Sonoma County Preliminary Regional Disposal Capacity Analysis
Technical Memorandum

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Prepared for:

Sonoma County Department of Transportation and Public Works – Intergrated Waste Division

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Introduction

This Preliminary Regional Disposal Capacity Analysis (Analysis) has been developed to help inform the County of Sonoma regarding the planning for the long-term disposal capacity needs of Sonoma County jurisdictions. While Sonoma County has adequate in-County disposal capacity projected to last many years, it is prudent to begin now with assessing potential options for continued environmentally sound and economically prudent disposal once the Central Disposal Site (CDS) reaches its' current permitted capacity. Two potential options explored in this Analysis include an expansion of the permitted capacity at the CDS or possible out-haul to existing regional disposal facilities. This analysis is intended to provide a preliminary overview of the existing disposal capacity at the CDS as well as regional disposal capacity that may be available to Sonoma County.

D. Edwards Inc., (DEI) is approaching this project in phases, with the findings of each phase informing the need for subsequent phases. This Technical Memorandum (Tech Memo or report) represents the work completed in the first phase or the Preliminary Analysis. For this Preliminary Phase of the Analysis, DEI has researched publicly available documents to compile relevant data related to the Central Disposal Site (CDS) and four (4) regional landfills including, Redwood Landfill (Marin County), Potrero Hills Landfill (Solano County), Hay Road Landfill (Solano County), and Keller Canyon Landfill (Contra Costa County).

DEI has prepared this Tech Memo to summarize the information reviewed. The Tech Memo includes narrative and tables to present, collate and compare the data collected. The Tech Memo also includes a review of Sonoma County's recent historical disposal generation and a discussion of potential future disposal capacity needs taking into consideration factors such as potential disaster debris, population, zero waste goals, available diversion infrastructure, etc. The report also provides specific data for each out-of-county regional disposal site along with summarizing the total combined daily and overall capacity that may be available for Sonoma County jurisdictions should the need arise. DEI presents our findings regarding the potential pros and cons, practicality and potential benefits or barriers of utilizing outhaul as a potential strategy for the long-term disposal needs for the County in comparison to expanding capacity at the existing CDS.

Both of these options will require more detailed study than was undertaken in this analysis in order to quantify the specific costs, environmental impacts, practicality and basic feasibility of each approach and to adequately compare the two strategies. That said, this preliminary review strongly suggests that pursuing the development of additional permitted disposal capacity at the CDS, will provide the County and its jurisdictions more flexibility, dependability, with less environmental impact overall compared to relying on outhaul to remote out-of-county landfills for additional long-term disposal capacity.

While prior studies have been completed on the topic, DEI strongly recommends that the County begin to update the prior engineering, design and environmental work to refine specifically how much additional capacity may be developed through an expansion at the CDS, and at what current cost. The full process of design, environmental review, and permitting can take many years. Beginning the initial work on this process soon will afford the County sufficient time to make appropriate findings to support informed policy decisions on this matter.

Time to Closure of Central Disposal Site

Remaining Capacity at the CDS

Estimating the "lifespan" of the CDS begins with quantifying the current disposal capacity in terms of cubic yards of permitted airspace remaining that can be filled with waste. The landfill operator, Republic Services, performs annual surveys to identify, among other things, total permitted capacity, the projected overall airspace consumed, the remaining airspace at the landfill, and the change in airspace over the previous year. All this data is expressed in cubic yards (cy). As of 12/31/2021 Republic reported the following:

- Total Permitted Airspace Capacity at the CDS 32,650,000 cy
- Projected Airspace Volume Consumed 24,651,989 cy
- Remaining Airspace of the CDS 7,998,010 cy
- Change in Airspace
    - Solid Waste Placed in (1/31/20 to 1/17/21) 465,396 cy

Republic's annual report also projects the disposal capacity in terms of years remaining. The projections are based on a CalRecycle accepted calculation method which include assumptions of waste density and annual volume expected to be received. Republic's annual report identified that, between the most recent survey dates, the site achieved an in-place waste density of 1,885 pounds per cubic yards. This factor included a combination of MSW and fire debris which contributed to a higher density than would be expected, on average, going forward. The annual report also provides site life projections based on a range of waste density assumptions that estimate that the remaining life at the CDS could be from 15.4 years to 19.1 years, based on a projected[1] annual MSW volume (325,000 tons per year) going forward with no fire debris.

Additional factors can also be considered to estimate lifespan under possible alternative scenarios that may occur. The analysis in this report includes data and discussion of possible alternative circumstances that could impact the projected lifespan of the current permitted capacity at the CDS.

The length of time the current disposal capacity or airspace at the CDS will last can be influenced by several variable factors. The primary factor is the volume of material received for disposal. Other factors such as type of material and its relative "as-received" density, operational compaction efficiency, refuse-to-cover ratio, waste settlement, and other elements can also impact the projected lifespan of the available airspace at the CDS to varying degrees. The two most significant factors for the CDS are disposal volume received and in-place density achieved. These two factors will be the main focus of this part of the analysis.

Disposal Volume

The CDS has been a valuable resource for Sonoma County jurisdictions for the day-to-day disposal of the typical municipal solid waste (MSW) generated by residents, businesses, and industry in the County since it opened around 1971. In addition, the CDS has provided local disposal capacity for the significant and relatively frequent disaster debris that has been generated due to the recent fire events in the region. This is also the case for debris from recent and historical severe weather and Russian River and other flood events. Table 1 below identifies the annual tons of MSW and Disaster related waste received for disposal at the CDS from 2017 through 2021.

