



CALIFORNIA DEPARTMENT OF WATER RESOURCES

SUSTAINABLE GROUNDWATER MANAGEMENT OFFICE

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July 27, 2023

Christina Buck
Butte County Department of Water and Resource Conservation
308 Nelson Ave.
Oroville, CA 95965
cbuck@buttecounty.net

RE: Sacramento Valley Basin – Wyandotte Creek Subbasin - 2022 Groundwater Sustainability Plan

Dear Christina Buck,

The Department of Water Resources (Department) has evaluated the groundwater sustainability plan (GSP) submitted for the Sacramento Valley Basin – Wyandotte Creek Subbasin and has determined the GSP is approved. The approval is based on recommendations from the Staff Report, included as an exhibit to the attached Statement of Findings, which describes that the Wyandotte Creek Subbasin GSP satisfies the objectives of the Sustainable Groundwater Management Act (SGMA) and substantially complies with the GSP Regulations. The Staff Report also proposes recommended corrective actions that the Department believes will enhance the GSP and facilitate future evaluation by the Department. The Department strongly encourages the recommended corrective actions be given due consideration and suggests incorporating all resulting changes to the GSP in future updates.

Recognizing SGMA sets a long-term horizon for groundwater sustainability agencies (GSAs) to achieve their basin sustainability goals, monitoring progress is fundamental for successful implementation. GSAs are required to evaluate their GSPs at least every five years and whenever the Plan is amended, and to provide a written assessment to the Department. Accordingly, the Department will evaluate approved GSPs and issue an assessment at least every five years. The Department will initiate the first periodic review of the Wyandotte Creek Subbasin GSP no later than January 28, 2027.

Please contact Sustainable Groundwater Management staff by emailing sgmps@water.ca.gov if you have any questions related to the Department's assessment or implementation of your GSP.

Thank You,

Steven Springhorn

Steven Springhorn
Supervising Engineering Geologist
Sustainable Groundwater Management

Attachment:

1. Statement of Findings Regarding the Approval of the Sacramento Valley Basin
– Wyandotte Creek Subbasin Groundwater Sustainability Plan

**STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES**

**STATEMENT OF FINDINGS REGARDING THE
APPROVAL OF THE
SACRAMENTO VALLEY – WYANDOTTE CREEK SUBBASIN GROUNDWATER
SUSTAINABILITY PLAN**

The Department of Water Resources (Department) is required to evaluate whether a submitted groundwater sustainability plan (GSP or Plan) conforms to specific requirements of the Sustainable Groundwater Management Act (SGMA or Act), is likely to achieve the sustainability goal for the basin covered by the Plan, and whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) The Department is directed to issue an assessment of the Plan within two years of its submission. (Water Code § 10733.4.) This Statement of Findings explains the Department’s decision regarding the Plan submitted by the Wyandotte Creek Groundwater Sustainability Agency (GSA or Agency) for the Wyandotte Creek Subbasin (Basin No. 5-021.69).

Department management has discussed the Plan with staff and has reviewed the Department Staff Report, entitled Sustainable Groundwater Management Program Groundwater Sustainability Plan Assessment Staff Report, attached as Exhibit A, recommending approval of the GSP. Department management is satisfied that staff have conducted a thorough evaluation and assessment of the Plan and concurs with staff’s recommendation and all the recommended corrective actions. The Department therefore **APPROVES** the Plan and makes the following findings:

- A. The Plan satisfies the required conditions as outlined in § 355.4(a) of the GSP Regulations (23 CCR § 350 et seq.):
 - 1. The Plan was submitted within the statutory deadline of January 31, 2022. (Water Code § 10720.7(a); 23 CCR § 355.4(a)(1).)
 - 2. The Plan was complete, meaning it generally appeared to include the information required by the Act and the GSP Regulations sufficient to warrant a thorough evaluation and issuance of an assessment by the Department. (23 CCR § 355.4(a)(2).)
 - 3. The Plan, either on its own or in coordination with other Plans, covers the entire Wyandotte Creek Subbasin. (23 CCR § 355.4(a)(3).)
- B. The general standards the Department applied in its evaluation and assessment of the Plan are: (1) “conformance” with the specified statutory requirements, (2) “substantial compliance” with the GSP Regulations, (3) whether the Plan is likely

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to achieve the sustainability goal for the Subbasin within 20 years of the implementation of the Plan, and (4) whether the Plan adversely affects the ability of an adjacent basin to implement its GSP or impedes achievement of sustainability goals in an adjacent basin. (Water Code § 10733.) Application of these standards requires exercise of the Department's expertise, judgment, and discretion when making its determination of whether a Plan should be deemed "approved," "incomplete," or "inadequate."

The statutes and GSP Regulations require Plans to include and address a multitude and wide range of informational and technical components. The Department has observed a diverse array of approaches to addressing these technical and informational components being used by GSAs in different basins throughout the state. The Department does not apply a set formula or criterion that would require a particular outcome based on how a Plan addresses any one of SGMA's numerous informational and technical components. The Department finds that affording flexibility and discretion to local GSAs is consistent with the standards identified above; the state policy that sustainable groundwater management is best achieved locally through the development, implementation, and updating of local plans and programs (Water Code § 113); and the Legislature's express intent under SGMA that groundwater basins be managed through the actions of local governmental agencies to the greatest extent feasible, while minimizing state intervention to only when necessary to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.1(h)) The Department's final determination is made based on the entirety of the Plan's contents on a case-by-case basis, considering and weighing factors relevant to the particular Plan and Subbasin under review.

- C. In making these findings and Plan determination, the Department also recognized that: (1) the Department maintains continuing oversight and jurisdiction to ensure the Plan is adequately implemented; (2) the Legislature intended SGMA to be implemented over many years; (3) SGMA provides Plans 20 years of implementation to achieve the sustainability goal in a Subbasin (with the possibility that the Department may grant GSAs an additional five years upon request if the GSA has made satisfactory progress toward sustainability); and, (4) local agencies acting as GSAs are authorized, but not required, to address undesirable results that occurred prior to enactment of SGMA. (Water Code §§ 10721(r); 10727.2(b); 10733(a); 10733.8.)
- D. The Plan conforms with Water Code §§ 10727.2 and 10727.4, substantially complies with 23 CCR § 355.4, and appears likely to achieve the sustainability goal for the Subbasin. It does not appear at this time that the Plan will adversely affect the ability of adjacent basins to implement their GSPs or impede achievement of sustainability goals.

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1. The sustainable management criteria and sustainability goals, which focus on having stable groundwater levels for the long-term and operating the Subbasin within its sustainable yield, are sufficiently justified and explained. The Plan relies on credible information and science such as long-term groundwater level data, a reasonable understanding of aquifer properties, and an updated groundwater model to quantify the groundwater conditions that the Plan seeks to avoid and provides an objective way to determine whether the Subbasin is being managed sustainably in accordance with SGMA. (23 CCR § 355.4(b)(1).)
2. The Plan has identified reasonable measures and schedules to eliminate data gaps such as collecting data from active domestic wells to adjust minimum thresholds, installing additional wells and other monitoring sites to analyze the interaction of streams and groundwater pumping, and updating and refining the Butte Basin Groundwater Model. Refinement of the groundwater model is expected to eliminate the data gap related to the interconnected surface water, develop appropriate sustainable management criteria, and support evaluation of projects or GSP updates as appropriate and warranted. (23 CCR § 355.4(b)(2).)
3. The projects and management actions proposed are designed to maintain sufficient groundwater supply and quality to achieve the sustainability goal. The GSA plans to achieve the sustainability goal through water supply augmentation, increase water supply efficiency, stabilize the groundwater levels on a long-term average basis, and avoid undesirable results. The projects and management actions are reasonable and commensurate with the level of understanding of the Subbasin setting. The projects and management actions described in the Plan provide a feasible approach to achieving the Subbasin's sustainability goal and should provide the GSA with greater versatility to adapt and respond to changing conditions and future challenges during GSP implementation. (23 CCR § 355.4(b)(3).)
4. The Plan provides a detailed explanation of how the varied interest of groundwater uses and users in the Subbasin were considered in developing the sustainable management criteria and how those interests, including beneficial uses and users of groundwater including domestic well owners, would be impacted by the chosen minimum thresholds. Furthermore, the GSP includes a management action entitled "Domestic Well Mitigation" that aims to potentially provide resources to well owners impacted by groundwater management and lowering groundwater levels planned under the GSA's management of the Subbasin. Under this management action, the GSA plans to collect data on domestic wells to determine which well owners potentially need assistance; secure financial

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- resources to assist with the repair, replacement, and deepening of domestic wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. (23 CCR § 355.4(b)(4).)
5. The Plan's projects and management actions appear feasible at this time and appear capable of preventing undesirable results and ensuring that the Subbasin is managed within its sustainable yield within 20 years. The Department will continue to monitor Plan implementation and reserves the right to change its determination if projects and management actions are not implemented or appear unlikely to prevent undesirable results or achieve sustainability within SGMA timeframes. (23 CCR § 355.4(b)(5).)
 6. The Plan includes a reasonable assessment of overdraft conditions and includes reasonable means to mitigate overdraft, if present. (23 CCR § 355.4(b)(6).)
 7. At this time, it does not appear that the Plan will adversely affect the ability of an adjacent basin to implement its GSP or impede achievement of sustainability goals in an adjacent basin. The Plan states that collaboration and coordination with 10 adjacent basins began in 2020 which will be continued during the Plan implementation period to ensure that undesirable results will be avoided and sustainability will be achieved at the regional level. (23 CCR § 355.4(b)(7).)
 8. Because a single plan was submitted for the Subbasin, a coordination agreement was not required. (23 CCR § 355.4(b)(8).)
 9. The GSA's member agency, Butte County, has a groundwater management plan, established monitoring networks, and Basin Management Objectives for groundwater level, groundwater quality related to seawater intrusion, and land subsidence. The Butte County's history of groundwater management and its participation in the Department's groundwater elevation and subsidence monitoring programs provide a reasonable level of confidence that the GSA has the legal authority and financial resources necessary to implement the Plan. (23 CCR § 355.4(b)(9).)
 10. Through review of the Plan and consideration of public comments, the Department determines that the GSA adequately responded to comments that raised credible technical or policy issues with the Plan, sufficient to warrant approval of the Plan at this time. The Department also notes that the recommended corrective actions included in the Staff Report are important to addressing certain technical or policy issues that were raised and, if not addressed before future, subsequent plan evaluations, may

preclude approval of the Plan in those future evaluations. (23 CCR § 355.4(b)(10).)

11. In addition to the grounds listed above, DWR also finds that:

- E. The Plan focuses on the protection of sustainably constructed domestic wells because dewatering domestic wells is a concern in the Subbasin. Per the GSP, the minimum thresholds aim to protect most domestic wells, including those not constructed sustainably. Domestic wells are generally shallower than other well types; therefore, the minimum threshold water level that is protective of domestic users is considered protective of other beneficial users too. The GSA plans to implement a mitigation program for domestic well owners to assist with the repair, replacement, and deepening of wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. The Plan's compliance with the requirements of SGMA and substantial compliance with the GSP Regulations supports the state policy regarding the human right to water (Water Code § 106.3). The Department developed its GSP Regulations consistent with and intending to further the policy through implementation of SGMA and the Regulations, primarily by achieving sustainable groundwater management in a basin. By ensuring substantial compliance with the GSP Regulations, the Department has considered the state policy regarding the human right to water in its evaluation of the Plan. (23 CCR § 350.4(g).)
1. The GSA has an adaptive management approach in regard to managing groundwater; therefore, there will be continued monitoring, assessment of groundwater conditions, and evaluation of benefits obtained from projects and management actions. The GSA plans to implement the groundwater allocation to manage groundwater demand only in the event that the proposed projects fail to achieve interim milestones and the Subbasin is projected to not be able to achieve sustainability goals by 2042.
 2. The Plan acknowledges and identifies interconnected surface waters within the Subbasin. The GSA proposes initial sustainable management criteria to manage this sustainability indicator and measures to improve understanding and management of interconnected surface water. The GSA acknowledges, and the Department agrees, many data gaps related to interconnected surface water exist. The GSA should continue filling data gaps, collecting additional monitoring data, and coordinating with resources agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping. Future updates to the Plan should aim to improve the initial sustainable management criteria as more information and improved methodology becomes available.

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3. Projections of future basin extractions are likely to stay within current and historic ranges, at least until the next periodic evaluation by the GSA and the Department. Subbasin groundwater levels and other SGMA sustainability indicators are unlikely to substantially deteriorate while the GSA implements the Department's recommended corrective actions. State intervention is not necessary at this time to ensure that local agencies manage groundwater in a sustainable manner. (Water Code § 10720.1(h).)
4. The California Environmental Quality Act (Public Resources Code § 21000 *et seq.*) does not apply to the Department's evaluation and assessment of the Plan.

Accordingly, the GSP submitted by the Agency for the Wyandotte Creek Subbasin is hereby **APPROVED**. The recommended corrective actions identified in the Staff Report will assist the Department's future review of the Plan's implementation for consistency with SGMA and the Department therefore recommends the Agency address them by the time of the Department's periodic review, which is set to begin on January 28, 2027, as required by Water Code § 10733.8. Failure to address the Department's Recommended Corrective Actions before future, subsequent plan evaluations, may lead to a Plan being determined incomplete or inadequate.

Signed:



Karla Nemeth, Director

Date: July 27, 2023

Exhibit A: Groundwater Sustainability Plan Assessment Staff Report – Sacramento Valley
– Wyandotte Creek Subbasin

State of California
Department of Water Resources
Sustainable Groundwater Management Program
Groundwater Sustainability Plan Assessment
Staff Report

Groundwater Basin Name: Sacramento Valley – Wyandotte Creek Subbasin (No. 5-021.69)
Submitting Agency: Wyandotte Creek Groundwater Sustainability Agency
Submittal Type: Initial GSP Submission
Submittal Date: January 28, 2022
Recommendation: Approved
Date: July 27, 2023

The Wyandotte Creek Groundwater Sustainability Agency (GSA or Agency) submitted the Wyandotte Creek Groundwater Subbasin Groundwater Sustainability Plan – December 2021 (GSP or Plan) for the Sacramento Valley – Wyandotte Creek Subbasin (Subbasin) to the Department of Water Resources (Department) for evaluation and assessment as required by the Sustainable Groundwater Management Act (SGMA)¹ and GSP Regulations.² The GSP covers the entire Subbasin for the implementation of SGMA.

