



***Appendix CC
Encina Wastewater Authority
Response to Request for Information
regarding the Encina Ocean Outfall
as a Brine Discharge Alternative for
the Carlsbad Desalination Plant***

***Renewal of NPDES CA0109223
Carlsbad Desalination Project***



ENCINA WASTEWATER AUTHORITY

A Public Agency

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July 20, 2016

Mr. Peter MacLaggan, Vice President
Poseidon Channelside
5780 Fleet St, Ste 140
Carlsbad, CA 92008

**Subject: Response to Request for Information regarding the Encina Ocean Outfall as a
Brine Discharge Alternative for the Carlsbad Desalination Plant**

Dear Mr. MacLaggan:

In accordance with our recent communications, the Encina Wastewater Authority (EWA) has prepared responses to your request for information on the Encina Ocean Outfall to facilitate the Poseidon Channelside (Poseidon) feasibility assessment for discharging a portion of the brine from the Claude "Bud" Lewis Carlsbad Desalination Plant (CDP). We understand that Poseidon's feasibility assessment of the Outfall is at the request of the San Diego Regional Water Quality Control Board (Regional Board), as part of the review process of Poseidon's Amended Report of Waste Discharge (ROWD).

OUTFALL AND DIFFUSER DESIGN AND OPERATION

The Encina Ocean Outfall system consists of a surge tower and effluent pump station that discharge to a 200-foot section of 84-inch reinforced concrete pipe (RCP), which ties into a 6,400-foot section of 48-inch diameter RCP, and subsequently into a 2,300-foot section of 72-inch RCP. The final 800 feet of the 72-inch RCP includes a 136-port diffuser section (68 on each side of the pipe), with depths between approximately 135 and 170 ft below MLLW.

The numbering convention for the diffuser ports starts with no. 1 located nearest to the end section of the Outfall, with odd numbers along the north side of the pipe increasing as one progresses toward the shore, and even numbers along the south side. Diffuser port nos. 1-48 are 3-inch internal diameter (ID); port nos. 49-92 are 2.75-inch ID; and port nos. 93-136 are 2.5-inch ID.

See Figure 1 below for a sketch of the existing Outfall and Figure 2 for a plan and profile diagram.

Figure 1. Existing Encina Ocean Outfall sketch (ref: UGI 2011)