[1] Based on the Joint Technical Document's projection for annual waste tons accepted at the facility

Table 1[2]
CDS Annual Disposal Tonnage
2017 - 2021

Year	MSW	Disaster Debris	Total
2017	302,654	362,156	664,810
2018	337,637	586,041	923,678
2019	343,387	912	344,299
2020	320,378	566	320,944
2021	340,924	79,223	420,147
Annual Average	**328,996**	**205,780**	**534,776**
Disposal Percentage	**62%**	**38%**	**100%**

As illustrated on Table 1, the MSW volume remained relatively stable during this five-year period while the Disaster Debris fluctuated based primarily on the timing of fire events in the area. As can also be seen, the disaster debris accepted at the CDS represented 38% of the total disposal volume during this five-year period. While it is not possible to predict future fire, flood, or other types of disasters and the associated debris that may need to be disposed, based on this historical data, it would seem prudent to anticipate some volume of this material will likely be generated in the future and require disposal at the CDS and elsewhere. While not specifically quantified in this report, increased landfill diversion from SB 1383 implementation, and other source reduction and recycling efforts, may reduce or keep even (against growth) the overall volume of waste requiring disposal, which in turn would maximize the usable lifespan of the CDS.

One resource reviewed for estimating the possible range of disaster related debris that could require disposal in the future is the recent publication entitled, "*Sonoma County California, Disaster Debris Management Plan, February 2022*" (Disaster Debris Plan). The Disaster Debris Plan's stated purpose is to provide a framework for how disaster debris operations will be managed by the County. One section of the plan identifies past Presidentially declared disasters in Sonoma County dating back to 1964. The excerpted information from the Disaster Debris Plan in Table 2 lists some of the declared disasters that occurred from 2017 through 2020 which contributed to the disaster disposal volume listed in Table 1 above.

Table 2[3]
Sonoma County Presidentially Declared Disasters
2017 - 2020

Type of Event	FEMA Disaster Number	Declaration Date
Severe Winter Storms, Flooding, And Mudslides	DR-4301-CA	Feb 14, 2017
Severe Winter Storms, Flooding, Mudslides	DR-4308-CA	Apr 1, 2017
Partrick Fire	FM-5222-CA	Oct 9, 2017
Nuns Fire	FM-5220-CA	Oct 9, 2017
Tubbs Fire	FM-5215-CA	Oct 9, 2017
Wildfires	DR-4344-CA	Oct 10, 2017
Kincade Fire	FM-5295-CA	Oct 24, 2019
Severe Winter Storms, Flooding, Landslides, And Mudslides	DR-4434-CA	May 18, 2019
LNU Lightning Fire Complex	FM-5331-CA	Aug 18, 2020
Wildfires	DR-4558-CA	Aug 22, 2020
Wildfires	DR-4569-CA	Oct 16, 2020

[2] Data Source: Republic Services

[3] Excerpted information from Table 1-2 of the Sonoma County California, Disaster Debris Management Plan, February 2022

As stated in the Disaster Debris Plan, "*Knowledge of the past can provide Sonoma County some understanding of possibilities for the future, and a basis for planning*." The Disaster Debris Plan includes an assessment of the types of disasters Sonoma County may be vulnerable to and further assigns a "Probability" and "Debris Generation Potential" to each type of possible event. The Plan identifies 12 types of potential disasters of which four are listed below in Table 3.

Table 3[4]
Potential Debris Generating Events

Type of Event	Probability	Debris Generation Potential[5]
Earthquake (Hayward Fault Scenario)	Medium	High
Severe Weather	High	Medium
Wildfire	High	High
Flood	High	High

The Disaster Debris Plan goes on to include estimates of the potential debris that could be generated from Sonoma County jurisdictions from each type of event. Table 4 below provides an excerpt of this information for the four event categories listed above. The Plan appropriately qualifies the debris estimates provided with the following statement:

"Estimating the quantities of debris that may be generated by various natural or man-made disasters is a complex analysis. There are endless variables (type of incident, severity, etc.) that can dramatically impact the quantities of debris that may be generated by a disaster and virtually no models that can accurately estimate debris volumes. Nevertheless, making a best estimate of the debris generation potential for the jurisdictions is an important exercise, the results of which should be used as a resource when planning for a debris-generating incident."

Table 4[6]
Disaster Debris Estimates in Cubic Yards

Type of Event	Debris Estimate (Cubic Yards)
Earthquake (Hayward Fault Scenario)	**8,234,380**
Severe Weather	**709,015**
Wildfire	**23,250,313**
Flood	**1,568,514**

Table 4 illustrates the potential significant amount of disaster debris that could require disposal at the CDS and other regional disposal facilities. It is important to note that not all the volume listed above would be destined for disposal. One of the objectives of the Disaster Debris Plan states, "*Maximize diversion to the greatest extent possible to preserve remaining landfill capacity*". As was the case with past disaster debris, a portion of the material generated, such as wood waste, metal, C&D, and concrete, can be readily recycled. However, even with aggressive recycling efforts, there is likely to be a significant amount of disaster debris remaining that would require disposal, all of which would reduce the projected lifespan of the CDS and other regional landfills that receive this volume.

[4] Excerpted information from Table 1-3 of the Sonoma County California, Disaster Debris Management Plan, February 2022

[5] Ability of a particular event to produce debris is based on historical data on each event type. High debris generation potential would be estimated based on an event that generates more than 1,000,000 cubic yards of debris. An event with medium debris generation potential could generate between 50,000 and 1,000,000 cubic yards. An event with low debris generation potential could generate approximately 25,000 – 50,000 cubic yards of debris.

[6] Excerpted information from Table 1-8, 1-13, 1.14, & 1-15 of the Sonoma County California, Disaster Debris Management Plan, February 2022

Current Out-of-county Disposal

Another factor to consider related to potential disposal volume and the lifespan of the CDS is that not all the waste currently generated within the County is disposed of at the CDS. If this changes, and the Sonoma County generated waste that is now disposed at out-of-county facilities were to be redirected to the CDS, then clearly it would also reduce the life of the facility.