After evaluation and assessment, Department staff conclude that the Plan includes the required components of a GSP, demonstrates a thorough understanding of the Subbasin based on what appears to be the best available science and information, sets well explained, supported, and reasonable sustainable management criteria to prevent undesirable results as defined in the Plan, and proposes a set of projects and management actions that will likely achieve the sustainability goal defined for the Subbasin.³ Department staff will continue to monitor and evaluate the Subbasin’s progress toward achieving the sustainability goal through annual reporting and future periodic evaluations of the GSP and its implementation.

- ***Based on the current evaluation of the Plan, Department staff recommend the GSP be approved with the recommended corrective actions described herein.***

This assessment includes five sections:

¹ Water Code § 10720 *et seq.*

² 23 CCR § 350 *et seq.*

³ 23 CCR § 350 *et seq.*

- **Section 1 – Summary**: Overview of Department staff's assessment and recommendations.
- **Section 2 – Evaluation Criteria**: Describes the legislative requirements and the Department's evaluation criteria.
- **Section 3 – Required Conditions**: Describes the submission requirements, Plan completeness, and basin coverage required for a GSP to be evaluated by the Department.
- **Section 4 – Plan Evaluation**: Provides an assessment of the contents included in the GSP organized by each Subarticle outlined in the GSP Regulations.
- **Section 5 – Staff Recommendation**: Includes the staff recommendation for the Plan and any recommended or required corrective actions, as applicable.

1 SUMMARY

Department staff recommend approval of the Wyandotte Creek GSP. The GSA has identified areas for improvement of its Plan (e.g., improve characterization of the aquifer system, collect data from active domestic wells to adjust minimum thresholds, installing additional wells and other monitoring sites to analyze interaction of streams and groundwater pumping, update and refine the Butte Basin Groundwater model). Department staff concur that those items are important and recommend the GSA address them as soon as possible. Department staff have also identified additional recommended corrective actions within this assessment that the GSA should consider addressing by the first periodic evaluation of the Plan. The recommended corrective actions generally focus on the following:

- (1) Improving the understanding of water quality conditions in the Subbasin, coordinating with lead regulatory agencies, and updating the GSP with information about how ongoing regulatory programs operating in the Subbasin may impact groundwater management,
- (2) Evaluating the potential impacts to beneficial uses and users of groundwater from the proposed sustainable management criteria for chronic lowering of groundwater levels and revising the definition of undesirable results and language pertaining to significant and unreasonable lowering of groundwater level,
- (3) Establishing a monitoring network and sustainable management criteria for land subsidence, and
- (4) Continuing to fill data gaps, collecting additional monitoring data, coordinating with resource agencies and interested parties to understand beneficial uses and users that may be impacted by depletions of interconnected surface water caused by groundwater pumping, and potentially refine sustainable management criteria.

Addressing the recommended corrective actions identified in [Section 5](#) of this assessment will be important to demonstrate, on an ongoing basis, that implementation of the Plan is likely to achieve the sustainability goal.

2 EVALUATION CRITERIA

The GSA submitted a single GSP to the Department to evaluate whether the Plan conforms to specified SGMA requirements⁴ and is likely to achieve the sustainability goal for the Wyandotte Creek Subbasin.⁵ To achieve the sustainability goal for the Subbasin, the GSP must demonstrate that implementation of the Plan will lead to sustainable groundwater management, which means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.⁶ Undesirable results must be defined quantitatively by the GSAs.⁷ The Department is also required to evaluate whether the GSP will adversely affect the ability of an adjacent basin to implement its GSP or achieve its sustainability goal.⁸

For the GSP to be evaluated by the Department, it must first be determined that the Plan was submitted by the statutory deadline,⁹ and that it is complete and covers the entire basin.¹⁰ If these conditions are satisfied, the Department evaluates the Plan to determine whether it complies with specific SGMA requirements and substantially complies with the GSP Regulations.¹¹ Substantial compliance means that the supporting information is sufficiently detailed and the analyses sufficiently thorough and reasonable, in the judgment of the Department, to evaluate the Plan, and the Department determines that any discrepancy would not materially affect the ability of the Agency to achieve the sustainability goal for the basin, or the ability of the Department to evaluate the likelihood of the Plan to attain that goal.¹²

When evaluating whether the Plan is likely to achieve the sustainability goal for the Subbasin, Department staff reviewed the information provided and relied upon in the GSP for sufficiency, credibility, and consistency with scientific and engineering professional standards of practice.¹³ The Department's review considers whether there is a reasonable relationship between the information provided and the assumptions and conclusions made by the GSA, including whether the interests of the beneficial uses and users of groundwater in the basin have been considered; whether sustainable management

⁴ Water Code §§ 10727.2, 10727.4.

⁵ Water Code § 10733(a).

⁶ Water Code § 10721(v).

⁷ 23 CCR § 354.26 *et seq.*

⁸ Water Code § 10733(c).

⁹ 23 CCR § 355.4(a)(1).

¹⁰ 23 CCR §§ 355.4(a)(2), 355.4(a)(3).

¹¹ 23 CCR § 350 *et seq.*

¹² 23 CCR § 355.4(b).

¹³ 23 CCR § 351(h).

criteria and projects and management actions described in the Plan are commensurate with the level of understanding of the basin setting; and whether those projects and management actions are feasible and likely to prevent undesirable results.¹⁴

The Department also considers whether the GSA has the legal authority and financial resources necessary to implement the Plan.¹⁵

To the extent overdraft is present in a basin, the Department evaluates whether the Plan provides a reasonable assessment of the overdraft and includes reasonable means to mitigate the overdraft.¹⁶ The Department also considers whether the Plan provides reasonable measures and schedules to eliminate identified data gaps.¹⁷ Lastly, the Department's review considers the comments submitted on the Plan and evaluates whether the GSA adequately responded to the comments that raise credible technical or policy issues with the Plan.¹⁸

The Department is required to evaluate the Plan within two years of its submittal date and issue a written assessment of the Plan.¹⁹ The assessment is required to include a determination of the Plan's status.²⁰ The GSP Regulations define the three options for determining the status of a Plan: Approved,²¹ Incomplete,²² or Inadequate.²³

Even when review indicates that the GSP satisfies the requirements of SGMA and is in substantial compliance with the GSP Regulations, the Department may recommend corrective actions.²⁴ Recommended corrective actions are intended to facilitate progress in achieving the sustainability goal within the basin and the Department's future evaluations, and to allow the Department to better evaluate whether the Plan adversely affects adjacent basins. While the issues addressed by the recommended corrective actions do not, at this time, preclude approval of the Plan, the Department recommends that the issues be addressed to ensure the Plan's implementation continues to be consistent with SGMA and the Department is able to assess progress in achieving the sustainability goal within the basin.²⁵ Unless otherwise noted, the Department proposes that recommended corrective actions be addressed by the submission date for the first periodic assessment.²⁶

¹⁴ 23 CCR §§ 355.4(b)(1), (3), (4), and (5).

¹⁵ 23 CCR § 355.4(b)(9).

¹⁶ 23 CCR § 355.4(b)(6).

¹⁷ 23 CCR § 355.4(b)(2).

¹⁸ 23 CCR § 355.4(b)(10).

¹⁹ Water Code § 10733.4(d); 23 CCR § 355.2(e).

²⁰ Water Code § 10733.4(d); 23 CCR § 355.2(e).

²¹ 23 CCR § 355.2(e)(1).

²² 23 CCR § 355.2(e)(2).

²³ 23 CCR § 355.2(e)(3).

²⁴ Water Code § 10733.4(d).

²⁵ Water Code § 10733.8.

²⁶ 23 CCR § 356.4 *et seq.*

The staff assessment of the GSP involves the review of information presented by the GSA, including models and assumptions, and an evaluation of that information based on scientific reasonableness, including standard or accepted professional and scientific methods and practices. The assessment does not require Department staff to recalculate or reevaluate technical information provided in the Plan or to perform its own geologic or engineering analysis of that information. The staff recommendation to approve a Plan does not signify that Department staff, were they to exercise the professional judgment required to develop a GSP for the basin, would make the same assumptions and interpretations as those contained in the Plan, but simply that Department staff have determined that the assumptions and interpretations relied upon by the submitting GSA are supported by adequate, credible evidence, and are scientifically reasonable.

Lastly, the Department's review and approval of the Plan is a continual process. Both SGMA and the GSP Regulations provide the Department with the ongoing authority and duty to review the implementation of the Plan.²⁷ Also, GSAs have an ongoing duty to provide reports to the Department, periodically reassess their plans, and, when necessary, update or amend their plans.²⁸ The passage of time or new information may make what is reasonable and feasible at the time of this review to not be so in the future. The emphasis of the Department's periodic reviews will be to assess the progress toward achieving the sustainability goal for the basin and whether Plan implementation adversely affects the ability of adjacent basins to achieve their sustainability goals.

3 REQUIRED CONDITIONS

A GSP, to be evaluated by the Department, must be submitted within the applicable statutory deadline. The GSP must also be complete and must, either on its own or in coordination with other GSPs, cover the entire basin.

3.1 SUBMISSION DEADLINE

SGMA required basins categorized as high- or medium-priority and not subject to critical conditions of overdraft to submit a GSP no later than January 31, 2022.²⁹

The GSA submitted its Plan on January 28, 2022.

3.2 COMPLETENESS

GSP Regulations specify that the Department shall evaluate a GSP if that GSP is complete and includes the information required by SGMA and the GSP Regulations.³⁰

²⁷ Water Code § 10733.8; 23 CCR § 355.6.

²⁸ Water Code §§ 10728 *et seq.*, 10728.2.

²⁹ Water Code § 10720.7(a)(2).

³⁰ 23 CCR § 355.4(a)(2).

The GSA submitted an adopted GSP for the entire Subbasin. After an initial, preliminary review, Department staff found the GSP to be complete and appearing to include the required information, sufficient to warrant a thorough evaluation by the Department.³¹ The Department posted the GSP to its website on February 27, 2022.³²

3.3 BASIN COVERAGE

A GSP, either on its own or in coordination with other GSPs, must cover the entire basin.³³ A GSP that is intended to cover the entire basin may be presumed to do so if the basin is fully contained within the jurisdictional boundaries of the submitting GSAs.

The GSP intends to manage the entire Wyandotte Creek Subbasin and the jurisdictional boundary of the submitting GSA fully contains the Subbasin.³⁴

4 PLAN EVALUATION

As stated in Section 355.4 of the GSP Regulations, a basin “shall be sustainably managed within 20 years of the applicable statutory deadline consistent with the objectives of the Act.” The Department’s assessment is based on a number of related factors including whether the elements of a GSP were developed in the manner required by the GSP Regulations, whether the GSP was developed using appropriate data and methodologies and whether its conclusions are scientifically reasonable, and whether the GSP, through the implementation of clearly defined and technically feasible projects and management actions, is likely to achieve a tenable sustainability goal for the basin. The Department staff’s evaluation of the likelihood of the Plan to attain the sustainability goal for the Subbasin is provided below.

4.1 ADMINISTRATIVE INFORMATION

The GSP Regulations require each Plan to include administrative information identifying the submitting Agency, its decision-making process, and its legal authority;³⁵ a description of the Plan area and identification of beneficial uses and users in the Plan area;³⁶ and a description of the ability of the submitting Agency to develop and implement a Plan for that area.³⁷

³¹ The Department undertakes a preliminary completeness review of a submitted Plan under section 355.4(a) of the GSP Regulations to determine whether the elements of a Plan required by SGMA and the GSP Regulations have been provided, which is different from a determination, upon review, that a Plan is “incomplete” for purposes of section 355.2(e)(2) of the GSP Regulations.

³² <https://sgma.water.ca.gov/portal/gsp/preview/99>.

³³ Water Code § 10727(b); 23 CCR § 355.4(a)(3).

³⁴ Wyandotte Creek Subbasin GSP, Executive Summary, p. 21.

³⁵ 23 CCR § 354.6 *et seq.*

³⁶ 23 CCR § 354.8 *et seq.*

³⁷ 23 CCR § 354.6(e).

A single GSP covering the entire Wyandotte Creek Subbasin was prepared and submitted to the Department by the Wyandotte Creek GSA, which is the only GSA in the Subbasin. The GSA was formed by the County of Butte, City of Oroville and Thermalito Water and Sewer District (TWSD) using a Joint Powers Agreement.³⁸ A GSA Board serves as the policy-making role for SGMA implementation, which is composed of five seats with equal and full voting rights. The five seats are filled by five board members who are representatives of the County of Butte, City of Oroville, TWSD, agricultural groundwater users, and domestic well users.³⁹ The GSP states that the GSA possesses the ability to exercise powers granted by the Joint Powers Agreement, SGMA, and the common powers of its members.⁴⁰

The Subbasin is located within Butte County which also includes the City of Oroville, state and federal lands, and portions of the Berry Creek Off-Reservation Trust Land, Mooretown Off-Reservation Trust Land and Mooretown Rancheria.⁴¹ The Subbasin is part of the larger Sacramento Valley Groundwater Basin and is surrounded by the Vina Subbasin to the northwest; Butte Subbasin to the west; North Yuba and Sutter Subbasins to the south; and by the Sierra Nevada geomorphic province to the east, as shown in Figure 1.⁴² All the adjacent groundwater basins are medium and high-priority basins with most of their GSPs under review by the Department.

³⁸ Wyandotte Creek Subbasin GSP, Section 1.1.4, p. 39.

³⁹ Wyandotte Creek Subbasin GSP, Section 1.1.4, p. 41.

⁴⁰ Wyandotte Creek Subbasin GSP, Section 1.1.4, p. 41.

⁴¹ Wyandotte Creek Subbasin GSP, Section 1.2.1, p. 45.

⁴² Wyandotte Creek Subbasin GSP, Executive Summary and Section 1.2.1, pp. 21 and 45.

