

# TECHNICAL MEMORANDUM

**Client:** City of Camas  
**Project:** 343 Zone Reservoir Siting Analysis  
**Project File:** CAMA 0220068.00.0004  
**Project Manager:** Michele Campbell, PE  
**Composed by:** Stephanie Perkins and Dylan Bright  
**Reviewed by:** Kyle Pettibone, PE  
**Subject:** Triple Bottom Line Analysis and Conceptual Site Design  
**Date:** October 19, 2023

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Signed: 10/19/2023

## Purpose

This technical memorandum (TM) describes the triple bottom line analyses (TBLA) conducted as part of the City of Camas' (City) 343 Zone Reservoir Siting Analysis. This analysis builds on the *Pressure Zone Reconfiguration, Reservoir Site Screening and Alternatives Identification TM*, which was developed previously as part of this project. This TM also provides conceptual site design and planning-level capital cost estimates for the preferred alternative.

## Background

The City's 2019 *Water System Plan* (WSP) identified the need for a new 1.4 to 1.5 million gallon (MG) 343 Zone Reservoir to replace the existing Butler Reservoir, as it has reached the end of its useful life. The WSP also identified widespread areas of low fire flow and pressure deficiencies in the 343 Zone service area. The City requested that RH2 Engineering, Inc., (RH2) provide engineering services to support the site selection for the replacement reservoir and associated distribution system improvements that may be needed to improve the 343 Zone's level of service.

RH2 previously evaluated reservoir sites and identified pressure zone conversion improvements in the *Pressure Zone Reconfiguration, Reservoir Site Screening and Alternatives Identification TM*. The five alternatives to be analyzed further in this TM are as follows:

1. Construct a 1.91 MG ground level 343 Zone Reservoir at the existing Butler Reservoir site.
2. Construct a 1.91 MG buried 343 Zone Reservoir on the City-owned property adjacent to the existing Butler Reservoir site. This alternative includes approximately 500 feet of 12-inch water main to connect the proposed reservoir to the existing booster pump station (BPS) and distribution main on the Butler Reservoir site.
3. Construct a 1.55 MG ground level 455 Zone Reservoir on the City-owned property adjacent to the existing Butler Reservoir site. This alternative also includes approximately 500 feet of 12-inch water main to connect the proposed reservoir to the

existing BPS and distribution main on the Butler Reservoir site, along with BPS improvements to increase water transfer capacity from the 343 Zone to the proposed 455 Zone Reservoir.

4. Construct a 1.91 MG ground level 260 Zone Reservoir at the Camas Cemetery site. Install a pressure reducing valve/altitude valve from the 343 Zone dedicated transmission main to the proposed 260 Zone Reservoir. This alternative also includes approximately 1,700 feet of 12-inch water main to connect the proposed 260 Zone Reservoir to the proposed 260 Zone and a new BPS for transmission of 260 Zone water to the 343 Zone.
5. Construct a 1.91 MG elevated 343 Zone Reservoir at the Camas Cemetery site. Install approximately 800 feet of 12-inch water main to connect the proposed 343 Zone Reservoir to the City's system.

## Triple Bottom Line Analysis

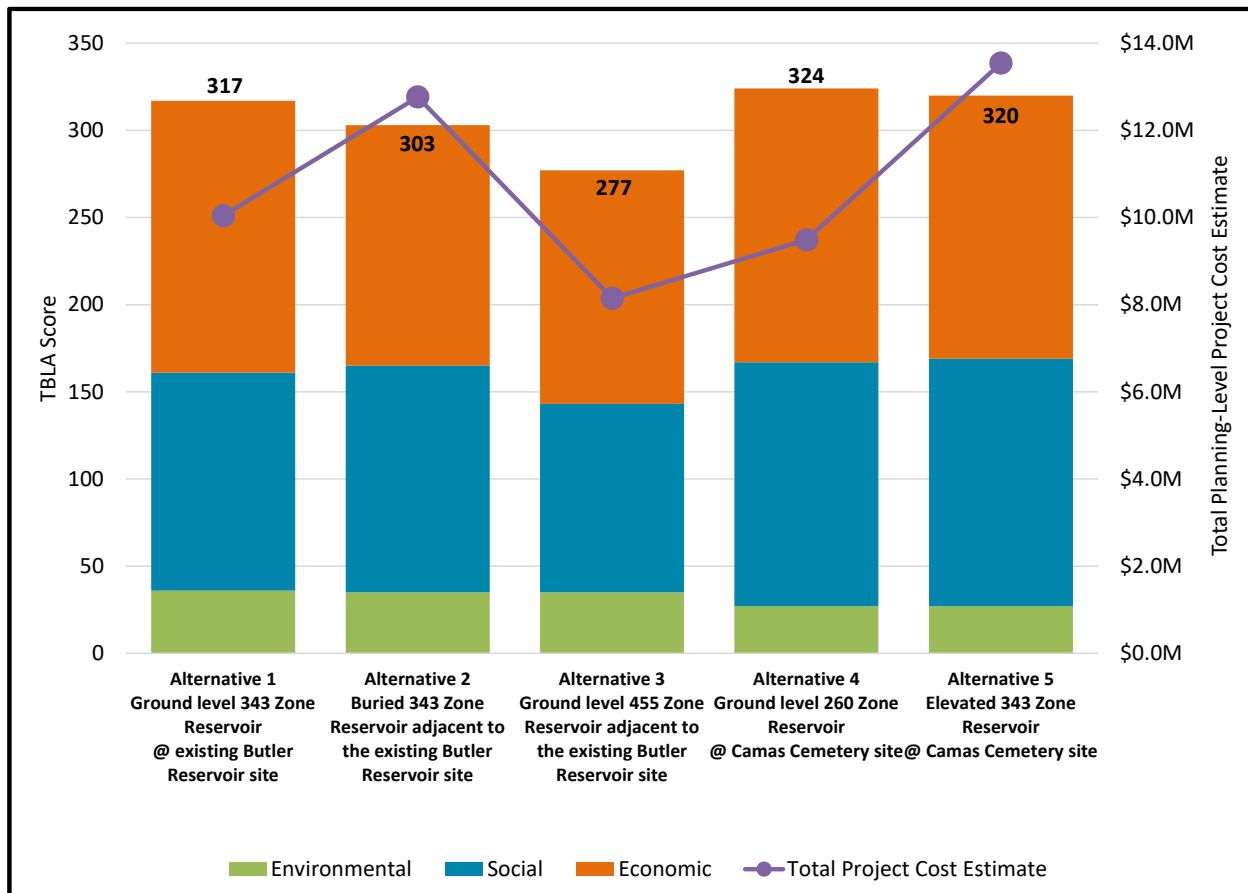
In addition to capital costs, other social and environmental impacts should be considered when evaluating and prioritizing the preferred reservoir sites. The TBLA provides a comparative analysis of these various factors and seeks to quantify their impacts and benefits.

