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Renewable Placer: Waste Action Plan

Phase I Concept Evaluation Report

Final

February 2019

Western Placer Waste Management Authority



Renewable Placer: Waste Action Plan

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Executive Summary

The Western Placer Waste Management Authority (WPWMA) was formed in 1978 and is composed of the County of Placer and the cities of Lincoln, Rocklin, and Roseville (Member Agencies). The WPWMA also provides solid waste services to the cities of Auburn and Colfax and the Town of Loomis; these entities and the Member Agencies are collectively referred to as Participating Agencies. The WPWMA's current facility provides the majority of solid waste and recycling services to the Participating Agencies. In addition to its 320-acre active permitted property, the WPWMA owns approximately 480 acres to the west and 160 acres to the east.

The WPWMA has expanded its services to increase material recovery and recycling as solid waste regulations and needs of the Participating Agencies have evolved, including significant facility modifications and capital infrastructure investments such as the construction of the material recovery facility (MRF) in 1995, expansion of the MRF in 2007, and expansion of the composting facility in 2011.

As regulatory and regional growth demands increase, the WPWMA's existing facilities lack necessary supporting capacity. In July 2015, the WPWMA initiated a master planning effort based on a series of potential modifications and enhancements intended to maintain service levels by responding to regulatory changes, addressing regional growth, optimizing material recovery, maximizing operational efficiency, and enhancing regional compatibility. This report presents the process, considerations, and results of Phase I of this project through December 2018. Phase I included planning level design and initial evaluations. As the project progresses beyond Phase I, it is possible that circumstances, conditions, and assumptions may change, affecting the final project implementation.

Waste Action Plan

At its October 13, 2016 meeting, the WPWMA Board approved a phased agreement with CH2M¹ to provide consulting services in support of the Renewable Placer: Waste Action Plan (Waste Action Plan). Phase I consisted of development of facility Plan Concepts to address future operational needs. Phase II will involve performing California Environmental Quality Act (CEQA) review of the Plan Concept(s) identified in Phase I.

At the onset of the project, the WPWMA convened an Advisory Committee composed of key staff from each of the WPWMA's Member Agencies to provide input and serve as a conduit between the WPWMA and Member Agency leadership groups throughout the process. The Advisory Committee agreed that should future operations be limited, jurisdictions would be better served by the WPWMA continuing to provide recycling and waste diversion services rather than landfill capacity.

Under Phase I, CH2M and its subcontractors (the CH2M Team) prepared numerous technical evaluations including waste projections and waste processing adjacency study, aquatic resources delineation, and preliminary cultural resources and geotechnical evaluations. CH2M incorporated these initial technical findings, and worked with WPWMA staff and the Member Agency Advisory Committee to develop several potential facility Plan Concepts that were later refined to the following three:

- **Plan Concept 0: Existing Site Reconfigured** – Conduct all future solid waste operations exclusively on the existing permitted parcel.
- **Plan Concept 1: Landfill East** – Designates the eastern property for future landfill operations as necessary. MRF and construction and demolition operations remain on the existing property, and

¹ On December 15, 2017, all CH2M companies became part of Jacobs Engineering Group Inc. (Jacobs) and are now wholly owned direct subsidiaries of Jacobs. CH2M HILL Engineers Inc will remain a separate legal entity, and we will continue to operate and conduct business under this entity. This report will have references to both CH2M and Jacobs; however, they should be viewed as one-and-the-same entity, and the names can be used interchangeably. For continuity with other documentation, the consulting team will be referred to as the CH2M Team.

organics management and space reserved for third-party compatible manufacturing operations² located on the western property.

- **Plan Concept 2: Landfill West** – Designates the western property for future landfill operations as necessary and nonlandfill operations on the existing parcel; and reserving the eastern property for third-party compatible manufacturing operations and/or biological reserve.

Stakeholder Engagement

In an effort to achieve an understanding of regional needs and consensus of the Waste Action Plan purpose and process, CH2M and WPWMA staff engaged the following stakeholder groups to solicit feedback. While feedback from these stakeholders varied somewhat, nearly all stakeholders expressed similar concerns related to the potential for increased regional odors.

- **Elected Officials, Boards, and Councils:**
 - Placer County Board of Supervisors
 - Roseville City Council
 - Rocklin City Council
 - Lincoln City Council
 - Pioneer Energy
- **Neighboring Land Owners:**
 - Placer Ranch, Inc.
 - United Auburn Indian Community
 - AKT Development Corp.
 - Placer Athens Limited Partnership
- **Environmental Groups:**
 - Sierra Club
 - Audubon Society
 - Native Plant Society
- **Community and Business Groups:**
 - North State Building Industry Association
 - Lincoln Chamber of Commerce
 - Placer County Associations of Realtors
 - Rocklin Chamber of Commerce Government Relations Committee
- **Regulators:**
 - Placer County Air Pollution Control District
 - Regional Water Quality Control Board
 - CalRecycle
 - Placer County Environmental Health Department
- **General Public**
 - Residents from the Blue Oaks, Westpark, Fiddymont Farms, and Amoruso neighborhoods

² Third-party compatible manufacturing operations refer to businesses that would take materials and products from the facility and then produce beneficial product(s) including renewable energy.

The CH2M Team incorporated Member Agency Advisory Committee and stakeholder feedback as Plan Concepts were compared using Multi-Objective Decision Analysis (MODA) and present value economic analysis, as described in the following sections.

MODA

The MODA process was designed to provide a quantifiable, objective, robust, and transparent method for comparing the Plan Concepts by analyzing nonmonetary aspects based on a series of criteria. The criteria were developed with the Member Agency Advisory Committee to reflect the project goals and priorities most important to the WPWMA, Member Agencies, and key stakeholders, as well as to provide a reasonable level of differentiation between the Plan Concepts. The WPWMA Board approved the MODA criteria at its September 13, 2018 meeting.

The CH2M Team led WPWMA staff and the Member Agency Advisory Committee through a weighting exercise to provide feedback on the relative importance of each criterion. The CH2M Team then independently scored how well each Plan Concept met the criteria and applied WPWMA staff and Member Agency Advisory Committee weighting factors to determine the final MODA score.

The CH2M Team created the following additional MODA weighting profiles to consider how the feedback received from other stakeholders might influence the MODA:

- **Proximate Stakeholders** – Weighted toward consideration of potential odor impacts on nearby sensitive receptors, available future disposal and diversion capacity, financial implications, and opportunities for third-party compatible manufacturing operations.
- **Odor Potential** – Weighted solely on “sensitive receptors” criterion, representing the potential impact of odors on surrounding residential/commercial receptors.
- **Operational Capacity** – Weighted toward ability to provide sufficient future disposal and diversion capacity; ability to maintain future operational, traffic and material flow patterns; and the potential to attract compatible technologies.
- **Financial Implications** – Weighted toward relative need to obtain near-term external financing for each concept.

Plan Concept 1 had the highest and most optimal MODA score.

Present Value Economic Analysis

The purpose of the economic analysis was to produce an annualized cost in current (2018) dollars for each Plan Concept and to identify when significant changes in capital and operating expenditures were projected to be necessary. For comparison purposes, the project time frame was equal to the longest landfill life expectancy of the three Plan Concepts (approximately 90 years after 2018).

The economic analysis results are intended to provide general insight into the budgetary-level costs needed to achieve the goals for each Plan Concept over the entire life of the evaluation period, and included only the capital, operating, and overhead costs for the elements identified in the Plan Concepts. Other costs or revenues that may be realized in the future outside of the Waste Action Plan were not included (i.e., facility renovations, MRF equipment replacement, or compatible technologies).

For the purposes of this analysis, CH2M assumed that the waste stream received and processed at the WPWMA's facility would roughly double over the next 30 years and would flatten thereafter (consistent with population growth estimates included in the Participating Agencies' general plans). In general, the waste stream growth rate was assumed to be a reasonable surrogate for base-level operating cost increases with additional operating changes accounted for separately. In addition, CH2M utilized costs from past WPWMA construction projects and operating budgets, current industry standard unit cost figures, and discussions with the WPWMA's facility operator to develop individual costs for each Plan Concept element, as follows:

- **Preliminary Annualized Cost Estimates:**

- Plan Concept 0 (Existing Site): \$74,100,000
- Plan Concept 1 (Landfill East): \$50,700,000
- Plan Concept 2 (Landfill West): \$59,800,000

The preliminary MODA and economic analyses were presented to the WPWMA Board at its November 2018 meeting. Since November, CH2M finalized the results, which are presented herein.

Findings

Based on the results of the MODA process and economic analysis, Plan Concept 1 best meets the needs of the WPWMA and its Member Agencies at the lowest relative cost. As a result, CH2M recommends that the WPWMA select Plan Concept 1 as the preferred option for the purposes of conducting a detailed environmental review consistent with CEQA guidelines.

Contents

Executive Summary	ES-1
Acronyms and Abbreviations	v
1. Introduction and Project Overview	1-1
1.1 Introduction	1-1
1.2 Project Overview	1-2
2. Development of Plan Concepts	2-1
2.1 Project Goals.....	2-1
2.1.1 Compliance with Expanding Regulations & Material Diversion	2-2
2.1.2 Capacity for Current and Future Development	2-3
2.1.3 Compatibility.....	2-4
2.2 Project Timing	2-4
2.3 Technical Evaluations Supporting Concept Development.....	2-5
2.3.1 Waste Projections	2-5
2.3.2 Aquatic Resource Delineation.....	2-6
2.3.3 Cultural Resources Evaluation.....	2-6
2.3.4 Geotechnical Evaluation	2-6
2.3.5 Adjacency Study	2-6
2.4 Sizing of Project Elements	2-7
2.5 Concept Development Process	2-7
2.6 General Comparison of Concepts.....	2-10
2.7 Comparative Evaluation Process.....	2-10
3. MODA	3-1
3.1 Purpose	3-1
3.2 Process	3-1
3.2.1 Step 1: Establish Evaluation Criteria and Measurement Scales	3-1
3.2.2 Step 2: Score How Well Each Alternative Meets Each Criterion	3-2
3.2.3 Step 3: Establish Relative Importance Weights for Each Criterion.....	3-2
3.2.4 Step 4: Combine Scores and Weight Factors to Calculate Results	3-3
3.2.5 Sensitivity Analysis	3-3
3.3 Results	3-4
4. Economic Analysis	4-1
4.1 Purpose	4-1
4.2 Process	4-1
4.2.1 Overview	4-1
4.2.2 Step 1: Develop Capital Costs	4-1
4.2.3 Step 2: Estimate Operating Costs.....	4-2
4.2.4 Step 3: Calculate Present Value Costs.....	4-2
4.2.5 Variables and Considerations	4-3
4.3 Results	4-4
4.3.1 Capital Costs.....	4-4
4.3.2 Operating Costs	4-5
4.3.3 Present Value.....	4-6
5. Findings and Recommendations	5-1

Appendixes

Section 1

None

Section 2

- 2A Consequence of No Action
- 2B Waste Stream Projections
- 2C Aquatic Resources Report
- 2D Cultural Resources Technical Memorandum
- 2E Geotechnical Evaluation
- 2F Adjacency Study
- 2G Mass Flow Diagram
- 2H 2016/2017 Tonnage and Vehicle Count Data
- 2I Phase I Stakeholder Engagement
- 2J Plan Concept Narratives

Section 3

- 3A MODA Criteria, Subcriteria, and Associated Measurement Scales
- 3B MODA Raw Scores Detail, Rational, and Background Calculations
- 3C MODA Weighting Percentages
- 3D MODA Scores

Section 4

- 4A Capital Cost Basis
 - 4A-1 Design Documentation
 - 4A-2 Capital Cost Estimates
 - 4A-3 Capital Cost Outlays
- 4B Operational Cost Basis
 - 4B-1 Operational Cost Estimates
- 4C Present Value Analysis
 - 4C-1 Discount Rate Documentation
 - 4C-2 Present Value Analysis Results
 - 4C-3 Capital Spending Charts
 - 4C-4 Cumulative Spending Charts

Section 5

None

Tables

1	Recent Regulations with Upcoming Mandates	2-2
2	Raw MODA Score	3-2
3	MODA Weighting and Ranking: WPWMA Staff and Member Agency Advisory Committee	3-3
4	Additional Weighting Profiles	3-3
5	MODA Weighting and Ranking of Additional Modeled Profiles	3-4
6	MODA Results, Ranking (Highest to Lowest)	3-4
7	Ultimate MODA Score of each Concept Under Different Weighting Groups and Scenarios	3-5
8	Total Initial Capital Costs	4-5
9	Present Value Summary Results	4-6

Figures

1	WPWMA Facility	1-1
2	Waste Action Plan Project Goals	2-1
3	WPWMA Facility Region Before and After Proposed Growth	2-4
4	Location Constraints	2-8
5	Concepts Presented to WPWMA Board in December 2017	2-9
6	Refined Group of Plan Concepts	2-10
7	MODA Process	3-1
8	MODA Results	3-5
9	Combined MODA Results for WPWMA Staff and Advisory Committee	3-6
10	Annual Capital Spending Estimates (2018 Dollars) from 2022 through 2032	4-5
11	Total Project Present Value Costs for Each Plan Concept.....	4-6
12	Annualized Project Costs for Each Plan Concept.....	4-7
13	Cumulative Total Spending (Present Value) for Each Plan Concept	4-7
14	Combined MODA and Annualized Present Value	5-1

Acronyms and Abbreviations

AACEI	American Association of Cost Engineering Institute
AB	Assembly Bill
C&D	construction and demolition
CEQA	California Environmental Quality Act
CH2M	CH2M HILL, Inc. (now Jacobs Engineering Group Inc.)
CH2M Team	CH2M (now Jacobs) and its subcontractors
CNG	compressed natural gas
LFG	landfill gas
MODA	Multi-Objective Decision Analysis
MRF	material recovery facility
O&M	operations and maintenance
PCCP	Placer County Conservation Plan
SA	Sunset Area
SB	Senate Bill
Waste Action Plan	Renewable Placer: Waste Action Plan
WPWMA	Western Placer Waste Management Authority
WPWMA Board	Western Placer Waste Management Authority Board of Directors

1. Introduction and Project Overview

1.1 Introduction

The Western Placer Waste Management Authority (WPWMA) is composed of the County of Placer and the cities of Lincoln, Rocklin, and Roseville (Member Agencies). Member Agencies are provided with solid waste services at the WPWMA facility. The WPWMA also provides solid waste services to the cities of Auburn and Colfax and the Town of Loomis; these entities and the Member Agencies are collectively referred to as Participating Agencies. The WPWMA's current facility provides the majority of solid waste and recycling services to the Participating Agencies. In addition to its 320-acre active permitted property, the WPWMA owns approximately 480 acres to the west and 160 acres to the east (Figure 1).