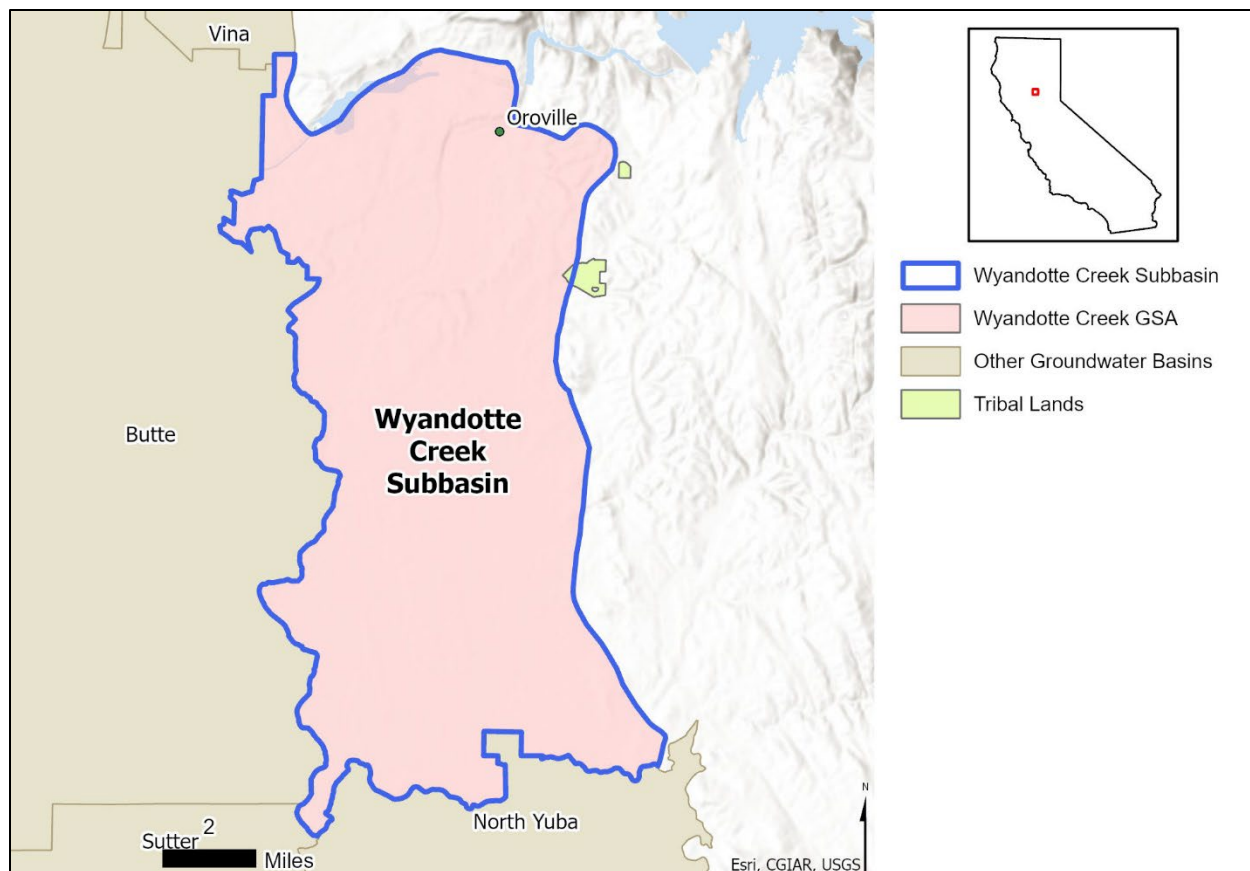


Figure 1: Wyandotte Creek Subbasin Location Map.

The GSP states that land use is dominated by agriculture with other land use types in the Subbasin being industrial, urban, and undeveloped.⁴³ The GSP also provides a map showing three land use types: agricultural areas, developed areas, and other land use;⁴⁴ however, the GSP does not appear to provide the quantitative information regarding the total area for each land use type. The GSP states that both agricultural and urban land uses rely on a combination of surface water and groundwater.⁴⁵

The GSP provides a list of beneficial uses and users of groundwater in the Subbasin which includes agricultural, domestic, municipal, environmental, and others.⁴⁶ The GSP states that more than 4,000 domestic wells are recorded per the Department's Online System for Well Completion Reports database as being located within the Wyandotte Creek Subbasin; however, the GSP adds that the data within this database cannot be guaranteed to always be accurate or precise.⁴⁷

⁴³ Wyandotte Creek Subbasin GSP, Section 1.2.1, p. 45.

⁴⁴ Wyandotte Creek Subbasin GSP, Figure 1-7, p. 51.

⁴⁵ Wyandotte Creek Subbasin GSP, Section 1.2.1, p. 45.

⁴⁶ Wyandotte Creek Subbasin GSP, Section 1.8.3, pp. 73-74.

⁴⁷ Wyandotte Creek Subbasin GSP, Section 1.4.4, p. 70.

The County of Butte has been monitoring groundwater in the County since 2000 under Butte County Code regarding groundwater conservation and protection.⁴⁸ In 2004, the Butte County Code required the establishment of monitoring networks and Basin Management Objectives for groundwater elevation, groundwater quality related to saline intrusion, and land subsidence.⁴⁹ The Basin Management Objectives program transitioned to SGMA implementation through a revision to the Butte County Code in 2019.⁵⁰

The GSP describes the existing monitoring programs and data sources that were considered during the GSP development. These programs and data sources are the California Statewide Groundwater Elevation Monitoring, Water Data Library, Online System for Well Completion Reports, Butte County Department of Water and Resource Conservation, Sacramento Valley Water Quality Coalition, and the Geotracker/Groundwater Ambient Monitoring and Assessment.⁵¹ In addition to the monitoring programs, the County of Butte has a Groundwater Management Plan that covers the entire County except for the areas covered by the Urban Water Management Plans,⁵² the Butte General Plan 2030, and the City of Oroville General Plan which aims to maintain and enhance water quality, ensure an abundant and sustainable water supply to support all uses, effectively manage groundwater resources, promote water conservation, protect water quality, improve stream bank stability and protect riparian resources.⁵³ Given the history of groundwater monitoring and management in the Subbasin by the GSA member agencies, the County of Butte and the City of Oroville, and the transition of ongoing programs to SGMA implementation, Department staff believe that the GSA has the ability to implement the GSP in the Subbasin.

The GSP's discussion and presentation of administrative information covers the specific items listed in the GSP Regulations in an understandable format using appropriate detail. Department staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the quality, data, and discussion of this subject in the GSP. The administrative information included in the Plan substantially complies with the requirements outlined in the GSP Regulations.

4.2 BASIN SETTING

GSP Regulations require information about the physical setting and characteristics of the basin and current conditions of the basin, including a hydrogeologic conceptual model; a description of historical and current groundwater conditions; and a water budget

⁴⁸ Wyandotte Creek Subbasin GSP, Section 1.4.1, pp. 68-69.

⁴⁹ Wyandotte Creek Subbasin GSP, Section 1.4.1, p. 69.

⁵⁰ Wyandotte Creek Subbasin GSP, Section 1.4.1, p. 69.

⁵¹ Wyandotte Creek Subbasin GSP, Sections 1.4.2-1.7, pp. 69-72.

⁵² Wyandotte Creek Subbasin GSP, Section 1.3.1, p. 60.

⁵³ Wyandotte Creek Subbasin GSP, Sections 1.3.5-1.3.5.2, pp. 62-66.

accounting for total annual volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budget conditions.⁵⁴

4.2.1 Hydrogeologic Conceptual Model

The hydrogeologic conceptual model is a non-numerical model of the physical setting, characteristics, and processes that govern groundwater occurrence within a basin, and represents a local agency’s understanding of the geology and hydrology of the basin that support the geologic assumptions used in developing mathematical models, such as those that allow for quantification of the water budget.⁵⁵ The GSP Regulations require a descriptive hydrogeologic conceptual model that includes a written description of geologic conditions, supported by cross sections and maps,⁵⁶ and includes a description of basin boundaries and the bottom of the basin,⁵⁷ principal aquifers and aquitards,⁵⁸ and data gaps.⁵⁹

The Subbasin is bounded on the west by the Feather River and Thermalito Afterbay, on the south by the Butte-Yuba County line, and on the north and east by the edge of the alluvium.⁶⁰ “Groundwater flows from the north and from foothill recharge areas in the east toward the subbasin’s southeastern corner.”⁶¹ The GSP describes the regional structure of the Sacramento Valley as a groundwater basin which consists of an “asymmetrical trough tilting to the southwest with a steeply dipping western limb and a gently dipping eastern limb.”⁶² Younger marine and continentally derived sediments and volcanic rock overlie older granitic and metamorphic rock formations; sediments thin near the eastern margin of the Subbasin, exposing older metamorphic and granitic rocks underlying and bounding the Sacramento Valley sediments. In the Oroville area, bedrock depths are irregular, ranging from 283 feet below ground surface (bgs) in the west to depths greater than 1,000 feet bgs in the east.⁶³

The GSP describes the bottom of the Subbasin using the North Yuba Subbasin description from the Department’s 2003 Bulletin 118 report (at the time, the North Yuba Subbasin included what is now the Wyandotte Creek Subbasin). The report describes the aquifer system to be comprised of “continental deposits of Quaternary to Late Tertiary (Pliocene) age. The cumulative thickness of these deposits increases from a few hundred feet near the Sierra Nevada foothills on the east to over 1,000 feet along the western

⁵⁴ 23 CCR § 354.12.

⁵⁵ DWR Best Management Practices for the Sustainable Management of Groundwater: Hydrogeologic Conceptual Model, December 2016: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-3-Hydrogeologic-Conceptual-Model_ay_19.pdf.

⁵⁶ 23 CCR §§ 354.14 (a), 354.14 (c).

⁵⁷ 23 CCR §§ 354.14 (b)(2-3).

⁵⁸ 23 CCR § 354.14 (b)(4) *et seq.*

⁵⁹ 23 CCR § 354.14 (b)(5).

⁶⁰ Wyandotte Creek Subbasin GSP, Section 2.1.1.1, p. 78.

⁶¹ Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.

⁶² Wyandotte Creek Subbasin GSP, Section 2.1.3, p. 87.

⁶³ Wyandotte Creek Subbasin GSP, Section 2.1.3, p. 87.

margin of the basin.”⁶⁴ According to the GSP, the base of the Laguna Formation is generally accepted as the base of fresh water. However, the GSP also mentions the base of the Mehrten Formation as the base of freshwater for portions of the Subbasin.⁶⁵ The GSP explains that the stratigraphy of the Subbasin is complicated by discontinuous formation exposures and inset relationships with older formations, primarily owing to the sedimentologic behavior of the Feather River system.⁶⁶ The base of fresh groundwater fluctuates by local changes in the subsurface geology and geologic formational structure. Because of the variable depths and geologic formations for defining the base of fresh groundwater, the GSP recognizes the inconclusiveness of the data and the need for additional data to improve characterization of the aquifer system.⁶⁷

The GSP describes a single principal aquifer in the Subbasin comprised predominantly of sedimentary deposits of three water bearing aquifers: Lone, Mehrten, and Laguna Formations.⁶⁸ The Lone Formation consists of discontinuous exposures of variably cemented, fine to coarse sandstone, siltstone, lignite, and claystone; primarily deltaic deposits.⁶⁹ The Mehrten Formation consists of a series of volcanic debris flows with pebble and cobble-gravel facies suggesting the debris flows may have choked ancestral stream/river systems.⁷⁰ The Laguna Formation within the Subbasin boundary is described as ancestral Feather River deposits.⁷¹ The water produced from the principal aquifer is primarily used to meet irrigation, domestic and municipal water demand.⁷² The GSP states that there are “no known structural properties that significantly restrict groundwater flow within the subbasin.”⁷³ Department staff note the GSP describes the principal aquifer without mentioning aquitards,⁷⁴ but the east-west cross section shows a thin aquitard layer at the surface.⁷⁵ Department staff encourages the GSA to clarify the presence or absence of aquitards in the Plan.

The GSP provides a north-south cross section showing lithology, well locations, regional water table elevation, and geologic interpretation of discontinuous aquifer zones.⁷⁶ The GSP also includes an east-west cross section with no supporting well log data, no identification of geologic formations, and no major stratigraphic or structural features.⁷⁷ Department staff find that the discussion and presentation of the east-west cross section

⁶⁴ Wyandotte Creek Subbasin GSP, Section 2.1.1.2, p. 78.

⁶⁵ Wyandotte Creek Subbasin GSP, Section 2.1.1.2, p. 78.

⁶⁶ Wyandotte Creek Subbasin GSP, Section 2.1.3, p. 87.

⁶⁷ Wyandotte Creek Subbasin GSP, Section 2.1.1.2, p. 79.

⁶⁸ Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.

⁶⁹ Wyandotte Creek Subbasin GSP, Section 2.1.5.1, p. 89.

⁷⁰ Wyandotte Creek Subbasin GSP, Section 2.1.5.2, p. 89.

⁷¹ Wyandotte Creek Subbasin GSP, Section 2.1.5.3, pp. 89-90.

⁷² Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.

⁷³ Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.

⁷⁴ Wyandotte Creek Subbasin GSP, Section 2.1.7, p. 93.

⁷⁵ Wyandotte Creek Subbasin GSP, Figure 2-8C, p. 93.

⁷⁶ Wyandotte Creek Subbasin GSP, Section 2.1.6, Figures 2-8A and 2-8B, pp. 90-92.

⁷⁷ Wyandotte Creek Subbasin GSP, Section 2.1.6, Figures 2-8A and 2-8C, pp. 90-91 and 93.

does not cover the information required by the GSP Regulations.⁷⁸ Department staff recommend revising the east-west cross section that will demonstrate relevant well logs and geologic descriptions.

The GSP identifies data gaps relevant to the development and understanding of the hydrogeologic conceptual model of the Subbasin.⁷⁹ The GSP notes the lack of groundwater monitoring data, the need for water quality data to understand recharge areas, better characterization of surface water-groundwater relationships, and using aerial electromagnetic (also known as AEM) survey data to improve understanding of lithology and aquifer connectivity.⁸⁰ The GSP mentions that data gaps can result from insufficient quantity or quality of the monitoring information and is planning to report any updates on data gaps in the annual report and the periodic evaluation of the Plan.⁸¹

Despite requesting clarification on the presence of aquitards and revision of the east-west cross section, the information provided in the GSP that comprises the hydrogeologic conceptual model substantially complies with the requirements outlined in the GSP Regulations. In general, the Plan's descriptions of the regional geologic setting, the Subbasin's physical characteristics, the identification of the principal aquifer, and hydrogeologic conceptual model appear to utilize the best available science. Department staff are aware of no significant inconsistencies or contrary technical information to that presented in the Plan.

4.2.2 Groundwater Conditions

The GSP Regulations require a written description of historical and current groundwater conditions for each of the applicable sustainability indicators and groundwater dependent ecosystems that includes the following: groundwater elevation contour maps and hydrographs,⁸² a graph depicting change in groundwater storage,⁸³ maps and cross-sections of the seawater intrusion front,⁸⁴ maps of groundwater contamination sites and plumes,⁸⁵ maps depicting total subsidence,⁸⁶ identification of interconnected surface water systems and an estimate of the quantity and timing of depletions of those systems,⁸⁷ and identification of groundwater dependent ecosystems.⁸⁸

According to the Plan, groundwater elevations have been relatively stable in the Subbasin.⁸⁹ The GSP provides four groundwater elevation contour figures showing the

⁷⁸ 23 CCR § 354.14 (c).

⁷⁹ Wyandotte Creek Subbasin GSP, Section 4.10, p. 193.

⁸⁰ Wyandotte Creek Subbasin GSP, Section 2.1.8, p. 95.