The California Department of Resources Recycling and Recovery (CalRecycle) tracks disposal volumes by jurisdiction of origin as part of its' statewide Disposal Reporting System (DRS). For Sonoma County, this information is consolidated under the Sonoma County Waste Management Agency (also known as Zero Waste Sonoma). The CalRecycle disposal data shows that, while the CDS receives most of the waste generated in-county, a significant volume of this waste is received and disposed of at out of county landfills. Table 5 below identifies the total annual tons of MSW and Disaster related waste generated in Sonoma County for the five-year period from 2016 through 2020.

Table 5[7]
Total Disposal Volume Generated
Sonoma County Jurisdictions
2016 - 2020[8]

Year	MSW	Disaster Debris	Total
2016	420,865	149	421,014
2017	479,501	466,993	946,494
2018	376,586	867,724	1,244,310
2029	468,939	3,903	472,842
2020	423,426	0	423,426
Annual Average	**433,863**	**267,754**	**701,617**
Disposal Percentage	**62%**	**38%**	**100%**

Table 6 below compares the five-year annual average for total disposal volume generated in Sonoma County (from Table 5) with the five-year annual average of volume disposed at the CDS (from Table 1). This comparison provides an approximate estimate of the annual average volume of in-County generated waste that is disposed at out-of-county landfills.

Table 6
Total Annual Average - In-County Waste Generated
Compared to
Total Annual Average - CDS Disposal Volume

5-yr Annual Average	MSW	Disaster Debris	Total
In-County Waste Generated	433,863	267,754	701,617
CDS Disposal Volume	328,996	205,780	534,776
Difference	**104,867**	**61,974**	**166,842**
Percent of Total Generated	**24%**	**23%**	**24%**

As shown on Table 6, approximately 24% of the total MSW generated by Sonoma County jurisdictions is disposed of at out-of-county landfills. A significant portion of the exported MSW stream originates in the city of Petaluma. Petaluma's annual disposal volume for the year 2021 was approximately 28,207[9] tons. The MSW from city of Petaluma is currently disposed at the Redwood Landfill in northern Marin County where their hauler transports waste collected through their franchise agreement. The current projected

[7] Data Source: CalRecycle Disposal Reporting System

[8] 2020 is the most recent year data is available on the CalRecycle Disposal Reporting System for Sonoma County

[9] Source: City of Petaluma

closure date for the Redwood Landfill is 2034[10]. Absent an expansion of this facility, alternative arrangements for disposal will be required after this projected date. Whether or not any of the exported waste stream will be redirected to the CDS in the future is unknown. Since, however, this is a relatively large volume of waste that could have a proportionally significant impact on the projected lifespan of the airspace at the CDS, it would seem sensible to consider, as part of the County's long term disposal capacity planning, the possibility that some portion of this exported MSW may be redirected.

Disposal Volume Findings

As shown in the various tables in this section, MSW volumes, while fluctuating somewhat up and down from year to year, have remained fairly stable and relatively predictable. Disaster debris, on the other hand has understandably fluctuated significantly from year to year related to the timing of fire, flood, and severe weather events in the county. The focus of this section is to understand historical disposal volume trends, and the potential for disaster debris and other possible disposal sources, sufficiently to make informed estimates regarding the timing and how much disposal volume may possibly be directed to the CDS to help determine a reasonable range of possible closure dates for long term planning purposes. The potential disposal source components estimated include:

- MSW – currently disposed at CDS
- Potential Disaster Debris
    - 5-yr historical average
    - Earthquake event
- Potential disposal volume redirected from out-of-county landfills

The volume estimates selected for these categories are discussed and presented below. The analysis will utilize these volume estimates to present three possible scenarios for the County to consider for projecting the lifespan of the current permitted capacity of the CDS. Each of the three scenarios presented include a range of projected closure dates based on the volume assumptions, combined with the same in-place waste density assumptions presented in Republic's most recent annual report (2022).

CDS MSW – MSW disposal volumes, in general and, here in Sonoma County are typically influenced by factors such as, economic growth or recession, population changes, increase or decrease in diversion and recycling infrastructure and/or access to services, education and public awareness efforts, adoption of new legislation and regulations for diversion, the pandemic, etc. These factors can either increase or decrease the disposal volume requiring capacity at the CDS depending on the nature of the change to these parameters. Projecting the net effect of all these factors on actual future disposal volume is complex and beyond the scope of this analysis.

For the purposes of projecting MSW volume disposed of at the CDS going forward, we have selected the five-year average annual disposal volume reported by Republic Services and listed in Table 1. This equates to 328,996 tons per year. This annual volume projection will be utilized for presenting the lifespan projections in Scenario 1 also referred to as the Status Quo Scenario (Table 7 on the following page). While this is a slightly higher volume than used by Republic in their current annual report calculations, we believe it represents a reasonable projection taking into account the recent annual fluctuations experienced for the MSW steam disposed of at the CDS.

[10] Data Source: GeoSyntec Consultants, Inc., "*Certification of No Substantial Changes at Redwood Landfill Preliminary Closure and Postclosure Maintenance Plans, Redwood Landfill, Marin County, California*" 31 January 2020

Table 7
CDS Lifespan Projection
Scenario 1 – Status Quo

Density	Remaining Tons	Annual Tons	Remaining Life	Closure Date
1,250	4,998,756	328,996	15.2	2037
1,350	5,398,657	328,996	16.4	2038
1,450	5,798,557	328,996	17.6	2040
1,550	6,198,458	328,996	18.8	2041

Disaster Debris – This report relies on two sources of information for selecting an estimate of potential disaster debris that will be utilized for the CDS lifespan projection. The first is based on the actual average disaster debris disposed of at the CDS for the five-year period between 2017 and 2021 and the second is based on the information reviewed in the Disaster Debris Plan and summarized in this report.

