APPENDIX 7

Greenhouse Gas Assessment

MEMORANDUM

URBAN CROSSROADS

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JOB NO: 13305-07 GHG Assessment

2020 OPTIMUM BASIN MANAGEMENT PROGRAM UPDATE GREENHOUSE GAS ASSESSMENT

Tom Dodson,

Urban Crossroads, Inc. is pleased to provide the following Greenhouse Gas Assessment for the 2020 Optimum Basin Management Program Update (**Project**) for the Chino Groundwater Basin (Basin), which is generally located within portions of the San Bernardino, Riverside, and Los Angeles counties.

PROJECT OVERVIEW

The OBMPU consists of construction and operation of the various facilities which are separated into four project categories: 1) Project Category 1: Well Development and Monitoring Devices; 2) Project Category 2: Conveyance Facilities and Ancillary Facilities; 3) Project Category 3: Storage Basins, Recharge Facilities, and Storage Bands; and 4) Project Category 4: Desalters and Water Treatment Facilities. The OBMPU is anticipated to be implemented over a 20-year horizon (2020 – 2040). The OBMPU is being proposed to improve both water quality and water reliability for users of the Basin.

SUMMARY OF FINDINGS

Results of the assessment indicate that the Project is consistent with the state and regional objectives, and that there would be a net reduction in GHG emissions with implementation of the Proposed Project. Therefore, the Project would result in a less than significant impact with respect to greenhouse gas emissions.

PROJECT GHG ANALYSIS

Discussion on Establishment of Significance Thresholds

The criteria used to determine the significance of potential Project-related GHG impacts are taken from the Initial Study Checklist in Appendix G of the State *CEQA Guidelines* (14 CCR of Regulations §§15000, et seq.). Based on these significance criteria, a project would result in a significant impact related to GHG if it would (California Air Resources Board):

- GHG-1: Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- GHG-2: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

GHG IMPACTS – CONSISTENCY WITH THRESHOLD NO. 1

Would the Project have the potential to generate direct or indirect GHG emissions that would result in a significant impact on the environment?

CONSTRUCTION

Construction activities associated with the implementation of the proposed Project would result in emissions of CO_2 and CH_4, with the majority of emissions originating from construction equipment burning fossil fuel during construction. As required by AB 197, construction diesel equipment progressively has become more efficient and cleaner due to the phasing out of older equipment and replacing it with new equipment, which has consequently improved emissions technology and electrified construction equipment.

Table 1 summarizes the Lifetime and Amortized GHG emissions associated with construction of the proposed Project. This information was obtained from the Air *Quality and GHG Impact Analysis (Gerrick Environmental)* (Gerrick Enviromental, 2023). The construction "Emissions Per Project Category" are multiplied by the total number of "Projects Per Category Built" in order to determine the total lifetime emissions that are expected to occur.

As shown, the proposed Project will result in approximately 13,669.20 metric tons of carbon dioxide equivalent emissions per year (MTCO2e) over the lifetime of the Project, which amortized annually over the 20-year horizon of the proposed Project would be approximately 683.46 MTCO2e per year.

TABLE 1: OBMPU CONSTRUCTION GHG EMISSIONS

Category	Emissions Per Project Category $MTCO_2e$	Number of Projects Per Category Built	Emissions (MT/yr)
Well Development and Monitoring Devices			
Drill ASR and Monitoring Wells	49.4	207	10,225.8
Install In-Line Flow Meters	0.03	400	12.0
Install Extensometer	1.3	3	3.9
Well Destruction or reconstruction/modification	13.5	5	67.5
Conveyance Facilities and Ancillary Facilities			
Pipeline Install (linear feet for 2 teams)	100.9	620,600	625.6
Booster Station Construction	72.0	18	1,296.0
Reservoir Construction	107.2	14	1,500.8
Storage Basins, Recharge Facilities, and Storage Bands			
Storage Basins Construction with Haul	673.3	4	2,693.2
Storage Basin Modification	102.8	2	205.6
Desalters and Water Treatment Facilities			
Upgrade Existing WTP	229.2	1	229.2
New H20 Purification Facility Construction	463.1	1	463.1
Groundwater Treatment at Well Sites Construction	32.3	20	646.0
New Regional Ground Water Treatment Construction	201.4	4	805.6
Improve Existing Ground Water Treatment Facilities	37.8	1	37.8
		Total Lifetime $MTCO_2e$	***13,669.20***
		Total Annual $MTCO_2e$[1]	***683.46***

[1] It should be noted that the emissions are amortized over a 20-year period

OPERATIONS

In terms of operational GHG emissions, the proposed Project involves the operation of wells, conveyance facilities and ancillary facilities, storage basins, recharge facilities, groundwater basin operations within storage bands, desalters and water treatment facilities, and associated improvements. These components of the proposed Project are all assumed to be powered by electricity that comes from the grid. As the grid moves towards carbon neutrality and renewable sources of energy, with the goal of 100% clean energy by 2045, the facilities identified in the Project are anticipated to incorporate these energy sources by way of state regulatory schemes and the state's long-term climate goals and strategies, such as AB 197, AB 32, SB 32, SB 350, and SB 100.