⁸¹ Wyandotte Creek Subbasin GSP, Section 4.10, p. 193.

⁸² 23 CCR §§ 354.16 (a)(1-2).

⁸³ 23 CCR § 354.16 (b).

⁸⁴ 23 CCR § 354.16 (c).

⁸⁵ 23 CCR § 354.16 (d).

⁸⁶ 23 CCR § 354.16 (e).

⁸⁷ 23 CCR § 354.16 (f).

⁸⁸ 23 CCR § 354.16 (g).

⁸⁹ Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.

spring and fall 2015 and 2019 groundwater elevations.⁹⁰ The GSP states that the Thermalito Afterbay and Feather River influence the stability of groundwater elevations in the north “between the spring and fall observation periods, while elevations in the south tend to be lower in the fall than the spring, a pattern typical of valley floor locations distant from major sources of recharge.”⁹¹ The four contour maps display higher groundwater elevations in the north indicating a general gradient that causes water to flow from north and from foothill recharge areas in the east toward the Subbasin’s southeastern corner.⁹²

In addition to the groundwater elevation contour maps, the GSP provides nine hydrographs of selected monitoring wells which depict long-term groundwater elevation trends in the Subbasin⁹³ and nine additional hydrographs for wells identified as representative monitoring sites for chronic lowering of groundwater levels in Appendix 3-C,⁹⁴ which also show long-term groundwater level data. The period of record for hydrographs provided in the GSP vary, some begin as early as the 1940s, but generally begin in the 2000s and extend through 2018. Based on the review of the information provided, it appears to Department staff that most hydrographs show stable groundwater levels in the Subbasin; however, some wells in the north (within the Oroville Management Area) show slight groundwater level decline after 2012. The GSP does not indicate how much groundwater levels have declined, but Department staff estimated the decline to be up to 10 feet.

The GSP describes the groundwater storage as declining over the summer when groundwater demand is high and replenishing through precipitation and natural recharge by the following spring.⁹⁵ The GSP provides a graph depicting the annual and cumulative change in storage between seasonal high groundwater conditions from 2000 to 2018, including annual groundwater pumping and water year type data.⁹⁶ The graph demonstrates groundwater storage increasing in wet years, decreasing in dry and critical years, and either increasing or decreasing in above normal and below normal years. The GSP states that a decline in groundwater storage was observed between the period of 2007 to 2016 and is attributed to the dry conditions experienced in the Subbasin.⁹⁷ A cumulative decline in groundwater storage is estimated to be -60,000 acre-feet.⁹⁸ The annual groundwater storage during the same period is reported as -3,700 acre-feet per

⁹⁰ Wyandotte Creek Subbasin GSP, Section 2.2.2.1 and Figures 2-9-2-12, pp. 96-100.

⁹¹ Wyandotte Creek Subbasin GSP, Executive Summary and Section 2.2.2.1, pp. 24 and 96.

⁹² Wyandotte Creek Subbasin GSP, Section 2.2.2.1, p. 96.

⁹³ Wyandotte Creek Subbasin GSP, Section 2.2.2.2 and Figures 2-13 to 2-14, pp. 101-103.

⁹⁴ Wyandotte Creek Subbasin GSP Appendices, Appendix 3-C, pp. 215-226.

⁹⁵ Wyandotte Creek Subbasin GSP, Section 2.2.2.4, p. 104.

⁹⁶ Wyandotte Creek Subbasin GSP, Section 2.2.2.4 and Figure 2-15, pp. 104-105.

⁹⁷ Wyandotte Creek Subbasin GSP, Section 2.2.2.4, p. 105.

⁹⁸ Wyandotte Creek Subbasin GSP, Figure 2-15, p. 105.

year (AFY).⁹⁹ Per the GSP, this annual change in storage is about 0.14 percent of the total groundwater stored, which is estimated to be 2.1 million acre-feet.¹⁰⁰

The GSP states that the Wyandotte Creek Subbasin is located far from the Delta and Pacific Ocean; therefore, seawater intrusion is not an applicable sustainability indicator.¹⁰¹ Department staff concur with this conclusion as the nearest coastline is about 100 miles away from the Subbasin.

The GSP describes the groundwater quality in the principal aquifer as generally good¹⁰² with some impacted areas by anthropogenic sources.¹⁰³ The GSP elaborates by presenting total dissolved solid (TDS) concentrations that demonstrate good water quality in the Subbasin. TDS is reported to range from 149 to 655 milligrams per liter (mg/L), with a median concentration of 277 mg/L,¹⁰⁴ which Department staff note is below the upper secondary maximum contaminant levels set for the State Secondary Drinking Water Standards.¹⁰⁵ The anthropogenic sources (or Active Contamination Remediation Sites) are in the northern region of the Subbasin as shown on Figure 2-16.¹⁰⁶ The GSP categorizes the Active Contamination Remediation Sites as: Other Sites with Corrective Action, Sites Needing Evaluation, Federal Superfund-Listed Sites, and Leaking LUST Cleanup Sites,¹⁰⁷ but the GSP does not identify which Active Contamination Remediation Site(s) pertain to what category. The GSP mentions that one site (formerly a manufactured gas plant) is confirmed to be impacting groundwater. The potential contaminants of concern derived from the manufactured gas plant include arsenic, cyanide, lead, polynuclear aromatic hydrocarbons, and total petroleum hydrocarbons.¹⁰⁸ The GSP also identifies saline to brackish groundwater in the northern portion¹⁰⁹ and chemicals of emerging concern, such as perfluorooctanesulfonic acid (PFOS) and per- and polyfluoroalkyl substances (PFAS), to potentially affect groundwater conditions.¹¹⁰ Department staff note that a map showing the extent and location of the contaminant plumes within the Subbasin is not provided.

The GSP states that the groundwater quality in the Subbasin is currently monitored by Butte County, Sacramento Valley Water Quality Coalition, California Rice Commission, State Drinking Water Program, California Department of Toxic Substances Control, and the United States Environmental Protection Agency's National Priorities List. Per the GSP, water quality data collected by Sacramento Valley Water Quality Coalition for

⁹⁹ Wyandotte Creek Subbasin GSP, Section 2.3.4.1, p. 140.

¹⁰⁰ Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.

¹⁰¹ Wyandotte Creek Subbasin GSP, Executive Summary and Section 2.2.3, pp. 24 and 105.

¹⁰² Wyandotte Creek Subbasin GSP, Section 2.1.7.4, p. 94.

¹⁰³ Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.

¹⁰⁴ Wyandotte Creek Subbasin GSP, Section 2.1.7.4, p. 94.

¹⁰⁵ <https://regulations.justia.com/states/california/title-22/division-4/chapter-15/article-16/section-64449/>

¹⁰⁶ Wyandotte Creek Subbasin GSP, Tables ES-4 and Figure 2-16, pp. 26 and 107.

¹⁰⁷ Wyandotte Creek Subbasin GSP, Section 2.2.4.2, p. 106.

¹⁰⁸ Wyandotte Creek Subbasin GSP, Section 2.2.4.2, p. 108.

¹⁰⁹ Wyandotte Creek Subbasin GSP, Section 2.1.7.4, p. 94.

¹¹⁰ Wyandotte Creek Subbasin GSP, Section 2.2.4.1, p. 106.

compliance with the Central Valley Regional Board’s Irrigated Lands Regulatory Program is an important set of data because irrigated agriculture is the predominant land use in the Wyandotte Creek Subbasin.¹¹¹ The GSP states that PFOS and PFAS will not be monitored by the GSA for SGMA implementation but the GSA will be attentive to the effect the presence of these contaminants may have on groundwater management.¹¹²

The GSP’s description of groundwater quality conditions in the Subbasin includes relevant topics such as water quality constituents of concern, and some discussion of the factors that have caused water quality degradation; however, Department staff conclude that the Plan is also lacking important details related to groundwater quality. Department staff recommend the GSA provide additional information in the GSP outlining the location and extent of contamination plumes, identifying which constituents are being monitored under various regulatory programs, and thoroughly describing ongoing remediation efforts within the Subbasin (see [Recommended Corrective Action 1a](#)). Further, the GSA should evaluate whether groundwater management activities, including groundwater production under the jurisdiction of the GSA, may influence the migration of contaminant plumes (see [Recommended Corrective Action 1b](#)). As the GSP acknowledges that the aquifer used for drinking water supply is potentially affected by the contaminants,¹¹³ the GSA should also evaluate how existing groundwater quality issues and existing contamination plumes present in the Subbasin may be impacting beneficial uses and users of groundwater (see [Recommended Corrective Action 1c](#)). Lastly, Department staff recommend the GSA coordinate with the lead agencies overseeing these remediation sites regularly and update the Plan to explain how existing groundwater quality conditions and/or remediation efforts may impact the GSA’s ability to manage groundwater (see [Recommended Corrective Action 1d](#)).

The GSP states that no inelastic land subsidence has been recorded in the Subbasin¹¹⁴ because of stable groundwater levels and subsurface materials that are not prone to compaction.¹¹⁵ The GSP includes two maps showing the stations and displacement values from the Sacramento Valley Global Positioning System (GPS) study of 2008 to 2017,¹¹⁶ and the Department’s Interferometric Synthetic Aperture Radar (InSAR) displacement data coverage between 2015 and 2019.¹¹⁷ Land subsidence observations from the GPS Subsidence Monitoring stations show a total cumulative displacement range of 0.038 to -0.015 feet between 2008 to 2017 and the InSAR data shows a total cumulative displacement range of 0.25 to -0.25 feet between 2015-2019.¹¹⁸ The GSP

¹¹¹ Wyandotte Creek Subbasin GSP, Section 2.2.4.1, p. 106.

¹¹² Wyandotte Creek Subbasin GSP, Section 2.2.4.1, p. 106.

¹¹³ Wyandotte Creek Subbasin GSP, Section 2.2.4.1, p. 106.

¹¹⁴ Wyandotte Creek Subbasin GSP, Section 2.2.5.1, p. 108.

¹¹⁵ Wyandotte Creek Subbasin GSP, Section 4.5.1, p. 180.

¹¹⁶ Wyandotte Creek Subbasin GSP, Figure 2-17A, p. 111.

¹¹⁷ Wyandotte Creek Subbasin GSP, Figure 2-17B, p. 112.

¹¹⁸ Wyandotte Creek Subbasin GSP, Table 2-2, p. 110.

states that “inelastic land subsidence due to groundwater withdrawal is unlikely to result in an Undesirable Result.”¹¹⁹

The GSP estimates the quantity and timing of depletions of interconnected surface water using the Butte Basin Groundwater Model (BBGM) for the primary streams in the Subbasin (i.e., Feather River, North Honcut Creek, and South Honcut Creek).¹²⁰ The GSP explains that a total of seven stream segments were defined for the primary streams.¹²¹ The BBGM was utilized to evaluate the stream segments and to classify them as being primarily gaining (gaining more than 80% of the time), losing (losing more than 80% of the time), or mixed over the historical period from 2000 to 2018. Based on the BBGM results, the Feather River appears to be gaining, North Honcut Creek as losing, and the South Honcut Creek as mixed.¹²² Additionally, the GSP states that, based on the results and on consideration of the spring depth to groundwater below the estimated streambed depth along each primary stream, it is likely that all streams traversing or bounding the Subbasin are connected to the groundwater system.¹²³ The water budget summary table for the groundwater system shows that the average annual inflow from the surface water system was 4,100 acre-feet and the outflow to the surface water system was 36,300 acre-feet.¹²⁴ This shows there was an annual net stream accretion of 32,200 acre-feet.

The GSP states that the BBGM incorporates the interaction of surface water and groundwater at a regional scale, but concedes that significant data gaps limit calibration of the groundwater response to the uppermost layer of the model.¹²⁵ Department staff note that the GSA plans to complete the first model update by 2027 and the second model update by 2032.¹²⁶ Department staff encourage the GSA to refine the model prior to the next periodic evaluation of the Plan and provide information on the interaction of surface water and groundwater at a reasonable scale, thereby eliminating the data gap related to groundwater response to the uppermost layer of the model.

The GSP utilized the Natural Communities Commonly Associated with the Groundwater (NCCAG) dataset to identify groundwater dependent ecosystems (GDEs). Per the GSP, the NCCAG dataset defines two habitat classes: wetland features commonly associated with the surface expression of groundwater under natural, unmodified conditions; and vegetation types commonly associated with the sub-surface presence of groundwater (i.e., phreatophytes).¹²⁷ The GSP provides a figure showing the locations of all potential

¹¹⁹ Wyandotte Creek Subbasin GSP, Section 2.2.5.2, p. 110.

¹²⁰ Wyandotte Creek Subbasin GSP, Section 2.2.6.2, p. 118.

¹²¹ Wyandotte Creek Subbasin GSP, Section 2.2.6.1, p. 114.

¹²² Wyandotte Creek Subbasin GSP, Section 2.2.6.1 and Figure 2-20, pp. 114 and 116.

¹²³ Wyandotte Creek Subbasin GSP, Section 2.2.6.1, p. 114.

¹²⁴ Wyandotte Creek Subbasin GSP, Table 2-6, pp. 136-137.

¹²⁵ Wyandotte Creek Subbasin GSP, Section 3.8.4, p. 170.

¹²⁶ Wyandotte Creek Subbasin GSP, Figure 6-1, p.227.

¹²⁷ Wyandotte Creek Subbasin GSP, Section 2.2.7.1, pp. 118-119.

GDEs identified by the NCCAG database within the Wyandotte Creek Subbasin.¹²⁸ The GSP states that GDE's dependence on groundwater was analyzed based on land use changes, proximity to perennial surface water supplies, areas accessing supplemental water supplies, adjacency to irrigated agriculture, dependency on agricultural-dependent surface water, and non-survival of vegetation during drought years.¹²⁹ Additionally, the potential GDE dataset was further reviewed against land use classifications to identify unlikely GDEs based on adjacency to agricultural operations.¹³⁰ Based on this analysis, the GSP classified the potential GDEs as "Not likely a GDE" or "Likely a GDE" showing their locations on a map.¹³¹ Additionally, the maps also show location of Valley Oak Dominated Areas which are classified as "Likely a GDE" because "this species can access groundwater over a wide range of depths."¹³²

Although recommended corrective actions are identified, the Plan sufficiently describes the historical and current groundwater conditions related to chronic lowering of groundwater levels, change in storage, seawater intrusion, and land subsidence throughout the Plan area, and the information included in the Plan substantially complies with the requirements outlined in the GSP Regulations. However, more information is required to fully understand groundwater conditions related to degraded water quality and depletions of interconnected surface water, as discussed above.