The five-year average of actual disaster debris disposed of at the CDS and presented in Table 1 is 205,780 tons per year. This accounts for fire, flood and severe weather events that occurred during this timeframe. Prior to the 2017 fires, it might have appeared quite speculative to predict the high level of disaster debris that has been experienced recently in Sonoma County. However, based on concerns over the impacts of climate change and further supported by this recent historical data, it seems resonable to consider the possibility that Sonoma County could continue to experience this level of disaster debris generating events on an ongoing basis. While we are hopeful that this will not be the case, for long term disposal capacity planning purposes, we are including this annual volume projection as part of the Scenario 2 lifespan estimates. This annual volume projection will be added to the Scenario 1 volumes to create the Scenario 2 projections presented in Table 8 below.

Table 8
CDS Lifespan Projection
Scenario 2 – Status Quo + 5-yr Average Disaster Debris

Density	Remaining Tons	Annual Tons	Remaining Life	Closure Date
1,250	4,998,756	534,776	9.3	2031
1,350	5,398,657	534,776	10.1	2032
1,450	5,798,557	534,776	10.8	2033
1,550	6,198,458	534,776	11.6	2034

For the development of the Scenario 3 projections, also referred to as the Worst-Case Scenario, this report is relying on the information presented in the Disaster Debris Plan. Table 4 summarizes the data projections for possible disaster debris that could be generated in Sonoma County from earthquake, severe weather, wildfire, and flood events. Since the historical data utilized in Scenario 2 above already includes volume associated with severe weather, wildfire, and flood events, this scenario will focus on the potential additional volume that is projected in the Disaster Debris Plan associated with an earthquake on the Hayward Fault.

The projection for this potential earthquake debris is identified as being 8,234,380 cubic yards. The volume estimates developed for this scenario need to take into consideration that, if there is sufficient infrastructure in place to do so, a large portion of this disaster debris can be recycled or at a minimum reduced in size/volume through chipping and grinding operations prior to disposal. While the Disaster Debris Plan recognizes the importance of identifying debris management sites and the operational capacity to implement reduction and recovery activities, it is beyond the scope of this report to predict

what the adequacy of this infrastructure may be at the time of a potential earthquake. If, however, it is assumed that the debris management and recycling infrastructure and operational capacity within the County at the time of the earthquake is sufficient to reduce and/or recover 80% of the projected debris then the remaining volume requiring disposal would be 1,646,876 cubic yards. If a lower percentage of reduction/recovery is achieved, then the projected lifespan of the CDS would be shortened proportionally.

Since an earthquake is typically a one-time event, for the lifespan estimates presented in Scenario 3, this report treats this projected disposal volume as a one-time reduction to remaining capacity at the landfill. As illustrated on Table 9 below, Scenario 3 utilizes the same disposal volume estimate as Scenario 2 but based on the reduced beginning capacity to estimate possible closure dates.

Table 9
CDS Lifespan Projection
Scenario 3 – Status Quo + 5-yr Average Disaster Debris + Earthquake Debris
Potential Worst-Case Scenario

Density	Remaining Tons	Annual Tons	Remaining Life	Closure Date
1,250	3,969,459	534,776	7.4	2029
1,350	4,287,015	534,776	8.0	2030
1,450	4,604,572	534,776	8.6	2031
1,550	4,922,129	534,776	9.2	2031

Redirected Out-of-county Disposal to CDS – As stated previously, not all the waste currently generated within the County is disposed of at the CDS. Table 5 identifies total waste generated by Sonoma County jurisdictions and Table 6 displays the 5-year averages of total waste generated compared to the volumes disposed of at the CDS. This represents an average of 104,867 tons per year of MSW that is generated in Sonoma County but disposed of at out-of-county landfills. This is in addition to the annual average of 61,974 tons of disaster debris exported. If the exported MSW volume were to be redirected to CDS this would represent an increase of approximately 32 percent of this waste stream and a corresponding reduction in lifespan at the CDS. With the Redwood Landfill currently projecting closure in 2034, absent an expansion, it is likely that some portion of this exported waste stream will be redirected to CDS in the future. While this report does not include a specific projected amount of disposal tonnage for redirection of exported waste in any of the three scenarios presented, it is highly recommended that this credible prospect should be taken into consideration as part of the County's long-term disposal planning.

CDS Time to Closure Recap – The data presented in this section demonstrates some of the potential complexities to consider when projecting the useful lifespan of the remaining permitted airspace at the CDS. Based on the information presented in this section, regarding the potential variables of in-place density achieved and overall volume of waste received for disposal, the CDS may reasonably have a lifespan of as much as 18.8 years under the "Status Quo Scenario" and as little as 7.4 years in the "Worst-Case Scenario". While the actual lifespan will likely be somewhere in between, the important fact to understand is that the permitted capacity at the CDS is finite and its lifespan, quite credibly, may be much shorter than the status quo assumptions predict.

Based on this review, it is highly recommended that the County consider potential next steps for additional review now that may be needed to determine and secure the most appropriate option(s) for continued environmentally sound and economically prudent disposal once the CDS reaches its' current permitted capacity. Either pursuing an expansion of the permitted capacity at the CDS or negotiating and securing reliable disposal contracts with out-of-county regional disposal facilities will take a considerable amount of time and effort. While this preliminary report makes recommendations regarding these two potential options, additional work may be required to refine the information needed to make a fully informed decision on the best path forward for the County and its jurisdictions. The sooner this effort begins the better.

Regional Disposal Capacity – Out of County Options

For this Preliminary Phase of the Analysis, DEI has researched publicly available documents[11] to compile relevant data related to four (4) regional landfills including, Redwood Landfill (Marin County), Potrero Hills Landfill (Solano County), Hay Road Landfill (Solano County), and Keller Canyon Landfill (Contra Costa County). These four landfills have been selected to review as they are within a reasonable distance from the CDS and the Sonoma County transfer stations and these facilities are now accepting, or have in the past accepted, waste for disposal from Sonoma County. It should be noted however, that no contact with these facilities has been made to confirm their willingness or capability to enter into long-term disposal agreements for Sonoma County waste.