As regulations and needs of the residents and businesses of Placer County have evolved, WPWMA has expanded its services to increase material recovery and recycling. This evolution has required some significant facility modifications and capital infrastructure investments such as the construction of the material recovery facility (MRF) in 1995, expansion of the MRF in 2007, and expansion of the composting area capacity in 2011. The WPWMA facility currently consists of the following types of vital infrastructure: a public waste and recyclables drop-off area, compost area, construction and demolition (C&D) processing area, MRF, household hazardous waste collection area, and landfill.

In 2015, WPWMA staff took steps to initiate a master planning project, termed the Renewable Placer: Waste Action Plan (Waste Action Plan). The Waste Action Plan addresses the next iteration of changes that are needed to respond to the demands on the facility from regional growth and regulatory changes. Without modification, WPWMA's existing facility infrastructure lacks capacity necessary to meet these demands.

CH2M HILL, Inc. (CH2M) (now Jacobs³) and its subcontractors (CH2M Team) were retained to provide consulting services in support of this project. The CH2M Team is currently composed of the following entities:

- CH2M/Jacobs (Prime)
- Golder Associates
- Douglas Environmental
- Integrated Waste Management Consultants, LLC
- JR Miller & Associates, Inc.
- Kearns and West, Inc.
- JB Comm

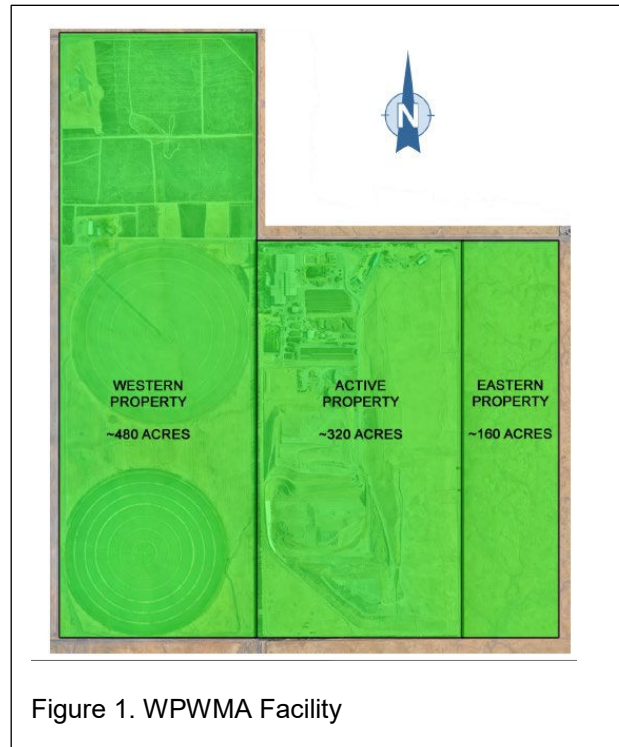


Figure 1. WPWMA Facility

³ On December 15, 2017, all CH2M companies became part of Jacobs Engineering Group Inc. (Jacobs) and are now wholly owned direct subsidiaries of Jacobs. CH2M HILL Engineers, Inc., will remain a separate legal entity, and we will continue to operate and conduct business under this entity. This report will have references to both CH2M and Jacobs; however, they should be viewed as one-and-the-same company, and the company names can be used interchangeably. For continuity with other documentation, the consulting team will be referred to as the CH2M Team.

The Waste Action Plan is a multi-phase project, and is composed of the following:

- Phase I – Master Planning and Facility Evaluation
- Phase II – Environmental Review
- Phase III - Permitting

This report summarizes the technical evaluations and analyses that have been conducted for Phase I of the Waste Action Plan, with emphasis on the comparative evaluation process that was applied to evaluate which master plan project layout (referred to as a Plan Concept) best meets WPWMA's long-term waste management needs and the goals as defined for this project. The Phase I findings will be used to inform decision makers on which Plan Concept(s) should be carried into Phase II for further development and environmental review through the California Environmental Quality Act (CEQA) process and eventually Phase III, permitting of the selected concept. Information in this report is organized into the following sections:

- Section 1: Introduction and Project Overview
- Section 2: Development of Plan Concepts
- Section 3: Multi-Objective Decision Analysis
- Section 4: Economic Analysis
- Section 5: Findings and Recommendations

It should be noted that as the project progresses beyond Phase I, it is possible that circumstances, conditions, and assumptions may change, affecting the final project implementation.

1.2 Project Overview

In July 2015, at the WPWMA Board of Directors (WPWMA Board) meeting, WPWMA staff presented a series of potential modifications and enhancements intended to maintain the long-term viability of the WPWMA facility by doing the following:

1. Responding to changes in applicable regulations.
2. Addressing anticipated regional growth.
3. Optimizing material diversion rates.
4. Maximizing operational efficiencies to improve customer safety and maintaining a stable cost structure.
5. Enhancing compatibility between operations and current and future adjacent land uses.

At that time, the WPWMA Board authorized WPWMA staff to initiate the process of hiring a consultant to develop a facility master plan layout (referred to as a Plan Concept) and to prepare the appropriate CEQA-related documents. WPWMA staff prepared and issued a request for proposals in March 2016. At the October 2016 meeting, the WPWMA Board approved an agreement with CH2M (now Jacobs) and their proposed subcontractors (the CH2M Team) for these services. Throughout 2017, the CH2M Team prepared a series of technical evaluations and analyses that have helped shape the development of several project concepts. To ensure that the project concepts address the needs and concerns of the Member Agencies, an Advisory Committee made up of Member Agency staff was convened and has provided input at important steps throughout the project. The CH2M Team, working with WPWMA staff and the Member Agency Advisory Committee, developed several preliminary Plan Concepts and then refined these into three concepts that met the overall project goal. These three Plan Concepts were presented to the WPWMA Board on December 14, 2017.

Following the December 2017 meeting, WPWMA staff and the CH2M Team began engaging other key stakeholders to increase awareness of the WPWMA's efforts and to solicit additional feedback on the Plan Concepts. On February 26, 2018, WPWMA staff conducted a workshop for the Member Agency City Managers and County Executive Officer and other key Member Agency staff. At that workshop, staff

provided the same presentation that was provided to the WPWMA Board at the December 14, 2017 meeting.

The feedback that staff received from the group included (1) wanting to clearly understand how the WPWMA's plans address anticipated regional growth in the future, (2) wanting to understand the ramifications of delaying or not proceeding with facility modifications, and (3) requesting a similar presentation to each of the City Councils and the County Board of Supervisors.

The CH2M Team and WPWMA staff took several actions to address this feedback. The Member Agency Advisory Committee meetings in March and April 2018 were used to provide additional information to Member Agency Advisory Committee members and to also collect feedback on the ramifications of delaying or not proceeding with facility modifications. At that time, Member Agency Advisory Committee members voiced the following priorities for the facility:

- Overall, if there is sufficient landfill capacity elsewhere (either in the County or nearby) that is feasible to use, then prioritize site capacity for MRF, Organics, and C&D infrastructure, rather than the landfill.
- Consider the viability of other disposal options.

The CH2M Team and WPWMA staff began looking into these aspects. Through these efforts, an additional concept, the Existing Site Reconfigured (Plan Concept 0), was developed to represent the most likely scenario involving minimal facility modifications and conducting all future solid waste operations exclusively on the existing permitted parcel, while prioritizing MRF, composting, and C&D infrastructure over landfill expansion.

WPWMA staff made presentations to each of the Member Agency City Councils and the Placer County Board of Supervisors during May 2018 to provide a high-level overview of the master planning effort and to solicit feedback on the overall process.

In June 2018, the CH2M Team and WPWMA staff met with the Member Agency Advisory Committee to discuss reducing the total number of concepts to three (including Plan Concept 0). At the June 2018 WPWMA Board meeting, WPWMA staff requested direction related to the next step of key stakeholder engagement involving larger land owners and developers proximate to the WPWMA's facility. The WPWMA Board authorized WPWMA staff to contact and coordinate meetings with applicable stakeholders.

As planning efforts progressed, WPWMA staff and the CH2M Team determined that increased stakeholder engagement and more robust evaluation was appropriate to ensure that the WPWMA Board would be provided with the most comprehensive, transparent, and objective analysis of the Plan Concepts utilizing the WPWMA's existing eastern and western properties. At the July 12, 2018 meeting, the WPWMA Board approved the First Amendment to the CH2M Agreement providing funding for additional stakeholder engagement and a Multi-Objective Decision Analysis (MODA) and present value economic analysis of the Plan Concepts.

In the months following, WPWMA staff and the CH2M Team met with a broad range of stakeholder groups and performed the MODA and present value analyses for three Plan Concepts. This evaluation was completed for Plan Concept comparison purposes and to inform decision makers. Preliminary results were shared at the November 2018 WPWMA Board meeting. The WPWMA Board directed staff to return in December 2018 with a recommended Plan Concept. The Board also requested additional details on the cost information (expanding on the economic analysis) including revenue considerations and tipping fee impacts.

Following the November 2018 WPWMA Board meeting, the CH2M Team worked with WPWMA staff to address the WPWMA Board's requests. Based on the work conducted under Phase I of this project, Plan Concept 1 appears to best meet the WPWMA's project goals and has the lowest present value cost.

The following sections provide details on the concepts, stakeholder engagement efforts, technical studies, and the MODA and economic analyses supporting this finding.

2. Development of Plan Concepts

Between the conception of this project in July 2015 and the end of 2018, a large body of work has been completed as part of Phase I. This work was performed with the intent of developing a range of concepts to consider for the Waste Action Plan (Plan Concepts), including evaluation of which Plan Concept best meets WPWMA's long-term waste management goals for the project along with economic analysis.

This section describes the project goals and facility needs that drove the master planning project, the general process that was followed to develop Plan Concepts, and the technical studies that supported the development and refinement of the Plan Concepts.

2.1 Project Goals

The primary project goal for the Waste Action Plan is to maintain the long-term viability of the WPWMA facility. As stated in the July 2015 WPWMA Board agenda packet, which was presented at the first WPWMA Board meeting that included discussion of this project, this goal was proposed to be accomplished by doing the following:

1. Responding to changes in applicable regulations.
2. Addressing anticipated regional growth.
3. Optimizing material diversion rates.
4. Maximizing operational efficiencies to improve customer safety and maintaining a stable cost structure.
5. Enhancing compatibility between operations and current and future adjacent land uses.

Following preliminary stakeholder engagement efforts, these goals evolved into the list shown on Figure 2.



Figure 2. Waste Action Plan Project Goals

These project goals were the starting point for Plan Concept development. Additional discussion on how these goals influenced the concept design process are discussed in the following sections.

2.1.1 Compliance with Expanding Regulations & Material Diversion

Several recent state of California regulations will have upcoming mandates that will impact WPWMA's Participating Agencies and will require them to identify how they will comply with these increased recycling and landfill diversion and reduced emissions mandates. Implementation of a Plan Concept will provide a solution for how WPWMA's Participating Agencies will comply with these recent regulations and associated upcoming mandates. These regulations are summarized in Table 1.

Table 1. Recent Regulations with Upcoming Mandates

Regulation	Expected Result
AB 32 – California Global Warming Solutions Act/Climate Change Scoping Plan; Reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030	WPWMA's Participating Agencies must identify how they will achieve these emissions reductions and then implement the necessary changes (e.g., divert organics and compost food waste).
AB 341 –Mandatory Commercial Recycling; 75 percent diversion by 2020	WPWMA's Participating Agencies must be able to meet this diversion requirement and will need the necessary processing equipment and operations for organics, C&D, and other material diversion.
AB 617 – Local Air Quality; Reduce emissions of toxic air contaminants and criteria pollutants	WPWMA's Participating Agencies must identify how they will achieve these emissions reductions, and then implement the necessary changes.
AB 1826 – Mandatory Commercial Organics Recycling	WPWMA's Participating Agencies must have the processing capacity for the associated commercial organics.
SB 1383 – Short-Lived Climate Pollutant Reduction Strategy; Reduce organics disposal by 50 percent by January 2020; 75 percent by January 2025	WPWMA's Participating Agencies must have the processing capacity for the associated organics.
Cal-Green Building Standards; 65 percent C&D diversion	WPWMA's Participating Agencies must have the processing capacity for the associated C&D.