4.2.3 Water Budget

GSP Regulations require a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical; current; and projected water budget conditions,¹³³ and the sustainable yield.¹³⁴

The GSP utilizes the BBGM, originally developed in 1992 and updated over the decades, to estimate the water budget for historical, current, and projected conditions.¹³⁵ The GSP identifies water years 2000 to 2018 as the historical water budget and states data collected from 1971 to 2018 reflects the current water budget, with 2018 representing the most recent hydrology.¹³⁶ The GSP uses a 50-year period from 1971 to 2018 with 2004 and 2005 repeated after 2018 to develop a projected water budget.¹³⁷ The water budgets are estimated for both the Land and Surface Water System and Groundwater System¹³⁸

¹²⁸ Wyandotte Creek Subbasin GSP, Figure 2-22, p. 120.

¹²⁹ Wyandotte Creek Subbasin GSP, Section 2.2.7.3, pp. 122-123.

¹³⁰ Wyandotte Creek Subbasin GSP, Section 2.2.7.4, p. 123.

¹³¹ Wyandotte Creek Subbasin GSP, Section 2.2.7.5 and Figure 2-23, pp. 124-125.

¹³² Wyandotte Creek Subbasin GSP, Section 2.2.7.4, p. 124.

¹³³ 23 CCR §§ 354.18 (a), 354.18 (c) *et seq.*

¹³⁴ 23 CCR § 354.18 (b)(7).

¹³⁵ Wyandotte Creek Subbasin GSP, Section 2.3.2, p. 128.

¹³⁶ Wyandotte Creek Subbasin GSP, Section 2.3.1, p. 127.

¹³⁷ Wyandotte Creek Subbasin GSP, Section 2.3.1, p. 127.

¹³⁸ Wyandotte Creek Subbasin GSP, Section 2.3.4, pp. 133-134.

and are provided in tabular and graphical formats.¹³⁹ The water budget includes a detailed discussion and estimates of inflows and outflows for each system. Specifically for the groundwater system, the main components of inflows are deep percolation, subsurface inflows from adjacent basins and foothills, and stream seepage. The main components of outflows are groundwater pumping, subsurface outflows to adjacent basins, and stream accretions.¹⁴⁰

For the groundwater system, the historical water budget reports a decline in groundwater storage of 3,700 AFY and the current water budget reports an increase of 100 AFY. The GSP simulates three projected water budget scenarios: future conditions with no climate change, future conditions with 2030 climate change factor, and future conditions with 2070 climate change factor. The estimated change in storage for the three projected water budget scenarios are a decline in storage of 300 AFY, 0 AFY, and 400 AFY, respectively.¹⁴¹

The GSP estimates the sustainable yield based on projected water levels under baseline conditions. Per the GSP, on average, groundwater levels will be five feet below the measurable objectives in 2042 if no groundwater management measures are implemented.¹⁴² The decline of five feet translates into 793 AFY of storage decline.¹⁴³ While the GSP does not explicitly state this information, it appears that the GSP rounds this decline in storage to 1,000 AFY and deducts this from historical pumping of 47,100 AFY to estimate sustainable yield.¹⁴⁴ Thus, the GSP estimates a sustainable yield of 46,100 AFY which is expected to stop the projected decline in groundwater levels.¹⁴⁵ Department staff encourage the GSA to update the Plan during future periodic evaluations to clarify how the sustainable yield was calculated to ensure the inference by Department staff is correct.

Department staff conclude that the historical, current, and projected water budgets included in the Plan substantially comply with the requirements outlined in the GSP Regulations. The GSP provides the required historical, current, and future accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Plan area and includes an estimate of the sustainable yield of the Plan area and projected future water demands.

4.2.4 Management Areas

The GSP Regulations provide the option for one or more management areas to be defined within a basin if the GSA has determined that the creation of the management areas will

¹³⁹ Wyandotte Creek Subbasin GSP, Tables 2-5 to 2-6 and Figures 2-26 to 2-35, pp. 135-139, 142-143, and 145-150.

¹⁴⁰ Wyandotte Creek Subbasin GSP, Section 2.3.4, p. 134.

¹⁴¹ Wyandotte Creek Subbasin GSP, Table 2-6, p. 137.

¹⁴² Wyandotte Creek Subbasin GSP, Section 2.3.6, p. 153.

¹⁴³ Wyandotte Creek Subbasin GSP, Table 2-9, p. 153.

¹⁴⁴ Wyandotte Creek Subbasin GSP, Section 2.3.6, p. 153.

¹⁴⁵ Wyandotte Creek Subbasin GSP, Section 2.3.6, p. 153.

facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives, provided that undesirable results are defined consistently throughout the basin.¹⁴⁶

The GSP divides the Subbasin into two management areas: Wyandotte Creek Oroville and Wyandotte Creek South. The GSP states that the management areas are created to develop sustainable management criteria, monitoring networks, and projects that best serve the need of the uses and users of groundwater unique to the management area.¹⁴⁷ The GSP further elaborates that the management areas are unique in terms of interest and vulnerability of stakeholders and groundwater uses, the nature of water demand such as agricultural, domestic, and municipal, the number and characteristics of wells supplying groundwater, and to some degree the hydrogeology and recharge sources.¹⁴⁸

The GSP states that the Wyandotte Creek Oroville management area encompasses the municipal and adjacent area to the City of Oroville and is predominantly an urban area with California Water Service providing groundwater supplies for residential and municipal use.¹⁴⁹ The Feather River enters the Subbasin in the northeast and crosses the management area through the central portion.¹⁵⁰

The Wyandotte Creek South management area encompasses the area south of the City of Oroville¹⁵¹ and is described to be “dominated by irrigated agriculture dependent on groundwater and surface water diversions from the Feather River.”¹⁵² The Feather River enters the management area in the northeast and flows along the western boundary. Both perennial and ephemeral streams traverse the management area including Honcut Creek and Wyandotte Creek.¹⁵³

The GSP sufficiently describes the reasoning for dividing the Subbasin into management areas along with the characteristics and features of each management area. Department staff believe that the established management area will likely help in Plan implementation as each management area appear to have unique challenges and opportunities.

4.3 SUSTAINABLE MANAGEMENT CRITERIA

GSP Regulations require each Plan to include a sustainability goal for the basin and to characterize and establish undesirable results, minimum thresholds, and measurable objectives for each applicable sustainability indicator, as appropriate. The GSP Regulations require each Plan to define conditions that constitute sustainable groundwater management for the basin including the process by which the GSA

¹⁴⁶ 23 CCR § 354.20.

¹⁴⁷ Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 60.

¹⁴⁸ Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 60.

¹⁴⁹ Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 54.

¹⁵⁰ Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 54.

¹⁵¹ Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 54.

¹⁵² Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 60.

¹⁵³ Wyandotte Creek Subbasin GSP, Section 1.2.2.1, p. 60.

characterizes undesirable results and establishes minimum thresholds and measurable objectives for each applicable sustainability indicator.¹⁵⁴

4.3.1 Sustainability Goal

GSP Regulations require that GSAs establish a sustainability goal for the basin. The sustainability goal should be based on information provided in the GSP's basin setting and should include an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation.¹⁵⁵

The sustainability goal for the Subbasin is “to ensure that groundwater is managed to provide a water supply of adequate quantity and quality to support beneficial users of groundwater including but not limited to rural areas and other communities, the agricultural economic base of the region, and environmental resource uses in the Subbasin now and in the future.”¹⁵⁶ The GSP states that groundwater management is already occurring in Butte County which has resulted in enhanced monitoring.¹⁵⁷ While the GSP states that the groundwater levels in the Subbasin may continue to decline during the implementation period, the GSP focuses on having stable groundwater levels for the long term and operating the Subbasin within its sustainable yield.¹⁵⁸ The GSA intends to achieve the Subbasin's sustainability goal by implementing projects and management actions which are aimed to augment water supply and increase water efficiency, stabilize groundwater levels on a long-term average basis, and avoid undesirable results to ensure the Subbasin is operating within its sustainable yield.¹⁵⁹ The GSA has adopted an adaptive management strategy under which new projects may be proposed, and the projects proposed in this GSP may be further expanded and modified depending on the groundwater conditions of the Subbasin.¹⁶⁰

Department staff note the Subbasin's sustainability goal substantially complies with the GSP Regulations.

4.3.2 Sustainability Indicators

Sustainability indicators are defined as any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results.¹⁶¹ Sustainability indicators thus correspond with the six undesirable results – chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon, significant and unreasonable reduction of groundwater storage, significant and unreasonable seawater intrusion, significant and unreasonable degraded water quality, including the

¹⁵⁴ 23 CCR § 354.22 *et seq.*

¹⁵⁵ 23 CCR § 354.24.

¹⁵⁶ Wyandotte Creek Subbasin GSP, Section 3.1, p. 157.

¹⁵⁷ Wyandotte Creek Subbasin GSP, Section 3.1, p. 157.

¹⁵⁸ Wyandotte Creek Subbasin GSP, Section 3.1, p. 157.

¹⁵⁹ Wyandotte Creek Subbasin GSP, Section 3.1, p. 157.

¹⁶⁰ Wyandotte Creek Subbasin GSP, Section 5.5, p. 218.

¹⁶¹ 23 CCR § 351(ah).

migration of contaminant plumes that impair water supplies, land subsidence that substantially interferes with surface land uses, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water¹⁶² – but refer to groundwater conditions that are not, in and of themselves, significant and unreasonable. Rather, sustainability indicators refer to the effects caused by changing groundwater conditions that are monitored, and for which criteria in the form of minimum thresholds are established by the agency to define when the effect becomes significant and unreasonable, producing an undesirable result.

GSP Regulations require that GSAs provide descriptions of undesirable results including defining what are significant and unreasonable potential effects to beneficial uses and users for each sustainability indicator.¹⁶³ GSP Regulations also require GSPs provide the criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.¹⁶⁴

GSP Regulations require that the description of minimum thresholds include the information and criteria relied upon to establish and justify the minimum threshold for each sustainability indicator.¹⁶⁵ GSAs are required to describe how conditions at minimum thresholds may affect beneficial uses and users,¹⁶⁶ and the relationship between the minimum thresholds for each sustainability indicator, including an explanation for how the GSA has determined conditions at each minimum threshold will avoid causing undesirable results for other sustainability indicators.¹⁶⁷

GSP Regulations require that GSPs include a description of the criteria used to select measurable objectives, including interim milestones, to achieve the sustainability goal within 20 years.¹⁶⁸ GSP Regulations also require that the measurable objectives be established based on the same metrics and monitoring sites as those used to define minimum thresholds.¹⁶⁹

The following subsections thus consolidate three facets of sustainable management criteria: undesirable results, minimum thresholds, and measurable objectives. Information, as presented in the Plan, pertaining to the processes and criteria relied upon to define undesirable results applicable to the Subbasin, as quantified through the establishment of minimum thresholds, are addressed for each applicable sustainability

¹⁶² Water Code § 10721(x).

¹⁶³ 23 CCR §§ 354.26 (a), 354.26 (b)(c).

¹⁶⁴ 23 CCR § 354.26 (b)(2).

¹⁶⁵ 23 CCR § 354.28 (b)(1).

¹⁶⁶ 23 CCR § 354.28 (b)(4).

¹⁶⁷ 23 CCR § 354.28 (b)(2).

¹⁶⁸ 23 CCR § 354.30 (a).

¹⁶⁹ 23 CCR § 354.30 (b).

indicator. A submitting agency is not required to establish criteria for undesirable results that the agency can demonstrate are not present and are not likely to occur in a basin.¹⁷⁰

4.3.2.1 Chronic Lowering of Groundwater Levels

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the chronic lowering of groundwater, the GSP Regulations require the minimum threshold for chronic lowering of groundwater levels to be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results that is supported by information about groundwater elevation conditions and potential effects on other sustainability indicators.¹⁷¹

The GSP defines significant and unreasonable lowering of groundwater levels as “sustainably constructed domestic wells going dry during non-dry year conditions.”¹⁷² However, the GSP did not provide the definition of “sustainably constructed domestic wells.”

The GSP states that “[a]n undesirable result caused by the chronic lowering of groundwater levels is experienced if sustained groundwater levels are too low to provide a water supply of adequate quantity and quality to achieve the Sustainability Goal.”¹⁷³ The undesirable result in terms of quantified exceedance of minimum threshold is defined as “[t]wo [representative monitoring site] wells within a management area reach their [minimum threshold] for two consecutive non-dry year-types.”¹⁷⁴ The GSP states that non-dry year types include wet, above normal, and below normal as defined by the Sacramento Valley Water Year Index.¹⁷⁵ Department staff note that the GSP excludes dry and critical water year types in the definition of undesirable results. SGMA includes a provision which states “overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.”¹⁷⁶ Therefore, Department staff conclude the inclusion of language in the definition of an undesirable result and in the discussion of significant and unreasonable conditions that precludes undesirable results during dry years without discussing how extractions and recharge will be managed to offset these potential impacts in other periods is problematic. The GSA should revise the definition of undesirable results to remove the non-dry year condition or discuss how extractions and recharge will be managed as necessary to ensure that reductions in groundwater levels or storage

¹⁷⁰ 23 CCR § 354.26 (d).

¹⁷¹ 23 CCR § 354.28(c)(1) *et seq.*

¹⁷² Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 159.

¹⁷³ Wyandotte Creek Subbasin GSP, Section 3.3.1, p. 159.

¹⁷⁴ Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 159.

¹⁷⁵ Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 159.

¹⁷⁶ Water Code § 10721(x)(1).

during dry years are offset by increases in groundwater levels or storage during other periods (see [Recommended Corrective Action 2a](#)).

While establishing groundwater level minimum thresholds, the GSP focuses on the protection of sustainably constructed domestic wells because of dewatering domestic wells is a concern in the Subbasin.¹⁷⁷ However, the GSP did not provide a definition of “sustainably constructed domestic wells.” Domestic wells are generally shallower than other well types; therefore, the water level that is protective of domestic wells is considered protective of other wells too.¹⁷⁸ The GSP states that the domestic well dataset was refined by removing wells installed before 1980 so that the wells that remained in the dataset are likely to be consistent with the current County well standards and currently serving domestic households.¹⁷⁹ The Department staff recommend evaluating impacts of proposed minimum thresholds on other beneficial uses and users, such as public and small water systems and environmental uses and users, as the GSP does not evaluate those impacts (see [Recommended Corrective Action 2b](#)).

Further, Department staff note the GSA does not assess how the proposed minimum thresholds for the chronic lowering of groundwater levels may impact other sustainability indicators (e.g., groundwater storage, depletion of interconnected surface water, etc.). Considering the GSA is choosing to manage the Subbasin below historic lows, understanding this relationship will be important during Plan implementation. Department staff recommend the GSA provide a description of the relationship between established minimum thresholds for the chronic lowering of groundwater levels and how they avoid undesirable results for each of the other sustainability indicators (see [Recommended Corrective Action 2c](#)).

