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1. Adaptation Pathways Decision Types

This appendix to the draft Change Management Strategy (CMS) document describes the various types of adaptive decisions that may come into play in the Adaptive Pathway the Committee will develop as part of its eventual Water Supply Augmentation Plan (the Plan). The intent of this appendix is to provide the Committee with enough information to create a shared understanding about the various types of decisions, so that the Committee can use that understanding as a foundation for its discussions toward an Agreement.

Some important considerations to keep in mind at this time:

- Note first that this appendix addresses **adaptive decisions**, as distinct from **implementation adjustments**. These terms are defined and described in the CMS document in section 2 (“Adjustments and Adaptations”). Briefly, **adaptive decisions** relate to the Plan’s progress on the Adaptive Pathway, the paths that the Plan ends up following, and the thresholds that the Plan may approach or cross along the way. **Adjustments** refer to the appropriate steps the Water Department will take to plan, develop, design, and construct or implement and operate Plan Elements as laid out in the Plan. The Department will also make necessary and appropriate adjustments during the implementation of the Plan, doing everything reasonable and feasible to make the Plan’s Elements work within expected performance parameters. Those adjustments are not reflected here.
- The decision types described in this appendix are merely illustrative of the various types of decisions that we may make over time. They do not represent or imply a final or even a proposed strategy.
- Similarly, the Adaptive Pathway images are merely illustrative; they, too, do not represent any particular strategy as being preferred in advance of the Committee’s discussion of and decision on its strategy.
- Finally, the timelines on the images are relative, not absolute; they do not necessarily reflect actual timelines that may be defined in the Committee’s Agreement.

1.1. Appendix Organization and Content

The appendix is split into 4 major sections:

- The first, “Common Principles”, provides the foundation upon which all Adaptive decisions are made. This section complements section 3 of the CMS, “Guidelines and Rules¹”, and defines the common “guiding principles” or “rules of the road” that apply to all adaptive decisions undertaken in pursuit of the Plan, unless there are special considerations that apply only to a specific decision type.

¹ “Guidelines and Rules” should be renamed “Guidelines and Principles”; this document will adopt the term Principles.

- The remaining 3 sections each discuss the decision types that relate to a given Plan Element. Each decision type discusses the possible outcomes of a given decision node on the Plan's Adaptive Pathway.

Within each section, the appendix addresses each possible adaptation decision type that relates to that Element. For example, the section "Start Element 1 [1.1]" discusses the context for and parameters relating to the decision to start operation of Element 1 (in-lieu water transfers). The "[1.1]" refers to the numbered decision node on the Adaptive Pathway figure. In some cases you may see "[n/a]" instead of a node number; this corresponds to the start of an Element's path (which isn't represented by a numbered decision node).

Note that there may be several possible decision types that relate to a given decision node. Each of these decision types corresponds to a potential outcome of that decision node. When thinking about a decision node, it's important to consider all of those potential outcomes.

Further, note that there may be circumstances where there are decision considerations that are unique to a given decision type, either complementing or in some cases over-riding the Common Principles (that apply by default to all decision types). Where this is the case, these considerations are addressed in sub-topics titled "Special Considerations" for each appropriate decision type.

Finally, particularly in the Common Principles discussion, the appendix includes some specific parameter values. As noted above, none of these are final until they are discussed and agreed upon by the Committee. Such values are enclosed in [square brackets] and highlighted in yellow, [like this].

1.2. General Note About the "Subway Map" Images

The last three sections of the appendix are introduced by and refer to a sample Adaptive Pathway image. The various decision types relate back to that image. That image includes a brief legend that defines the types of nodes depicted in the image. This image comes from the Pathway images that the Technical Team has provided in the September meeting packet, in document 6a-1, "Overview to the Adaptive Pathways 'Subway Maps' and Gantt Chart". You should refer to that separate overview document for more-complete descriptions of each of the Adaptive Pathways and the various pathway nodes.

2. Common Principles

As noted previously, this appendix addresses adaptive decisions that relate to the Plan's progress and the Plan's performance against agreed upon thresholds. Those basic thresholds and guiding considerations are documented in the "Adjustments and Adaptations" and "Guidelines and Rules" sections of the draft Change Management Strategy document – please take a moment to familiarize yourself with those sections of that document.

This section contains elaborations or extensions to those basic guidelines and considerations. Taken together with the CMS document, these considerations and elaborations represent the "guiding principles" or "rules of the road" that the City will follow as it implements the Plan. As noted previously, any specific principles outlined in either the CMS document or in this appendix are currently in draft form, pending discussion of and agreement on them by the full Committee. At some point these principles will be included in the Committee's Agreement document(s).

The concepts and values captured here and in the CMS document are critical to the Agreement and to the Plan. They apply, by default, to every adaptive decision type. Rather than repeat those thresholds and considerations throughout this appendix, they are addressed here, once. When reading and thinking about a decision type, you should consider all of these considerations to be at play in that decision. If a decision type requires additional or different considerations, they are enumerated in a "Special Considerations" topic in the discussion of that decision type.

