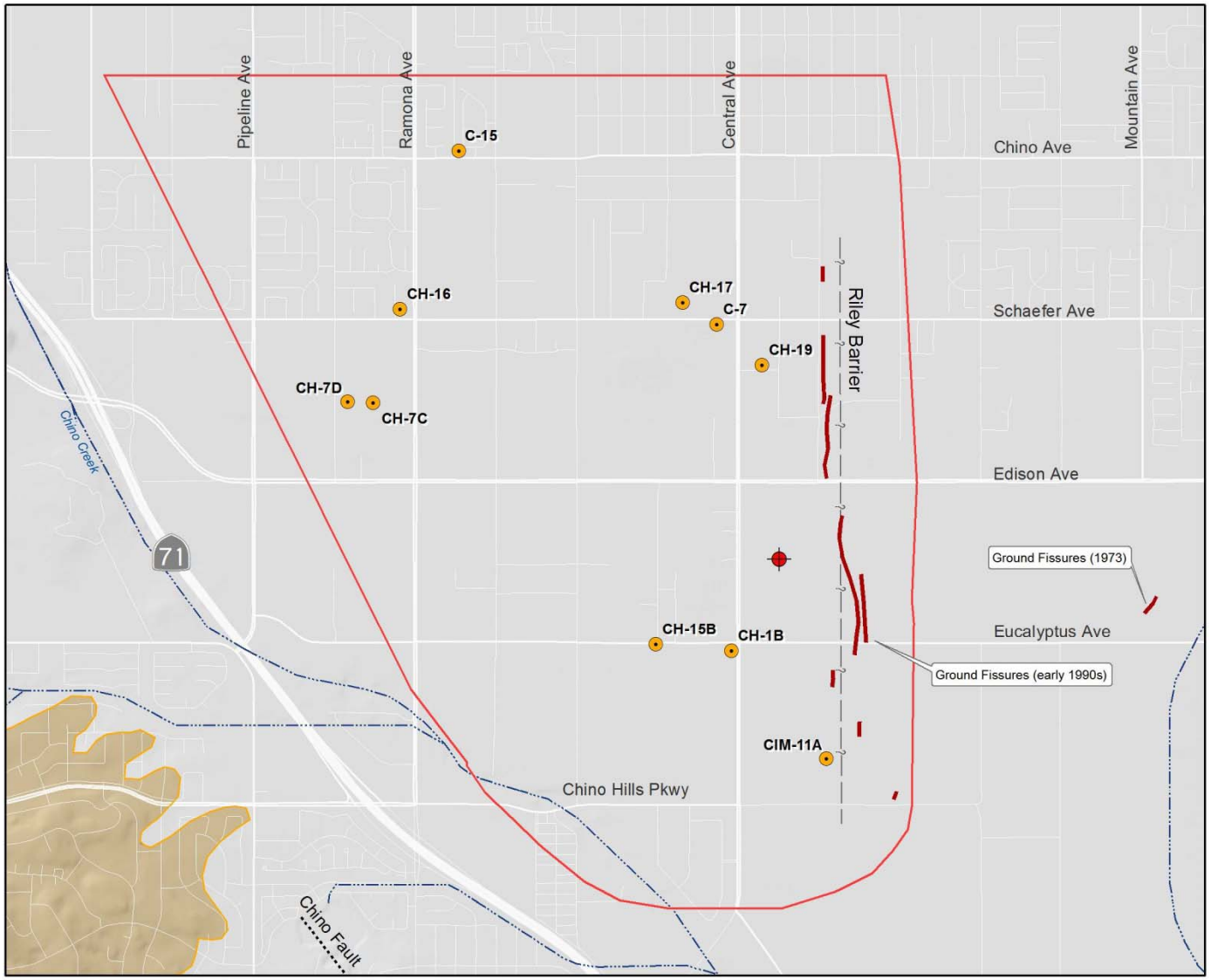
2013 Annual Report

Historical Land Surface Deformation in Management Zone 1
Leveling Surveys (1987 to 1999) and InSAR (1993 to 1995)

