









## Water Studies Occupations

Baccalaureate Labor Market Analysis

October 2023

### SUMMARY

BDP PROGRAM RECOMMENDATION?	EVIDENCE OF A SUPPLY GAP?	AT OR ABOVE THE LIVING WAGE?	EXPECTED EDUCATION FOR MAJORITY OF OCCUPATIONS ANALYZED
 <b>Proceed with New Program</b>	 	 	<input type="checkbox"/> Doctorate Degree <input type="checkbox"/> Master's Degree <input checked="" type="checkbox"/> Bachelor's Degree <input type="checkbox"/> Associate Degree <input type="checkbox"/> Some College or Certificate <input checked="" type="checkbox"/> HS Diploma or Equivalent <input type="checkbox"/> Less than a HS Diploma <input type="checkbox"/> Apprenticeship
DOES A SIMILAR PROGRAM EXIST AT A UC OR CSU?	EXISTING ASSOCIATE DEGREE PROGRAM IN REGION?	NUMBER OF ANNUAL JOB OPENINGS	
<b>No,</b> <b>a UC or CSU currently offers a similar program</b>	 	<div style="background-color: #4a7c9c; color: white; padding: 2px; display: inline-block;">LOW</div> 	

The San Diego & Imperial Center of Excellence (COE) developed this brief to determine if an unmet workforce need exists for a baccalaureate degree program (BDP) for [Water Studies Occupations](#). According to Assembly Bill No. 927, community college districts seeking approval for a BDP must 1) not offer “program curricula already offered by the California State University or the University of California” systems, 2) “continue to offer an associate degree program in the same academic subject”<sup>1</sup> of the proposed BDP, and 3) “provide evidence of unmet workforce needs.”<sup>2</sup>

This brief recommends that the San Diego & Imperial Counties Community Colleges to proceed with a BDP for [Water Studies Occupations](#) because although 1) **entry-level and median wages are above the living wage** and 2) **a supply gap exists for these occupations**.

<sup>1</sup> “The bill would require a community college district to continue to offer an associate degree program in the same academic subject for which a baccalaureate degree program has been approved, unless the community college district has received approval from the chancellor to eliminate the associate degree program, as specified.”

<sup>2</sup> “AB-927 Public postsecondary education: community colleges: statewide baccalaureate degree.” California Legislative Information. Accessed 09/05/2023. [leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=202120220AB927](https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB927)

## INTRODUCTION

According to Assembly Bill No. 927, community college districts seeking approval to offer a baccalaureate degree program (BDP) must:<sup>3</sup>

1. Not offer a BDP or “program curricula already offered by the California State University or the University of California”
2. “Continue to offer an associate degree program in the same academic subject for which a baccalaureate degree program has been approved”
3. Identify and document unmet workforce needs “in the local community or region of the district”

To determine the need for a new BDP, this brief examines labor market information (LMI) for [Water Studies Occupations](#) using the following Standard Occupational Classification (SOC)<sup>4</sup> codes:

- **Water and Wastewater Treatment Plant and System Operators** (SOC 51-8031): Operate or control an entire process or system of machines, often through the use of control boards, to transfer or treat water or wastewater.
- **Civil Engineers** (SOC 17-2051): Perform engineering duties in planning, designing, and overseeing construction and maintenance of building structures and facilities, such as roads, railroads, airports, bridges, harbors, channels, dams, irrigation projects, pipelines, power plants, and water and sewage systems. Includes architectural, structural, traffic, and geotechnical engineers
  - **Water/Wastewater Engineers** (SOC 17-2051.02): Design or oversee projects involving provision of potable water, disposal of wastewater and sewage, or prevention of flood-related damage. Prepare environmental documentation for water resources, regulatory program compliance, data management and analysis, and field work. Perform hydraulic modeling and pipeline design.

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<sup>3</sup> “AB-927 Public postsecondary education: community colleges: statewide baccalaureate degree.” California Legislative Information. Accessed 09/05/2023. [leginfo.ca.gov/faces/billTextClient.xhtml?bill\\_id=202120220AB927](https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB927)

<sup>4</sup> The Standard Occupational Classification (SOC) system is used by federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. [bls.gov/soc/](https://www.bls.gov/soc/).