Further, the proposed Project does not propose any substantive new stationary or mobile sources of GHG emissions, and therefore, by its very nature, will not generate quantifiable GHG emissions from Project operations. The proposed Project does not propose a trip-generating land use or facilities that would generate any substantive amount of on-going GHG emissions. While it is anticipated that the Project would require intermittent maintenance, such maintenance would be minimal, requiring a negligible amount of traffic trips on an annual basis.

Subchapters 4.2 (Air Quality) and 4.5 (Energy) explain that at this time, the project-level design for the OBMPU facilities has not yet been defined such that that previous data gathered could be utilized to generate OBMPU-specific operational energy demand calculations. Those chapters explain the difficulties of quantifying the proposed Project's operational energy demand as follows:

> (1) For certain types of facilities that are being proposed as part of the OBMPU, the IEUA and Watermaster have not collected sufficient data to predict operational energy demands, as such, for facilities such as ASR wells, the energy required is dependent on several factors (how deep the well is drilled, the type of equipment required to operate the well, where the water is delivered to/from, etc.), that cannot be known until project-level design has been completed;
>
> (2) The exact design, type and size of facilities that are considered appurtenances—such as booster pump stations, reservoirs, etc.—defined under Project Category 2: Conveyance Facilities and Related Infrastructure, have not been defined, and as such the operational energy demands thereof cannot be known until project-level design has been completed;
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> (3) The exact scope and type of new groundwater treatment facilities, and regional groundwater treatment facilities have not been defined, and as such the operational energy demands thereof cannot be known until project-level design has been completed;
>
> (4) the proposed upgrades to the Chino Desalters, to the WFA Agua de Lejos Treatment Plant, and to existing groundwater treatment facilities have not been defined, and as such the operational energy demands thereof cannot be known until project-level design has been completed;
>
> (5) and finally, until a specific project is proposed at the design level, it is not known what source of energy will be utilized to operate said facility, which renders determining the energy-related operational emissions a speculative matter given that energy is anticipated

to be increasingly generated by alternative sources over the planning horizon for the OBMPU.

Therefore, the energy demands of the OBMPU components, and their associated GHG emissions, are too speculative and cannot be quantified at this time. CEQA Guidelines Section 15064.4 recognizes that it may not be always possible to quantify GHG emissions and gives the lead agency the discretion to determine, in the context of a particular project, whether to quantify GHG emissions from a particular project, and/or rely on a qualitative analysis or performance based standards.

While the proposed Project's operational energy demands cannot be quantified for the reasons set forth above, they can be qualitatively discussed and analyzed by comparing the embedded energy intensity of the water that would be supplied to the Basin by the facilities proposed under the OBMPU with other potential water sources, such as importing water from the California State Water Project or the Colorado River.

Numerous studies have analyzed the intersection of energy and water, including a recent study, "The Future of California's Water-Energy Climate Nexus" (Sept. 9, 2021) (Water-Energy Nexus Report), prepared by the nonprofit organization Next 10.[1]

The Water-Energy Nexus Report aimed to update prior estimates of water-related energy and GHG emissions in California and builds on numerous prior studies, such as work prepared for the California Public Utilities Commission, California Energy Commission, and others. The Water-Energy Nexus Report developed an assessment of the energy and GHG footprint related to water use in California in hopes of identifying opportunities associated with reducing water-related energy use and in turn, GHG emissions.

The Water-Energy Nexus Report identifies the embedded energy demands from water conveyance methods for various regions in California, including the South Coast region, which includes the area where the proposed Project resides. (Water-Energy Nexus Report at p. 18.) The Report then identifies the embedded energy use by kilowatt hours per acre-foot (kWh/AF) for each California region based on the various stages of the water cycle, including water generation or extraction, conveyance, treatment, and distribution.

The proposed Project would implement all of the Water Generation/Extraction methods defined by the Water-Energy Nexus Report (Water-Energy Nexus, n.d.), including groundwater pumping, recycled (non-potable) treatment, and recycled (indirect potable) treatment. With respect to Water Conveyance, the proposed Project would include local surface water deliveries, local imported deliveries, and recycled water conveyance. Table 4 of the Water-Energy Nexus Report is reproduced below.