The TBLA is provided at the end of this technical memorandum as **Attachment 1**. The analysis evaluated the various impacts and benefits the five preferred reservoir alternatives may have on the economic, social, and environmental aspects of the nearby area, City customers, and the City's water system. Each category that was considered in the TBLA was given a weighting factor between 1 and 5 that indicates the relative importance of the category to the other categories being evaluated for economic, social, and environmental (triple bottom line) impacts. A weight factor of 5 indicates categories that are considered the most important in the analysis. Not all categories are weighted under each of the triple bottom line columns, as the categories may not impact all three classes. The economic score reflects the relative financial impact of the item being considered. The social score reflects the relative impact on people and the community. The environmental score reflects the relative impact to the environment and the City's goals for sustainability.

For each preferred reservoir alternative, the relative economic, social, and environmental impacts were scored between 1 and 5 for each category that was applicable. A score of 5 in the table indicates that the item has a significant economic, social, or environmental advantage over the other sites. A score of 1 indicates that the item in question has a significant economic, social, or environmental disadvantage over the other sites.

A summary of the TBLA scoring in **Attachment 1** is shown in **Chart 1** and indicates that Alternative 4 is the most favorable alternative when considering the economic, social, and environmental impacts of the preferred reservoir alternatives, followed by Alternatives 5 and 1. Alternatives 2 and 3 have the lowest TBLA scorings. The lower rating for Alternative 2 is in part due to the added excavation and maintenance that the below-grade reservoir requires.

Chart 1  
TBLA Summary



## Planning-Level Conceptual Project Cost Estimates

Planning-level conceptual project costs for the proposed reservoir and associated water system infrastructure were estimated for each alternative. The project cost estimates include the estimated construction cost of the reservoir and necessary water main improvements, a 30-percent contingency, and indirect costs estimated at 35 percent of the construction cost for design, services during construction, permitting, and construction management. Project cost estimates for water main and improvements were based on the hydraulic analyses performed for each alternative and documented in the *Pressure Zone Reconfiguration, Reservoir Site Screening and Alternatives Identification TM*.

The planning-level conceptual total project cost estimates for each reservoir alternative are shown in **Table 1** in 2023 dollars. Although the booster pump station is recommended to be constructed for Alternative 4 to provide redundancy and reliability to the overall water system, it is not required for the operation of the reservoir under the alternative. For the purposes of comparing the Alternative 4 cost against the other alternatives, the cost of the booster pump station was not included in the total project costs shown in **Table 1**. Alternative 5 would require an elevated reservoir to be located on the Camas Cemetery site. The planning-level conceptual cost estimate for Alternative 5 has the highest capital cost because elevated reservoirs are

more costly to construct than ground level reservoirs. Alternative 2 would require the reservoir to be buried on a small City-owned property. Due to the significant costs of the earthwork required for a buried reservoir, Alternative 2 has the second highest capital project cost of the alternatives (**Table 1**). Alternatives 1, 3, and 4 are similar in cost, with Alternative 3 being the lowest cost alternative.

**Table 1**  
**Planning-Level Conceptual Project Cost Estimates**

| Project Alternatives                                                                                                            | TBLA Score |        |        |       | Total Project Cost Estimate |
|---------------------------------------------------------------------------------------------------------------------------------|------------|--------|--------|-------|-----------------------------|
|                                                                                                                                 | Economic   | Social | Enviro | Total |                             |
| <b>Alternative 1</b><br>Ground level 343 Zone Reservoir<br>@ existing Butler Reservoir site                                     | 156        | 125    | 36     | 317   | \$10.0M                     |
| <b>Alternative 2</b><br>Buried 343 Zone Reservoir @ City-owned property adjacent to the<br>existing Butler Reservoir site       | 138        | 130    | 35     | 303   | \$12.8M                     |
| <b>Alternative 3</b><br>Ground level 455 Zone Reservoir @ City-owned property adjacent to the<br>existing Butler Reservoir site | 134        | 108    | 35     | 277   | \$8.1M                      |
| <b>Alternative 4</b><br>Ground level 260 Zone Reservoir<br>@ Camas Cemetery site                                                | 157        | 140    | 27     | 324   | \$9.5M                      |
| <b>Alternative 5</b><br>Elevated 343 Zone Reservoir<br>@ Camas Cemetery site                                                    | 151        | 142    | 27     | 320   | \$13.5M                     |