NB: Any values in this draft are preliminary in nature, and must be discussed and agreed upon by the Committee before they would be included in the Committee's Agreement. Eventually, they should migrate to the Change Management document.

In general, this appendix assumes that the Plan and its elements are operating within acceptable performance ranges, unless stated otherwise. The Department will decide on and make any and all necessary and practicable adjustments in order to help to ensure that the Plan and its Elements perform optimally. These adjustments do not constitute adaptive decisions. Adaptive decisions are made in the context of more-comprehensive Assessments of the Plan's progress.

2.1. Threshold Types (Criteria)

Recall that CMS identifies four major threshold types (or criteria) that, taken together, define the envelope of acceptable overall Plan performance.

They are:²

- Cost
- Yield
- Timeliness
- Public Acceptance

These four criteria define the conceptual space within which the Plan's performance is assessed on a regular basis. Evaluating the risk attendant on each of those criteria individually, as well as the collective risk projected for the Plan as a whole, is the essence of each such Assessment.

In general, the Plan's goal is to cover at least [100%] of the projected peak season supply /demand gap in a timely manner, within budget, and in a manner that is understood and accepted by the public, while allowing for curtailments up to [15%] in up to [2] years out of 10. [With clear evidence that the aquifer(s) are, in fact, being successfully recharged and while accumulating sufficient storage, curtailments up to [25%] in up to [4] years out of 10 are acceptable.]³

In addition, there are common principles that, coupled with an objective evaluation of the Plan's performance within these four major criteria, provide the complete context for any adaptive decision. These are defined in the "Guidelines and Rules" section of the CMS and apply to all adaptive decision types described in this appendix.

The following topics elaborate on the core threshold types (or criteria).

2.2. Cost

When evaluating whether and, if so, how to proceed with an Element, Cost is a major consideration, both in terms of the absolute cost of the Plan as a whole, and in terms of the relative cost of different Elements of the Plan.

In general, adaptive decisions should favor lower-cost alternatives.

For cost comparisons, we are using ***annualized cost per unit of yield in average years***, as follows:

- *C is defined as the **annualized cost per unit of yield in average years** for all elements (Elements 1 and 2, and all possible Elements 3)*

² Public Health is assumed to be a core value that the Plan must protect. This will be added to the CMS document.

³ This square-bracketed sentence about the possible acceptability of greater curtailments attempts to capture the potential willingness of the Committee and the community to "live with" occasional deeper curtailments during the aquifer recharge cycle, as long as it's clear that the aquifers are, indeed, recharging and will do so timely.

- *C* is defined as the **annualized cost per unit of yield in average years for all Candidate Elements 3**
- *C'* is defined as the **annualized cost per unit of yield in average years for Elements 1 and 2**
 - See accompanying Excel spreadsheet for the calculations of *C*, *C'* and *C''*
- Unless otherwise specified, *C* represents the threshold cost value for comparisons.

In any cost comparisons between Elements, cost differences less than **[+/- 20%]** are deemed immaterial.

2.3. Yield

Yield relates to the Plan's ability to meet projected supply / demand gaps. The costs of a given yield are captured in the Cost criterion. Yield indicates how well the Plan is meeting the gap.

As with cost, there is acceptable variance of **[+/- 20%]** around the target yield of any given Element.⁴ However, the acceptability of any such variance must be evaluated in the context of the Plan's overall performance, taking into account all of the major criteria. Such evaluation could take into account other Elements that are exceeding target, for example.

2.4. Timeliness

Considerations of solution timeliness relate to and are affected by such factors as

- Climate and weather
- Performance of Plan Elements to-date
- Public's sense of urgency around a solution
- The time required to bring another Element on line

As such, Assessments of the Plan's performance will reflect the sense of timeliness that reflects conditions and sentiments at the time of the Assessment based on how conditions have evolved to that time, and not based on a "snapshot" set of events.

In general, timeliness variance of **[+/- 20%]** may be acceptable. However, the acceptability of any such variance must be evaluated in the context of the Plan's overall performance, taking into account the other major criteria.

2.5. Public Acceptance

Having the public understand the nature of Santa Cruz's water supply and the reliability issues it faces is a prerequisite for establishing and maintaining public support for the steps needed to address the issues and improve the system's ability

⁴ Note that this refers to the yield shortfall of a *single Element* in the Plan. The impact of that shortfall must be understood in the context of that Element's contribution to the total Plan yield. For example, if an Element that is responsible for ¼ of the Plan's yield falls 20% short, then the resulting Plan yield shortfall would be 5%.

to provide reliable service during droughts. The City needs to provide regular opportunities for community members and interest groups to learn about the water system, the demand management, infrastructure and operational changes that are being pursued to improve system performance and the options available for increasing supply. Ultimately, the public must understand and accept the Plan and its Elements. To that end, the CMS document has identified as one of its guiding principles that the City will endeavor to “over-communicate” about the Plan, its progress and performance, and any adjustments and adaptations.

In the case of Element 3, given the City’s history with desalination, the Plan may call for focused, substantial efforts relating to study, education, and public discussions about the technologies that may be employed in that Element.

The Committee may choose to include recommendations about how and how frequently to gauge the Public’s attitudes about the Plan and its various Elements.