Notes:

AB = Assembly Bill
SB = Senate Bill

As shown in Table 1, a common theme among these regulations is increased recycling and diversion requirements as well as emissions reduction, especially related to organic waste. New infrastructure will be required to meet the needs of WPWMA's Participating Agencies.

Material diversion can be further expanded by creating a multi-faceted approach to optimizing resource recovery via the following:

- Expanding the types and quantities of material composted.
- Establishing areas for new technology pilot studies.
- Facilitating the siting of compatible manufacturing operations and industry.
- Collaborating with local universities.
- Establishing local influence of markets.

This multi-faceted approach is even more important with the challenging recycling market conditions that are the current reality (e.g., China's recent initiatives such as Green Fence and Blue Sky). These

approaches were considered as Plan Concepts, and were developed by including the following types of expanded or new project elements:

- Compost Area – redesigned compost area with larger capacity to accommodate growth, increased organics diversion requirements, ability to process food waste, and provide improved odor control.
- C&D Area – redesigned with larger capacity to accommodate growth and C&D diversion mandates.
- Public Area – redesigned with larger capacity to accommodate growth and support customer safety and convenience.
- Recovered Materials Storage Area – redesigned with larger capacity to accommodate growth and buffer the impacts of recyclable market volatility.
- Compatible Manufacturing – space reserved for third-party compatible manufacturing operations that would take materials and products from the facility and then produce beneficial product(s) including renewable energy.
- Pilot Study Area – space reserved for third parties to conduct pilot studies using materials and products from the facility, and processing them in new ways or producing beneficial product(s) including renewable energy.
- University Research Area – space reserved for university-lead research using materials and products from the facility, and processing them in new ways or producing beneficial product(s) including renewable energy.
- Landfill Gas (LFG) to Compressed Natural Gas (CNG) Area – to fuel waste haul and other municipally owned and operated vehicles.
- Reuse store – where usable materials and products (such as construction materials, home goods, and consumer electronics) can be made available to the public for purchase at the facility.

Project elements were further categorized into “critical elements” and “non-critical” elements. Critical elements are the elements within the project that are needed to continue providing the existing services to WPWMA’s Participating Agencies (i.e., Landfill, Compost Area, C&D Area, and Public Area). Note that renovations or changes to the MRF building or the equipment within are not included in this document because no changes are currently proposed, nor are they anticipated to impact the MRF footprint or be necessary components of the CEQA effort for this project. Non-critical elements are elements that are needed to meet other project goals (e.g., create opportunities for innovation and economic growth). The non-critical elements in this project are Compatible Manufacturing, University Research Area, Pilot Study, LFG to CNG, and the reuse store. In addition, there are several supporting elements such as recovered materials storage area, stormwater ponds, crossings, maintenance areas, administrative building areas, and parking.

In addition to including the above types of project elements, the CH2M Team considered a series of other topics such as Capacity for Current and Future Development, Regional Combability, and Operational Compatibility. Each of these topics are discussed in the following sections.

2.1.2 Capacity for Current and Future Development

Significant regional growth is anticipated in the next 15 to 30 years. The City of Lincoln’s General Plan envisions that by 2050, its population will more than triple to 132,000 residents. The City of Roseville’s General Plan suggests that by 2035, its population will increase by 40 percent to 182,000 residents. The City of Rocklin’s General Plan notes that the southwest unincorporated county and the cities of Lincoln, Rocklin, and Roseville are anticipated to increase in population by nearly 210,000 by 2035. The County of Placer General Plan projects more than a doubling of the overall county’s population by 2050 to a total of 750,000 residents.

Facility modifications are needed to support the growing materials management needs of the region. The current facility cannot accommodate further expansion of the landfill in conjunction with other functions

simultaneously. Without addressing the regional capacity needs, the WPWMA facility is at risk of not being able to address needs of its Member Agencies and other Participating Agencies.

2.1.3 Compatibility

2.1.3.1 Regional Compatibility

As discussed above, significant regional growth is anticipated to result in increased development around the facility. Figure 3 depicts the existing WPWMA facility in relation to both current development (on the left) and proposed future development associated in and around the Sunset Area (SA) including the proposed Placer Ranch development. As shown on Figure 3, a significant amount of development is proposed, which will result in a reduction of the distance between the WPWMA facility and its neighbors. Additional proposed development data was further evaluated later in the project (in relation to sensitive receptors) and is discussed in the MODA section and supplementary appendixes of this report. Enhancing the operational compatibility of the facility with current and future neighboring land uses will be key to the long-term viability of this facility; and odor, dust, noise, and traffic impacts will need to be considered and factored into master planning.

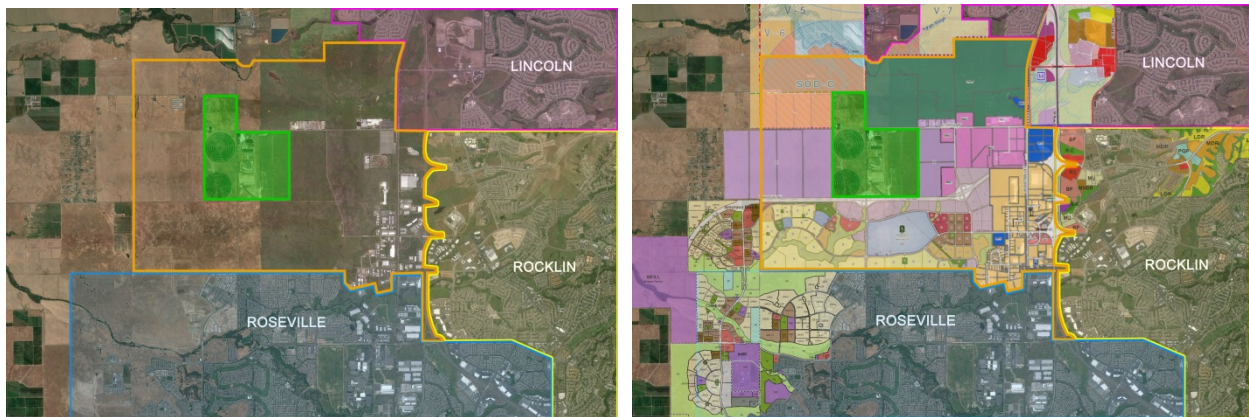


Figure 3. WPWMA Facility Region Before and After Proposed Growth

2.1.3.2 Operational Compatibility

Increased population and urban growth will increase the quantity of materials received at the facility for processing and/or disposal. It will also result in more customers using the facility and more traffic at the facility. These impacts will further heighten onsite operational flow and safety considerations as well as the need for flexibility to address future changes. Operational flow, safety, and flexibility for future needs can be accomplished by the following:

- Providing space between project elements to allow for future changes while maintaining enough proximity to allow for the efficient flow of materials
- Improving separation of public, commercial, and operational traffic
- Optimizing traffic flow patterns for reduced wait times and improved customer convenience
- Optimizing material flow patterns for reduced double-handling

These approaches were applied forward into Plan Concept development to address operational compatibility.

2.2 Project Timing

As presented in the previous sections, many growth, capacity, and regulatory drivers are contributing to the need for WPWMA facility modifications. This facility is an existing, active waste and materials

management facility and is the primary provider of these services to the Participating Agency jurisdictions, as well as the residents and businesses of Placer County. There is no other single facility within Placer County that could serve all these needs. The following summarizes why master planning is needed now through the Waste Action Plan:

- The current facility cannot accommodate further expansion of the landfill in conjunction with other functions simultaneously; therefore, it is at risk of not being able to address needs of the Participating Agencies. Master planning for all facility functions will result in optimum use of site space overall, greater efficiency, reduced costs, and increased site safety.
- The current space constraints of the site result in inconveniences to customers, double handling of materials (e.g., compost, excess soil, baled recyclables), and safety risks to customers and operations staff.
- The facility must address current stormwater management compliance issues.
- The facility must address the long-term risk concerns associated with the unlined modules.
- Surrounding land use changes are being planned that will result in increased development around the facility (as discussed in Section 2.1.3). Enhancing the operational compatibility of the facility (e.g., odor, dust, noise, and traffic) with current and future land uses will be essential. Proactively addressing this through master planning can also create opportunities for compatible and beneficial components.
- If master planning and resulting use of the western and eastern properties are not completed, the facility will be unable to provide all the needed services; therefore, WPWMA's Participating Agencies will ultimately be forced to go elsewhere for some, and potentially all, functions of this facility. If that occurs, the Participating Agencies will need considerable time to develop other options (i.e., to procure, contract for, and finance alternate recycling or disposal services and related waste transfer infrastructure). Potential alternative landfills were researched and are included in Appendix 2A. Although there are potential alternate landfills, there is no guarantee that these sites would accept the quantities of waste that are generated by this region or that the tipping fee requested by those landfills would be acceptable to the region. The types of offsite services that would be needed are dependent on the priorities of WPWMA's Participating Agencies (at the time that such decision must be made). Potential options are further summarized in the Consequence of No Action technical memorandum⁴ provided in Appendix 2A. Development of new processing or disposal facilities elsewhere has its own associated risks. Siting and developing a facility takes a minimum of 5 to 10 years for a landfill, transfer station, or composting facility (if even possible, new facilities have been infrequently sited in California within the last 30 years). This timeline does not align with capacity or growth needs and would require transfer and long hauling of materials to other contract facilities for the near term (until new facilities or long-term services are contracted elsewhere). WPWMA's Participating Agencies would lose control of rates, jobs would be exported out of the region, and the full burden to achieve regulatory mandates would fall on the jurisdictions.

Additional discussion regarding the consequence of no action is contained in Section 2.5 and Appendix 2A.

2.3 Technical Evaluations Supporting Concept Development

Starting in 2017, the CH2M Team prepared a series of technical evaluations and analyses that helped inform development of the Plan Concepts. These resulting technical evaluations are referenced below and throughout this report.

2.3.1 Waste Projections

Taking into consideration the project goals and facility needs, the CH2M Team prepared waste stream projections. These projections were one of many factors considered when preparing conceptual sizing of future site elements. The anticipated waste stream growth projections and facility capacity needs have

⁴ CH2M. 2019. Technical Memorandum: Consequence of No Action. Prepared for the WPWMA. Final. February 6.

been estimated by the CH2M Team based on a combination of factors, including (1) historic site waste acceptance data, (2) population growth estimates by the California Department of Finance, (3) employment and housing construction estimates published in the California Economic Forecast, (4) taxable retail sales from the California Board of Equalization, and (5) estimates of impacts associated with impending solid waste-related regulations. The details of that analysis are included in Appendix 2B.

To address questions from the Member Agency Advisory Committee regarding the potential for the County population to double by 2050 (as discussed in Section 2.1.2), the CH2M Team conducted some sensitivity analysis on its waste projections compared to the County projections. The doubling of County population by 2050 is based on projections in the County's General Plan and includes very aggressive growth and buildout rates. The CH2M Team determined that the waste stream projections prepared by the CH2M Team (Appendix 2B) were more realistic and provide representative projections based on historic trends at the site and provide a reasonable basis for initial project element sizing. These findings were further considered when sizing the various project elements and were used to develop a site mass flow diagram as discussed later in this report.

The calculated waste stream growth rate based on County general plan projections (population doubled by 2050) were applied at later stages in the project to conservatively calculate landfill life and provide a uniform, simplified basis to project changes in operational costs.

2.3.2 Aquatic Resource Delineation

The CH2M Team conducted aquatic resource delineation field surveys between May and June 26, 2017. The findings from this delineation are summarized in the report in Appendix 2C. Across all areas surveyed, 170 seasonal wetlands, 13 swales, 2 irrigation ponds, 2 irrigated wetlands, and 1 excavated drainage were delineated. The eastern property included the greatest number and acreage of wetland and aquatic features, followed by the northwest and southwest properties, and the south triangle, respectively. These results were further considered in the MODA and economic analyses.

2.3.3 Cultural Resources Evaluation

The CH2M Team conducted a cultural resources desktop literature review for the site in August 2017. The results of this review are summarized in the technical memorandum in Appendix 2D. Based on this desktop review, the potential for historic period resources is moderate because of long-term agricultural use of the area. These results were further considered in the MODA and economic analyses.

2.3.4 Geotechnical Evaluation

The CH2M Team conducted a geotechnical investigation of the site in September 2017. The results of this review are summarized in the report in Appendix 2E. The findings from this investigation were consistent with previous geotechnical investigations. These results were further considered during preparation of the landfill layouts.

2.3.5 Adjacency Study

The CH2M Team conducted an Adjacency Study of the site on June 26 and 27, 2017. The objectives of this Adjacency Study were as follows:

- Evaluate existing operational activities to get insight into how these operations may be impacted by the addition and modification of project elements associated with this master planning project.
- Determine the need for adjacency of related site elements.
- Identify locations that may be beneficial to reserve for future operations growth.