[1] The Water-Energy Nexus Report is available here:
https://www.next10.org/sites/default/files/2021-09/Next10-Water-Energy-Report_v2.pdf.

Excerpt of Table 4 of the Water-Energy Nexus Report:

TABLE 4 California Electricity (kWh/AF) and Natural Gas (MMBtu/AF) Energy Intensities by Hydrologic Region, by Water Cycle Stage

	North Coast	San Francisco Bay	Central Coast	South Coast	Sacramento River	San Joaquin River	Tulare Lake	North Lahontan	South Lahontan	Colorado River
Electricity Energy Intensity (kWh/AF)										
1. Water Generation/Extraction										
Groundwater Pumping	343	453	479	647	350	365	450	320	433	494
Recycled (Indirect Potable) Treatment	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218
Recycled (Non-potable) Treatment	543	543	543	419	508	508	508	508	508	508
2. Water Conveyance										
Local Surface Water Deliveries	110	110	118	128	118	118	118	110	118	128
Local Imported Deliveries	116	137	44	44	44	44	44	44	44	44
Central Valley Project Deliveries	225	650	726	225	225	334	196	NA	NA	NA
Colorado River Deliveries	NA	NA	NA	2,115	NA	NA	NA	NA	NA	225
State Water Project Deliveries	NA	1,031	2,043	3,280	238	501	2,158	NA	3,505	4,000
Seawater Desalination Conveyance	100	100	100	100	100	100	100	100	100	100
Recycled Water Conveyance	364	364	364	364	364	364	364	364	364	364
3. Water Treatment										
Conventional Drinking Water Treatment	237	237	237	227	235	235	235	235	235	235
Seawater Desalination Treatment	4,503	4,503	4,503	4,503	4,503	4,503	4,503	4,503	4,503	4,503
Brackish Desalination Treatment	1,593	1,593	1,593	1,593	1,707	1,707	1,707	1,593	1,593	1,593
4. Distribution										
Urban Water Distribution	501	977	501	501	54	54	54	54	501	54
Agricultural Water Distribution	144	144	144	488	19	19	389	144	389	488

The embedded energy intensity of alternate sources of supply to the Basin, such as the California State Water Project and the Colorado River, are also included in Table 4, and serve as a qualitative basis for comparing the energy use of the proposed Project—and consequently, its GHG emissions—to alternative sources of supply.

Based on the energy intensity shown in Table 4 of the Water-Energy Nexus Report, reliance on local sources is significantly less energy intensive than relying on imported water from either the State Water Project (3,280 kWh/AF) or the Colorado River (2,115 kWh/AF). Even the most energy-intensive local source—recycled (indirect potable) treatment plus recycled water conveyance

(1,218 + 364 = 1,582 kWh/AF),[2] by far the most energy-intensive local water source, is 25% less energy intensive than Colorado River water and more than 50% less than State Water Project water. Other sources of local supply included in the proposed Project, such as groundwater pumping (647 kWh/AF), are 70% to 80% less energy intensive than imported water, with correspondingly lower GHG emissions. In addition, as discussed in Subchapter 4.5 (Energy), certain components of the proposed Project may include opportunities to incorporate renewable energy and/or energy storage components, which if constructed, could further reduce the electricity demands from the grid and corresponding GHG emissions. No other indirect GHG emissions sources have been identified at this time, consequently, no impacts from indirect GHG emissions sources are anticipated.

Qualitatively, implementation of the proposed Project would result in a lower energy-intensity embedded in Basin water supplies than relying on alternative sources of supply, such as imported water from the State Water Project or Colorado River.

CONCLUSION

Given the inability at this time to quantify the proposed Project's operational GHG emissions, it is also inappropriate to apply a quantitative significance threshold to determine whether the proposed Project would have the potential to generate direct or indirect GHG emissions that would result in a significant impact on the environment. Instead, this analysis has evaluated the energy intensity of the water to be generated through the operations of the proposed Project and compared it to the energy intensity of alternative sources of supply. For informational purposes, the annual GHG emissions associated with the production of up to 20,000 AF/year has been calculated to represent the potential water supply capacity that the Project could provide. As shown on Table 2 below, GHG emissions associated with water conveyance from the Colorado River Deliveries or State Water Project Deliveries are substantially more than all other water conveyance sources. Further, if the Project's annual amortized construction emissions (683.46 MTCO2e per year) are added to the any local sources, the resulting annual GHG emissions would be substantially less than the amount of GHG emissions for the same amount of water conveyed from either the Colorado River Deliveries or State Water Project Deliveries.