The relevant data collected for each site includes:

- Maximum Daily Permitted Capacity
- Current Estimated Daily Volume Received
- Estimated Potential Daily Capacity Available
- Total Maximum Permitted Capacity (cy)
- Estimated Remaining Capacity (cy)
- Reported In-Place Density
- Estimated Closure Date
- Mileage from Central Transfer/Processing Facility (CTPF)

The information gathered is presented and discussed below in three categories, 1) Daily Capacity Factors, 2) Total Site Capacity Factors and, 3) Projected Increased Vehicle Miles Traveled (VMT). This section of the report provides a preliminary overview of regional disposal capacity that may be available to Sonoma County along with providing a high-level assessment of potential issues related to the inherent environmental and economic impacts associated with the transportation of waste to out-of-county facilities.

Daily Capacity Factors

Table 10 on the following page, identifies the maximum daily amount of waste permitted to be received at the CDS and each of the four out-of-county landfills. It further provides an estimate, based on the records reviewed, of the amount of waste each facility receives on a daily basis. The nexus between the daily permit limit and the daily amount of waste received at each facility provides an estimate of the potential excess capacity these regional landfills may have available to support disposal of waste from Sonoma County jurisdictions should the need arise. Table 10 further compares the potential capacity available at each of the out-of-county landfills, as well as the total combined capacity of all four landfills, to the average daily volume of MSW received at the CDS. The comparison reflects MSW volumes and limits only, as opposed to disaster debris, since during regional declared disaster events daily limits are usually waived by state and local regulators to accommodate the increased volumes from disaster cleanup efforts.

[11] The primary source for information for this preliminary analysis has been public permit and technical documents available on CalRecycle's Solid Waste Information System (SWIS). The dates, categories and specificity of this data varies for each site reviewed but may be considered adequate for the purposes of this preliminary analysis.

Table 10
Daily Capacity – Potential Estimated Availability
Out-of-county Regional Landfills

Daily Capacity Factors	Central Disposal Site (CDS)	Redwood Landfill	Potrero Hills Landfill	Keller Canyon Landfill	Hay Road Landfill	Combined Regional Total (Excludes CDS)
Permitted Capacity TPD	**2,500**	**1,390**	**3,400**	**3,500**	**3,200**	**11,490**
Current Estimated Volume Received TPD	**1,072**	**1,120**	**2,700**	**2,900**	**1,743**	**8,463**
Potential Capacity Available – TPD	N/A	**270**	**700**	**600**	**1,457**	**3,027**
CDS Average Daily Volume[12]	**1,072**	**1,072**	**1,072**	**1,072**	**1,072**	**1,072**
Shortfall/Excess Capacity Available TPD	N/A	**-802**	**-372**	**-472**	**385**	**1,955**

As illustrated on Table 10, while the four out-of-county landfills combined have sufficient estimated daily capacity to accommodate Sonoma County's MSW stream, only one of the regional landfills, Hay Road Landfill, has sufficient estimated capacity to accept all of the MSW disposal volume now going to the CDS. It is worth noting that Hay Road Landfill is also the furthest facility from Sonoma County jurisdictions and, as discussed later in this report, represents the option that would require the largest increase in Vehicle Miles Traveled (VMT) and related Greenhouse Gas (GHG) and other air emissions, should this path be taken. Previously, when the CDS was closed for approximately five years for regulatory reasons, the County's waste was out hauled to regional landfills. The County's approach at that point was to contract with more than one landfill for their disposal needs. This approach provided the County with some flexibility and redundancy should the need have risen. Given the limited estimated daily capacity at most of the sites, it would seem likely that a similar approach of contracting with more than one facility would be warranted if this long-term disposal strategy is pursued by the County.

Another factor to take into consideration is that, as mentioned previously, Redwood Landfill has a current projected closure date of 2034 so, absent an expansion, this facility would not likely be available as an out-of-county disposal option by the time the current permitted capacity at the CDS runs out. In addition, the disposal volume identified in Table 10 does not include any projected amount for Sonoma County generated waste that is currently disposed of at Redwood Landfill that may be redirected upon its' potential closure. As identified in Table 6, the total volume of County generated MSW disposed of at out-of-county landfills was estimated to be 104,867 tons per year or approximately 342 tons per day, some significant portion of which would potentially need to be accommodated in addition to the 1,072 tons per day identified in Table 10.

This initial preliminary review of the data indicates that, from a daily permitted capacity perspective, it may be possible for Sonoma County to secure disposal capacity for the current volumes of MSW disposed of at the CDS. This would likely need to be through disposal agreements with more than one of these regional landfills. What is also important to keep in mind is that the volume data used for Table 10 does not include potential disaster debris and that it may be desirable to include provisions in any disposal

[12] Based on 5-yr average MSW volume presented in Scenario 1 (328,996 tpy) divided by 307 days

agreement with these third-party regional landfills for handling this possible volume should the need arise. While the initial data indicates the possibility of this approach, much additional research and due diligence will be needed to ultimately determine the actual feasibility and the practicality of this approach from an economic and environmental perspective.

Total Site Capacity Factors

Table 11, on the following page, identifies that, with the exception of Redwood Landfill, the out-of-county landfills appear to have a significant amount of remaining overall site capacity. Combined, this projected capacity may be able to support a fairly long-term disposal volume from Sonoma County jurisdictions. Table 11 also provides estimated closure dates for the CDS and the other landfills. Taken at face value, the closure dates indicate that, when the CDS is projected to close in 2040, three of the out-of-county landfills will still be open. The projected closure dates of the three remaining landfills are 2050 for Keller Canyon, 2059 for Potrero Hills and 2065 for Hay Road. While this shows remaining life of these out-of-county landfills at between 10 and 25 years from when CDS is projected to fill, clearly the addition of Sonoma County volume would shorten these projections. In addition, as with the CDS, the length of time the current disposal capacity or airspace at these landfills will last can be influenced by several variable factors. The two most significant factors are disposal volume received and in-place density achieved. Other factors such as type of material and its relative "as-received" density, operational compaction efficiency, refuse-to-cover ratio, waste settlement, and other elements can also impact the projected lifespan of the available airspace at these out-of-county landfills to varying degrees.