Additionally, the team noted areas of congestion and where site circulation and traffic interfaces appeared to pose safety concerns. The results of this review are summarized in the report in Appendix 2F.

2.4 Sizing of Project Elements

The CH2M Team used the following data and evaluations to prepare initial conceptual sizes for the “critical elements” of the project (i.e., the landfill, compost area, C&D area, and public area):

- Adjacency Study
- Mass Flow Diagram
- Waste Stream Projections
- 2016/2017 Tonnage and Vehicle Count Data (based on WPWMA scalehouse transaction data)
- Other considerations (e.g., optimal operational configurations)

The CH2M Team developed a mass flow diagram of the facility (Appendix 2G), which was used to define the incoming and outgoing waste streams for each facility element and to make sure the waste streams were properly considered. The waste stream projection evaluation (Appendix 2B) served as the basis for determining either the proposed tonnage for a particular element and/or the associated growth rate that was applied to the 2016/2017 tonnage and vehicle count data (Appendix 2H). This methodology was used for all the critical elements except the landfill, which was designed with the intent of optimizing the landfill footprint in the available space. Following is a summary of how initial sizing information was applied for each of the critical elements:

- Landfill: Designed to optimize the landfill footprint considering the possible layouts using the eastern and western properties; actual sizing information and landfill site life calculations are further detailed in the capital cost discussion in this report.
- Compost Area: Designed for a 25-year design life (using 2042 waste projections adjusted for SB 1383) and aerated static pile configuration. Various operating scenarios were initially considered; the most space-consuming operating scenario was used to establish a conservative basis for the space allocated for this element; and actual sizing information is further detailed in the capital cost discussion in this report.
- Public Tipping Area: Designed for a 25-year design life; considering the anticipated growth determined from the waste projections (using the 2042 waste projections, this equates to a 35 percent growth rate). Space allocation is based on projected traffic during design year 2042 and the largest footprint for operational variances. Design year traffic is based on 2017 average weekend and peak day traffic data provided by WPWMA (peak day on August 23, 2017), increased by 35 percent (based on the projected population increase from 2017 to 2042 as documented in the Waste Stream Projections Technical Memorandum in Appendix 2B).
- C&D Area: Designed for a new processing line and area that is approximately 2 to 3 times the existing area. Conceptual size estimate is based on the need for new equipment and ability to manage the projected C&D waste stream in design year 2042 (85,755 tons of C&D debris, based on the projected population increase from 2017 to 2042 as documented in the Waste Stream Projections Technical Memorandum in Appendix 2B). The New C&D Area will include a new processing line capable of handling 40 to 50 tons per hour as well as an open-air roof structure to shield the processing line from weather elements.

Additional details for the critical element sizing are discussed further in Section 4 of this report and in the economic analysis, as applicable.

2.5 Concept Development Process

After the project goals and needs were identified and the critical project element sizing was completed, the CH2M Team worked with WPWMA staff and the Member Agency Advisory Committee to develop several preliminary project concepts subsequently refined to three concepts that met the overall project goals. Generally, these three concepts had the following characteristics:

- All three of the WPWMA's properties were utilized.
- Space was allocated for the following critical elements: landfill, public area, compost area, and C&D area with considerations for improving facility operational efficiency, safety, and future adaptability.

- Space was allocated for supporting elements such as stormwater ponds, recovered materials storage, maintenance area, and administrative area.
- Space was allocated for non-critical elements that support the multi-faceted approach to increasing material recovery, such as an LFG to CNG facility, space for university research, and space for third-party compatible manufacturing operations.
- There are existing site features that result in some portions of the existing property not being available for master planning of the elements for this project. Primarily, the features are the existing landfill lined landfill cells and MRF building. No changes to the surrounding roadways or power lines were included as part of this project. The MRF building and related features were assumed to be unchanged, aside from additions to the administrative portion of the building, adjacent parking, and an upgrade to accommodate long-haul trucking at the end of landfill life. Project elements were situated around existing infrastructure and roadways that were assumed to remain unchanged. Figure 4 shows these areas.

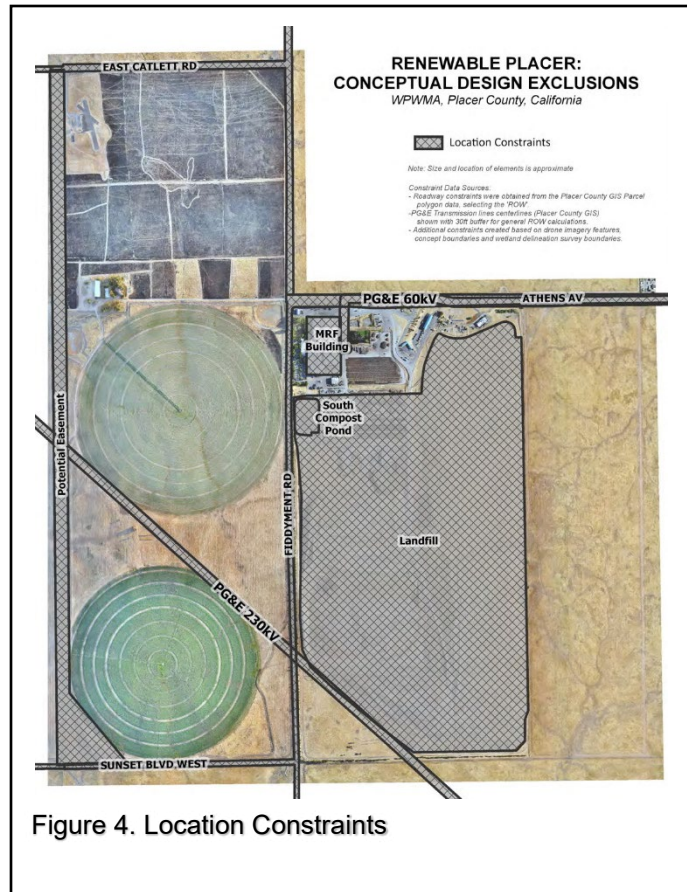
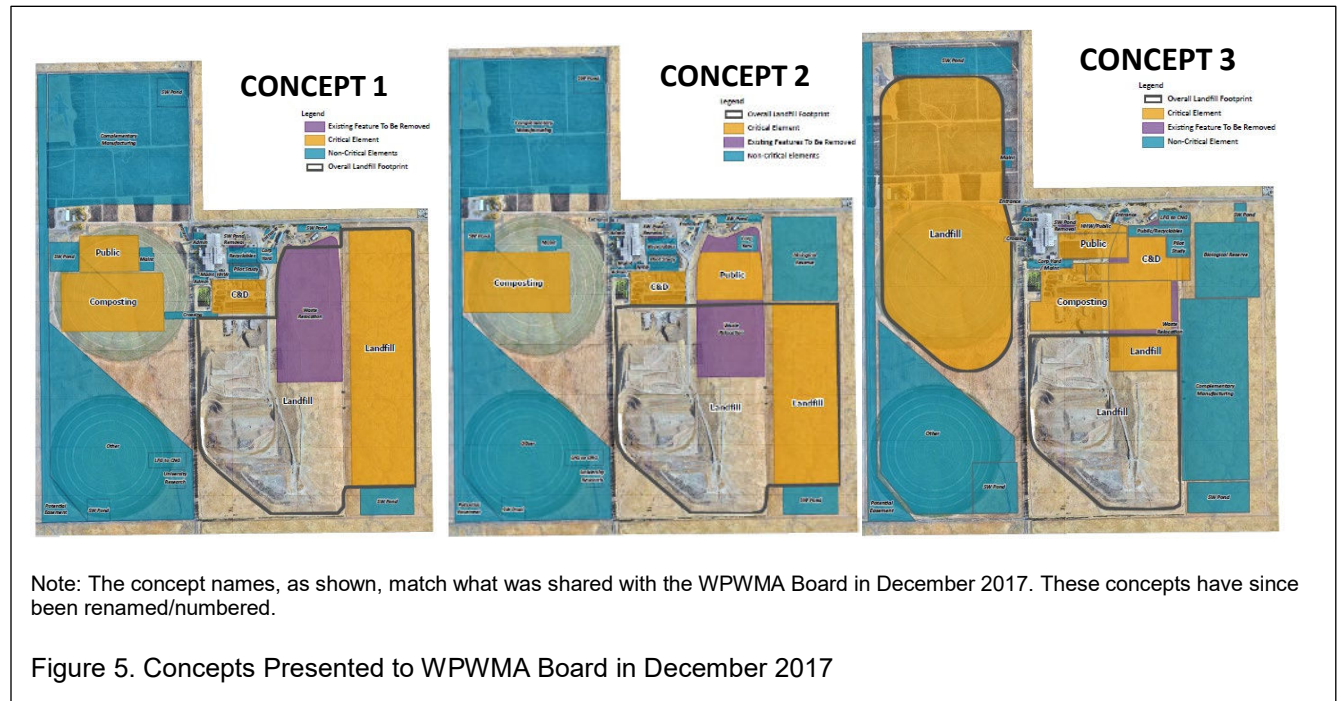


Figure 4. Location Constraints

- One layout (former⁵ Concept 1) centered around the concept of providing one contiguous landfill (future development on the eastern property, which is adjacent to the existing landfill) and maximum separation of traffic and maximum flexibility.
- One layout (former Concept 3) centered around the concept of using the western property for future landfill development. This was a use that was evaluated for this property when it was first purchased by the WPWMA in the late 1980s.
- The last layout (former Concept 2) was a subset of the layout that involved future landfill development on the eastern property, but with a smaller landfill footprint and less use of the western and eastern properties for new infrastructure.

Figure 5 shows the three preliminary concepts that were presented to the WPWMA Board in December 2017.

⁵ The concept names match what was shared with the WPWMA Board in December 2017. These concepts have since been renamed and renumbered.



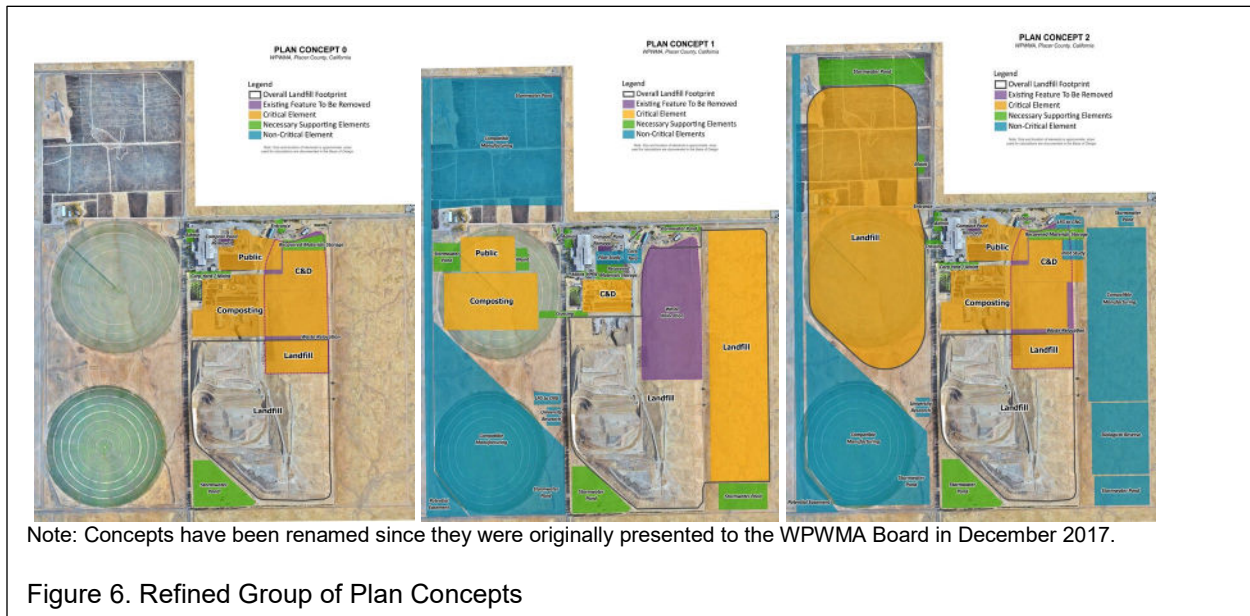
The three concepts that were presented to the December 2017 WPWMA Board were shared with other stakeholders through a variety of activities as summarized in Appendix 2I. Feedback on the initial concepts was collected and considered. One of the key results from this engagement was the addition of a new concept: Existing Site Reconfigured (Plan Concept 0). This concept was developed to represent the most likely scenario involving minimal facility modifications and conducting all future solid waste operations exclusively on the existing permitted parcel, while prioritizing MRF, composting, and C&D infrastructure over landfill expansion.

It was determined that based on the definitions of the three concepts that were presented to the WPWMA Board in December 2017 (Figure 5) and based on the approach that the team intends to follow for CEQA, there would not be significant benefits to the WPWMA by analyzing all three concepts independently. Therefore, the two concepts that best bracket the range of options (former Concept 1 and former Concept 3) were recommended for further evaluation. The CH2M Team believes that the evaluation and subsequent CEQA document can capture the third option (former Concept 2) as a subset of the others with definable differences, if necessary.