To establish groundwater level minimum thresholds, the GSP identifies three representative monitoring sites in the Wyandotte Creek Oroville management area and six representative monitoring sites in the Wyandotte Creek South management area. A unique minimum threshold is established at each representative monitoring site well to protect the sustainably constructed domestic wells, as well as to mitigate the impact on the majority of domestic wells.

The minimum threshold was established using the refined domestic well dataset, and further refining the dataset by removing 15 percent of the shallowest wells based on the elevation of the bottom of the wells within a three-mile radius of each representative monitoring site.¹⁸⁰ The GSP explains that a percentile statistical analysis was conducted based on the calculation of domestic well depths (translated to elevation). Box and whisker plots were used to calculate the minimum threshold using this method.¹⁸¹ The

¹⁷⁷ Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 159.

¹⁷⁸ Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 160.

¹⁷⁹ Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 160.

¹⁸⁰ Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 160.

¹⁸¹ Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 160.

GSP explains that the minimum threshold will protect 85 percent of all domestic wells within a three-mile radius of the representative monitoring site.¹⁸² Department staff note that Appendix 3-B shows the upper quartile of the box and whisker plot to be the minimum threshold value.

Department staff note the GSP includes a management action referenced as “Domestic Well Mitigation” that aims to potentially provide resources to well owners impacted by groundwater management and lowering groundwater levels planned under the GSA’s management of the Subbasin. Under this management action, the GSA plans to collect data on domestic wells to determine which well owners potentially need assistance; secure financial resources to assist with the repair, replacement, and deepening of domestic wells; and provide emergency response to well owners including supplying bottled water and potable water for sanitation. Department staff are encouraged by the GSA’s proposed management action to assist well owners who may be impacted by the proposed groundwater management of the Subbasin. Department staff recommend the GSA utilizes the Department’s Drinking Water Guidance¹⁸³ as appropriate and provide updates to the Plan about the progress of this program during GSP implementation.

The measurable objective is defined as the “groundwater level based on the groundwater trend line for the dry periods (over the period of record) of observed short-term climatic cycles extended to 2030.”¹⁸⁴ In other words, measurable objectives are the groundwater level trend that will be observed in 2030 based on the linear projection of the groundwater level data for the dry periods since 2000. The groundwater level data shows cyclic fluctuations over a four- to seven-year cycle and generally, the lowest groundwater levels of a given cycle were used for this projection unless they appeared to be outliers.¹⁸⁵ Since groundwater levels have been relatively stable in the Subbasin,¹⁸⁶ the projected 2030 levels are near the lowest historical levels.¹⁸⁷ The GSP clarifies that the measurable objective water level is chosen as the 2030 water level because it will take time to stop the long-term decline through the implementation of projects and management actions.¹⁸⁸

The GSP states that interim milestones are based on linear interpolation of groundwater levels at each representative monitoring site between 2022 and 2042.¹⁸⁹ However, the majority of the interim milestones are the same as the measurable objective and when the interim milestones are different, they only differ by a few feet.¹⁹⁰ The GSP also states

¹⁸² Wyandotte Creek Subbasin GSP, Section 3.3.2, p. 161.

¹⁸³ DWR Guidance for Sustainable Groundwater Management Act Implementation: Considerations for Identifying and Addressing Drinking Water Well Impacts, March 2023: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Files/Considerations-for-Identifying-and-Addressing-Drinking-Water-Well-Impacts_FINAL.pdf.

¹⁸⁴ Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 162.

¹⁸⁵ Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 162.

¹⁸⁶ Wyandotte Creek Subbasin GSP, Executive Summary, p. 24.

¹⁸⁷ Wyandotte Creek Subbasin GSP Appendices, Appendix 3-C, pp. 215-226.

¹⁸⁸ Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 161.

¹⁸⁹ Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 162.

¹⁹⁰ Wyandotte Creek Subbasin GSP, Table 3-1, p. 163.

that observed groundwater levels may be higher than the established interim milestones because the projection is based on the dry years in the cycle.¹⁹¹

The GSP considers the beneficial uses and users of groundwater by analyzing minimum threshold impacts on domestic wells and establishing minimum thresholds that are protective of sustainably constructed wells. The measurable objectives set at 2030 groundwater levels are 12 to 48 feet higher than the minimum threshold levels.¹⁹² The GSP states that this range between minimum thresholds and measurable objectives provides operational flexibility for active management.¹⁹³ Although groundwater levels will continue to decline for some time, the GSA plans to stabilize groundwater levels by 2030 through the implementation of various projects and management actions. For more information on the proposed projects and management actions, please see Projects and Management Actions ([Section 4.5](#)). Department staff note that the GSA's approach of allowing the groundwater level to further decline until 2030 is based on the anticipation that it will take a few years to implement the projects and to reflect the benefit of these projects on groundwater levels.

Despite the identification of multiple recommended corrective actions, the GSP's discussion of minimum thresholds and measurable objectives for the chronic lowering of groundwater levels seems to be comprehensive and includes adequate support, justification, and information to understand the GSA's process, analysis, and rationale. Although Department staff have requested the GSA further evaluate potential impacts to beneficial uses and users, the GSP includes a well mitigation program to assist any well owners who may be impacted during initial plan implementation which is a consideration of these users. While Department staff have also noted the GSA needs to evaluate the potential impacts to other sustainability indicators at the proposed minimum thresholds, this does not preclude plan approval at this time since the GSA's planned management maintains current groundwater level trends until 2030 and will likely not cause undesirable results as defined in the Plan. Department staff expect the GSA to update the plan accordingly and potentially refine the groundwater level sustainable management criteria as more information becomes available to ensure the proposed management considers beneficial uses and users and does not cause undesirable results for other sustainability indicators.

4.3.2.2 Reduction of Groundwater Storage

In addition to components identified in 23 CCR §§ 354.28 (a-b), for the reduction of groundwater storage, the GSP Regulations require the minimum threshold for the reduction of groundwater storage to be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the

¹⁹¹ Wyandotte Creek Subbasin GSP, Section 3.3.3, p. 162.

¹⁹² Wyandotte Creek Subbasin GSP, Table 3-1, p. 163.

¹⁹³ Wyandotte Creek Subbasin GSP, Section 3.2.3, p. 158.

sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.¹⁹⁴

The GSP states that the sustainable management criteria developed for chronic lowering of groundwater levels are used for reduction of groundwater storage because groundwater levels and groundwater storage are closely related and measured changes in groundwater levels can serve as a proxy for change in groundwater storage.¹⁹⁵ Because groundwater levels are used as a proxy, the minimum thresholds and measurable objectives for groundwater storage are the same as groundwater levels.¹⁹⁶

The GSP states that an undesirable result related to the reduction of groundwater storage is experienced if “sustained groundwater storage volumes are insufficient to achieve the Sustainability Goal.”¹⁹⁷ The GSP further states that minimum thresholds intended to prevent significant and unreasonable negative impacts on groundwater levels are assumed adequate to protect against significant and unreasonable reductions of groundwater storage.¹⁹⁸ Per the GSP, “[t]he aquifer system in the Wyandotte Creek Subbasin generally has sufficient groundwater storage capacity to take additional groundwater recharge during wet periods and remain saturated during dry periods, allowing for a range of active management reflecting the desired state for groundwater storage at the year 2042.”¹⁹⁹

The GSP’s discussion of minimum thresholds and measurable objectives for the reduction of groundwater storage seems to be comprehensive and includes adequate support, justification, and information to understand the GSA’s process, analysis, and rationale. Department staff find that the GSP’s discussion and presentation of information covers the specific items listed in the GSP Regulations in an understandable format using appropriate data and assumptions. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.3 *Seawater Intrusion*

In addition to components identified in 23 CCR §§ 354.28 (a-b), for seawater intrusion, the GSP Regulations require the minimum threshold for seawater intrusion to be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results.²⁰⁰

¹⁹⁴ 23 CCR § 354.28(c)(2).

¹⁹⁵ Wyandotte Creek Subbasin GSP, Section 3.4.1, p. 163.

¹⁹⁶ Wyandotte Creek Subbasin GSP, Sections 3.4.2 and 3.4.3, pp. 163-164.

¹⁹⁷ Wyandotte Creek Subbasin GSP, Section 3.4.1, p. 163.

¹⁹⁸ Wyandotte Creek Subbasin GSP, Section 3.4.2, p. 164.

¹⁹⁹ Wyandotte Creek Subbasin GSP, Section 3.4.3, p. 164.

²⁰⁰ 23 CCR § 354.28(c)(3).

The GSP does not consider seawater intrusion an applicable sustainability indicator in the Subbasin due to its distance from the Pacific Ocean.²⁰¹ Therefore, the GSP does not define undesirable results and establish sustainable management criteria for seawater intrusion. Department staff concur with the rationale for not setting sustainable management criteria for seawater intrusion.

4.3.2.4 Degraded Water Quality

In addition to components identified in 23 CCR §§ 354.28 (a-b), for degraded water quality, the GSP Regulations require the minimum threshold for degraded water quality to be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.²⁰²

The GSP states that undesirable results related to water quality as a result of groundwater pumping have not occurred historically, are not currently occurring, and are not likely to occur in the future in the Subbasin.²⁰³ While the GSP briefly discusses the presence of various water quality constituents of concern in the Subbasin, the only acknowledgement of groundwater quality conditions to support the sustainable management criteria established for degradation of water quality is for specific conductance, which is a measurement of salinity. The salinity appears to be relatively stable over the years and well below the regulatory limits as the GSP states, “[o]bservations of specific conductance at [representative monitoring sites] from 2001 through 2019 ranged between 346 and 390 [microsiemens per centimeter ($\mu\text{S}/\text{cm}$)] and demonstrated no trend.”²⁰⁴

To determine what is considered “significant and unreasonable” degraded water quality, the GSA consulted with stakeholders in the Subbasin and determined that the following could be potential impacts: aesthetic concerns for drinking water; reduced crop yield and quality; and increased reliance on surface water for blending.²⁰⁵ Considering these potential impacts, degraded water quality would be significant and unreasonable and, therefore, an undesirable result “if groundwater quality degrades such that the specific conductance exceeds the upper Secondary [Maximum Contaminant Level (MCL)] of 1,600 $\mu\text{S}/\text{cm}$.”²⁰⁶ The GSP acknowledges that there is no public health goal or primary MCL goal associated with specific conductance.

²⁰¹ Wyandotte Creek Subbasin GSP, Section 3.6, p. 167.

²⁰² 23 CCR § 354.28(c)(4).

²⁰³ Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.

²⁰⁴ Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.

²⁰⁵ Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.

²⁰⁶ Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.

The GSP states that an undesirable result is experienced if “groundwater pumping compromises the Subbasin’s ability to achieve its Sustainability Goal.”²⁰⁷ The GSP also defines undesirable result occurrence in terms of a minimum threshold exceedance when “two [representative monitoring site] wells over the entire Wyandotte Creek Subbasin exceed their [minimum threshold] for two consecutive non-dry years.”²⁰⁸

Department staff note that the GSP excludes dry and critical years in the definition of undesirable results. Department staff conclude that including language in the definition of an undesirable result that precludes undesirable results during dry years without discussing how the degradation of groundwater quality will be managed in other periods may be problematic. The GSA should revise the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry periods will be managed as necessary to ensure that adverse water quality conditions are offset during other periods (see [Recommended Corrective Action 3](#)).

The minimum thresholds and measurable objectives are established based on the Secondary MCL (SMCL) of specific conductance (salinity).²⁰⁹ The minimum threshold is defined as “the upper [SMCL] for specific conductance based on the State Secondary Drinking Water Standards” which is 1,600 $\mu\text{S}/\text{cm}$ ²¹⁰ and the measurable objective is defined as “the recommended [SMCL] for specific conductance based on the State Secondary Drinking Water Standards” which is 900 $\mu\text{S}/\text{cm}$.²¹¹

Despite the presence of various constituents of concern, the GSA established sustainable management criteria only for salinity and does not intend to manage other constituents of concern because the groundwater quality in the Subbasin is led and overseen by other entities under existing laws and regulations. Department staff note that the GSA plans to coordinate with the applicable agencies implementing water quality management and regulatory programs to understand if the existing regulations are being met or if groundwater pumping in the Subbasin is adversely impacting the constituents managed or regulated under these programs.²¹² Department staff reiterate the need for the GSA to provide detailed information on all water quality constituents of concern and to discuss how existing groundwater quality conditions and/or remediation efforts may impact the GSA’s ability to manage groundwater as requested in [Recommended Corrective Action 1a through 1d](#).

Despite the identification of a recommended corrective action, the GSP’s discussion of constituents of concern in the Subbasin and the degraded water quality sustainability indicator is comprehensive and includes adequate support, justification, and information to understand the GSA’s process, analysis, and rationale. While Department staff have

²⁰⁷ Wyandotte Creek Subbasin GSP, Section 3.5.1, p. 164.

²⁰⁸ Wyandotte Creek Subbasin GSP, Section 3.5.1, p. 164.

²⁰⁹ Wyandotte Creek Subbasin GSP, Sections 3.5.2 and 3.5.3, pp. 165-166.

²¹⁰ Wyandotte Creek Subbasin GSP, Section 3.5.2, p. 165.

²¹¹ Wyandotte Creek Subbasin GSP, Section 3.5.3, p. 166.

²¹² Wyandotte Creek Subbasin GSP, Section 3.5.1, p. 164.

noted the GSA needs to remove the exemption that excludes dry and critical years from the definition of undesirable results, this flaw does not preclude plan approval at this time as water quality is closely regulated by many other agencies in the Subbasin. Staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.5 *Land Subsidence*

In addition to components identified in 23 CCR §§ 354.28 (a-b), the GSP Regulations require the minimum threshold for land subsidence to be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.²¹³ Minimum thresholds for land subsidence shall be supported by identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency’s rationale for establishing minimum thresholds in light of those effects and maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum thresholds and measurable objectives.²¹⁴

The GSP defines the sustainable management criteria for land subsidence the same as those established for chronic lowering of groundwater levels. The GSP states that measured changes in groundwater levels can serve as a proxy for potential land subsidence because land subsidence typically occurs concurrently or shortly after significant declines in groundwater levels.²¹⁵

The GSP states that an undesirable result resulting from land subsidence is experienced if “groundwater pumping leads to changes in the ground surface elevation severe enough to disrupt critical infrastructure or development of projects in a manner that is inconsistent with the Sustainability Goal.”²¹⁶ The GSP identifies critical infrastructure that could be affected by subsidence as state and county highways, power transmission lines, and water conveyance and distribution facilities.²¹⁷ The GSP states that undesirable results related to land subsidence in the Subbasin have not occurred historically, are not currently occurring, and are not likely to occur in the future.²¹⁸ Department staff note that while undesirable results related to land subsidence have not occurred in the past, there is a potential for undesirable results to occur in the future given the GSA’s proposed management strategy to lower groundwater levels below historic lows. Department staff recommend to the GSA to provide a clear, quantitative definition of when undesirable

²¹³ 23 CCR § 354.28(c)(5).