From a projected volume perspective, the data reviewed for this preliminary analysis did not indicate whether any of the lifespan projections at the out-of-county landfills took into consideration the potential for acceptance of disaster debris. In addition, the daily volume assumption utilized in Table 10 to estimate the volume from Sonoma County that would require disposal capacity, projects only MSW volume from the "Status Quo" Scenario 1 presented in Table 7. This scenario includes only that portion of the Sonoma County generated MSW steam currently disposed of at the CDS and no consideration for the possible redirection of additional County-generated waste back to the CDS or any potential disaster debris which may also require disposal under an out-of-county disposal approach. These potential additional volumes would contribute to a shortening of the lifespan of the current and projected airspace of these out-of-county landfills potentially available for disposal of Sonoma County waste stream.

On the other end of the spectrum, it is also possible that one or more of these landfills may pursue expansions of their current permitted capacity thus extending their useful life. If these possible expansions include the ability to accept out-of-county waste, this could potentially increase the volume and length of time they may be able to support disposal of Sonoma County's waste material.

As with the daily capacity factors discussed above, while the preliminary review of the public data regarding overall site capacity suggests that the combined out-of-county landfill network may be able to support Sonoma County's waste stream for a fairly long term period after the projected closure date of the CDS, a much more detailed analysis to take a more granular look at all the potential variables that may affect capacity, will be needed to verify the feasibility of this approach.

Table 11
Total Estimated Site Capacity
CDS & Out-of-county Regional Landfills

Total Site Capacity Factors	Central Disposal Site (CDS)	Redwood Landfill	Potrero Hills Landfill	Keller Canyon Landfill	Hay Road Landfill	Combined Regional Total (Excludes CDS)
Total Permitted Capacity Cubic Yards	32,650,000	26,077,000	83,100,000	75,000,000	42,139,000	226,316,000
Site Capacity Used Cubic Yards	24,651,989	20,177,000	25,200,000	25,239,215	12,015,000	82,631,215
Remaining Capacity Cubic Yards	7,998,010	5,900,000	57,900,000	49,760,785	30,124,000	143,684,785
Date of Site Capacity Information	12/31/21	1/31/20	4/31/2020	7/1/19	6/30/20	
In-Place Density Lbs. per Cubic Yard	1,450[13]	1,623	1,450	1,839	1,300	Average Density 1,553
Estimated Closure Date	2040	2034	2059	2050	2065	

Projected Increased Vehicle Miles Traveled (VMT)

Table 12, on the following page, illustrates the estimated potential increase in Vehicle Miles Traveled (VMT) should the County rely on out-of-county landfills for their long-term disposal needs once the CDS has reached its' current permitted capacity. Since Redwood Landfill has a current projected closure date of 2034 and absent an expansion would not likely be available as an out-of-county disposal option by the time the CDS fills, our discussion in this section will focus on the remaining three landfills.

Table 12 provides the approximate round-trip miles from the CDS/CTPF to each of the out-of-county landfills[14]. It further estimates the number of transfer trailer loads that would be required to out haul the annual waste volume for the three volume scenarios presented earlier in this report. Scenarios 2 and 3 are presented together as their ongoing projected waste volume was the same with the difference being Scenario 3 included a reduction in airspace at the CDS from a potential one-time earthquake event.

The Scenario 1 volume projected is based on the "Status Quo" five-year average MSW only volume of 328,996 tons per year divided by 22 tons per load for each transfer trailer. This equates to approximately 14,554 round trips per year. The Scenario 2 and 3 volume projected is based on the five-year average MSW plus the five-year average Disaster Debris volume of 534,776 tpy divided by 22 tons per load. This equates to approximately 22,308 round trips per year. As is illustrated on Table 12, depending on the mix of out-of-county landfills that are utilized, the increased annual VMT associated with outhaul could range from approximately 1,586,386 extra miles to as much as 3,346,200 extra miles.

[13] The 1450 lbs. per CY density is a conservative number based on the average density achieved at the CDS in 2022
[14] Note: For simplicity the single CDS/CTPF location was utilized for estimating increased VMT for outhaul. If this option is pursued, waste would likely be transported from each of the remote transfer stations and the increase in VMT would vary accordingly.

Table 12
Estimated Increased Vehicle Miles Traveled (VMT) to
Out-of-county Regional Landfills

Vehicle Miles Traveled VMT Factors	Central Disposal Site (CDS)	Redwood Landfill	Potrero Hills Landfill	Keller Canyon Landfill	Hay Road Landfill
Approximate Milage from CDS - Round-Trip[15]	**0**	**31**	**109**	**120**	**150**
Annual Trips[16] Scenario 1	**14,554**	14,554	14,554	14,554	14,554
Increased VMT per Year Scenario 1	**0**	**451,174**	**1,586,386**	**1,746,480**	**2,183,100**
Annual Trips[17] Scenario 2 & 3	**22,308**	22,308	22,308	22,308	22,308
Increased VMT per Year Scenario 2 & 3	**0**	**691,548**	**2,431,572**	**2,676,960**	**3,346,200**

While it is beyond the scope of this report to estimate the increased cost of transportation or the increased GHG and other air emissions attributable to the increase in VMT from this approach, it is likely to be significant for both of these factors. If the outhaul approach is pursued by the County, it is highly recommended that additional analysis of these factors be performed as part of the due diligence in determining the feasibility of reliance on this approach as a long-term disposal option for the Sonoma County waste stream.