In June 2018, CH2M and WPWMA staff met with the Advisory Committee to discuss this approach. As a result of these discussions, the concepts were renamed. The following concepts were chosen for further evaluation because of their ability to capture the range of options:

- Plan Concept 0: Existing Site Reconfigured
- Plan Concept 1: Landfill East
- Plan Concept 2: Landfill West

These Plan Concepts are illustrated on Figure 6.



2.6 General Comparison of Concepts

Plan Concepts 0, 1, and 2 provide equal processing capacity for compost, public tipping, and C&D, with differing landfill capacities. There are trade-offs associated with each concept. For example, Plan Concepts 0 and 2, which increase operational efficiency by keeping operations centralized, result in less future adaptability and either significantly less landfill space (Plan Concept 0) or landfill on the western property (Plan Concept 2). Additional details, including when project elements are planned for each Plan Concept, are provided in the Narratives in Appendix 2J, and are summarized as follows:

- **Plan Concept 0:** All future activities occur exclusively on the existing permitted 320-acre parcel, significantly limiting future adaptability. Existing permitted landfill airspace capacity is reduced to accommodate the need for increased processing and recycling system infrastructure (per Member Agency preference for limited site use). The unlined waste in Modules 1, 2, 10, and 11 is immediately excavated and relocated to make space for needed changes. No space is allocated for third-party compatible manufacturing operations.
- **Plan Concept 1:** The 158-acre eastern property is configured for future landfilling contiguous to the existing landfill as necessary. The 480-acre western property is utilized for nonlandfilling operations including composting and public waste receiving, thereby providing flexibility for future needs. Portions of the western property are set aside for third-party compatible manufacturing operations. The existing permitted 320-acre property will contain a smaller landfill than is currently permitted, and is reconfigured to optimize MRF operations and provide space for emerging technology pilot studies.
- **Plan Concept 2:** The 480-acre western property is configured for future landfilling as necessary. The existing permitted 320-acre property will contain a smaller landfill than is currently permitted, and is reconfigured to optimize MRF and composting operations as well as public waste receiving, and provides space (as available) for emerging technology pilot studies. Portions of the eastern and western properties are set aside for third-party compatible manufacturing operations.

2.7 Comparative Evaluation Process

The CH2M Team used the following different types of analyses to independently compare the Plan Concepts:

- MODA was used to evaluate and compare nonmonetary project criteria for each of the Plan Concepts.
- Present Value Economic Analysis was used to evaluate and compare economic impacts for each of the Plan Concepts. The first step was to develop conceptual capital and operating costs for each Plan Concept and the timing of those costs. Those capital and operating costs were then used to determine the present value cost (in 2018 dollars) of each Plan Concept and to ultimately compare the lifecycle costs for each of the Plan Concepts.

The details of those analyses are described further in the following sections.

3. MODA

3.1 Purpose

MODA was used to evaluate how each Plan Concept meets the nonmonetary project criteria and to evaluate the various benefits and trade-offs of each Plan Concept. This process is designed to provide a quantifiable, objective, robust, and transparent method for comparing the Plan Concepts by analyzing nonmonetary aspects of each Plan Concept based on a series of project criterion and by applying weights to the importance of each criterion. Results of this analysis are intended to inform decision makers and to support their decision.

3.2 Process

MODA consists of four main steps as illustrated on Figure 7. Each of these steps is described in further detail in the corresponding report sections.

3.2.1 Step 1: Establish Evaluation Criteria and Measurement Scales

The first step of the MODA process consists of establishing evaluation criteria and measurement scales. The following Waste Action Plan project goals served as the foundation for development of the criteria:

- Ensure compliance with expanding regulations.
- Increase facility recycling and landfill diversion.
- Provide capacity to support current and future population and development.
- Provide a safeguard for future generations by maintaining local control and stable rates.
- Enhance operational compatibility with current and future neighboring land uses.
- Create opportunities for industrial innovation and economic growth.

Using these goals as a basis, a large list of potential criteria was brainstormed by the CH2M Team, WPWMA staff, and the Member Agency Advisory Committee. The CH2M Team and WPWMA staff refined the list to nine criteria that reflect the priorities most important to the WPWMA, Member Agencies, and key stakeholders and that provide a reasonable level of differentiation between the concepts. Other factors typically evaluated in the CEQA process (such as potential greenhouse gas emissions, noise, and utility requirements) were deemed to not be sufficiently definable at this point to distinguish between the concepts; therefore, they were excluded from this part of the analysis. Additionally, these factors will be evaluated during CEQA at the applicable level. These criteria were all focused on nonmonetary aspects, with the exception of the External Financing criteria, which was included to reflect the difference in when large capital outlays may be required in the first 10 years and the Opportunities for Industrial Innovation criteria, which qualitatively represented the ability of the concepts to generate associated revenue from compatible manufacturing/technologies, based on the amount of space allocated for that type of element. All other monetary-type aspects were considered under the separate economic analysis.

These criteria were approved by the WPWMA Board at the September 13, 2018, Board meeting. The criteria, subcriteria, and associated measurement scales are included in Appendix 3A.

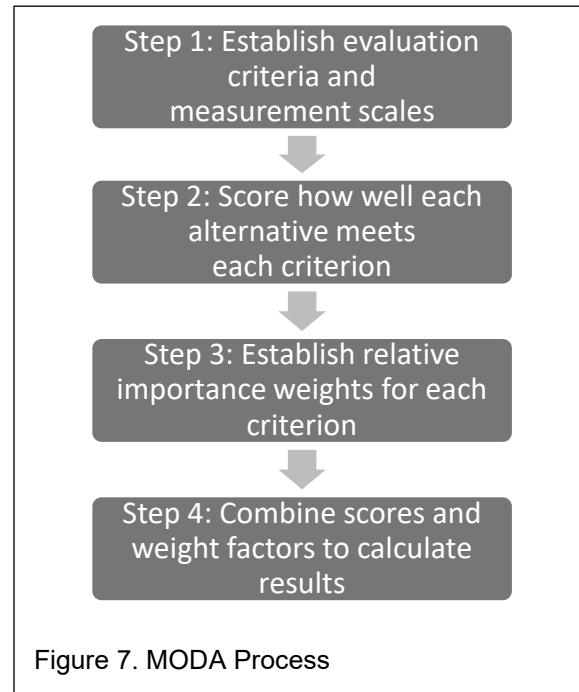


Figure 7. MODA Process

3.2.2 Step 2: Score How Well Each Alternative Meets Each Criterion

The CH2M Team independently scored how well each Plan Concept (Plan Concepts 0, 1, and 2 as defined in Section 2 and Figure 6) met the criteria approved by the WPWMA Board (Appendix 3A). Table 2 shows a summary of the scoring results (termed raw scores) prior to weighting of the criteria. In this table, scores are color coded with green being the best score (Best Feasible Outcome), orange and yellow being in the middle, and red being the worst score (Worst Feasible Outcome) for that criteria category. The variations of shade for these colors indicate the relative location on the scale of best to worst for each criterion score for each Plan Concept. The Best Feasible Outcome and Worst Feasible Outcome classifications were then used to normalize the scores.

Table 2. Raw MODA Score

Renewable Placer: Waste Action Plan Determine optimal concept layout for Renewable Placer: Waste Action Plan							
ID#	Evaluation Criteria	Measurement Scale	Worst Feasible Outcome	Best Feasible Outcome	Plan 0	Plan 1	Plan 2
1	Sensitive Receptors						
1.1	Sensitive Receptors - Zone 1	Acres and	3,000	1,000	1,810	2,791	2,726
1.2	Sensitive Receptors - Zone 2	Acres and	17,000	10,000	11,020	15,939	15,220
1.3	Sensitive Receptors Zone 3	Acres and	2,000	1,000	1,270	1,744	1,540
2	Wetland Impacts						
2.1	Wetland - Critical Elements	Acres	15	0	1	13	9
2.2	Wetland - Non-Critical Elements	Acres	20	0	0	9	12
3	Cultural Resource Impacts						
3.1	Cultural Resource Impacts - Critical Elements	Number	0	0	0	0	0
3.2	Cultural Resource Impacts - Non-Critical Elements	Number	0	0	0	0	0
4	Offsite Vehicle Impact	Trucks	2,000,000	42,848	1,968,817	42,848	816,062
5	Disposal and Diversion Capacity	Years	20	100	30	90	70
6	Opportunities for Industrial Innovation	Acres	0	259	0	259	172
7	Traffic and Material Flow						
7.1	Traffic Separation	1 to 5	1	5	3	5	4
7.2	Traffic Flow	1 to 5	1	5	4	5	4
7.3	Material Flow	1 to 5	1	5	5	3	4
8	Flexibility for Future Operations	1 to 5	1	5	1	5	3
9	External Financing	Total Capital Cost First 5 Years	400,000,000	100,000,000	183,500,000	130,000,000	223,800,000

On a raw score basis (prior to applying weighting), Plan Concept 1 scored the best in the most categories. Rationale and background information and calculations for each criterion are included in Appendix 3B. As presented in Appendix 3B, the criteria were scored using a variety of analyses as applicable to the specific criteria and ranging in complexity.

3.2.3 Step 3: Establish Relative Importance Weights for Each Criterion

The next step was to establish the relative importance for each criterion. WPWMA staff and the Member Agency Advisory Committee provided their feedback on each criterion through a weighting exercise. WPWMA staff and Member Agencies performed the weighting exercise without knowledge of the raw scores calculated by the CH2M Team in Step 2. The discretely prepared weights for WPWMA staff and each Member Agency are shown in Table 3 as converted into the percentage of total points assigned. Each of these groups is described further as a weighting group.

Table 3. MODA Weighting and Ranking: WPWMA Staff and Member Agency Advisory Committee

Criteria	WPWMA	Lincoln	Rocklin	Roseville	Placer County
Sensitive Receptors	16%	17%	10%	21%	15%
Wetland Impacts	4%	2%	2%	2%	5%
Cultural Resource Impacts	3%	2%	2%	2%	7%
Offsite Vehicle Impacts	12%	6%	10%	14%	5%
Disposal and Diversion Capacity	16%	22%	21%	17%	18%
Opportunities for Industrial Innovation	12%	12%	10%	11%	11%
Traffic and Material Flow	13%	9%	8%	6%	13%
Flexibility for Future Operations	15%	11%	19%	11%	16%
External Financing	9%	19%	17%	17%	9%

As shown in the table, the relative importance of criteria is similar among the five weighting groups. The criteria ranked of highest importance were Sensitive Receptors, Disposal and Diversion Capacity, Flexibility for Future Operations, and External Financing. Wetland Impacts and Cultural Resource Impacts were consistently ranked with the least importance.

Weighting factors were applied to the raw scores for the final MODA step as described below.

3.2.4 Step 4: Combine Scores and Weight Factors to Calculate Results

The CH2M Team applied the WPWMA staff and Member Agency Advisory Committee weighting factors to the unweighted scores that were prepared by the consulting team. This generated the ultimate MODA score for each concept under each of these weighting groups. Additional details regarding the results are discussed below.

3.2.5 Sensitivity Analysis

To evaluate the sensitivity of the MODA results to the weighting in Table 3, and to account for feedback received during the stakeholder engagement process, the CH2M Team created several additional MODA weighting profiles to consider how the feedback received may influence the MODA results. The four additional weighting profiles that were developed are summarized in Table 4.

Table 4. Additional Weighting Profiles

Weighting Profile	Profile Representation
Proximate Stakeholders	This profile was heavily weighted toward consideration of the impact of odor on nearby sensitive receptors and available future disposal and diversion capacity. The financial implications as well as the potential opportunities related to siting compatible manufacturing/technologies and fostering emerging solid-waste related technologies were also weighted as being important.
Odor Potential	Under this profile, the only criterion considered was the potential impact of odors on surrounding residential and commercial receptors.
Operational Capacity	The ability to provide sufficient future disposal and diversion capacity and to maintain flexibility to accommodate changes in future operations, traffic and material flow patterns, as well as the potential to attract compatible manufacturing technologies, dominated the ranking of this profile.
Financial Implications	This profile was heavily weighted toward the need to obtain near-term external financing for the proposed concepts.

The associated percentages of total points assigned for the weighting for these additional profiles are summarized in Table 5. These additional weighting profiles were used to calculate MODA scores for the profiles.

Table 5. MODA Weighting and Ranking of Additional Modeled Profiles

Criteria	Proximate Stakeholders	Odor Potential	Operational Capacity	Financial Implications
Sensitive Receptors	38%	100%	5%	8%
Wetland Impacts	2%	0%	1%	8%
Cultural Resource Impacts	2%	0%	1%	8%
Offsite Vehicle Impact	4%	0%	3%	8%
Disposal and Diversion Capacity	19%	0%	26%	8%
Opportunities for Industrial Innovation	15%	0%	13%	8%
Traffic and Material Flow	2%	0%	23%	8%
Flexibility for Future Operations	8%	0%	25%	8%
External Financing	11%	0%	3%	38%

Appendix 3C contains the weighting percentages assigned to each criteria and subcriteria by weighting group and scenario. These additional weighting profiles were applied to the raw scores to calculate MODA scores for the profiles.