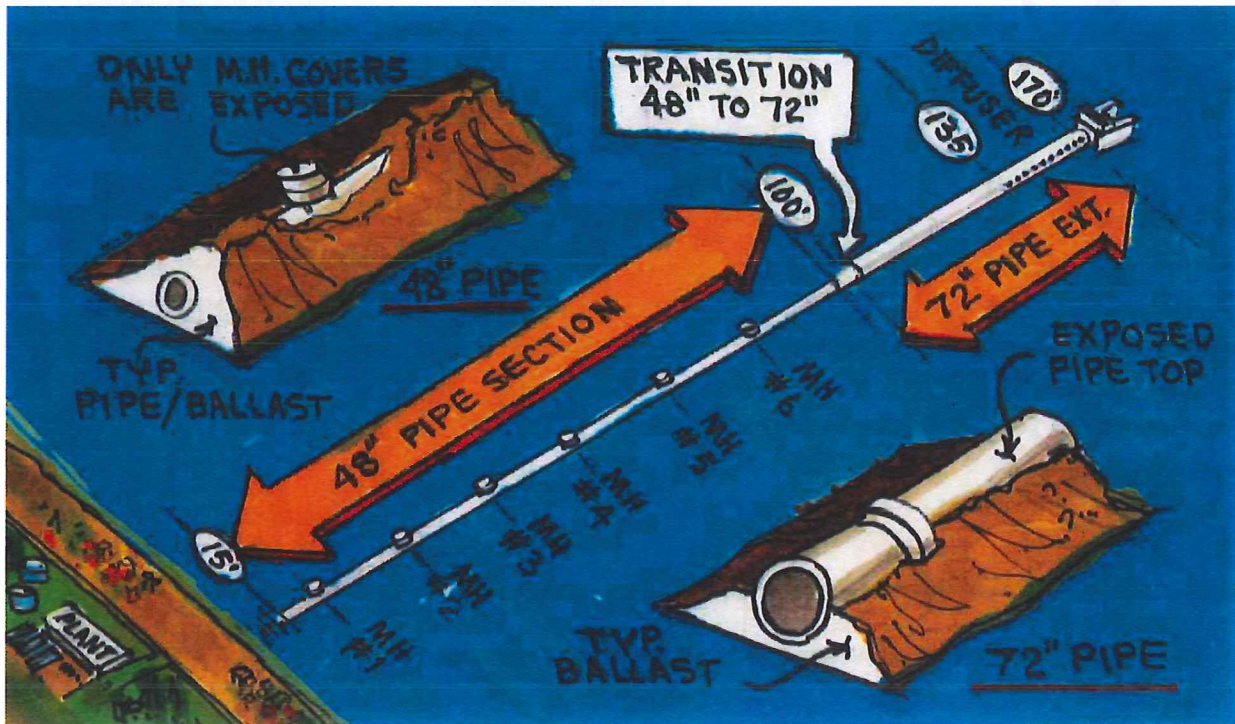
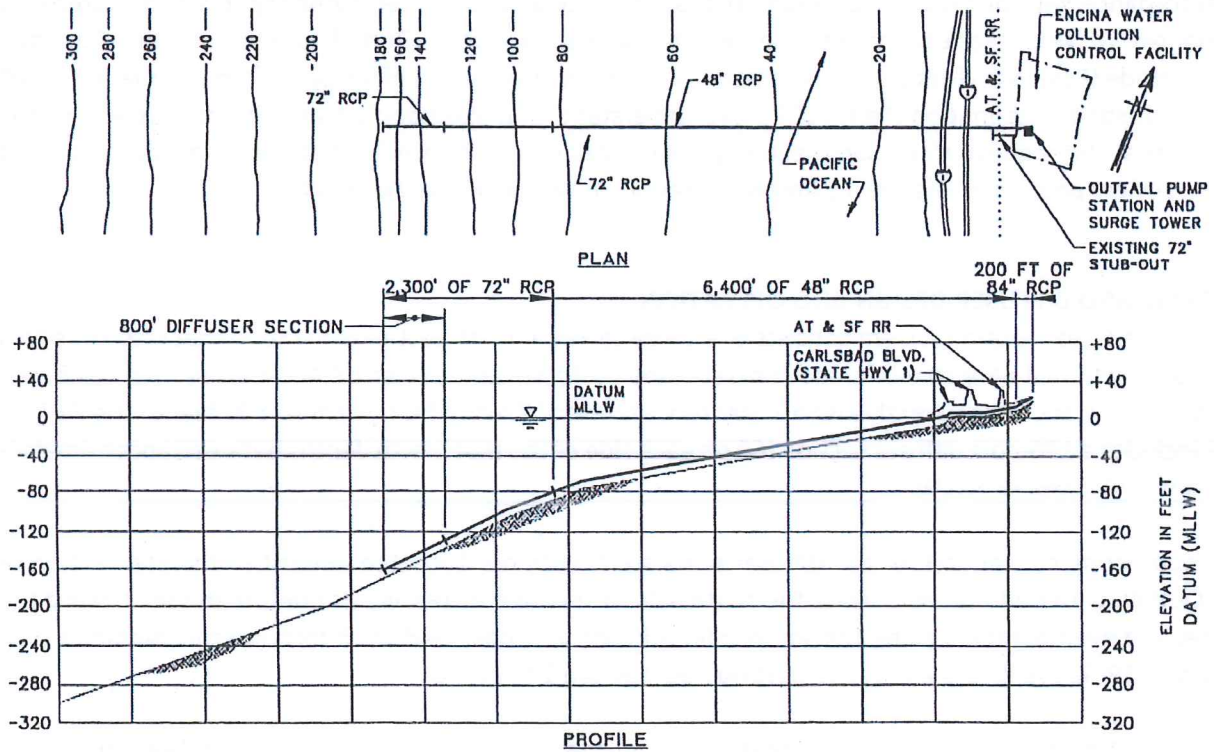


Figure 2. Existing Encina Ocean Outfall Plan and Profile (ref: MWH 1999)



OUTFALL CAPACITY

The Outfall capacity was rated at 75 mgd at the highest recorded tide of 8.3 ft above MLLW, based on field tests performed in 1995. This also accounts for the maximum allowable hydrostatic pressure on the 48-inch RCP portion of the outfall (i.e., the oldest portion), which corresponds to a maximum surge tower water elevation of 46.8 ft above MLLW. Based on a risk assessment performed in 1999, the maximum capacity was estimated to be higher, ranging from about 77 to 87 mgd depending on the tides. For the purposes of the calculations herein, a maximum Outfall capacity of 75 mgd was conservatively selected. It should be noted that this is lower than the hydraulic capacity of the Encina Water Pollution Control Facility (EWPCF), which is rated at 115 mgd.