As mentioned previously, no contact has been made with the operators of these out-of-county landfills as part of this analysis. As part of potential subsequent due diligence, it will be important for the County to confirm these facility's willingness and capability to enter into long-term disposal agreements for Sonoma County waste as well as develop estimates of overall potential costs of this option including tip fees, transportation costs, cost of environmental impact assessments, CEQA compliance, etc.

CDS – Disposal Capacity Expansion Option

One of the two potential options identified in this report for the long-term management of Sonoma County's disposal needs is the consideration of an expansion of the permitted disposal capacity at the CDS itself. The CDS is comprised of approximately 398.5 acres of which about 172.8 acres are currently permitted for waste disposal. The 1998 Central Disposal Site Improvement Program EIR (1998 EIR) described various improvements to be made at the Central Disposal Site, including expansion into the East and West Canyons to gain additional waste disposal capacity. While the East Canyon expansion area has been pursued the West Canyon area (also referred to as the West or Western Expansion Area or WEA) has not and could provide the County with another possible physical area within or adjacent to the current property boundary to gain additional permitted disposal capacity. Two studies were commissioned by the

[15] Source: Google Maps
[16] Based on 5-yr average MSW volume presented in Scenario 1 (328,996 tpy) divided by 22 tons per load
[17] Based on 5-yr average MSW & 5-yr average Disaster Debris volume presented in Scenario 2 & 3 (534,776 tpy) divided by 22 tons per load

County in 2003[18] and 2004[19] respectively to determine the feasibility, potential capacity and costs associated with development of a West Area Expansion (WEA). Study elements of the reports included, geologic and seismic hazard investigations, groundwater investigations, geotechnical and civil engineering analysis, development of a conceptual master plan including subgrade excavation, containment system design, refuse fill plans, capacity estimates, and liner construction cost estimates. These studies concluded that an expansion of disposal capacity in the WEA would be feasible and could result in the creation of over 24 million cubic yards of future disposal capacity. To put this in perspective, this equates to approximately three times the remaining capacity currently available at the CDS.

In order to reaffirm the feasibility of expanding the permitted disposal capacity in the West Canyon area or elsewhere at the CDS, the County will need to update the work done previously by conducting new engineering and other studies. The new studies can build upon the former to, among other things, confirm or verify the specific location and total area best suited for the expansion, the potential capacity available in this area and design elements that would be required to integrate the expansion area into the existing landfill structure and operations. This would include, but not be limited to, liner systems, access road locations and routing, environmental control systems such as the leachate collection, storage and management system, the landfill gas collection and renewable energy production system, air and groundwater monitoring systems, etc. The engineering studies can also re-evaluate the need and potential for mining excavation for beneficial reuse and to create more airspace for disposal as was done in the Rock Extraction Area (REA) at the CDS. The excavation element will also benefit from a cost and logistics analysis based on current conditions and resources in the area. The studies will need to be conducted at an initial level of detail sufficient to form the design basis from which contemporary cost estimates can be prepared.

In addition to the initial physical design and capital cost estimates, the County will also need to identify the environmental review requirements that will be necessary to comply with the California Environmental Quality Act (CEQA), as well as determine the permitting path and requirements to receive approvals from the Local Enforcement Agency (LEA), CalRecycle, the North Coast Regional Water Quality Control Board (NCRWQCB), the Bay Area Air Quality Management District (BAAQMD) and others for the solid waste, water, air and the other permits that will be needed to construct and operate the expanded facility. An important part of this work will also include the development of an estimated schedule for the entire process for design, environmental review, permitting and construction that will be required to begin accepting waste at an expanded area of the CDS.

In simple terms, these initial studies and analysis will be needed to determine in greater detail and based on current circumstances the feasibility of utilizing the expansion of the permitted capacity at the CDS as a viable long-term disposal option for Sonoma County's future waste streams. These studies will help the County confirm how much airspace can be developed, and from this, estimate how much additional disposal capacity in terms cubic yards, tons and years can be expected to be available through pursuing this option. The analysis, of course, would include making a credible estimate as to how much this added capacity would cost to develop. Determining the overall cost and related cost per ton will provide the County with the data needed to make an informed comparison of the cost elements of the CDS expansion option versus the potential cost of an out-of-county disposal option. It is important to again note that while cost is a very important factor to consider, the data reviewed in this report also indicates that the out-of-county disposal option is likely to include a significant increased environmental impact related to the inherent additional Vehicle Miles Traveled, and associated GHG and other air emissions, that will be required to outhaul Sonoma County waste to remote regional landfills.

[18] GeoLogic Associates in conjunction with Bryan A. Stirrat & Associates, *"Siting and Classification Study Proposed West Area Expansion, Central Disposal Site, Sonoma County, California"* March 2003

[19] Vector Engineering, Inc., *"Western Area Expansion Area Development Plan"* January 2004

Findings and Recommendations

Provided below is a summary of the key findings and recommendations based on the data and information reviewed as part of this Preliminary Regional Disposal Capacity Analysis.

Findings

1. **Finding:** The CDS has been a valuable resource for Sonoma County jurisdictions for the day-to-day disposal of typical municipal solid waste (MSW) and for local disposal of the significant disaster debris generated from the recent and historic wildfires, severe weather, and floods

2. **Finding:** The "Time to Closure" of the CDS is primarily dependent on volume received and in-place density achieved.

3. **Finding:** Between 2017 to 2021 MSW volume remained relatively stable while the Disaster Debris fluctuated based primarily on the timing of fire events in the area.

4. **Finding:** Between 2017 to 2021 disaster debris accepted at the CDS represented 38% of the total disposal volume.

5. **Finding:** While it is not possible to predict future disasters, based on recent historical data, it would seem prudent to anticipate some volume of disaster debris will likely be generated and require disposal at the CDS.