3.3 Results

MODA results are shown in Tables 6 and 7. Table 6 shows the ranking of each Plan Concept (rank 1, 2, and 3, and representing highest to lowest score) under each of the scenarios. For both the WPWMA staff weighting group and the combined Advisory Committee weighting group, Plan Concept 1 scored best, followed by Plan Concept 2. For both of those weighting groups, Plan Concept 0 scored the lowest. When the four additional weighting profiles were combined with the raw scores, three of the four additional profiles showed the same result as the WPWMA staff and Advisory Committee weighting groups. The only profile that had a different result was the odor potential profile, which had all weighting on the sensitive receptors criteria. Therefore, the only time the result was changed in this analysis is when all other criteria are ignored (and associated project goals) and the only focus is on the sensitive receptors.

Table 6. MODA Results, Ranking (Highest to Lowest)

Stakeholder Scenarios	Plan Concept 0	Plan Concept 1	Plan Concept 2
WPWMA Staff	3	1	2
Advisory Committee	3	1	2
Proximate Stakeholders	3	1	2
Odor Potential	1	3	2
Operational Capacity	3	1	2
Financial Implications	3	1	2

Table 7 provides a summary of the total ultimate MODA scores for each Plan Concept under the weighting scenarios evaluated. In this table, green shading is used for best MODA scores for that weighting profile, gold shading is used for the second best, and red shading is used for the worst MODA scores. Figure 8 is a graphical representation of the distribution of scores among the concepts under

each scenario. As shown in Table 7 and on Figure 8, there is a clear difference between the highest ranked concept and the other two concepts.

Table 7. Ultimate MODA Score of each Concept Under Different Weighting Groups and Scenarios

Profile	Plan Concept 0	Plan Concept 1	Plan Concept 2
WPWMA staff	33.9	75.1	52.9
Advisory Committee	34.4	75.8	53.0
Placer County	33.6	71.6	50.7
Roseville	36.3	74.4	52.5
Lincoln	36.6	75.7	53.0
Rocklin	30.9	81.7	55.7
Proximate Stakeholders	41.2	61.7	47.4
Odor Potential	72.6	17.1	28.4
Operational Capacity	28.9	85.1	59.8
Financial Implications	47.6	74.6	52.0

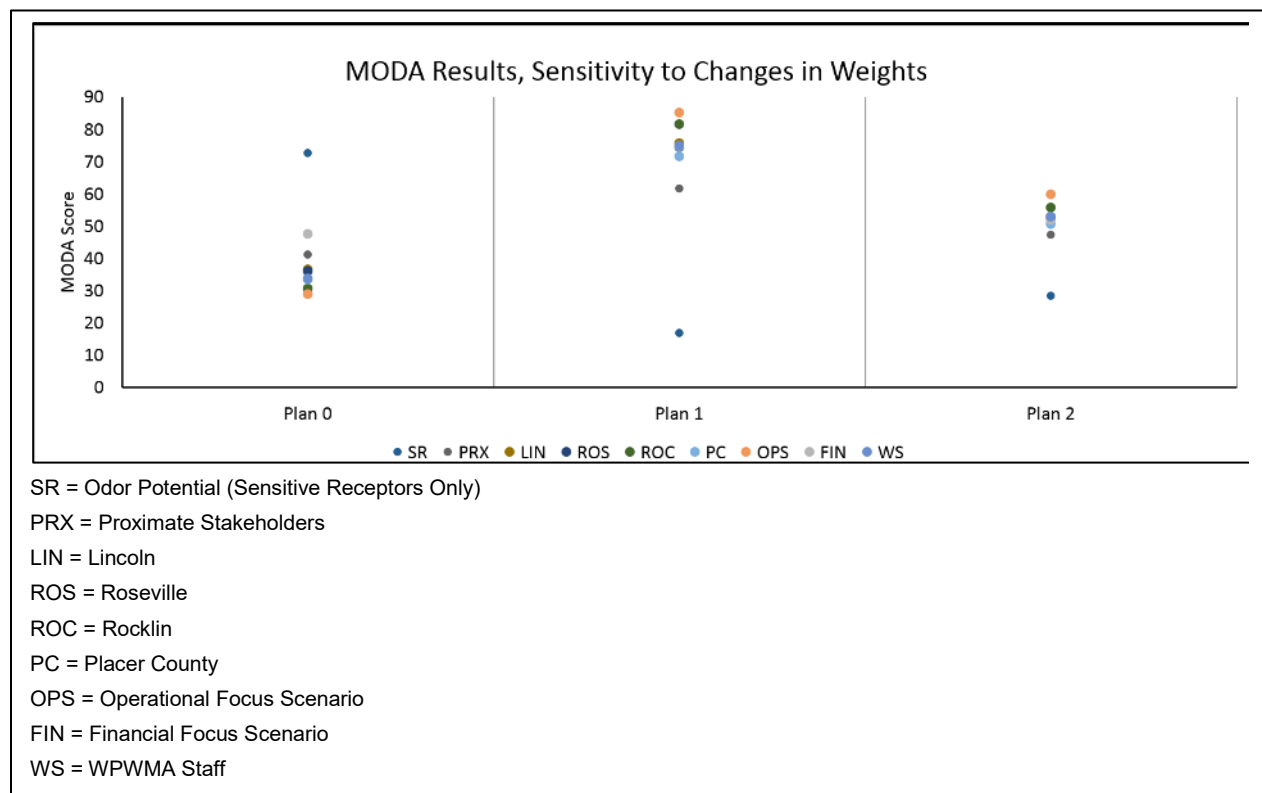


Figure 8. MODA Results

As mentioned earlier, in each weighting scenario evaluated for this MODA analysis except for the odor potential scenario, Plan Concept 1 scored best followed by Plan Concept 2 and then Plan Concept 0. This result is further illustrated in Table 7 with the weighting groups (except Odor Potential) closing clustered. In this evaluation, the Odor Potential scenario is the only scenario that results in a higher score

for Plan Concept 0 than for the other two concepts. This result was primarily driven by the way this criterion was scored, with longer lifespans of the landfill resulting in worse scores for Plan Concepts 1 and 2. Figure 8 also shows an interesting trend among the scenarios (minus the Odor Potential scenario) where the lowest score for Plan Concept 1 is higher than the highest score for Plan Concept 2, and the lowest score for Plan Concept 2 is higher than the highest for Plan Concept 0.

Figure 9 illustrates the combined result of WPWMA staff and Advisory Committee weights applied to the raw scores. This figure shows how each total MODA score is composed of individual contributions from each criterion. The score for Plan Concept 1 is largely impacted by Disposal and Diversion Capacity and Flexibility for Future Operations, whereas the score for Plan Concept 0 is impacted by sensitive receptors. The points allocated for each criterion are further shown in Appendix 3D.

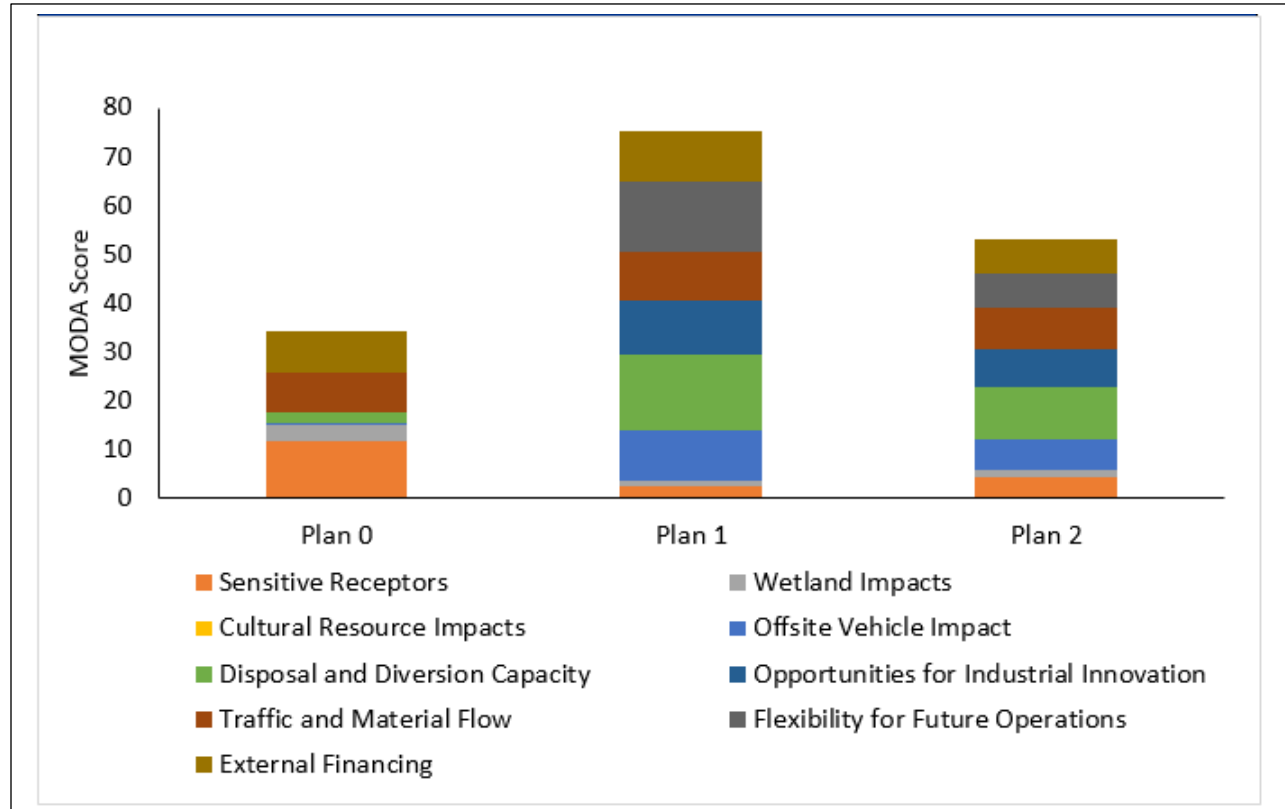


Figure 9. Combined MODA Results for WPWMA Staff and Advisory Committee

Based on the results of the MODA analysis, Plan Concept 1 has the best MODA score and best meets WPWMA's long-term waste management needs and the goals of this project.

4. Economic Analysis

4.1 Purpose

The economic analysis was performed to estimate the cost of implementing each Plan Concept and to understand the relative difference between Plan Concepts in terms of overall capital, operating, and present value costs. This analysis also presents an estimate of the differences of when the capital costs would occur in each Plan Concept. Similar to the MODA process, the economic analysis was intended to provide insight into the relative difference between Plan Concepts and focused on critical site elements. Revenues were not factored into this analysis; however, WPWMA has utilized the results of this economic analysis in a separate financial forecasting tool (not included in this report). The ultimate outcome of this analysis was a total project present value cost and an annualized present value cost for each Plan Concept in 2018 dollars. The following sections describe each component of this analysis in greater detail.

4.2 Process

4.2.1 Overview

The economic analysis process included the following steps:

- Develop capital costs.
- Estimate operational costs.
- Calculate present value and annualized costs.

Detailed documentation of capital costs, operational costs, and results of the present value economic analysis is provided in Appendixes 4A, 4B, and 4C, respectively.

4.2.2 Step 1: Develop Capital Costs

The first step of the economic evaluation was to develop initial capital costs and replacement costs for the critical and necessary supporting elements for each Plan Concept. The term “initial capital costs” refers to the capital costs for initial design, construction, and installation of the project elements. Replacement costs are associated with the differing useful lives of individual site components (such as concrete pads), which should be replaced at regular intervals to maintain the functionality of the facility.

American Association of Cost Engineering Institute (AACEI) Class 4 cost estimates were developed for the economic analysis. Per AACEI, Class 4 rough order-of-magnitude estimates can be used for strategic planning, alternative evaluation, and economic or technical feasibility, and represent the actual total installed cost within the range of -30 to +50 percent of the cost indicated. More detail on the definition and development of AACEI Class 4 estimates is provided in Appendix 4A.

Capital costs were developed for each of the Plan Concepts, and consist of the following elements:

- New Public Area
- New C&D Area
- New Composting Area
- Landfill Construction
- Landfill Closure
- Excess Soil Stockpile Relocation
- Unlined Waste Area Excavation
- Administrative Building Expansion
- Main Entrance Upgrade
- New Western Entrance
- New Overpass

- New Recyclables Storage
- Primary Maintenance Facility Upgrade/Expansion
- New Satellite Maintenance Facility
- New Stormwater Ponds
- Special Permits and Allowances
- Wetlands Mitigation
- Site Beautification (as required by Placer County zoning and land use requirements)
- Initial Sitewide Demolition and Disposal
- New Site Utilities
- MRF Upgrade (to accommodate long-haul trucking operations after depletion of the landfill)

Appendix 4A contains more detail on the capital cost development basis. Conceptual design details used to estimate Class 4 capital costs for these elements are included in Appendix 4A-1. The detailed Class 4 capital cost worksheets for each Plan Concept are included in Appendix 4A-2. The timing and frequency at which initial capital and replacement costs occur for each Plan Concept are described in Appendix 4A and shown in Appendix 4A-3.