WASTEWATER EFFLUENT

The wastewater effluent disposed of via the Outfall consists mostly of secondary effluent from the EWPCF. In addition to the EWPCF effluent, Vallecitos Water District (Vallecitos) diverts secondary effluent from its Meadowlark Water Reclamation Facility (WRF) to the outfall when their recycled water is out of compliance, during and after wet weather events when recycled water demand is low (after filling Mahr Reservoir), or as a failsafe (if the full plant capacity must be diverted).

Currently, there are two non-potable reuse treatment facilities that utilize EWPCF secondary effluent as the influent to their treatment process, thus diverting it from the Outfall. These are the Carlsbad WRF (owned by the City of Carlsbad and operated by EWA), and the Gafner WRP (owned and operated by Leucadia Wastewater District [Leucadia]). A portion of EWPCF secondary effluent is also treated within the EWPCF for in-plant non-potable uses (e.g., equipment washdown); however, most of this water makes it back into the plant's process flows and thus we have not subtracted it from the Outfall flows.

MONTHLY FLOW PROJECTIONS FOR 2018, 2025, 2030, AND 2040

To determine the average and minimum outfall capacity available in 2018, 2025, 2030, and 2040—as well as the average and minimum wastewater effluent available for blending—historical flow data and flow projections were reviewed for the following facilities as detailed below:

- EWPCF
 - 2018 flows were based on monthly flow data from January 2014 – May 2016.
 - 2020-2040 flows were based on the projections developed as part of the EWPCF Process Master Plan (Carollo 2016, not yet complete).
- Meadowlark WRF
 - 2018-2040 flows were projected based on information provided by Vallecitos in July 2016.
- Carlsbad WRF
 - 2018 flows were based on monthly flow data from January 2014 – May 2016.
 - 2018-2040 flows were projected based on information provided by the City of Carlsbad in July 2016.
- Gafner WRF
 - 2018-2040 flows were based on monthly flow data from January 2014 – May 2016. No changes are currently planned.

The complete monthly flow projections by year are presented in tabular format in Attachment 1.

DIURNAL FLOW CURVES FOR 2018, 2025, 2030, AND 2040

Given that the primary driver of wastewater effluent flows discharged via the Outfall is the flow from EWPCF, a diurnal flow curve for EWPCF was developed using recent dry-weather flow data. This reflects intraday flow variability, which impacts both the available Outfall capacity and the wastewater effluent available for blending described above. Because the makeup of EWA's sewershed is not expected to change significantly over time (i.e., the primary sewer contributor is and will continue to be residential), the diurnal flow curve shape was assumed to remain constant at the projected flow rates. The projected diurnal curves and associated tabular data are included in Attachment 2.

POTENTIAL DISRUPTIONS TO OUTFALL CAPACITY

During significant precipitation events, up to the full Outfall capacity **may be required** to be used by the Encina WPCF to pass the peak flows due to wastewater infiltration and inflow (I&I) throughout the collection system. Historically, these periods of increased effluent discharge typically last only a few days, but could be as long as a week or two depending on storm characteristics (e.g., intensity, duration, antecedent conditions).

Construction of a 7.5-million gallon storage facility was completed in 2005 and one of its functions is to provide secondary effluent flow equalization for managing wet weather events. Based on peak flow management studies most recently updated in 2011, the existing 7.5-million gallon storage facility is expected to be sufficient to protect against the 10-year return period precipitation event (i.e., the 10% annual exceedance probability event) through 2040 with no modifications to the Outfall. It should be noted that, if the storage volume is exceeded during a peak wet weather event, the consequence would be discharge of excess secondary effluent to the onsite flood control channel (Encinas Creek), not to the Outfall (which would likely be in use simultaneously at or near its capacity).

POTENTIAL DISRUPTIONS TO WASTEWATER EFFLUENT AVAILABLE FOR BLENDING

Other than the projected recycled water diversions previously described, we do not anticipate additional disruptions of wastewater effluent available for blending. However, the plans for recycled water use by EWA member agencies are always being reevaluated and could increase from what has currently been identified.