TABLE 2: ESTIMATED GHG EMISSIONS FROM WATER CONVEYANCE SOURCES

	kWh/AF	AF/Year	kWh/year	MW/year	Tons CO2e/year	**Metric Tons CO2e/Year**
Local Surface Water Deliveries	128	20,000	2,560,000	2,560	364.80	**330.94**
Local Imported Deliveries	44	20,000	880,000	880	125.40	**113.76**
Central Valley Project Deliveries	225	20,000	4,500,000	4,500	641.25	**581.73**
Colorado River Deliveries	2115	20,000	42,300,000	42,300	6,027.75	**5,468.28**
State Water Project Deliveries	3280	20,000	65,600,000	65,600	9,348.00	**8,480.37**
Seawater Desalination Conveyance	100	20,000	2,000,000	2,000	285.00	**258.55**
Recyclyed Water Conveyance	365	20,000	7,300,000	7,300	1,040.25	**943.70**

Conversions:

Tons of CO2 equivalent/MWh (avg 2026-2035) from Table 5 of Water-Energy Nexus Report	0.1425
Tons to Metric Tons	0.907185

[2] To get an accurate understanding of the energy intensity of recycled water sources, one must add the energy required for recycled water generation to conveyance.

On this basis, implementing the proposed Project would be substantially less energy intensive than relying on an equivalent amount of imported water and, in turn, would generate substantially less GHG emissions. Therefore, the proposed Project's direct and indirect GHG emissions would not result in a significant impact on the environment.

GHG IMPACTS – CONSISTENCY WITH THRESHOLD NO. 2

Would the Project have the potential to conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs?

Pursuant to 15604.4 of the CEQA Guidelines, a lead agency may rely on qualitative analysis or performance-based standards to determine the significance of impacts from GHG emissions **Invalid source specified.**.

CONSTRUCTION

40% below 1990 levels by 2030

By using newer and electrified construction equipment as it is phased in pursuant to requirements under AB 197 and similar law, policies and programs, the Project will be aligned with applicable plans and policies and would, therefore, not otherwise conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

This is consistent with SB 32's goal of reducing statewide emissions of greenhouse gases by 40% below 1990 levels by 2030.

85% below 1990 levels by 2045 / 2050

While construction activities associated with the implementation of future OBMPU facilities would result in emissions of CO_2 and CH_4 (see previous section regarding threshold 1), most of the emissions will come from the burning of fossil fuel in construction equipment. These emissions from construction equipment will decrease even more as emissions technology improves in the next 20 years. Additionally, it is likely that diesel equipment will be cleaner and more efficient, powered by renewable diesel, and/or phased out due to local Climate Action Plans and state requirements (such by AB 197) by 2045. Newer electrified construction equipment will also become more broadly available, further decreasing construction emissions.

This is consistent with AB 1279's goal of reducing emissions to 85% below 1990 levels and carbon neutrality by 2045 and, by extension, Executive Order S-03-05's goal of reducing emissions to 80% below 1990 levels by 2050.

OPERATIONS

40% below 1990 levels by 2030

Operational emissions are powered primarily by electricity, so the Project's GHG emissions will decline as renewable and carbon neutral energy sources make up a larger and larger percentage of power on the grid in compliance with state's plans, policies, and regulations.

This is consistent with SB 32's goal of reducing statewide emissions of greenhouse gases by 40% below 1990 levels by 2030.

85% below 1990 levels by 2045 / 2050

Operational emissions are powered primarily by electricity, so the Project's GHG emissions will decline as renewable and carbon neutral energy sources make up a larger and larger percentage of power on the grid in compliance with state's plans, policies, and regulations.

Finally, the implementation of the Project will increase local water supplies, thereby avoiding the need to import water from remote sources, such as the Delta. By reducing the demand for importing water, which is energy intensive and generates GHG emissions, the Project will offset GHG emissions that would otherwise have occurred absent implementation of the Project.

This is consistent with AB 1279's goal of reducing emissions to 85% below 1990 levels and carbon neutrality by 2045 and, by extension, Executive Order S-03-05's goal of reducing emissions to 80% below 1990 levels by 2050. This is also consistent with CARB's 2022 Scoping Plan goals and objectives, which are based on compliance with AB 1279.

CONCLUSION

Results of the assessment indicate that the proposed Project is consistent with the state and regional objectives, and on that basis, would have a less than significant impact with respect to GHG emissions.

REFERENCES

California Air Resources Board. (n.d.). *2022 Scopuing Plan Documents.* Retrieved from https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents

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