## Conclusion

The five reservoir alternatives all have favorable site conditions with varying impacts based on economic, social, and environmental factors. Alternatives 1 and 2 both represent partially buried concrete reservoir options that would operate at a hydraulic grade of 343 feet. Alternative 2 is more expensive due to the larger amount of earthwork and site improvements required to develop the site and construct a reservoir. That said, Alternative 1 is complicated by the existing Butler Reservoir that would need to be removed and the existing water infrastructure that will need to be maintained and kept in service during construction. Conversely, Alternatives 3 and 4 represent ground level steel standpipe options. While on the surface Alternative 3 appears to be a lesser cost alternative, it scores the lowest of all alternatives due to its lower overall benefit to water system operation and resiliency, whereas Alternative 4 provides a greater overall benefit to water system operation and resiliency and scores the highest. Alternative 5 is the most expensive option because elevated reservoirs are more costly to construct than ground level reservoirs.

The results of the TBLA indicate that Alternative 4 is the most favorable and should be prioritized for conceptual design. In addition to being the second-lowest cost alternative, Alternative 4 will improve pressure and fire flow levels of service in the City and provide increased storage capacity. Alternatives 5 and 1 have the second and third highest TBLA scores, respectively.

Another benefit of Alternative 4 is that it provides increased operational flexibility and a path for the City to phase in the eventual replacement of the existing Butler Reservoir. Currently, the existing Butler Reservoir functions as the primary and only storage reservoir for the City's

Downtown area and 343 Zone and provides operational control for the City's primary supply system, the Camas Wellfield. This increases the complexity and risk associated with replacing the existing Butler Reservoir while maintaining water system operation.

Construction of a new 260 Zone Reservoir at the Camas Cemetery site (Alternative 4) would help mitigate this risk by providing storage at an intermediate level that can be used to both directly supply the Downtown area and which, with the addition of a future 260/343 Zone BPS, could be used to supply the 343 Zone when the Butler Reservoir is replaced. It should be noted that while construction of the 260 Zone Reservoir and future BPS will reduce the criticality of the Butler Reservoir, it is still recommended that the reservoir be maintained at the Butler site to provide the hydraulic grade and operational control for the Camas Wellfield.

## Conceptual Site Design

Based on the preferred alternative, RH2 conducted a desktop survey of the Camas Cemetery site, including a review of existing utilities, site topography, property lines, building setbacks, and existing easements. RH2 also reviewed available GIS data and aerial imagery of the site to prepare conceptual design plans for the proposed 260 Zone Reservoir.

**Attachment 2** includes a conceptual site plan showing the proposed reservoir and foundation footprints, BPS, water mains, vaults, support buildings, stormwater facilities, and access roadways. In general, the conceptual plan assumes that the proposed reservoir will be located within an unused area on the north side of the Camas Cemetery. Access to the site may be provided either through the Camas Cemetery site or through the adjacent Camas School District property. The proposed 12-inch inlet pipe for the 260 Zone Reservoir will be connected to the existing 18-inch transmission main running between the Camas Wellfield and the Butler Reservoir, and a pressure sustaining/reducing and altitude valve will be provided to maintain proper backpressure for the wellfield's pumps and prevent reservoir overflow. The proposed 12-inch outlet pipe will be extended within the proposed access road and to a connection point near the intersection of NE 5<sup>th</sup> Avenue and NE Oak Street, where it will connect to the newly reconfigured 260 Zone (formerly Downtown 343 Zone) distribution piping. **Attachment 3** includes an Engineer's Opinion of Probable Construction Cost based on the conceptual design for the selected Alternative 4.

## Attachments

Attachment 1 – Triple Bottom Line Analysis

Attachment 2 – Conceptual Site Plan for Alternative 4

Attachment 3 – Opinion of Probable Construction Cost for Alternative 4

## Attachment 1

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# Triple Bottom Line Analysis

343 Reservoir Siting Study  
Triple Bottom Line Analysis  
RH2 Engineering

| Category                                    | Weight     |            |               | Total     |
|---------------------------------------------|------------|------------|---------------|-----------|
|                                             | Economic   | Social     | Environmental |           |
| Total project cost                          | 4          |            |               | 4         |
| Construction and permitting schedule        | 3          | 3          |               | 6         |
| Operational impacts during construction     | 5          | 5          |               | 10        |
| Geologic hazard impacts                     | 5          |            | 4             | 9         |
| Environmental impacts                       | 3          | 1          | 5             | 9         |
| Cultural resource impacts                   | 2          | 2          |               | 4         |
| Property ownership                          | 5          | 2          |               | 7         |
| Benefit to the water system LOS             | 1          | 3          |               | 4         |
| Impact to maintenance efforts               | 4          | 4          |               | 8         |
| Benefit to system redundancy and resiliency | 5          | 5          |               | 10        |
| Traffic impacts during construction         | 1          | 1          | 1             | 3         |
| Short-term community impacts                |            | 1          |               | 1         |
| Long-term community impacts                 |            | 4          |               | 4         |
| Long-term operational impacts               | 5          | 5          |               | 10        |
| Proximity to public spaces                  |            | 2          |               | 2         |
| <b>Total</b>                                | <b>43</b>  | <b>38</b>  | <b>10</b>     | <b>91</b> |
| <b>% of Total</b>                           | <b>47%</b> | <b>42%</b> | <b>11%</b>    |           |