REFERENCES

References used to develop this letter include the following:

Carollo Engineers (Carollo), 2016. Encina Wastewater Authority Process Master Plan, Technical Memorandum No. 1 – Flows and Loadings. May 2016.

EcoSystems Management Associates, Inc. (ECO-M), 2015. Encina Wastewater Authority Year 2015 Ocean Outfall Inspection and Maintenance. June 2015.

Montgomery Watson (MWH), 1999. Encina Wastewater Authority Peak Flow Management Plan. October 1999.

RMC Water and Environment (RMC), 2011. Encina Wastewater Authority Equalization Storage 2011 Update. January 2011.

Undersea Graphics Inc. (UGI), 2011. Encina Wastewater Authority Ocean Outfall Inspection 2010. May 2011.

If you would like any of the reference material, would like clarification of the information presented herein, or have additional questions, please call me at (760) 268 8812 or email me at kirplonk@encinajpa.com.

Sincerely,



Kirsten Plonka, P.E.
Director of Engineering

Attachments:

Attachment 1: Encina Ocean Outfall Effluent and Capacity – Monthly Flow Projections

Attachment 2: EWPCF Wastewater Diurnal Curve

Encina Ocean Outfall Effluent and Capacity Monthly Flow Projections

2025 - Average Wastewater Effluent Flows (Average Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												Annual Avg.
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Encina WPCF Secondary Effluent	25.7	25.8	25.9	25.4	24.7	24.8	25.1	24.8	24.5	24.1	24.1	26.0	25.0
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	5.0	3.1	3.3	2.0	4.6	0.7	0.0	0.0	1.4	0.8	1.5	3.9	2.2
Carlsbad WRF (taken from EWPCF SE)	1.5	2.0	2.1	3.1	3.7	8.0	4.1	3.9	3.3	2.8	1.9	1.5	3.2
Leucadia Gafner WRF (taken from EWPCF SE)	0.1	0.1	0.2	0.4	0.3	0.5	0.5	0.4	0.3	0.4	0.3	0.0	0.3
TOTAL EFFLUENT TO OUTFALL	29.0	26.8	26.8	24.0	25.3	17.0	20.5	20.5	22.3	21.8	23.5	28.4	23.8
REMAINING OUTFALL CAPACITY	46.0	48.2	48.2	51.0	49.7	58.0	54.5	54.5	52.7	53.2	51.5	46.6	51.2

2025 - Minimum Wastewater Effluent Flows (Maximum Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												Annual Avg.
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Encina WPCF Secondary Effluent	23.6	23.7	23.8	23.4	22.7	22.9	23.1	22.9	22.5	22.2	22.2	23.9	23.0
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carlsbad WRF (taken from EWPCF SE)	1.5	3.6	3.9	5.6	6.8	8.0	8.0	8.0	6.1	5.1	3.4	2.4	5.2
Leucadia Gafner WRF (taken from EWPCF SE)	0.1	0.3	0.4	0.6	0.8	0.8	0.8	0.8	0.6	0.6	0.4	0.1	0.5
TOTAL EFFLUENT TO OUTFALL	22.0	19.8	19.5	17.2	15.2	14.1	14.3	14.1	15.9	16.5	18.4	21.4	17.4
REMAINING OUTFALL CAPACITY	53.0	55.2	55.5	57.8	59.8	60.9	60.7	60.9	59.1	58.5	56.6	53.6	57.6

2025 - Maximum Wastewater Effluent Flows (Minimum Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												Annual Avg.
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Encina WPCF Secondary Effluent	28.2	28.4	28.5	28.0	27.2	27.3	27.6	27.3	26.9	26.5	26.5	28.6	27.5
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Carlsbad WRF (taken from EWPCF SE)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Leucadia Gafner WRF (taken from EWPCF SE)	0.0	0.0	0.3	0.4	0.1	0.6	0.5	0.5	0.3	0.4	0.4	0.0	0.3
TOTAL EFFLUENT TO OUTFALL	31.7	31.9	31.7	31.1	30.6	30.2	30.6	30.3	30.1	29.6	29.6	32.1	30.8
REMAINING OUTFALL CAPACITY	43.3	43.1	43.3	43.9	44.4	44.8	44.4	44.7	44.9	45.4	45.4	42.9	44.2