6. **Finding:** The CDS may reasonably have a lifespan of as much as 18.8 years under the "Status Quo Scenario" and as little as 7.4 years in the "Worst-Case Scenario". While the actual lifespan will likely be somewhere in between, the important fact to understand is that the permitted capacity at the CDS is finite and its lifespan, quite credibly, may be much shorter than the status quo assumptions predict.

7. **Finding:** Increased landfill diversion from SB 1383 implementation, and other source reduction and recycling efforts, may reduce or keep even (against growth) the overall volume of waste requiring disposal, which in turn would maximize the usable lifespan of the CDS.

8. **Finding:** Approximately 24% of the total waste currently generated by Sonoma County jurisdictions is disposed of at out-of-county landfills.

9. **Finding:** While the preliminary review of the Daily Capacity Factors, and the Total Site Capacity Factors at four potential out-of-county landfills suggests that the combined out-of-county landfill network may be able to support Sonoma County's waste stream, additional research and due diligence will be needed to determine the economic and environmental impacts and overall feasibility associated with relying on outhaul for the long-term disposal needs for Sonoma County.

10. **Finding:** While the four out-of-county landfills combined appear to have sufficient estimated daily capacity to accommodate Sonoma County's MSW stream, only one of the regional landfills, Hay Road Landfill, has sufficient estimated capacity to accept the full daily disposal volume of the MSW now landfilled at the CDS.

11. **Finding:** Redwood Landfill has a current projected closure date of 2034 so, absent an expansion, this facility would not likely be available as an out-of-county disposal option by the time the current permitted capacity at the CDS runs out.

12. **Finding:** Increased annual Vehicle Miles Traveled (VMT) associated with outhaul of Sonoma County waste could range from 1,586,386 extra miles to as much as 3,346,200 extra miles per year.

13. **Finding:** While it is beyond the scope of this report to estimate the increased cost of transportation or the increased GHG and other air emissions attributable to the potential increase in VMT from this approach, it is likely to be significant for both of these factors.

14. **Finding:** The CDS is comprised of approximately 398.5 acres of which about 172.8 acres are currently permitted for waste disposal.

15. **Finding:** The 1998 Central Disposal Site Improvement Program EIR (1998 EIR) described various improvements to be made at the Central Disposal Site, including expansion into the West Canyon area to gain additional waste disposal capacity.

16. **Finding:** Two studies were commissioned by the County in 2003[20] and 2004[21] respectively to determine the feasibility, potential capacity and costs associated with development of a West Area Expansion (WEA).

17. **Finding:** Study elements of the reports included, geologic and seismic hazard investigations, groundwater investigations, geotechnical and civil engineering analysis, development of a conceptual master plan including subgrade excavation, containment system design, refuse fill plans, capacity estimates, and liner construction cost estimates.

18. **Finding:** These studies concluded that an expansion of disposal capacity in the WEA would be feasible and could result in the creation of over 24 million cubic yards of future disposal capacity, or approximately three times the remaining capacity currently available at the CDs.

19. **Finding:** This preliminary review strongly suggests that pursuing the development of additional permitted disposal capacity within or adjacent to the existing property boundary of the CDS, will provide the County and its jurisdictions more flexibility, dependability, with less environmental impact overall compared to relying on outhaul to remote out-of-county landfills for additional long-term disposal capacity.

20. **Finding:** In order to re-affirm the feasibility of expanding the permitted disposal capacity in the West Canyon area or elsewhere at the CDS, the County will need to update the work done previously by conducting new engineering and other studies to determine how much airspace can be developed and at what cost.

Recommendations

1. **Recommendation:** Perform the necessary contemporary updated studies to identify, at the CDS, the specific location and total area best suited for the expansion of permitted disposal capacity, confirm the potential airspace capacity available in this area and the design elements that would be required to integrate the expansion area into the existing landfill structure and operations. The studies will need to be conducted at an initial level of detail sufficient to form the design basis from which contemporary cost estimates can be prepared.

2. **Recommendation:** Prepare an initial capital cost estimate based on the design basis elements identified in number one (1) above.

[20] GeoLogic Associates in conjunction with Bryan A. Stirrat & Associates, *"Siting and Classification Study Proposed West Area Expansion, Central Disposal Site, Sonoma County, California"* March 2003

[21] Vector Engineering, Inc., *"Western Area Expansion Area Development Plan"* January 2004

3. **Recommendation:** Identify the environmental review requirements that will be necessary to comply with the California Environmental Quality Act (CEQA).

4. **Recommendation:** Determine the permitting path and requirements to receive approvals from the Local Enforcement Agency (LEA), CalRecycle, the North Coast Regional Water Quality Control Board (NCRWQCB), the Bay Area Air Quality Management District (BAAQMD) and others for the solid waste, water, air and the other permits that will be needed to construct and operate an expanded facility.

5. **Recommendation:** Develop an estimated schedule for the entire process for the design, environmental review, permitting, excavation and construction that will be required to begin accepting waste at the CDS.

6. **Recommendation:** Prepare an initial overall cost estimate (and related cost per ton) for the design, permitting and development of the additional disposal capacity at the CDS.

7. **Recommendation:** Perform additional due diligence to determine if and to what extent that the out-of-county regional landfills are willing and able to consider entering into long-term disposal agreements for Sonoma County waste.

8. **Recommendation:** Prepare an initial estimate of overall potential costs of the outhaul option including tip fees, transportation costs, cost of environmental impact assessments, CEQA compliance, etc.

9. **Recommendation:** Refine the data related to increased VMT associated with outhaul of waste and quantify the magnitude of increased GHG and other emissions that would result from this approach.

10. **Recommendation:** Prepare an initial cost comparison estimate of expansion of disposal capacity at the CDS versus relying on outhaul to remote out-of-county landfills for additional long-term disposal capacity.