Figure 1-1



MZ-1 Managed Well

Ayala Park Extensometer

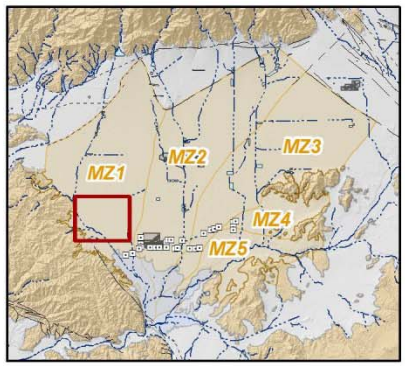
Managed Area

Ground Fissures

Approximate Location of Riley Barrier

Faults

Location Concealed



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0 0.5 1 Miles

0 0.5 1 1.5 Kilometers

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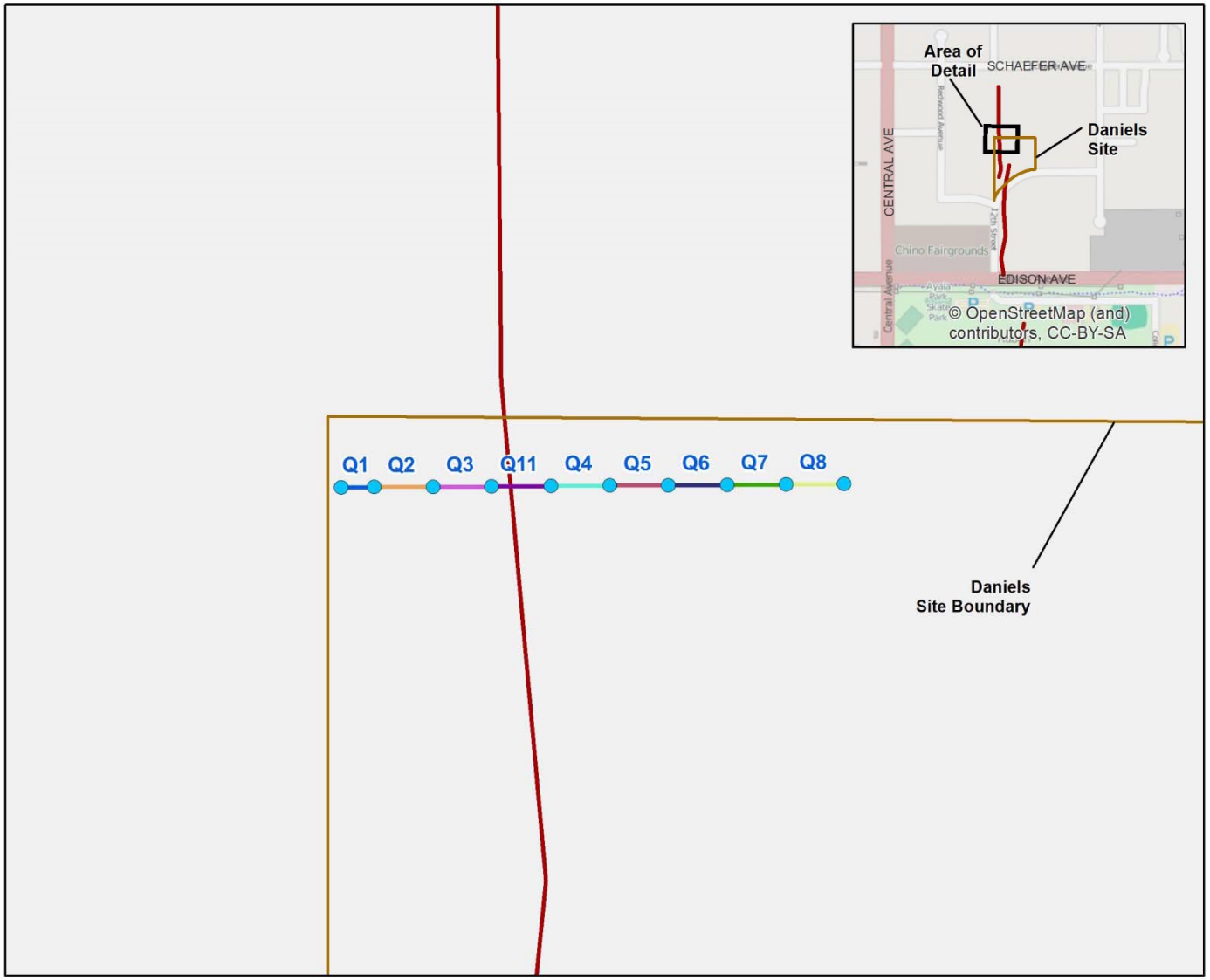
2013 Annual Report

MZ-1 Managed Area and Managed Wells

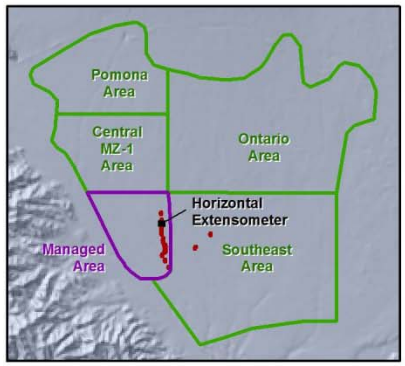
Figure 1-2



Horizontal Extensometer Benchmark

Quartz Tube Extensometer
color corresponds to recorded deforamtion shown on Figure 3-5