City of Camas  
343 Reservoir Siting Study  
Triple Bottom Line Analysis

| Category                                | Weight Factor |     |     | Alternative 1                                                    |       |       |     |                                                                                                                                                                                                                                                                                          | Alternative 2                                                                                  |       |       |     |                                                                                                                                                                                                                                                | Alternative 3                                                                                        |       |       |     |                                                                                                                                                                                             | Alternative 4                                         |       |       |     |                                                                                                                                                                                                                                                                     | Alternative 5                                     |       |   |    |                                                                                                                                                                                                                                                      |
|-----------------------------------------|---------------|-----|-----|------------------------------------------------------------------|-------|-------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-------|-------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------|-------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------|-------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------|---|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                         |               |     |     | Ground level 343 Zone Reservoir @ existing Butler Reservoir site |       |       |     |                                                                                                                                                                                                                                                                                          | Buried 343 Zone Reservoir @ City-owned property adjacent to the existing Butler Reservoir site |       |       |     |                                                                                                                                                                                                                                                | Ground level 455 Zone Reservoir @ City-owned property adjacent to the existing Butler Reservoir site |       |       |     |                                                                                                                                                                                             | Ground level 260 Zone Reservoir @ Camas Cemetery site |       |       |     |                                                                                                                                                                                                                                                                     | Elevated 343 Zone Reservoir @ Camas Cemetery site |       |   |    |                                                                                                                                                                                                                                                      |
|                                         | Score         |     |     | Sum of Weighted Category Score                                   | Notes | Score |     |                                                                                                                                                                                                                                                                                          | Sum of Weighted Category                                                                       | Notes | Score |     |                                                                                                                                                                                                                                                | Sum of Weighted Category                                                                             | Notes | Score |     |                                                                                                                                                                                             | Sum of Weighted Category                              | Notes | Score |     |                                                                                                                                                                                                                                                                     | Sum of Weighted Category                          | Notes |   |    |                                                                                                                                                                                                                                                      |
|                                         | Eco           | Soc | Env |                                                                  |       | Eco   | Soc | Env                                                                                                                                                                                                                                                                                      |                                                                                                |       | Eco   | Soc | Env                                                                                                                                                                                                                                            |                                                                                                      |       | Eco   | Soc | Env                                                                                                                                                                                         |                                                       |       | Eco   | Soc | Env                                                                                                                                                                                                                                                                 |                                                   |       |   |    |                                                                                                                                                                                                                                                      |
| Total project cost                      | 4             | 0   |     | 5                                                                | 5     |       | 20  | \$10.0M                                                                                                                                                                                                                                                                                  | 1                                                                                              | 1     |       | 4   | \$12.8M                                                                                                                                                                                                                                        | 4                                                                                                    | 4     |       | 16  | \$8.1M                                                                                                                                                                                      | 5                                                     | 5     |       | 20  | \$9.5M                                                                                                                                                                                                                                                              | 3                                                 | 3     |   | 12 | \$13.5M                                                                                                                                                                                                                                              |
| Construction and permitting schedule    | 3             | 3   |     | 4                                                                | 4     |       | 24  | Proposed use is similar to existing use. Permitting is expected to be easier than other sites. This alternative does not require offsite improvements other than the PZ reconfiguration improvements. Washougal Wellfield operation will be extremely difficult throughout construction. | 1                                                                                              | 1     |       | 6   | Permitting will likely require delineation of adjacent wetland. This alternative requires minor offsite improvements in addition to the PZ reconfiguration improvements. Construction schedule will be longer due to excavation for reservoir. | 4                                                                                                    | 4     |       | 24  | Permitting will likely require delineation of adjacent wetland. This alternative requires BPS improvements at the Butler Reservoir site in addition to the PZ reconfiguration improvements. | 1                                                     | 1     |       | 6   | Permitting will likely require a Shoreline Conditional Use Permit. This alternative requires BPS improvements and offsite water main improvements in addition to the PZ reconfiguration improvements. Design will likely require coordination with school district. | 3                                                 | 3     |   | 18 | Permitting will likely require a Shoreline Conditional Use Permit. This alternative requires minor offsite water main improvements in addition to the PZ reconfiguration improvements. Design will likely require coordination with school district. |
| Operational Impacts During Construction | 5             | 5   |     | 1                                                                | 1     |       | 10  | Existing Butler Reservoir will be required to be taken out of service during construction. Operation of system without a 343 Reservoir will be challenging.                                                                                                                              | 5                                                                                              | 5     |       | 50  | Only minor impacts to operation during tie in to existing system.                                                                                                                                                                              | 5                                                                                                    | 5     |       | 50  | Only minor impacts to operation during tie in to existing system.                                                                                                                           | 5                                                     | 5     |       | 50  | Only minor impacts to operation during tie in to existing system.                                                                                                                                                                                                   | 5                                                 | 5     |   | 50 | Only minor impacts to operation during tie in to existing system.                                                                                                                                                                                    |
| Geologic hazard impacts                 | 5             |     | 4   | 4                                                                |       | 4     | 36  | Predominantly very low liquifaction susceptibility, moderate area of deep landslide susceptibility.                                                                                                                                                                                      | 5                                                                                              |       | 5     | 45  | Predominantly very low liquifaction susceptibility.                                                                                                                                                                                            | 5                                                                                                    |       | 5     | 45  | Predominantly very low liquifaction susceptibility.                                                                                                                                         | 3                                                     |       | 3     | 27  | Predominantly very low liquifaction susceptibility. Reservoir should be situated on the site to avoid areas of moderate or high deep landslide susceptibility on eastern side.                                                                                      | 3                                                 |       | 3 | 27 | Predominantly very low liquifaction susceptibility. Reservoir should be situated on the site to avoid areas of moderate or high deep landslide susceptibility on eastern side.                                                                       |
| Environmental impacts                   | 3             | 1   | 5   | 5                                                                | 5     | 4     | 40  | No natural resource areas mapped on site. Removal of large trees onsite will be required.                                                                                                                                                                                                | 4                                                                                              | 4     | 3     | 31  | No natural resource areas mapped on site. Delineation of adjacent wetlands will be required. Removal of large trees will be required.                                                                                                          | 4                                                                                                    | 4     | 3     | 31  | No natural resource areas mapped on site. Delineation of adjacent wetlands will be required. Removal of large trees will be required                                                        | 3                                                     | 3     | 3     | 27  | No natural resource areas mapped on site. Lacamas Creek Urban Conservancy requirements may apply due to proximity to creek.                                                                                                                                         | 3                                                 | 3     | 3 | 27 | No natural resource areas mapped on site. Lacamas Creek Urban Conservancy requirements may apply due to proximity to creek.                                                                                                                          |
| Cultural resource impacts               | 2             | 2   |     | 1                                                                | 1     |       | 4   | High to very high risk of encountering cultural resources.                                                                                                                                                                                                                               | 1                                                                                              | 1     |       | 4   | High to very high risk of encountering cultural resources.                                                                                                                                                                                     | 1                                                                                                    | 1     |       | 4   | High to very high risk of encountering cultural resources.                                                                                                                                  | 1                                                     | 1     |       | 4   | High to very high risk of encountering cultural resources.                                                                                                                                                                                                          | 1                                                 | 1     |   | 4  | High to very high risk of encountering cultural resources.                                                                                                                                                                                           |
| Property ownership                      | 5             | 2   |     | 5                                                                | 5     |       | 35  | Property is owned by the City and existing use will not change.                                                                                                                                                                                                                          | 3                                                                                              | 3     |       | 21  | Property is owned by the City but its use has not previously been designated for water utility functions.                                                                                                                                      | 3                                                                                                    | 3     |       | 21  | Property is owned by the City but its use has not previously been designated for water utility functions.                                                                                   | 4                                                     | 4     |       | 28  | Property is owned by the City and its use has been reserved for water utility functions.                                                                                                                                                                            | 4                                                 | 4     |   | 28 | Property is owned by the City and its use has been reserved for water utility functions.                                                                                                                                                             |