Encina Ocean Outfall Effluent and Capacity Monthly Flow Projections

2030 - Average Wastewater Effluent Flows (Average Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Avg.
Encina WPCF Secondary Effluent	27.7	27.8	28.0	27.5	26.7	26.8	27.1	26.8	26.4	26.1	26.1	28.1	27.0
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	6.5	4.0	4.2	2.6	6.0	0.9	0.0	0.0	1.8	1.1	2.0	5.1	2.9
Carlsbad WRF (taken from EWPCF SE)	2.0	2.5	2.7	3.8	4.7	10.0	5.2	4.8	4.2	3.5	2.3	2.0	4.0
Leucadia Gafner WRF (taken from EWPCF SE)	0.0	0.0	0.2	0.3	0.1	0.5	0.5	0.4	0.2	0.4	0.2	0.0	0.2
TOTAL EFFLUENT TO OUTFALL	32.2	29.4	29.3	25.9	28.0	17.2	21.5	21.6	23.9	23.3	25.5	31.2	25.8
REMAINING OUTFALL CAPACITY	42.8	45.6	45.7	49.1	47.0	57.8	53.5	53.4	51.1	51.7	49.5	43.8	49.2

2030 - Minimum Wastewater Effluent Flows (Maximum Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Avg.
Encina WPCF Secondary Effluent	24.9	25.1	25.2	24.7	24.0	24.1	24.4	24.1	23.8	23.5	23.5	25.3	24.3
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carlsbad WRF (taken from EWPCF SE)	2.0	4.5	4.8	7.0	8.5	10.0	10.0	10.0	7.6	6.4	4.2	3.0	6.5
Leucadia Gafner WRF (taken from EWPCF SE)	0.1	0.3	0.4	0.6	0.8	0.8	0.8	0.8	0.6	0.6	0.4	0.1	0.5
TOTAL EFFLUENT TO OUTFALL	22.8	20.2	19.9	17.1	14.8	13.4	13.6	13.4	15.6	16.5	18.8	22.2	17.4
REMAINING OUTFALL CAPACITY	52.2	54.8	55.1	57.9	60.2	61.6	61.4	61.6	59.4	58.5	56.2	52.8	57.6

2030 - Maximum Wastewater Effluent Flows (Minimum Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Avg.
Encina WPCF Secondary Effluent	29.5	29.6	29.7	29.2	28.4	28.5	28.8	28.5	28.1	27.7	27.7	29.9	28.7
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Carlsbad WRF (taken from EWPCF SE)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Leucadia Gafner WRF (taken from EWPCF SE)	0.0	0.0	0.3	0.4	0.1	0.6	0.5	0.5	0.3	0.4	0.4	0.0	0.3
TOTAL EFFLUENT TO OUTFALL	34.0	34.1	33.9	33.3	32.8	32.4	32.8	32.5	32.3	31.8	31.8	34.4	33.0
REMAINING OUTFALL CAPACITY	41.0	40.9	41.1	41.7	42.2	42.6	42.2	42.5	42.7	43.2	43.2	40.6	42.0

Encina Ocean Outfall Effluent and Capacity Monthly Flow Projections

2040 - Average Wastewater Effluent Flows (Average Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												Annual Avg.
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Encina WPCF Secondary Effluent	31.8	32.0	32.1	31.5	30.7	30.8	31.1	30.8	30.4	29.9	29.9	32.3	31.0
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	6.5	4.0	4.2	2.6	6.0	0.9	0.0	0.0	1.8	1.1	2.0	5.1	2.9
Carlsbad WRF (taken from EWPCF SE)	2.0	2.5	2.7	3.8	4.7	10.0	5.2	4.8	4.2	3.5	2.3	2.0	4.0
Leucadia Gafner WRF (taken from EWPCF SE)	0.1	0.1	0.2	0.4	0.3	0.5	0.5	0.4	0.3	0.4	0.3	0.0	0.8
TOTAL EFFLUENT TO OUTFALL	36.2	33.4	33.5	30.0	31.7	21.2	25.5	25.5	27.7	27.1	29.3	35.3	29.7
REMAINING OUTFALL CAPACITY	38.8	41.6	41.5	45.0	43.3	53.8	49.5	49.5	47.3	47.9	45.7	39.7	45.3