²¹⁴ 23 CCR §§ 354.28(c)(5)(A-B).

²¹⁵ Wyandotte Creek Subbasin GSP, Section 3.7.1, p. 167.

²¹⁶ Wyandotte Creek Subbasin GSP, Section 3.7.1, p. 167.

²¹⁷ Wyandotte Creek Subbasin GSP, Section 2.2.5.1, p. 108.

²¹⁸ Wyandotte Creek Subbasin GSP, Section 3.7.1, p. 167.

results for land subsidence may occur in the Subbasin, as required by the GSP regulations (see [Recommended Corrective Action 4a](#)).

While the GSP states that inelastic land subsidence due to groundwater pumping is unlikely to produce an undesirable result in the Subbasin,²¹⁹ the groundwater levels will continue to decline before they will stabilize in 2030.²²⁰ Because the groundwater level is anticipated to decline and the future groundwater levels will be lower than historical lows for some representative monitoring sites,²²¹ Department staff believe that it is critical for the GSA to monitor for land subsidence using a method that can directly measure land elevation changes and provide quantitative data. Furthermore, Department staff conclude that the use of groundwater level as a proxy for land subsidence is inappropriate because of the GSA's plan to allow continued lowering of groundwater levels. Therefore, Department staff recommend the GSA establish a monitoring network for land subsidence that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations, and establish sustainable management criteria for land subsidence (see [Recommended Corrective Action 4b](#)).

Despite the identification of a recommended corrective action, the GSP's discussion of land subsidence is comprehensive and includes adequate support, justification, and information to understand the GSA's process, analysis, and rationale. While Department staff have asked the GSA to remove the use of groundwater levels as a proxy for land subsidence, this flaw does not preclude plan approval as the Subbasin does not appear to have any significant current of historical land subsidence. Department staff are aware of no significant inconsistencies or contrary information to that presented in the GSP and, therefore, have no significant concerns regarding the discussion of this subject in the GSP.

4.3.2.6 *Depletions of Interconnected Surface Water*

SGMA defines undesirable results for the depletion of interconnected surface water as those that have significant and unreasonable adverse impacts on beneficial uses of surface water and are caused by groundwater conditions occurring throughout the basin.²²² The GSP Regulations require that a Plan identify the presence of interconnected surface water systems in the basin and estimate the quantity and timing of depletions of those systems.²²³ The GSP Regulations further require that minimum thresholds be set based on the rate or volume of surface water depletions caused by groundwater use, supported by information including the location, quantity, and timing of depletions, that

²¹⁹ Wyandotte Creek Subbasin GSP, Section 2.2.5.2, p. 110.

²²⁰ Wyandotte Creek Subbasin GSP, Section 3.3.3, pp. 161-162.

²²¹ Wyandotte Creek Subbasin GSP Appendices, Appendix 3-C, pp. 216-226.

²²² Water Code § 10721(x)(6).

²²³ 23 CCR § 354.16 (f).

adversely impact beneficial uses of the surface water and may lead to undesirable results.²²⁴

The Plan acknowledges the presence of interconnected surface water in the Subbasin and provides some data of stream gains and losses;²²⁵ however, the GSP plans to use groundwater levels as a proxy for depletion of interconnected surface water because the connectivity between the surface water and groundwater is not well measured or understood at this time.²²⁶ The GSP further elaborates that the BBGM incorporates interaction of surface water and groundwater at a regional scale but “there are significant data gaps that limit calibration of the groundwater response to the uppermost layer of the model.”²²⁷ The GSP states that the groundwater level sustainable management criteria will be used as a proxy in the interim as more data is collected.²²⁸ The GSP mentions that an accelerated schedule has been developed to fill these data gaps, and the sustainable management criteria for depletion of interconnected surface water will be established in the future.²²⁹

The GSP defines an undesirable result as “depletion of surface water flows caused by groundwater pumping significantly and unreasonably impacts beneficial uses of surface water.”²³⁰ The minimum thresholds and measurable objectives for depletion of interconnected surface water are the same as chronic lowering of groundwater levels because groundwater levels are used as a proxy.²³¹

Department staff understand that quantifying depletions of surface water from groundwater extractions is a complex task that likely requires developing new, specialized tools, models, and methods to understand local hydrogeologic conditions, interactions, and responses. During the initial review of GSPs, Department staff have observed that most GSAs have struggled with this new requirement of SGMA. However, staff believe that most GSAs will more fully comply with regulatory requirements after several years of Plan implementation that includes projects and management actions to address the data gaps and other issues necessary to understand, quantify, and manage depletions of interconnected surface waters. Accordingly, Department staff believes that affording GSAs adequate time to refine their Plans to address interconnected surface waters is appropriate and remains consistent with SGMA’s timelines and local control preferences.

The Department will continue to support GSAs in this regard by providing, as appropriate, financial and technical assistance to GSAs, including the development of guidance describing appropriate methods and approaches to evaluate the rate, timing, and volume

²²⁴ 23 CCR § 354.28 (c)(6).

²²⁵ Wyandotte Creek Subbasin GSP, Section 2.2.6.1, Figure 2-20, and Table 2-3, pp. 114, 116, and 118.

²²⁶ Wyandotte Creek Subbasin GSP, Section 3.8.3, p. 170.

²²⁷ Wyandotte Creek Subbasin GSP, Section 3.8.4, p. 170.

²²⁸ Wyandotte Creek Subbasin GSP, Section 3.8.4, pp. 170-171.

²²⁹ Wyandotte Creek Subbasin GSP, Section 3.8.3, p. 170.

²³⁰ Wyandotte Creek Subbasin GSP, Section 3.8.3, p. 170.

²³¹ Wyandotte Creek Subbasin GSP, Sections 3.8.4 and 3.8.5, pp. 170-171.

of depletions of interconnected surface water caused by groundwater extractions. Once the Department’s guidance related to depletions of interconnected surface water is publicly available, the GSA, where applicable, should consider incorporating appropriate guidance approaches into their future periodic evaluation to the GSP (see [Recommended Corrective Action 5a](#)). GSAs should consider availing themselves of the Department’s financial or technical assistance, but in any event must continue to fill data gaps, collect additional monitoring data, and implement strategies to better understand and manage depletions of interconnected surface water caused by groundwater extractions and define segments of interconnectivity and timing within their jurisdictional area (see [Recommended Corrective Action 5b](#)). Furthermore, GSAs should coordinate with local, state, and federal resources agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion (see [Recommended Corrective Action 5c](#)).

4.4 MONITORING NETWORK

The GSP Regulations describe the monitoring network that must be developed for each sustainability indicator including monitoring objectives, monitoring protocols, and data reporting requirements. Collecting monitoring data of a sufficient quality and quantity is necessary for the successful implementation of a groundwater sustainability plan. The GSP Regulations require a monitoring network of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.²³² Specifically, a monitoring network must be able to monitor impacts to beneficial uses and users,²³³ monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds,²³⁴ capture seasonal low and high conditions,²³⁵ include required information such as location and well construction and include maps and tables clearly showing the monitoring site type, location, and frequency.²³⁶ Department staff encourage GSAs to collect monitoring data as specified in the GSP, follow SGMA data and reporting standards,²³⁷ fill data gaps identified in the GSP prior to the first periodic evaluation,²³⁸ update monitoring network information as needed, follow monitoring best management practices,²³⁹ and submit all monitoring data to the Department’s Monitoring Network Module immediately after collection including any additional groundwater monitoring data that is collected within the Plan area that is used for groundwater management decisions. Department staff note that if GSAs do not fill their identified data

²³² 23 CCR § 354.32.

²³³ 23 CCR § 354.34(b)(2).

²³⁴ 23 CCR § 354.34(b)(3).

²³⁵ 23 CCR § 354.34(c)(1)(B).

²³⁶ 23 CCR §§ 354.34(g-h).

²³⁷ 23 CCR § 352.4 *et seq.*

²³⁸ 23 CCR § 354.38(d).

²³⁹ Department of Water Resources, 2016, [Best Management Practices and Guidance Documents](#).

gaps, the GSA's basin understanding may not represent the best available science for use to monitor basin conditions.

The GSA has developed monitoring networks for chronic lowering of groundwater level and degraded water quality. The GSA proposes to use the groundwater level monitoring network as a proxy for the reduction of groundwater in storage, land subsidence, and depletions of interconnected surface water sustainability indicators. The GSA has not established a dedicated monitoring network for the seawater intrusion sustainability indicator because the GSA has determined this indicator is not applicable to the Subbasin.

The GSP includes 13 wells in the groundwater level monitoring network, with five of the wells located in the Wyandotte Creek Oroville management area and eight wells in the Wyandotte Creek South management area.²⁴⁰ Of the 13 wells, a total of nine wells are identified as representative monitoring wells with three located in the Wyandotte Creek Oroville management area and six in the Wyandotte Creek South management area.²⁴¹ The wells are drilled and screened at various depths to measure groundwater levels in the single principal aquifer.²⁴² The densities of monitoring wells are 5 wells per 29 square miles (equivalent to 17 wells per 100 square miles) in Wyandotte Creek Oroville management area and 8 wells per 64 square miles (equivalent to 12.5 wells per 100 square miles) in Wyandotte Creek South management area,²⁴³ which are above the range of 0.2 to 10 wells per 100 square miles recommended in the Department's Best Management Practices.

The frequency of groundwater level monitoring for wells in the existing network is quarterly, while the representative monitoring wells will be monitored at least biannually (spring and fall) for the purpose of SGMA compliance.²⁴⁴ While the GSA is planning to monitor groundwater levels bi-annually at a minimum, the GSP does not provide specific months when the monitoring will take place. The GSP does not provide analysis to support the justification that the proposed frequency of measurements can accurately capture the seasonal highs and lows in the Subbasin. Therefore, Department staff recommend the GSA to specify which months depict the seasonal high and low and provide justification on specified months representing the seasonal high and low.

The GSP proposes to use the groundwater level monitoring network as a proxy for the groundwater storage monitoring network.²⁴⁵ Department staff concur with the GSA's approach of using groundwater level as a proxy to monitor change in groundwater storage.

²⁴⁰ Wyandotte Creek Subbasin GSP, Section 4.2, p. 174.

²⁴¹ Wyandotte Creek Subbasin GSP, Table 4-5, p. 188.

²⁴² Wyandotte Creek Subbasin GSP, Section 4.2, p. 174.

²⁴³ Wyandotte Creek Subbasin GSP, Section 4.2.1, p. 177.

²⁴⁴ Wyandotte Creek Subbasin GSP, Section 4.2.1, p. 176.

²⁴⁵ Wyandotte Creek Subbasin GSP, Section 4.3.1, p. 177.

The GSP states that the seawater intrusion sustainability indicator is not applicable to this Subbasin; therefore, no monitoring network is proposed.²⁴⁶ Department staff agree with the GSA's assessment of seawater intrusion; therefore, the development of a monitoring network is not required.

The GSP includes two wells in the water quality monitoring network, both in the Wyandotte Creek Oroville management area.²⁴⁷ The density of monitoring wells is reported as 2.1 wells per 100 square miles.²⁴⁸ The GSA plans to monitor pH and temperature but plans to only track specific conductance or salinity at the representative monitoring sites.²⁴⁹ The GSP states that the month of July is near the peak season for groundwater demand, and therefore, the GSA plans to collect groundwater quality samples once a year in July to understand the water quality when the demand is at its highest.²⁵⁰

For the land subsidence monitoring network, the GSP discusses the Sacramento Valley GPS Subsidence Monitoring Network and the availability of InSAR data for the Subbasin;²⁵¹ however, the GSP does not clearly discuss how and if these data will be utilized for land subsidence monitoring. Furthermore, in the sustainable management criteria section, the GSP discusses using the groundwater level as a proxy for land subsidence, but the GSP does not indicate or discuss using the groundwater level monitoring network as a proxy for the land subsidence monitoring network. Because GSA's intent to monitor and manage land subsidence in the Subbasin is unclear, Department staff recommend the GSA establish monitoring for land subsidence utilizing a method that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations (see [Recommended Corrective Action 4b](#)).

The GSP states that a total of 13 monitoring wells and three stream gages are included in the Subbasin's network for monitoring groundwater and streamflow interactions,²⁵² which means all the groundwater level monitoring sties in the Subbasin are included in the depletions of interconnected surface water monitoring network. Therefore, Department staff are unclear regarding which monitoring wells will be utilized to evaluate depletions of interconnected surface water. Department staff are unable to determine if the proposed monitoring network is sufficient to evaluate conditions related to depletions of interconnected surface water because pertinent information about the monitoring network such as specific details regarding monitoring sites, frequency of monitoring, and scientific justification for site selection are not provided. Department staff recommend the

²⁴⁶ Wyandotte Creek Subbasin GSP, Section 4.1, p. 173.

²⁴⁷ Wyandotte Creek Subbasin GSP, Section 4.4.1 and Table 4-3, p. 178.

²⁴⁸ Wyandotte Creek Subbasin GSP, Section 4.4.2, p. 178.

²⁴⁹ Wyandotte Creek Subbasin GSP, Section 4.4.1, p. 177.

²⁵⁰ Wyandotte Creek Subbasin GSP, Section 4.4.2, p. 178.

²⁵¹ Wyandotte Creek Subbasin GSP, Section 4.5.1, p. 180.

²⁵² Wyandotte Creek Subbasin GSP, Section 4.6.1, p. 182.

GSA clarify the groundwater level monitoring sites that will be used for the evaluation of depletions of interconnected surface water and provide site-specific information (see [Recommended Corrective Action 5d](#)).

While recommended corrective actions are identified, the description of the monitoring network included in the Plan substantially complies with the requirements outlined in the GSP Regulations. Overall, the Plan describes in sufficient detail a monitoring network that promotes the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the Plan area and evaluate changing conditions that occur through Plan implementation. The GSP provides a good explanation for the conclusion that the monitoring network is supported by the best available information and data and is designed to ensure adequate coverage of sustainability indicators. The Plan also describes existing data gaps and the steps that will be taken to fill data gaps and improve the monitoring network. Department staff consider the information presented in the Plan to satisfy the general requirements of the GSP Regulations regarding monitoring network.