City of Camas  
343 Reservoir Siting Study  
Triple Bottom Line Analysis

| Category                                    | Weight Factor |     |     | Alternative 1                                                    |       |       |     | Alternative 2                                                                                  |                                                                                                                                                                                                                                                                             |       |       | Alternative 3                                                                                        |     |                          |                                                                                                                                                                                | Alternative 4                                         |     |     |                          | Alternative 5                                     |                                                                                                                                                                                                                                                          |     |     |  |  |    |                                                                                                                                                                                                                                                        |   |   |  |  |    |                                                                                                                                                                                |
|---------------------------------------------|---------------|-----|-----|------------------------------------------------------------------|-------|-------|-----|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|------------------------------------------------------------------------------------------------------|-----|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----|-----|--------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--|--|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--|--|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             |               |     |     | Ground level 343 Zone Reservoir @ existing Butler Reservoir site |       |       |     | Buried 343 Zone Reservoir @ City-owned property adjacent to the existing Butler Reservoir site |                                                                                                                                                                                                                                                                             |       |       | Ground level 455 Zone Reservoir @ City-owned property adjacent to the existing Butler Reservoir site |     |                          |                                                                                                                                                                                | Ground level 260 Zone Reservoir @ Camas Cemetery site |     |     |                          | Elevated 343 Zone Reservoir @ Camas Cemetery site |                                                                                                                                                                                                                                                          |     |     |  |  |    |                                                                                                                                                                                                                                                        |   |   |  |  |    |                                                                                                                                                                                |
|                                             | Score         |     |     | Sum of Weighted Category Score                                   | Notes | Score |     |                                                                                                | Sum of Weighted Category                                                                                                                                                                                                                                                    | Notes | Score |                                                                                                      |     | Sum of Weighted Category | Notes                                                                                                                                                                          | Score                                                 |     |     | Sum of Weighted Category | Notes                                             |                                                                                                                                                                                                                                                          |     |     |  |  |    |                                                                                                                                                                                                                                                        |   |   |  |  |    |                                                                                                                                                                                |
|                                             | Eco           | Soc | Env |                                                                  |       | Eco   | Soc | Env                                                                                            |                                                                                                                                                                                                                                                                             |       | Eco   | Soc                                                                                                  | Env |                          |                                                                                                                                                                                | Eco                                                   | Soc | Env |                          |                                                   | Eco                                                                                                                                                                                                                                                      | Soc | Env |  |  |    |                                                                                                                                                                                                                                                        |   |   |  |  |    |                                                                                                                                                                                |
| Benefit to the water system LOS             | 1             | 3   |     |                                                                  | 3     | 3     |     | 12                                                                                             | Pressure and fire flow LOS will improve with the proposed pressue zone reconfiguration. Storage capacity will increase to provide additional emergency and operational volume. LOS will be lowered during duration of construction when the 343 Zone does not have storage. | 5     | 5     |                                                                                                      |     | 20                       | Pressure and fire flow LOS will improve with the proposed pressue zone reconfiguration. Storage capacity will increase to provide additional emergency and operational volume. | 2                                                     | 2   |     |                          | 8                                                 | Pressure and fire flow LOS will improve with the proposed pressue zone reconfiguration. Storage capacity will increase to provide additional emergency and operational volume but the large amount of dead storage may increase water age in the system. | 5   | 5   |  |  | 20 | Pressure and fire flow LOS will improve with the proposed pressue zone reconfiguration. Storage capacity will increase to provide additional emergency and operational volume.                                                                         | 5 | 5 |  |  | 20 | Pressure and fire flow LOS will improve with the proposed pressue zone reconfiguration. Storage capacity will increase to provide additional emergency and operational volume. |
| Impact to maintenance efforts               | 4             | 4   |     |                                                                  | 4     | 4     |     | 32                                                                                             | The site is relatively small with several other buildings located on it that limit site access for maintenance vehicles and equipment.                                                                                                                                      | 1     | 1     |                                                                                                      |     | 8                        | Maintenance for a buried reservoir is more difficult because access to the structure is limited.                                                                               | 3                                                     | 3   |     |                          | 24                                                | A ground level reservoir will provide the least impact to maintenance compared to other reservoir styles. Additional reliance on BPSs will increase maintenance efforts to ensure their continued operation.                                             | 4   | 4   |  |  | 32 | A ground level reservoir will provide the least impact to maintenance compared to other reservoir styles. The new BPS will require additional maintenance efforts.                                                                                     | 3 | 3 |  |  | 24 | Maintenance for an elevated tank can be difficult and more costly than other reservoir styles. The new BPS will require additional maintenance efforts.                        |
| Benefit to system redundancy and resiliency | 5             | 5   |     |                                                                  | 2     | 2     |     | 20                                                                                             | Replacing the aging existing reservoir will greatly improve the resiliency of the system. System redundancy will be lowered during duration of construction when the 343 Zone does not have storage.                                                                        | 3     | 3     |                                                                                                      |     | 30                       | Replacing the aging existing reservoir will greatly improve the resiliency of the system.                                                                                      | 1                                                     | 1   |     |                          | 10                                                | Replacing the aging existing reservoir will greatly improve the resiliency of the system. This alternative relies on multiple pumps in series to fill the reservoir and reduces system resiliency.                                                       | 5   | 5   |  |  | 50 | Replacing the aging existing reservoir will greatly improve the resiliency of the system. The BPS will provide an additional conveyance route for water supply from the wells to the 343 and other higher zones, greatly increasing system redundancy. | 3 | 3 |  |  | 30 | Replacing the aging existing reservoir will greatly improve the resiliency of the system.                                                                                      |
| Traffic impacts during construction         | 1             | 1   | 1   |                                                                  | 3     | 3     |     | 6                                                                                              | Main construction access will be along primary school routes. Site is easily accessable from adjacent roads.                                                                                                                                                                | 3     | 3     |                                                                                                      |     | 6                        | Main construction access will be along primary school routes. Site is easily accessable from adjacent roads.                                                                   | 3                                                     | 3   |     |                          | 6                                                 | Main construction access will be along primary school routes. Site is easily accessable from adjacent roads.                                                                                                                                             | 2   | 2   |  |  | 4  | Main construction access from arterials will be along primary school routes. Local access may be through small cemetery roads or accessed through the school bus property.                                                                             | 2 | 2 |  |  | 4  | Main construction access from arterials will be along primary school routes. Local access may be through small cemetery roads or accessed through the school bus property.     |