According to available LMI, employers require a minimum educational attainment ranging from a high school diploma or equivalent to a bachelor’s degree for [Water Studies Occupations](#). On average, the entry-level hourly earnings for [Water Studies Occupations](#) are \$32.17, which is more than the \$18.43 per hour living wage for a single adult in San Diego County.<sup>5</sup>

SOC Title (SOC Code)	Entry-Level Hourly Earnings <sup>6</sup>	Median Hourly Earnings	Typical Entry-Level Education
Civil Engineers (17-2051)	\$38.45	\$47.98	Bachelor's degree
Water and Wastewater Treatment Plant and System Operators (51-8031)	\$25.90	\$32.28	Associate degree

The following sections “assess the workforce value of [a] proposed baccalaureate degree program” for [Water Studies Occupations](#) in accordance with AB-927.<sup>7</sup>

## BDP PROPOSAL REQUIREMENTS

### UC and CSU Programs

According to AB-927, community colleges must not offer a BDP or program curricula already offered by the CSU or UC systems. To determine if a BDP already exists for [Water Studies Occupations](#), the COE examined CSU and UC programs in related Classification of Instructional Programs (CIP) codes.<sup>8</sup>

According to CIP data, the following institutions from the UC and CSU systems offer programs related to [Water Studies Occupations](#) (Exhibit 1).

<sup>5</sup> Lightcast. 2023.03; QCEW, Non-QCEW, Self-Employed.

<sup>6</sup> 25th Percentile. Lightcast. 2023.03; QCEW, Non-QCEW, Self-Employed.

<sup>7</sup> “AB-927 Public postsecondary education: community colleges: statewide baccalaureate degree.” California Legislative Information. Accessed 09/05/2023. [leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=202120220AB927](https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB927)

<sup>8</sup> CIP data comes from the Integrated Postsecondary Education Data System ([nces.ed.gov/ipeds/use-the-data](https://nces.ed.gov/ipeds/use-the-data)). The COE uses the national SOC-CIP crosswalk to determine which programs could potentially train for the occupation in question. [nces.ed.gov/ipeds/cipcode/post3.aspx?y=56](https://nces.ed.gov/ipeds/cipcode/post3.aspx?y=56)

## Exhibit 1: California UC and CSU Institutions with Related Programs by CIP Code (2021)<sup>9</sup>

### CIP Code and Title

#### [14.0805 Water Resources Engineering](#)

- No CSU or UC

#### [15.0506 Water Quality and Wastewater Treatment Management and Recycling Technology/Technician](#)

- No CSU or UC

## Existing Associate Degree Program(s)

AB-927 also states that districts should “continue to offer an associate degree program in the same academic subject for which a baccalaureate degree program has been approved.” To determine if an associate degree program in the same subject area exists, the COE reviewed the [California Community Colleges Chancellor’s Office’s official TOP-CIP crosswalk](#) and found that there is one TOP codes and two CIP codes related to Water Studies Occupations (Exhibit 2).

### Exhibit 2: Chancellor’s Office TOP-CIP Crosswalk for Baccalaureate Degree Programs

TOP Code	TOP Title	CIP Code	CIP Title
	No Match	14.0805	Water Resources Engineering
0958.00	Water and Wastewater Technology	15.0506	Water Quality and Wastewater Treatment Management and Recycling Technology/Technician

According to the [Chancellor’s Office Curriculum Inventory \(COCI\)](#), two regional community colleges offer an associate degree program for the CIP codes listed above (Exhibit 3).<sup>10</sup>

### Exhibit 3: San Diego Community Colleges with Associate Degree Programs in Related CIP Codes

CIP Code	CIP Title	Community College(s) with Existing Program in CIP Code
14.0805	Water Resources Engineering	<ul style="list-style-type: none"> <li>• None</li> </ul>
15.0506	Water Quality and Wastewater Treatment Management and Recycling Technology/Technician	<ul style="list-style-type: none"> <li>• Cuyamaca</li> <li>• Palomar</li> </ul>

<sup>9</sup> Lightcast. Q3 2023 Data Set. Program Overview. Completions by Institutions. Completions data for 2019 and 2021 to account for programs not captured after decline in enrollment from the COVID-19 pandemic.

<sup>10</sup> “Programs. California Community Colleges Curriculum Inventory (COCI).” Accessed 09/05/2023. [coci2.ccctechcenter.org/programs](https://coci2.ccctechcenter.org/programs)

## WORKFORCE NEEDS ASSESSMENT: SUPPLY VS. DEMAND

According to AB-927, community colleges must identify and document unmet workforce needs “in the local community or region of the district.” To assess the regional workforce need for [Water Studies Occupations](#), this section compares educational supply with labor market demand.

### Educational Supply

Baccalaureate educational supply for an occupation can be estimated by analyzing the number of completions<sup>11</sup> in related CIP codes. According to CIP data, the following institutions supply [San Diego County](#) with awards for [Water Studies Occupations](#) (Exhibit 4).