4.2.3 Step 2: Estimate Operating Costs

The primary basis of operational costs was derived from WPWMA's operational costs for the facility in year 2017. These costs were provided in summary spreadsheets by WPWMA staff. From these spreadsheets, WPWMA staff worked with the CH2M Team to identify the applicable costs to include in the overall operations and maintenance (O&M) cost estimate. The WPWMA operating cost data extracted from this spreadsheet were then prorated into the related operating components, and operating costs per ton were developed for 2017 as a base year. The CH2M Team then reviewed the unit costs with WPWMA staff and the operator to gather input on whether these rates appeared to be reasonable and what increases to these unit costs might be necessary to reflect operating condition changes outside of and as a result of the master planning project. Using this input, the CH2M Team made adjustments to the base year unit costs, and incorporated other increases for the near planning term. The following unit operating costs were developed for each of the following categories using this method:

- Landfill operations (per ton)
- Public Area operations (per ton)
- C&D Area operations (per ton)
- Compost Area operations (per ton)
- WPWMA administrative operations (per ton)
- Offsite disposal and long-haul trucking operations (per ton, after closure of the landfill)
- Post-closure care operations (per acre, after closure of the landfill)

Detailed documentation of operational cost development is included in Appendix 4B.

4.2.4 Step 3: Calculate Present Value Costs

The final step of the economic analysis was to develop present value costs for each Plan Concept. The purpose of this analysis was to produce an annualized cost in current (2018) dollars for each Plan Concept and comparative total Plan Concept costs. For the purposes of this analysis, the overall project time frame was equal to the longest landfill life expectancy of the three Plan Concepts plus one additional year (i.e., approximately 91 additional years from now [2018 to 2109]). To capture additional useful life and liability impacts applicable outside of the analysis timeframe, remaining useful life/liability for each Plan Concept was factored into the analysis. A real discount rate of 2 percent was utilized to reflect the time value of money in the present value analysis (Appendix 4C).

Similar to the MODA process, the present value reflects the relative difference between Plan Concepts. The present value includes only the capital, operating, and overhead costs for the elements identified in the Plan Concepts. Some other costs or revenues that may be realized in the future are not included in the present value, such as renovations or replacement of MRF equipment, which are not an element of the master planning project. The present value cost results are not intended to be viewed in their absolute

terms or used to directly predict future tipping fees. Rather, they should be compared to provide general insight into the budgetary-level costs needed to achieve the goals for each Plan Concept over the entire life of the present value analysis period.

The CH2M Team utilized costs from past WPWMA construction projects and operating budgets, current industry standard unit cost figures, and discussions with the facility operator to develop individual capital, operating, and overhead costs for each Plan Concept element (e.g., composting, landfill, and public area). A key element in the present value analysis was estimating future waste generation, processing, and disposal rates. For the purposes of this analysis, the CH2M Team assumed the waste stream received and processed at the WPWMA's facility would roughly double over the next 30 years (consistent with population growth estimates included in the Participating Agencies' general plans) and would flatten thereafter (see Appendix 4B-1). This assumption was used instead of the detailed waste projection prepared by the CH2M Team, because it was a simplified assumption that could be applied across the operation and provided a conservative comparison.

Detailed documentation of present value cost development is provided in Appendix 4C. Real discount rate documentation is provided in Appendix 4C-1. Full outlays of the present value analysis for each Plan Concept are provided in Appendix 4C-2. For visual analysis, cost charts and graphs are provided in Appendixes 4C-3 and 4C-4.

4.2.5 Variables and Considerations

Some variables and considerations warrant additional discussion because they can impact timing, cost, and feasibility. While they have been accounted for with reasonable assumptions in the MODA and economic analysis, these assumptions are not obvious in reviewing the results. For the most part, these variables and considerations will impact all three Plan Concepts as follows:

- Air permitting developments – Local and statewide air regulations and the implementation methodologies are rapidly evolving especially with greenhouse gases, organics, and compost facilities. These cost estimates assumed that air permitting costs are captured in the overall assumptions for permitting as a percentage of capital costs. The rapidly evolving air permitting environment could result in element design changes to reduce emissions (these types of element design changes are not included in the analysis).
- Wetlands agencies and preferences – The WPWMA facility area is within an area covered by the prospective Placer County Conservation Plan (PCCP). The PCCP is scheduled for final adoption in 2019. The approach to wetland mitigation and the roles of various agencies will vary depending on the status of the PCCP at the time this project goes through CEQA. The WPWMA is a Participating Special Entity in the PCCP. The analysis assumes the WPWMA will be able to take advantage of the opportunities associated with the PCCP as they are known to exist on the date of the economic analysis.
- Potential MRF revisions – The MRF building and associated processing lines have not been included as part of this master planning project because changes to them (other than upgrading for long-haul trucking capability after depletion of the landfill) are not currently proposed, nor are they anticipated to impact the MRF footprint or be necessary components of the CEQA effort for this project.
- Soil management and phasing – The current facility has a significant soil surplus that results from excavating for landfill cells and the operational need for soil being less than what is excavated. The economic analysis includes simplifying assumptions for stockpiling and relocating the soil. In general, the costs and complexity assumed for this activity are higher when the overall facility is more space constrained.
- Offsite remote disposal and long-haul transportation of waste – The assumptions used in the economic analysis for remote disposal and long haul represent a reasonable comparison point for the three Plan Concepts. However, it cannot be determined to what degree alternative disposal locations can and will be available, for what tipping fee, for what term, and at what long-haul transportation cost in future planning years.

- Impacts of financing – Many variables could impact the ability to obtain financing and corresponding rates. The magnitude of financing needed can also vary as the project components are implemented. These aspects all impact the ultimate cost of the project.
- Facility-related revenue – There are many possible revenue streams that are highly speculative at this time. The MODA indirectly considered the opportunity for revenue as a function of the space available for third-party compatible manufacturing operations. However, there could be a wide range in variations of revenue, such as from lease of land and space, sale of MRF or other waste-generated products to the third-party compatible manufacturing operations, shared revenue from compost and C&D products, and possible land sale income that could result from implementation of the Plan Concepts. Additionally, while not currently quantifiable, significant regional revenue and financial benefits could result from additional green industries and renewable energy that synergistically radiate from the hub of this facility if these projects are implemented. These additional potential economic benefits were not included in the analysis.
- O&M cost estimate – Development of operational costs for the present value analysis relies on the use of existing operating costs as a basis for the future operating cost estimate. It includes an operating cost estimate for the components of the master planning project (project elements), and does not include the existing MRF building and operations within that building. Currently, the MRF operating fees paid by WPWMA cover a wide range of site operations for materials recovery outside of the MRF, including composting and C&D recovery, as well as operations of the public area. For this O&M cost estimate, MRF costs were divided between these elements and the MRF building itself. Following are some considerations related to operating costs that are outside of this evaluation:
 - The age of the facility, particularly the MRF, means there are more O&M costs with functions within the MRF building, which could result in less of the current MRF-related revenue being available to compensate for other facility costs.
 - The cost of fully burdened labor has increased rapidly in the last few years, which is more than reflected in the usual indices.
 - The costs for risk and liability (i.e., insurance and other requirements) have increased significantly since the pricing structure was developed.
 - Recycling revenues are down, and this is not a reliable income stream.
 - The current payment structure for operating the landfill was based on having the MRF operated by the same entity, and there are cost savings and sharing opportunities to be considered.
- Economic versus financial analysis – The economic analysis performed for this project is for comparing the Plan Concepts, and while it can be used to compare relative tipping fee impacts, the economic analysis is not a real financial representation of the tipping fee changes needed nor the timing, which will be subject to many variables (such as timing of costs, level of reserves used, financing costs, revenue streams, and tip fee increase approach).

4.3 Results

4.3.1 Capital Costs

The initial Class 4 capital costs (in 2018 dollars) for each Plan Concept are summarized in Table 8. AACEI Class 4 estimates present rough order-of-magnitude costs where actual costs may be within the range of -30 to +50 percent of the probable cost indicated.

Table 8. Total Initial Capital Costs

Total Capital Costs	Plan Concept 0	Plan Concept 1	Plan Concept 2
Probable Cost	\$352,250,000	\$521,233,000	\$640,364,500
Class 4 – Low Range (-30%)	\$246,575,000	\$364,864,000	\$448,256,000
Class 4 – High Range (+50%)	\$528,375,000	\$781,850,000	\$960,548,000
<p>Note:</p> <p>Costs shown in this table are provided in 2018 dollars, and do not factor in construction timing, replacement, costs, or the time value of money as considered in the present value analysis. In other words, these costs are the equivalent of all elements within each Plan Concept being constructed in its entirety within year 2018. For replacement costs and timing at which they occur, refer to Appendix 4A.</p>			

The specific elements that were included in the capital costs as well as the design details and replacement cost schedule that were required to establish costs are further described in Appendix 4A.

Figure 10 illustrates how the near term (years 2022 to 2032) capital expenditures differ among the three Plan Concepts. As shown, Plan Concept 0 and 2 both have much higher capital expenditures in the first few years due to the immediacy of certain element phasing (Appendix 2J) as well as additional requirements for stockpile relocation, unlined area waste relocation, and subsequent backfill of the unlined area.

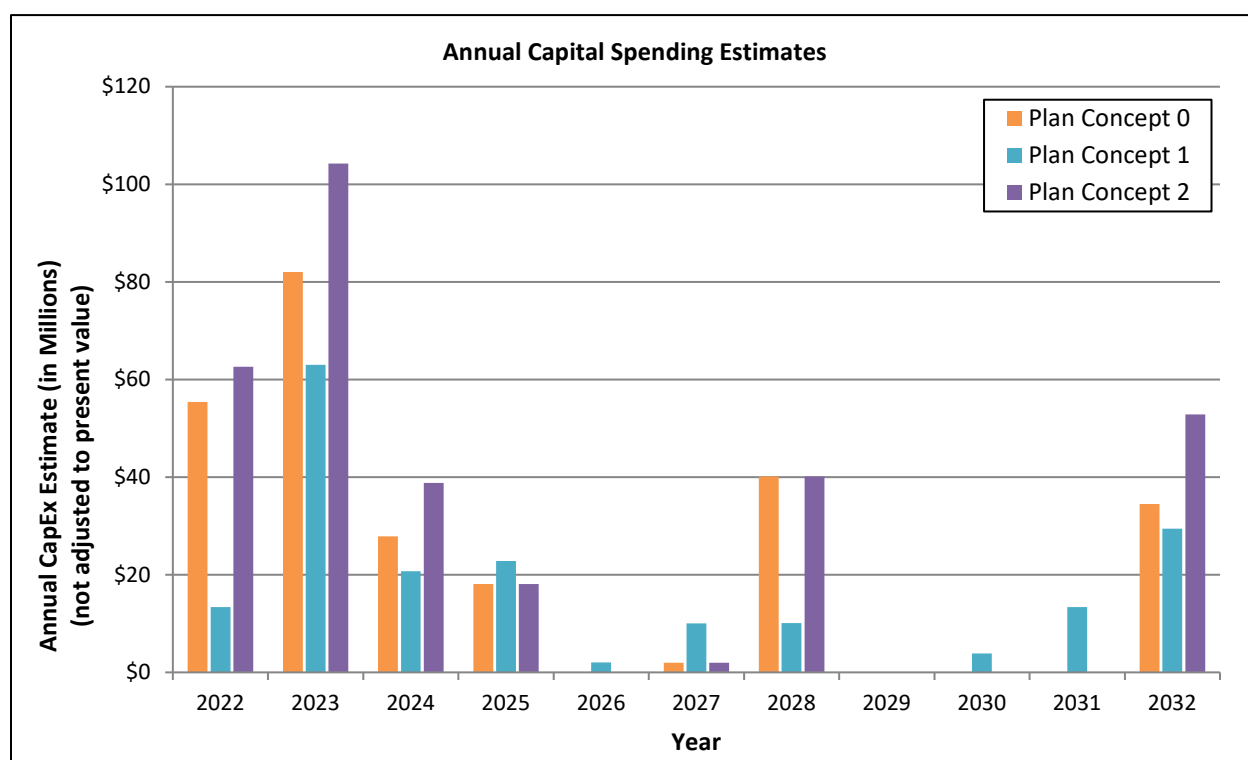


Figure 10. Annual Capital Spending Estimates (2018 Dollars) from 2022 through 2032

4.3.2 Operating Costs

O&M unit costs for each element and the resulting operational costs for each Plan Concept for each year of the analysis period are summarized in Appendix 4B.

4.3.3 Present Value

The capital and operational cost results were used to generate total project present value costs for each Plan Concept. The timing of each capital and operating cost were factored in, and the corresponding present value was calculated, using a real discount rate of 2 percent. Revenues were not modeled as part of this analysis. The total project present value and the annualized project value for each Plan Concept are summarized in Table 9. Additional details of this analysis are shown on Figures 11 through 13, which highlight the differences in overall present value as well as timing of costs within the Plan Concepts.

As shown, Plan Concept 1 has the lowest annualized project present value, followed by Plan Concept 2 and Plan Concept 0.

Additional details that summarize the relationship between capital and operating costs for these estimates as well as information about when these costs may be incurred are in Appendixes 4A, 4B, and 4C.

Table 9. Present Value Summary Results

Plan Concept	Total Project Present Value	Annualized Project Present Value
0	\$3,092,100,000	\$74,100,000
1	\$2,117,300,000	\$50,700,000
2	\$2,497,200,000	\$59,800,000

Note:
Costs are shown in present value 2018 dollars.