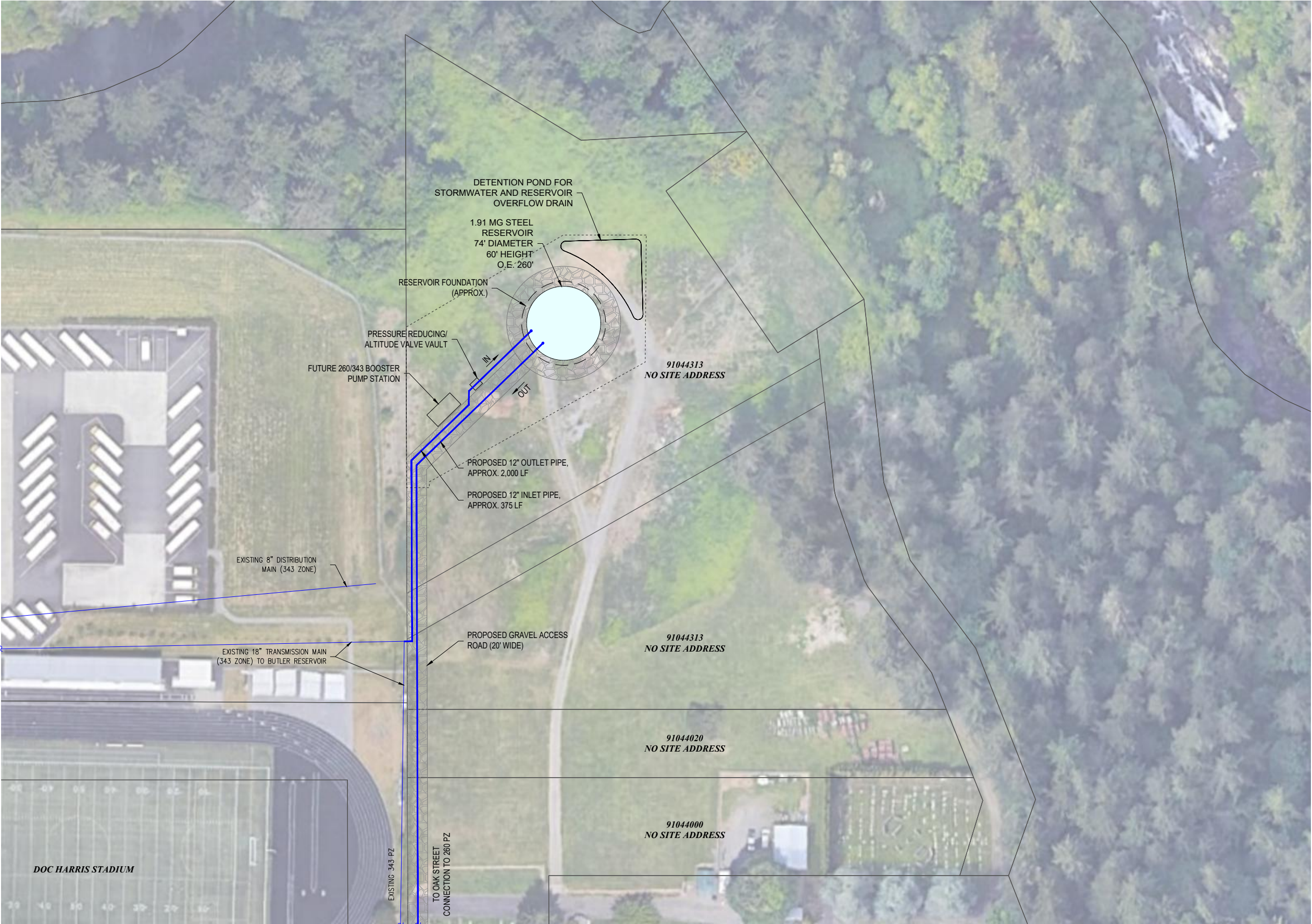
City of Camas  
343 Reservoir Siting Study  
Triple Bottom Line Analysis

| Category                               | Weight Factor |     |     | Alternative 1                                                    |       |       |     | Alternative 2                                                                                         |                          |       |       | Alternative 3                                                                                        |                                                                                                       |                          |       | Alternative 4                                         |     |                                                                                                                                                                                                                        |                          | Alternative 5                                                                                              |     |                                                                                                       |                                                                                                                                                                                                                                                                            |     |                                                                                                                                                            |     |                                                                                                       |                                                               |  |  |  |
|----------------------------------------|---------------|-----|-----|------------------------------------------------------------------|-------|-------|-----|-------------------------------------------------------------------------------------------------------|--------------------------|-------|-------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------|-------|-------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--|--|--|
|                                        |               |     |     | Ground level 343 Zone Reservoir @ existing Butler Reservoir site |       |       |     | Buried 343 Zone Reservoir @ City-owned property adjacent to the existing Butler Reservoir site        |                          |       |       | Ground level 455 Zone Reservoir @ City-owned property adjacent to the existing Butler Reservoir site |                                                                                                       |                          |       | Ground level 260 Zone Reservoir @ Camas Cemetery site |     |                                                                                                                                                                                                                        |                          | Elevated 343 Zone Reservoir @ Camas Cemetery site                                                          |     |                                                                                                       |                                                                                                                                                                                                                                                                            |     |                                                                                                                                                            |     |                                                                                                       |                                                               |  |  |  |
|                                        | Score         |     |     | Sum of Weighted Category Score                                   | Notes | Score |     |                                                                                                       | Sum of Weighted Category | Notes | Score |                                                                                                      |                                                                                                       | Sum of Weighted Category | Notes | Score                                                 |     |                                                                                                                                                                                                                        | Sum of Weighted Category | Notes                                                                                                      |     |                                                                                                       |                                                                                                                                                                                                                                                                            |     |                                                                                                                                                            |     |                                                                                                       |                                                               |  |  |  |
|                                        | Eco           | Soc | Env |                                                                  |       | Eco   | Soc | Env                                                                                                   |                          |       | Eco   | Soc                                                                                                  | Env                                                                                                   |                          |       | Eco                                                   | Soc | Env                                                                                                                                                                                                                    |                          |                                                                                                            | Eco | Soc                                                                                                   | Env                                                                                                                                                                                                                                                                        |     |                                                                                                                                                            |     |                                                                                                       |                                                               |  |  |  |
| Short-term community impacts           | 1             |     |     |                                                                  | 2     |       | 2   | Visible construction, noise, and traffic will impact residential areas to the west and south.         |                          | 2     |       | 2                                                                                                    | Visible construction, noise, and traffic will impact residential areas to the west and south.         |                          | 2     |                                                       | 4   |                                                                                                                                                                                                                        | 4                        | Site is adjacent to public areas that are less impacted by construction activities than residential areas. |     | 4                                                                                                     |                                                                                                                                                                                                                                                                            | 4   | Site is adjacent to public areas that are less impacted by construction activities than residential areas.                                                 |     |                                                                                                       |                                                               |  |  |  |