2040 - Minimum Wastewater Effluent Flows (Maximum Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												Annual Avg.
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Encina WPCF Secondary Effluent	26.9	27.0	27.1	26.6	25.9	26.0	26.3	26.0	25.7	25.3	25.3	27.3	26.2
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carlsbad WRF (taken from EWPCF SE)	2.0	4.5	4.8	7.0	8.5	10.0	10.0	10.0	7.6	6.4	4.2	3.0	6.5
Leucadia Gafner WRF (taken from EWPCF SE)	0.1	0.3	0.4	0.6	0.8	0.8	0.8	0.8	0.6	0.6	0.4	0.1	0.5
TOTAL EFFLUENT TO OUTFALL	24.8	22.2	21.9	19.1	16.7	15.3	15.5	15.3	17.5	18.3	20.6	24.1	19.3
REMAINING OUTFALL CAPACITY	50.2	52.8	53.1	55.9	58.3	59.7	59.5	59.7	57.5	56.7	54.4	50.9	55.7

2.1 4.8 5.2 7.6 9.2 10.8 10.8 10.8 8.2 7.0 4.6 3.1

2040 - Maximum Wastewater Effluent Flows (Minimum Outfall Capacity Available)

Flow Source / User	Flows to Encina Ocean Outfall, Monthly Avg. (mgd)												Annual Avg.
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Encina WPCF Secondary Effluent	31.8	32.0	32.1	31.5	30.7	30.8	31.1	30.8	30.4	29.9	29.9	32.3	31.0
Vallecitos Secondary Effluent (diverted from Meadowlark WRF)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Carlsbad WRF (taken from EWPCF SE)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Leucadia Gafner WRF (taken from EWPCF SE)	0.0	0.0	0.3	0.4	0.1	0.6	0.5	0.5	0.3	0.4	0.4	0.0	0.3
TOTAL EFFLUENT TO OUTFALL	36.3	36.5	36.3	35.6	35.1	34.7	35.1	34.8	34.6	34.0	34.0	36.8	35.3
REMAINING OUTFALL CAPACITY	38.7	38.5	38.7	39.4	39.9	40.3	39.9	40.2	40.4	41.0	41.0	38.2	39.7

Encina Wastewater Authority EWPCF Wastewater Diurnal Curve (Dry Weather)

Time	Measured Flow ⁽¹⁾ mgd	Projected 2018 Flow mgd	Projected 2025 Flow mgd	Projected 2030 Flow mgd	Projected 2040 Flow mgd
12:00 AM	19.2	20.9	24.7	26.6	30.6
1:00 AM	14.2	15.4	18.2	19.7	22.6
2:00 AM	10.2	11.1	13.1	14.2	16.3
3:00 AM	7.8	8.5	10.0	10.8	12.4
4:00 AM	6.3	6.9	8.1	8.8	10.0
5:00 AM	5.7	6.2	7.3	7.9	9.0
6:00 AM	6.5	7.0	8.3	9.0	10.3
7:00 AM	11.5	12.5	14.7	15.9	18.2
8:00 AM	19.5	21.2	25.0	27.0	31.0
9:00 AM	25.3	27.5	32.4	35.0	40.2
10:00 AM	27.6	30.0	35.4	38.3	43.9
11:00 AM	27.3	29.7	35.0	37.8	43.4
12:00 PM	26.4	28.7	33.8	36.5	41.9
1:00 PM	24.9	27.0	31.9	34.4	39.5
2:00 PM	23.6	25.6	30.2	32.6	37.4
3:00 PM	22.6	24.5	28.9	31.2	35.8
4:00 PM	21.6	23.5	27.7	29.9	34.3
5:00 PM	21.7	23.6	27.8	30.0	34.5
6:00 PM	22.2	24.2	28.5	30.8	35.3
7:00 PM	23.5	25.5	30.1	32.5	37.3
8:00 PM	25.1	27.2	32.1	34.7	39.8
9:00 PM	26.1	28.4	33.4	36.1	41.5
10:00 PM	25.8	28.1	33.1	35.8	41.1
11:00 PM	23.6	25.6	30.2	32.7	37.5
Daily Average	19.5	21.2	25.0	27.0	31.0

Notes:

(1) Measured Flows shown are average hourly dry weather flows calculated from 2-minute interval EWPCF secondary effluent flow data from the three week period from April 25 to May 17, 2015. Days with precipitation reported by NOAA at the Carlsbad Station (US1CASD0062) were excluded from the calculations; these dates are April 26, May 7-8, and May 16.