**Exhibit 4: Number of Completions by Postsecondary Institutions (San Diego County, 2021)**

CIP Code	CIP Title	Completions (2021)
15.0506	Water Quality and Wastewater Treatment Management and Recycling Technology/Technician	
	• Cuyamaca	21
	• Palomar	32
	<b>Total</b>	<b>53</b>

**Exhibit 5: Number of Completions by Postsecondary Institutions (California, 2021)**

CIP Code	CIP Title	Completions (2021)
14.0805	Water Resources Engineering	4
15.0506	Water Quality and Wastewater Treatment Management and Recycling Technology/Technician	472
	<b>Total</b>	<b>476</b>

<sup>11</sup> Completion numbers include bachelor's degree programs or higher.

## Labor Market Demand

Between 2022 and 2027, employers in San Diego County will need to hire **565** workers annually to fill new jobs and backfill jobs due to attrition caused by turnover and retirement for **Water Studies Occupations** (Exhibit 6).

**Exhibit 6: Labor Demand (Annual Job Openings) for Water Studies Occupations**

SOC Code	Occupational Title	Average Annual Job Openings (2022-2027)	
		San Diego County	California
17-2051	Civil Engineers	469	4,086
51-8031	Water and Wastewater Treatment Plant and System Operators	96	1,179
		<b>565</b>	<b>5,265</b>

## Demand vs. Supply

Comparing labor market demand (annual job openings) with educational supply (bachelor's degree completions) suggests that there is a **supply gap** for **Water Studies Occupations** in San Diego County, with **565** annual openings and **53** awards. Comparatively, there are **5,265** annual openings in California and **476** awards, suggesting that there is also a **supply gap** across the state <sup>12</sup> (Exhibit 7).

**Exhibit 7: Labor Demand (Job Openings) vs. Educational Supply (Completions)<sup>13</sup>**

	Demand (Job Openings)	Supply (Completions)	Supply Gap or Oversupply
San Diego	565	53	<b>512</b>
California	5,265	476	<b>4,789</b>

<sup>12</sup> "Supply and Demand," Centers of Excellence Student Outcomes, [coecc.net/our-resources](http://coecc.net/our-resources)

<sup>13</sup> This is a basic analysis of supply and demand of labor. The data does not include workers currently in the labor force who could fill these positions or workers who are not captured by publicly available data. This data should be used to discuss the potential gaps or oversupply of workers; however, it should not be the only basis for determining whether or not a program should be developed.

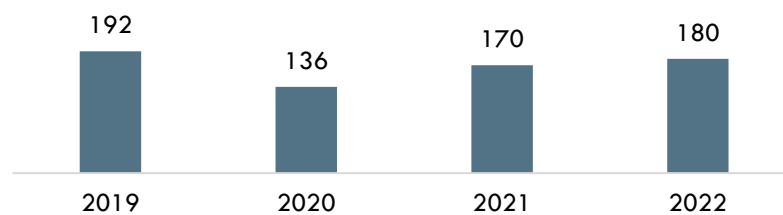
## OTHER LMI TO CONSIDER FOR PROGRAM DEVELOPMENT

### ONLINE JOB POSTINGS

This report analyzes not only historical and projected (traditional LMI) data, but also recent data from online job postings (real-time LMI). Online job postings may provide additional insight about recent changes in the labor market that are not captured by historical data. While *Water Studies Occupations* include “Civil Engineers” and “Water and Wastewater Treatment Plant and System Operators,” employers do not typically use these formal occupational titles when recruiting for wastewater positions. As a result, this section explores online job postings that include the skill “Wastewater,”<sup>14</sup> which employers commonly use to hire for these roles.

There was an average of 170 online job postings per year for “Wastewater” in San Diego County between 2019 and 2022 (Exhibit 8). Please note that online job postings do **not** equal labor market demand; demand is represented by annual job openings (see Exhibit 6). While this brief includes online job postings data to help with curriculum development, the community colleges should note that this type of data is impacted by several variables: employers may post a position multiple times to increase the pool of applicants; a job posting can remain posted after a business decides not to fill a position; or an employer may use one posting to fill multiple positions, for example.

**Exhibit 8: Number of Online Job Postings with “Wastewater” Skill in San Diego County (2019-2022)<sup>15</sup>**



While labor market demand cannot be determined for “Wastewater” roles, the COE estimates that approximately 3.3 percent of the occupations in San Diego County and 3.5 percent in California require the skill “Wastewater,” based on the percentage of online job postings that listed “Wastewater” (Exhibit 8). Based on this information, there is an estimated labor market demand of 565 and 5,265 annual job openings for “Wastewater” in San Diego County and California, respectively (Exhibit 9).