| Long-term community impacts            | 4             |     |     |                                                                  | 4     |       | 16  | No additional community impacts beyond existing operations.                                           |                          | 4     |       | 16                                                                                                   | No additional community impacts beyond existing operations.                                           |                          | 4     |                                                       | 3   |                                                                                                                                                                                                                        | 12                       | Impacts will be limited to providing for future maintenance access through cemetery.                       |     | 3                                                                                                     |                                                                                                                                                                                                                                                                            | 12  | Reservoir could be used as a landmark for the adjacent stadium. Other impacts will be limited to providing for future maintenance access through cemetery. |     |                                                                                                       |                                                               |  |  |  |
| Long-Term Operational Impacts          | 5             | 5   |     |                                                                  | 5     | 5     | 50  | No additional operational impacts beyond existing conditions.                                         | 5                        | 5     |       | 50                                                                                                   | No additional operational impacts beyond existing conditions.                                         | 1                        | 1     |                                                       | 10  | Additional complexity in operation of system without a reservoir for the Washougal Wellfield to pump directly into. The wells and 455 Zone BPS will need to be configured to pump in series to new 455 Zone reservoir. | 3                        | 3                                                                                                          |     | 30                                                                                                    | Additional complexity in operation of system without a 343 Zone reservoir for the Washougal Wellfield to pump directly into. A control valve at the reservoir site can be utilized to reduce complexity of controls for the wells pumping in series with the 455 Zone BPS. | 5   | 5                                                                                                                                                          |     | 50                                                                                                    | No additional operational impacts beyond existing conditions. |  |  |  |
| Proximity to public spaces             | 2             |     |     |                                                                  | 5     |       | 10  | All sites are adjacent to public spaces and do not impact the residential character of neighborhoods. |                          | 5     |       | 10                                                                                                   | All sites are adjacent to public spaces and do not impact the residential character of neighborhoods. |                          | 5     |                                                       | 10  |                                                                                                                                                                                                                        | 5                        |                                                                                                            | 10  | All sites are adjacent to public spaces and do not impact the residential character of neighborhoods. |                                                                                                                                                                                                                                                                            | 5   |                                                                                                                                                            | 10  | All sites are adjacent to public spaces and do not impact the residential character of neighborhoods. |                                                               |  |  |  |
| Subtotal Economic-Social-Environmental |               |     |     | 156                                                              | 125   | 36    |     |                                                                                                       |                          |       | 138   | 130                                                                                                  | 35                                                                                                    |                          |       |                                                       |     | 134                                                                                                                                                                                                                    | 108                      | 35                                                                                                         |     |                                                                                                       |                                                                                                                                                                                                                                                                            |     | 157                                                                                                                                                        | 140 | 27                                                                                                    |                                                               |  |  |  |
| TOTAL TBLA SCORE                       |               |     |     |                                                                  |       |       |     | 317                                                                                                   |                          |       |       | 303                                                                                                  |                                                                                                       |                          |       | 277                                                   |     |                                                                                                                                                                                                                        |                          | 324                                                                                                        |     |                                                                                                       |                                                                                                                                                                                                                                                                            | 320 |                                                                                                                                                            |     |                                                                                                       |                                                               |  |  |  |