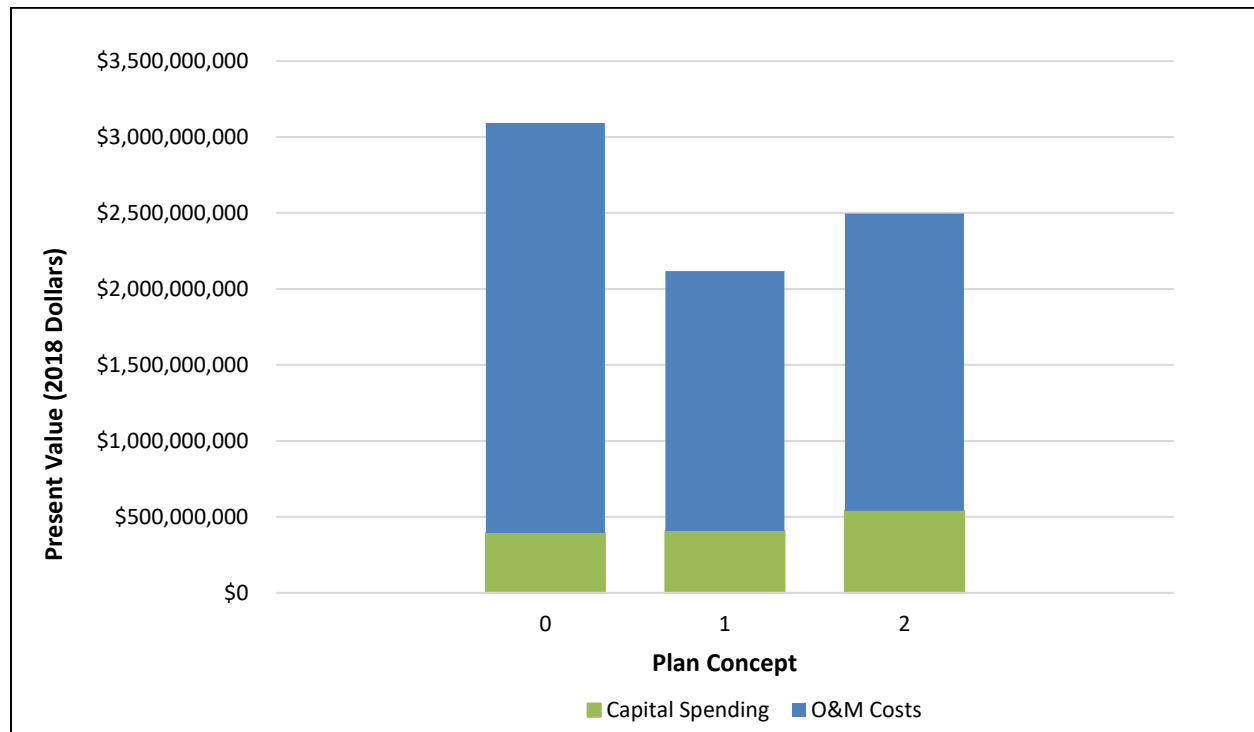


Figure 11. Total Project Present Value Costs for Each Plan Concept

Figure 11 presents the total project present value costs and the proportion of capital versus operating costs for each Plan Concept. Plan Concept 1 has the lowest total project present value cost of the three Plan Concepts.

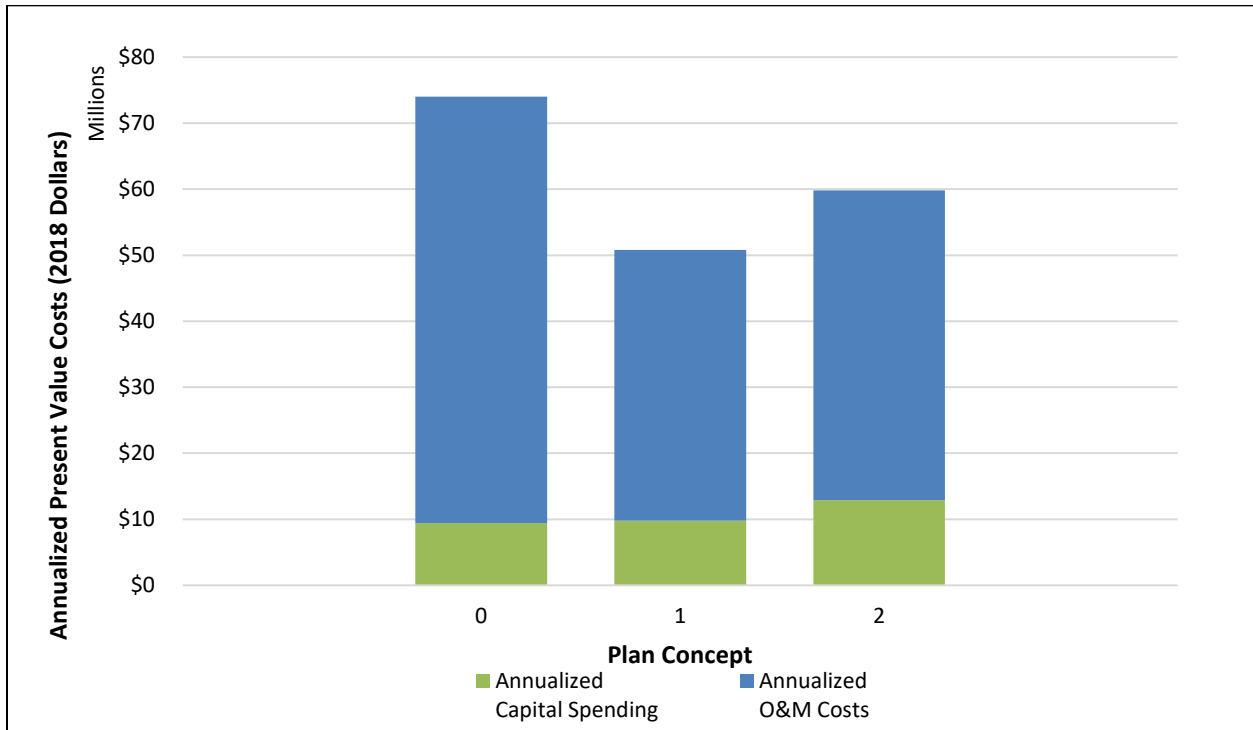


Figure 12. Annualized Project Costs for Each Plan Concept

Figure 12 presents the annualized project cost and the proportion of capital versus operating costs for each Plan Concept. Plan Concept 1 has the lowest annualized cost of the three Plan Concepts.

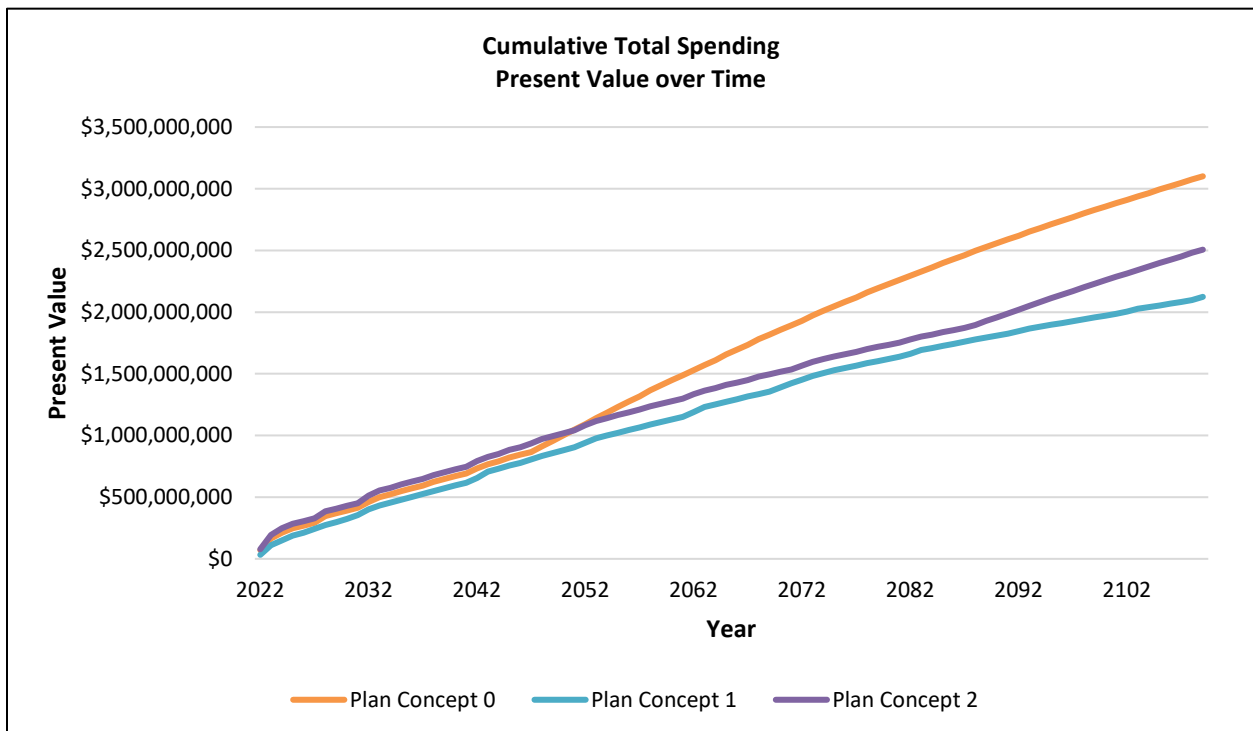


Figure 13. Cumulative Total Spending (Present Value) for Each Plan Concept

Figure 13 presents cumulative total spending (capital and operating costs) in present value costs over the analysis period. Plan Concept 1 has the lowest total project cost of the three Plan Concepts. Plan Concepts show significant increases in costs due to commencement of long-haul trucking and post-closure care costs at the end of landfill life (Year 2049 for Plan Concept 0, Year 2109 for Plan Concept 1, and Year 2089 for Plan Concept 2).

5. Findings and Recommendations

The CH2M Team combined the results of the MODA and present value analysis. As shown on Figure 14, Plan Concept 1 provides the highest MODA score and lowest annualized present value. Conversely, Plan Concept 0 has the lowest MODA score and highest annualized present value.

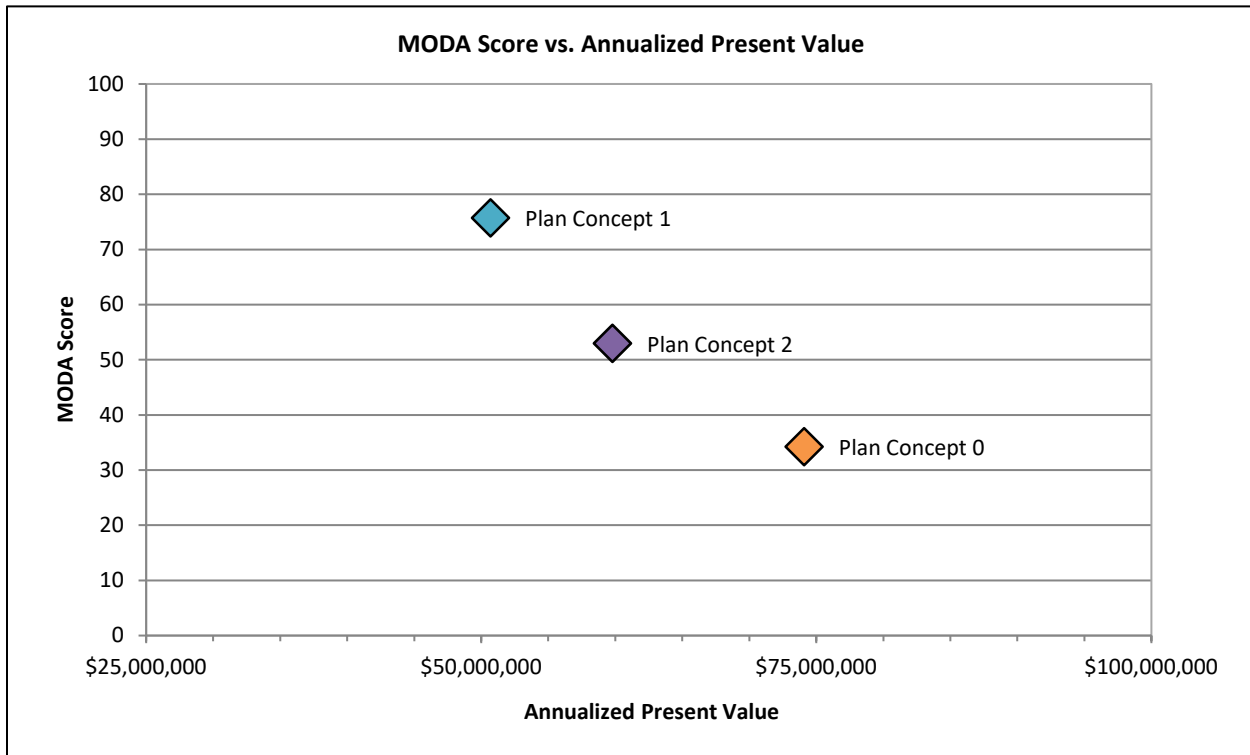


Figure 14. Combined MODA and Annualized Present Value

Based on the results of the MODA and economic analysis, Plan Concept 1 appears to best meet the WPWMA's project goals.