<sup>14</sup> Lightcast. 2023.3 – QCEW Employees, Non-QCEW Employees, and Self-Employed data set. “Job Postings Analytics” for selected SOC codes. Numbers in the exhibit reflect “unique postings” or de-duplicated online job postings. “Wastewater” skills include “Wastewater,” “Industrial Wastewater,” “Wastewater Distribution,” “Water/Wastewater Engineering,” “Wastewater Operator Engineering,” “Wastewater Operator Certification,” “Wastewater Treatment Plant,” “Industrial Wastewater Treatments,” “Wastewater Treatment Plant Design,” “NICET Water/Wastewater Plants,” “Wastewater Collection System Operation,” and “NICET Stormwater And Wastewater System Inspection.”

<sup>15</sup> Lightcast; “Job Posting Analytics.” 2018-2022.

**Exhibit 9: Online Job Postings for Selected SOC Codes and “Wastewater” Skill (January 2020 - December 2022)<sup>16</sup>**

	Online Job Postings (San Diego)	Online Job Postings (California)
Occupations listed in Exhibit 5	5,035	48,533
Occupations listed in Exhibit 5 and filtered by "wastewater" skills	486	5,012
<b>% of online job postings with skills and job titles above</b>	<b>9.7%</b>	<b>9.7%</b>

**Exhibit 10: Number of Annual Job Openings (Labor Market Demand) by SOC Code, 2022-2027<sup>17</sup>**

SOC Code	Occupational Title	Average Annual Job Openings		Estimated Annual Job Openings for “Wastewater” <sup>18</sup>	
		San Diego	California	San Diego	California
17-2051	Civil Engineers	469	4,086	45	396
51-8031	Water and Wastewater Treatment Plant and System Operators	96	1,179	9	114
	<b>Total</b>	<b>565</b>	<b>5,265</b>	<b>54</b>	<b>510</b>

<sup>16</sup> Lightcast. 2023.3 – QCEW Employees, Non-QCEW Employees, and Self-Employed data set. “Job Postings Analytics” for selected SOC codes. Numbers in the exhibit reflect “unique postings” or de-duplicated online job postings. “Wastewater” skills include “Wastewater,” “Industrial Wastewater,” “Wastewater Distribution,” “Water/Wastewater Engineering,” “Wastewater Operator Engineering,” “Wastewater Operator Certification,” “Wastewater Treatment Plant,” “Industrial Wastewater Treatments,” “Wastewater Treatment Plant Design,” “NICET Wate/ Wastewater Plants,” “Wastewater Collection System Operation,” and “NICET Stormwater And Wastewater System Inspection.”

<sup>17</sup> Lightcast. 2023.3 – QCEW Employees, Non-QCEW Employees, and Self-Employed data set. Numbers in the “Estimated Annual Job Openings for “Wastewater” reflect the 9.7% (% of online job postings with ‘wastewater’ skill) multiplied against the average annual job openings for each occupation.



# SAN DIEGO & IMPERIAL COUNTIES COMMUNITY COLLEGES

## TOP EMPLOYERS

Between January 1, 2020 and December 31, 2022, the top five employers in San Diego County for *Water Studies Occupations* were Kennedy/Jenks Consultants, County Of San Diego, Dudek, Psomas, and City Of San Diego based on online job postings (Exhibit 11).

### Exhibit 11: Top Employers for “Wastewater” Skill in San Diego County<sup>19</sup>

Top Employers	
<ul style="list-style-type: none"><li>• Kennedy/Jenks Consultants</li><li>• County of San Diego</li><li>• Dudek</li><li>• Psomas</li><li>• City Of San Diego</li></ul>	<ul style="list-style-type: none"><li>• Michael Baker International</li><li>• CDM Smith</li><li>• J.R. Filanc Construction Company, Inc.</li><li>• City Of Escondido</li><li>• Harris &amp; Associates</li></ul>

## EDUCATION, SKILLS, AND CERTIFICATIONS

*Water Studies Occupations* have a national educational attainment ranging from a high school diploma or equivalent to a bachelor’s degree (Exhibit 12a).