## Attachment 2

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# Conceptual Site Plan for Alternative 4



| LEGEND |                     |
|--------|---------------------|
|        | TAXLOTS             |
|        | EXISTING WATER MAIN |
|        | FUTURE WATER MAIN   |
|        | FUTURE FENCE        |
|        | FUTURE LANDSCAPING  |
|        | FUTURE GRAVEL AREA  |
|        | FUTURE PAVING       |

| NOTES                                           |
|-------------------------------------------------|
| LAND USE DESIGNATION: RESIDENTIAL-7,500 (R-7.5) |

**AUGUST 2023**  
**JOB NO. 22-0068**

**CITY OF CAMAS**  
343 ZONE RESERVOIR SITING STUDY

**CONCEPTUAL SITE PLAN**  
**ALTERNATIVE 4: CAMAS CEMETERY SITE**  
**1.91 MG STEEL STANDPIPE**

SCALE: 1" = 50'

DRAWING IS FULL SCALE WHEN BAR MEASURES 2'

## Attachment 3

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# Opinion of Probable Construction Cost for Alternative 4

City of Camas  
Reservoir Siting Study - 343 Zone Reservoir Replacement  
Conceptual-Level Opinion of Probable Construction Cost  
Alternative 4: Camas Cemetery Site (Preferred)  
1.91 MG Steel Standpipe

|                                       |                                                              | Units | Quantity | Unit Price  | Extended<br>Total Cost |
|---------------------------------------|--------------------------------------------------------------|-------|----------|-------------|------------------------|
| 1                                     | Mobilization, Demobilization, Site Preparation, and Clean-up | LS    | 1        | 10%         | \$485,800              |
| 2                                     | Site Work and Utilities                                      | LS    | -        |             | \$2,155,000            |
|                                       | Site Work and Utilities                                      | LS    | 1        | \$1,730,000 | \$1,730,000            |
|                                       | Off-Site Watermain (12-inch DIP)                             | LF    | 1,700    | \$250       | \$425,000              |
| 3                                     | Reservoir Structure                                          | LS    | -        |             | \$2,703,000            |
|                                       | 1.91 MG Steel Reservoir (74' Dia, 60' Tall)                  | LS    | 1        | \$2,703,000 | \$2,703,000            |
| Subtotal Estimated Construction Costs |                                                              |       |          |             | \$5,344,000            |
|                                       | Contingency                                                  |       |          | 30%         | \$ 1,603,000           |
| Total Estimated Construction Costs    |                                                              |       |          |             | \$6,947,000            |
|                                       | Indirect Costs (Engineering, Permitting, Const. Admin)       |       |          | 35%         | \$ 2,431,450           |
| Total Estimated Project Cost          |                                                              |       |          |             | \$ 9,378,450           |