Historical Ground Fissures (1990s)



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0 20 40 60 80 100 Feet
0 10 20 30 Meters

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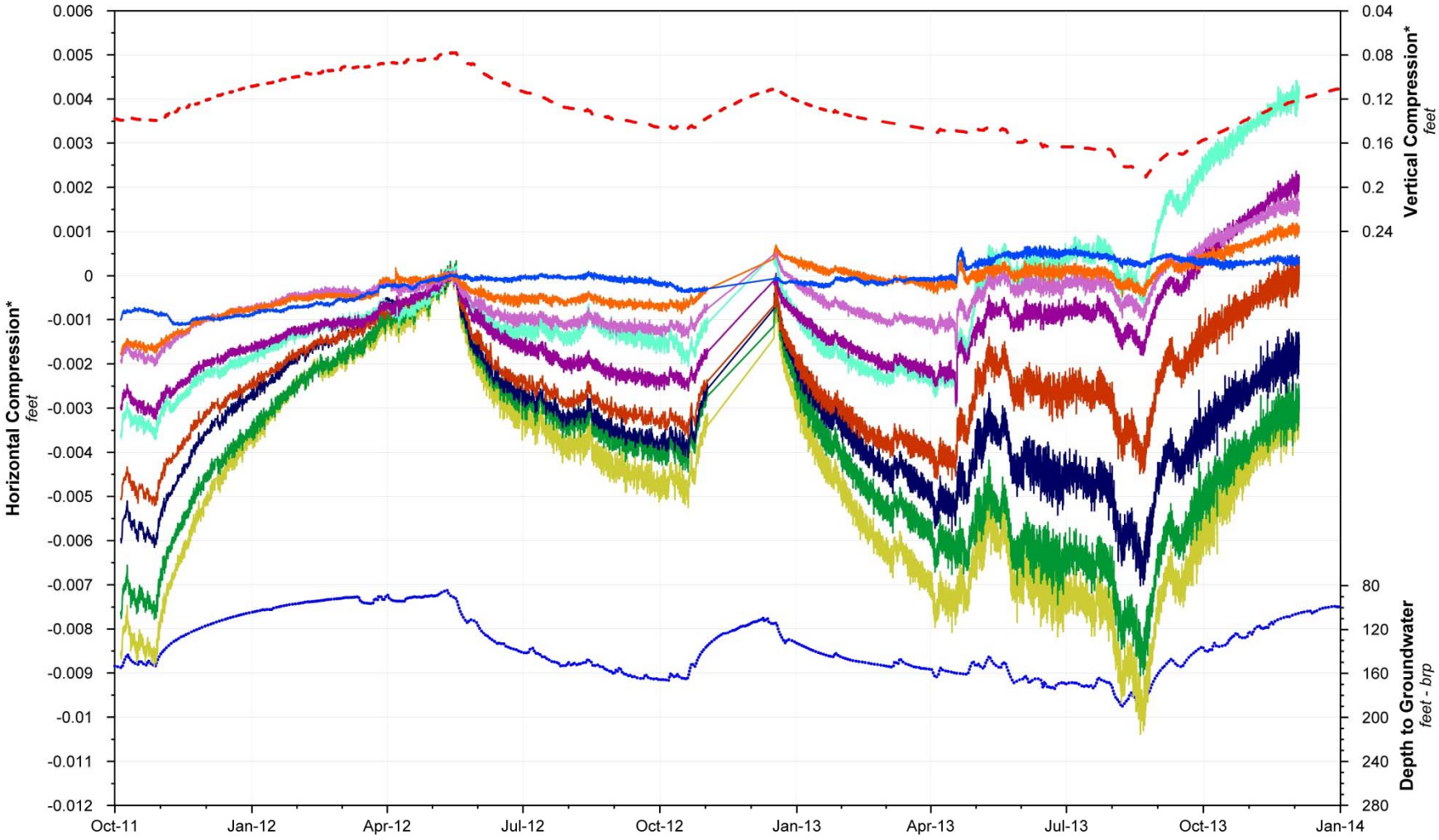
2013 Annual Report

Location of the Daniels Horizontal Extensometer

Figure 3-6



Cumulative Displacement of Horizontal Extensometers

- Q1 (west)
- Q2
- Q3
- Q11 (historical fissure)
- Q4
- Q5
- Q6
- Q7
- Q8 (east)

Displacement is cumulative from west to east

Vertical Compression of the Aquifer System West of the Fissure Zone

- Ayala Park Deep Extensometer

Depth to Groundwater West of the Fissure Zone at Ayala Park

- DTW- PA-7

*Positive compression values represent compression of soils, negative compression values represent expansion of soils.

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Horizontal Deformation at the Daniels Horizontal Extensometer

Figure 3-7