### Exhibit 12a: National Educational Attainment for *Water Studies Occupations*<sup>20</sup>

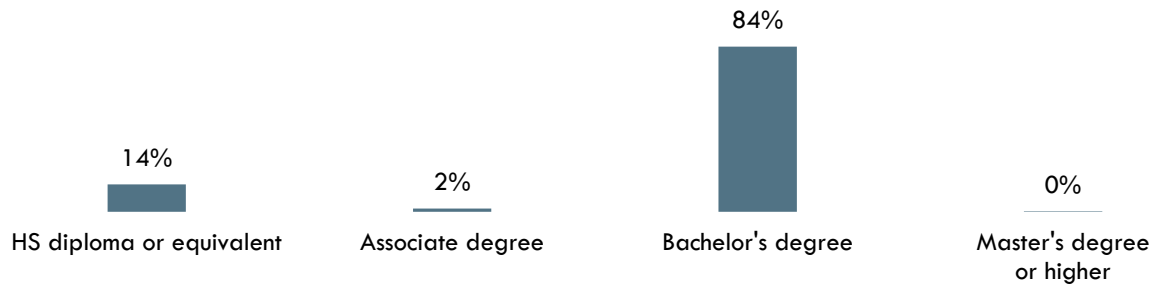
Occupational Title	Typical Entry-Level Education
Civil Engineers	Bachelor's degree
Water and Wastewater Treatment Plant and System Operators	High school diploma or equivalent

<sup>19</sup> Lightcast; “Job Posting Analytics.” 2020-2022.

<sup>20</sup> Lightcast 2023.03; QCEW, Non-QCEW, Self-Employed.

Based on online job postings between January 1, 2020 and December 31, 2022 in San Diego County, employers posted a **bachelor's degree** as the most requested educational requirement for *Water Studies Occupations* (Exhibit 12b).<sup>21</sup>

**Exhibit 12b: Educational Requirements in Online Job Postings for *Water Studies Occupations* in San Diego County<sup>22</sup>**



\*May not total 100 percent due to rounding

Exhibit 13 lists the top specialized, soft, and software skills that appeared in online job postings between January 1, 2020 and December 31, 2022.

**Exhibit 13: Top Skills in Online Job Postings with “Wastewater” in San Diego County<sup>23</sup>**

Specialized Skills	Soft Skills	Software Skills
<ul style="list-style-type: none"> <li>• Wastewater</li> <li>• Civil Engineering</li> <li>• Project Management</li> <li>• Sewage Treatments</li> <li>• Construction</li> <li>• Water Resources</li> <li>• AutoCAD</li> <li>• Pump Stations</li> <li>• Project Engineering</li> <li>• Stormwater Management</li> <li>• Environmental Engineering</li> <li>• Business Development</li> <li>• Engineering Design Process</li> <li>• Hydraulics</li> <li>• Construction Management</li> </ul>	<ul style="list-style-type: none"> <li>• Planning</li> <li>• Communications</li> <li>• Management</li> <li>• Operations</li> <li>• Customer Service</li> <li>• Writing</li> <li>• Coordinating</li> <li>• Budgeting</li> <li>• Mathematics</li> <li>• Verbal Communication Skills</li> <li>• Leadership</li> <li>• Report Writing</li> <li>• Scheduling</li> <li>• Quality Control</li> <li>• Presentations</li> </ul>	<ul style="list-style-type: none"> <li>• AutoCAD</li> <li>• Microsoft Excel</li> <li>• AutoCAD Civil 3D</li> <li>• Geographic Information Systems</li> <li>• MicroStation</li> <li>• Microsoft PowerPoint</li> <li>• Microsoft Outlook</li> <li>• Microsoft Word</li> <li>• Design Software</li> <li>• Autodesk Revit</li> <li>• ArcGIS (GIS Software)</li> </ul>

<sup>21</sup> Lightcast; “Job Posting Analytics.” 2020-2022.

<sup>22</sup> “Educational Attainment for Workers 25 Years and Older by Detailed Occupation,” Bureau of Labor Statistics, last modified April 9, 2021. [bls.gov/emp/tables/educational-attainment.htm](https://bls.gov/emp/tables/educational-attainment.htm).

<sup>23</sup> Lightcast; “Job Posting Analytics.” 2020-2022.

Exhibit 14 lists the top certifications that appeared in online job postings between January 1, 2020 and December 31, 2022.

**Exhibit 14: Top Certifications in Online Job Postings with “Wastewater” in San Diego County<sup>24</sup>**

Top Certifications in Online Job Postings

1. Professional Engineer (PE) License
  2. Engineer in Training
  3. CDL Class C License
  4. Security Clearance
  5. Certified Construction Manager
  6. Cardiopulmonary Resuscitation (CPR) Certification
  7. Wastewater Operator Certification
  8. CDL Class B License
  9. Operator Certification
  10. Project Management Professional Certification
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<sup>24</sup> Lightcast; “Job Posting Analytics.” 2020-2022.

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### Important Disclaimers

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. This study examines the most recent data available at the time of the analysis; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and the report findings; however, neither the Regional Centers of Excellence (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.