4.5 PROJECTS AND MANAGEMENT ACTIONS

The GSP Regulations require a description of the projects and management actions the submitting Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.²⁵³ Each Plan’s description of projects and management actions must include details such as: how projects and management actions in the GSP will achieve sustainability, the implementation process and expected benefits, and prioritization and criteria used to initiate projects and management actions.²⁵⁴

The GSP identifies 15 projects which are intended to achieve the Subbasin’s sustainability goal.²⁵⁵ The projects, if implemented, are reported to provide benefit to groundwater levels, which will in turn benefit groundwater storage, groundwater quality, interconnected surface water, and the land subsidence sustainability indicators, as well as addressing data gaps. The 15 projects are designed to increase direct and in-lieu recharge and promote water conservation to reduce groundwater demand. The projects are categorized into “planned”, “potential”, or “conceptual” projects, where planned projects are expected to move forward and be completed by 2042, potential projects are in planning stages and are dependent on funding sources, and conceptual projects are in conceptual planning stages and will require significant work to move forward.²⁵⁶

There are eight planned projects to reduce groundwater demand through water conservation, improving irrigation efficiency, increasing capacity of a water treatment

²⁵³ 23 CCR § 354.44 (a).

²⁵⁴ 23 CCR § 354.44 (b) *et seq.*

²⁵⁵ Wyandotte Creek Subbasin GSP, Sections 5 and 5.3, pp. 195 and 216.

²⁵⁶ Wyandotte Creek Subbasin GSP, Section 5.2.3 and Tables 5-1 to 5-3, pp. 196-200.

plant, and monitoring water loss from fire hydrants due to unpermitted use, as well as increase recharge.²⁵⁷ There are five potential projects to also reduce groundwater demand through intra-basin water transfer and water conservation.²⁵⁸ Lastly, there are two conceptual projects for direct recharge and water conservation.²⁵⁹

Based on the implementation schedule provided, most projects will be initiated by 2025 and be completed by 2042. Eight projects were implemented in 2022 or 2023, four will be ready for implementation by 2025, and three projects do not have a timetable provided.²⁶⁰

The GSP provides an estimate of an expected groundwater supply reduction from some planned and potential projects. The planned and potential projects have an expected groundwater supply reduction of up to 12,700 AFY and 8,000 AFY, respectively. The combined supply reduction is 20,700 AFY which is much higher than the estimated overdraft of 1,000 AFY.²⁶¹

Consistent with GSP Regulations, the project descriptions contain information regarding a description of the measurable objective that is expected to benefit from the project, an implementation trigger, a summary of the permitting and regulatory process required, expected benefits, and legal authority under which each project will be implemented.

The GSA has an adaptive management strategy for the Subbasin if projects are not progressing or achieving their targets. The GSA will evaluate the need for additional projects or modify the current projects and begin implementation of management actions.²⁶²

The GSP includes five management actions that the GSA may consider during GSP implementation.²⁶³ The management actions can be implemented to reduce groundwater demand which “can include increased data collection, education and outreach, regulatory policies, incentive programs, and enforcement actions.”²⁶⁴ The GSA plans to coordinate with Butte County and the City of Oroville so that important components of the GSP are addressed in their general plans,²⁶⁵ collect domestic well data to provide emergency response to homeowners with dry domestic wells,²⁶⁶ coordinate with Butte County to amend the County Code which requires domestic wells to be screened below the groundwater levels measured during the 1989 to 1994 drought,²⁶⁷ coordinate with Butte County and the City of Oroville to update the landscape ordinance to encourage new

²⁵⁷ Wyandotte Creek Subbasin GSP, Section 5.2.4, pp. 201-208.

²⁵⁸ Wyandotte Creek Subbasin GSP, Sections 5.2.5.1 to 5.2.5.5, pp. 209-213.

²⁵⁹ Wyandotte Creek Subbasin GSP, Sections 5.2.6.1 to 5.2.6.2, pp. 214-215.

²⁶⁰ Wyandotte Creek Subbasin GSP, Tables 5-1 to 5-2, Sections 5.2.4.1 to 5.2.6.2 and Figure 6-1, pp. 197-199, 201-215, and 227.

²⁶¹ Wyandotte Creek Subbasin GSP, Executive Summary and Section 2.3.6, pp. 32 and 153.

²⁶² Wyandotte Creek Subbasin GSP, Sections 5.5, p. 218.

²⁶³ Wyandotte Creek Subbasin GSP, Section 5.3, pp. 216-217.

²⁶⁴ Wyandotte Creek Subbasin GSP, Section 5.3, p. 216.

²⁶⁵ Wyandotte Creek Subbasin GSP, Section 5.3.1, p. 216.

²⁶⁶ Wyandotte Creek Subbasin GSP, Section 5.3.2, p. 216.

²⁶⁷ Wyandotte Creek Subbasin GSP, Section 5.3.3, p. 217.

developments to use drought-resistant plants,²⁶⁸ and water purveyors to expand their service area to provide drinking water to residential areas that are currently using private domestic wells.²⁶⁹

The GSP does not provide an implementation schedule for the management actions and states that the schedule is likely to vary depending on the groundwater conditions of the Subbasin.²⁷⁰ While some of the management actions are likely to help reduce groundwater demand, the GSP does not quantify the expected benefit.

Department staff encourage the implementation of adaptive management given that proposed projects and management actions have not been fully developed. Department staff recommend that the adaptive management strategy continues to be utilized to update projects and management actions to adapt to future conditions in the Subbasin.

The Plan adequately describes proposed projects and management actions in a manner that is generally consistent and substantially complies with the GSP Regulations. The projects and management actions, which focus largely on refining the GSA's understanding of basin conditions and avoiding undesirable results, are directly related to the sustainable management criteria and present a generally feasible approach to achieving the sustainability goal of the Plan area.

As projects and management actions are implemented, the Department expects that progress be included in annual reports and any addition or removal of project and management actions be documented in periodic evaluations.

4.6 CONSIDERATION OF ADJACENT BASINS/SUBBASINS

SGMA requires the Department to "...evaluate whether a groundwater sustainability plan adversely affects the ability of an adjacent basin to implement their groundwater sustainability plan or impedes achievement of sustainability goals in an adjacent basin."²⁷¹ Furthermore, the GSP Regulations state that minimum thresholds defined in each GSP be designed to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.²⁷²

The GSP acknowledges that the water management decisions and actions in the Wyandotte Creek Subbasin can affect adjacent basins because groundwater basins in the Northern Sacramento Valley are hydrologically interconnected.²⁷³ Therefore, the GSA has been collaborating with the other GSAs from the adjacent basins on SGMA implementation efforts. Although there are only four groundwater basins adjacent to the Wyandotte Creek Subbasin, the GSA has been coordinating with GSAs from 10

²⁶⁸ Wyandotte Creek Subbasin GSP, Section 5.3.4, p. 217.

²⁶⁹ Wyandotte Creek Subbasin GSP, Section 5.3.5, p. 217.

²⁷⁰ Wyandotte Creek Subbasin GSP, Section 5.3, p. 216.

²⁷¹ Water Code § 10733(c).

²⁷² 23 CCR § 354.28(b)(3).

²⁷³ Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 229.

groundwater basins (Antelope, Bowman, Butte, Colusa, Corning, Los Molinos, Red Bluff, Sutter, Vina, and Yolo), since 2020.²⁷⁴ While the collaboration among the GSAs began in 2020 because of insufficient time during the GSP development phase, GSAs were not able to fully characterize or address inconsistencies among the 11 GSPs.²⁷⁵ Therefore, the GSAs have developed a framework for long-term coordination which will be followed through during Plan implementation.²⁷⁶ The GSP also discusses its inter-basin coordination plan which involves identifying and acknowledging significant discrepancies, understanding why those differences exist, and evaluating to the extent they need to be reconciled.²⁷⁷ According to the inter-basin coordination plan, the GSAs will also evaluate sustainable management criteria among the GSPs to assess impacts and identify significant differences and possible impacts between subbasins that could potentially lead to undesirable results, joint monitoring, regional modeling, and other efforts to address data gaps at subbasin boundaries, compiling and comparing model outputs, and so on.²⁷⁸ Department staff concur with the GSA's plan to collaborate and coordinate with multiple groundwater basins to ensure that sustainability will be achieved at the regional level and the management of one basin will not adversely impact the management of other interconnected basins.

Based on information available at this time, Department staff have no reason to believe that groundwater management in the Subbasin will adversely affect groundwater conditions in the adjacent Subbasins at this time. Department staff will continue to review periodic evaluations to the Plan to assess whether implementation of the Wyandotte Creek GSP is potentially impacting adjacent basins.

4.7 CONSIDERATION OF CLIMATE CHANGE AND FUTURE CONDITIONS

The GSP Regulations require a GSA to consider future conditions and project how future water use may change due to multiple factors including climate change.²⁷⁹

Since the GSP was adopted and submitted, climate change conditions have advanced faster and more dramatically. It is anticipated that the hotter, drier conditions will result in a loss of 10% of California's water supply. As California adapts to a hotter, drier climate, GSAs should be preparing for these changing conditions as they work to sustainably manage groundwater within their jurisdictional areas. Specifically, the Department encourages GSAs to:

²⁷⁴ Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 230.

²⁷⁵ Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 230.

²⁷⁶ Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 230.

²⁷⁷ Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 232.

²⁷⁸ Wyandotte Creek Subbasin GSP Appendices, Appendix 6-A, p. 233.

²⁷⁹ 23 CCR § 354.18.

1. Explore how their proposed groundwater level thresholds have been established in consideration of groundwater level conditions in the Subbasin based on current and future drought conditions.
2. Explore how groundwater level data from the existing monitoring network will be used to make progress towards sustainable management of the Subbasin given increasing aridification and effects of climate change, such as prolonged drought.
3. Take into consideration changes to surface water reliability and that impact on groundwater conditions.
4. Evaluate updated watershed studies that may modify assumed frequency and magnitude of recharge projects, if applicable.
5. Continually coordinate with the appropriate groundwater users, including but not limited to domestic well owners and state small water systems, and the appropriate overlying county jurisdictions developing drought plans and establishing local drought task forces²⁸⁰ to evaluate how their Plan's groundwater management strategy aligns with drought planning, response, and mitigation efforts within the basin.

5 STAFF RECOMMENDATION

Department staff recommend approval of the GSP with the recommended corrective actions listed below. The Wyandotte Creek Subbasin GSP conforms with Water Code Sections 10727.2 and 10727.4 of SGMA and substantially complies with the GSP Regulations. Implementation of the GSP will likely achieve the sustainability goal for the Wyandotte Creek Subbasin. The GSA has identified several areas for improvement of their Plan and Department staff concur that those items are important and should be addressed as soon as possible. Department staff have also identified additional recommended corrective actions that should be considered by the GSA for the first periodic evaluation of its GSP. Addressing these recommended corrective actions will be important to demonstrate that implementation of the Plan is likely to achieve the sustainability goal.

The recommended corrective actions include:

RECOMMENDED CORRECTIVE ACTION 1

Provide additional information on historical and current groundwater quality conditions in the Subbasin and refine the definition of sustainable management criteria including:

- a. Provide additional information in the GSP outlining the location and extent of contamination plumes, identifying which constituents are being monitored

²⁸⁰ Water Code § 10609.50.

under various programs, and thoroughly describing ongoing remediation efforts within the Subbasin.

- b. Evaluate whether groundwater management actions, including production and/or replenishment under the jurisdiction of the GSA, may influence the migration of contaminant plumes.
- c. Investigate if groundwater quality issues are adversely impacting groundwater supply and beneficial uses and provide information if there are any mitigation programs in place and the effectiveness of such programs.
- d. Coordinate with the lead agencies overseeing these remediation sites regularly and update the Plan stating how existing groundwater quality conditions and/or remediation efforts may impact the GSA's ability to manage groundwater.

RECOMMENDED CORRECTIVE ACTION 2

Provide sufficient information regarding criteria used to identify significant and unreasonable conditions, undesirable results, and the potential impacts to various beneficial uses and users of groundwater related to the chronic lowering of groundwater level minimum thresholds. The GSA should address the following items:

- a. Revise the definition of undesirable results and language pertaining to significant and unreasonable lowering of groundwater level to remove the non-dry year condition or discuss how extractions and recharge will be managed as necessary to ensure that reductions in groundwater levels or storage during dry years are offset by increases in groundwater levels or storage during other years within the sustainable management criteria for the chronic lowering of groundwater levels.
- b. Provide information on impacts to domestic wells during projected conditions where minimum thresholds are exceeded but undesirable results do not occur and quantify domestic wells that will be impacted by the proposed minimum threshold. Furthermore, the GSA should evaluate the impacts of proposed minimum thresholds on other beneficial uses and users, such as public and small water systems and environmental users and users as the GSP does not evaluate those impacts.
- c. Provide a description of the relationship between established minimum thresholds for the chronic lowering of groundwater levels and how they avoid undesirable results for each of the other sustainability indicators.

RECOMMENDED CORRECTIVE ACTION 3

Revise the definition of undesirable results to remove the non-dry year condition or discuss how degradation during dry period will be managed as necessary to ensure that adverse water quality conditions are offset during other periods.

RECOMMENDED CORRECTIVE ACTION 4

Provide additional information on criteria used to identify undesirable results, and sustainable management criteria for land subsidence, including:

- a. Provide a clear, quantitative definition of when undesirable results for land subsidence may occur in the Subbasin, as required by the GSP Regulations, to support the selection of land subsidence minimum thresholds that demonstrate avoidance of undesirable results.
- b. Establish sustainable management criteria for land subsidence for the Subbasin utilizing a monitoring network that directly measures land elevation change such as remote sensing data, survey monuments, or global positioning system stations.

RECOMMENDED CORRECTIVE ACTION 5

Department staff understand that estimating the location, quantity, and timing of stream depletion due to ongoing, Subbasin-wide pumping is a complex task and that developing suitable tools may take additional time; however, it is critical for the Department's ongoing and future evaluations of whether GSP implementation is on track to achieve sustainable groundwater management. The Department plans to provide guidance on methods and approaches to evaluate the rate, timing, and volume of depletions of interconnected surface water and support for establishing specific sustainable management criteria in the near future. This guidance is intended to assist GSAs to sustainably manage depletions of interconnected surface water.

In addition, the GSA should work to address the following items by the first periodic evaluation:

- a. Consider utilizing the interconnected surface water guidance, as appropriate, when issued by the Department to establish quantifiable minimum thresholds, measurable objectives, and management actions.
- b. Continue to fill data gaps, collect additional monitoring data, and implement the current strategy to manage depletions of interconnected surface water and define segments of interconnectivity and timing.
- c. Prioritize collaborating and coordinating with local, state, and federal regulatory agencies as well as interested parties to better understand the full suite of beneficial uses and users that may be impacted by pumping induced surface water depletion within the GSA's jurisdictional area.
- d. Clarify the groundwater level monitoring sites that will be used for the evaluation of depletions of interconnected surface water and provide site-specific information.
- e.