Promontory Point Landfill Class V Permit Needs Assessment Report Volume I

Prepared for Promontory Point Resources, LLC

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1. Purpose and Approach of This Needs Assessment

1.1. Background

Promontory Point Resources, LLC (PPR) is submitting an application to the Utah Department of Environmental Quality (DEQ) for a Class V permit for its Promontory Point Landfill (PPL) to allow it to accept a wider range of nonhazardous wastes than presently allowed under PPL's current Class I permit. In addition to municipal solid wastes (MSW) contracted directly from municipalities, counties, and other publicly owned solid waste management entities operating in the State of Utah, a Class V permit would expand PPL's potential market to include municipal and other nonhazardous solid wastes directly from commercial sources (including commercial waste collectors, haulers, and industrial sources), including sources (both commercial and public) outside of Utah. PPL is *not* seeking a permit to accept wastes characterized as hazardous under either federal or Utah state law.

Under Utah Code Title 19, Chapter 6, Part 1, Subsection 108, Subsections 10 and 11, the Class V permit application process requires submission of an economic market analysis that justifies the need for an additional commercial landfill in Utah. PPR has engaged National Economic Research Associates, Incorporated (NERA) to prepare this report to the Director of the Utah Division of Waste Management and Radiation Control (DWMRC) to fulfill that statutory requirement. This report presents the results of economic market analyses that provide a robust basis for the Director of DWMRC to conclude that a new Class V landfill located at the PPL site will provide net benefits to Utah, while accounting for existing capacity of such landfills in Utah and over the broader western region of the United States.

The focus of this report is on two detailed analyses of PPL's potential competitiveness for providing cost-effective landfilling services for two of the key waste forms that PPL would be able to accept under a Class V permit. The specific waste forms addressed in NERA's economic market analyses, and documented in this report, are:

- MSW generated in northern Utah and southeastern Idaho, including both commercially- and publicly-collected wastes.
- Excavated soils from northern California cleanup projects that are classified as non-hazardous under federal and Utah state law, but which California classifies more stringently, requiring disposal in a RCRA Subtitle C landfill if disposed in California.[1]

Sound economics practice in market analysis requires that the product or service being analyzed be specifically defined so that its demand and competing suppliers can be clearly identified, in order to obtain robust conclusions about potential market outcomes. Thus, the waste forms analyzed in detail in this report are necessarily more specific and narrower than the full range of waste forms that could benefit from PPL having a Class V permit. NERA has taken the approach of demonstrating a proven market for at least two of the key waste forms (MSW and excavated soils) that PPL would be able to support, and which could provide a sufficient demand for PPL to be able to achieve the scale of operations comparable to that of its surrounding commercial landfill competitors. The report also discusses how the insights

[1] The soils are sometimes referred to as "Non-RCRA" soils, to denote that these soils are nonhazardous under the federal Resource Conservation and Recovery Act (RCRA).

derived from these market analyses allow inferences about the market benefits that PPL could provide to the larger universe of waste forms that would become acceptable at PPL with a Class V permit.

In addition to explaining these new, robust market analyses, this report addresses all of the other elements required of the needs assessment under Subsections 10 and 11 of the statute, either by providing new information developed by NERA, or by referencing and summarizing the relevant information in other documents in the Director's record.

1.2. Overview of Economics-Based Approach Necessary to Meet Requirements of Utah Code § 19-6-108 (10) and (11)

Utah Code § 19-6-108(10) lists specific information that is required as part of a demonstration of the need for a new additional commercial landfill in Utah. In condensed form, Subsection 10 requires:[2]

a) evidence that the proposed commercial facility has a proven market of nonhazardous solid […] waste,

b) a description of the public benefits of the proposed facility, and

c) compliance history of an owner or operator of a proposed commercial nonhazardous solid […] waste treatment, storage, or disposal facility, which may be applied by the director in a nonhazardous solid […] waste operation plan decision, including any plan conditions.

Additionally, Subsection 11 requires the Director to determine that:

a) the probable beneficial environmental effect of the facility to the state outweighs the probable adverse environmental effect; and

b) there is a need for the facility to serve industry within the state.

The above determination is to be made in light of all of the evidence provided in response to the requirements of Subsection 10 as well in the permit application itself.[3] In essence, it requires a synthesis of all the material provided by the applicant in decision-relevant, "net benefit" terms – both net environmental benefits and net economic benefits to the state. Although this determination is to be made by the Director, net benefit evaluations are well within the purview of economists, including environmental economists, and this report also provides such a synthesis based on the new information provided in this report and elsewhere in the Director's record.

The remaining sections of this report are structured around the above requirements that are the appropriate domain of NERA's environmental economists. We note, however, that this report does not directly incorporate the compliance history information required under Subsection (10)(c), as this is

[2] The ellipses in these quotes from the statute have removed references to hazardous waste, which are irrelevant to the Class V permit application for PPL, which *does not seek permission to accept hazardous wastes.*

[3] The requirements of the permit application are identified in Utah Code § 19-6-108(9).

information of which only PPR has knowledge. This information is provided as a supplement to this report in a document prepared separately by PPR.[4]

As a prelude to the presentation of NERA's analytical findings, we believe it is helpful to explain our perspective on the economic principles of determining "need" in the context of this statute, which speaks in terms of whether there is a "proven" market in a situation where the new supplier (i.e., commercial landfill) has not yet entered the market. The language of the statute, and indeed the specific types of information listed as required under Subsection (10)(a), might be interpreted by some readers as implying that need only arises if the total capacity of available landfills will be exceeded by the total volume of waste expected to be produced in the near future, or if the new landfill will charge a price that is lower than existing landfills.[5] This would be an overly simplistic way of determining whether a new entrant is "needed". Economists also consider whether the existing capacity is *located* well with respect to the demand for that service or product. This is a particularly important consideration when accessing the service or product requires a significant transportation cost, in addition to the price charged for the service/product itself. Restated in terms of landfills, the cost of disposing of waste is determined by the combination of transporting it to the landfill and the price charged by the landfill for disposing of it (i.e., the tipping fee). If the transportation cost to a particular landfill is high, it does not matter if that landfill charges a relatively low tipping fee, nor that it has enough capacity to continue accepting the region's wastes for centuries – another landfill is "needed" if it can offer a reduced cost for the transportation component without a higher tipping fee. Addition to the market of such an additional landfill improves economic efficiency: it reduces transportation costs while providing the same service, leading to a better allocation of economic resources. Thus, the quantity of current landfill capacity is largely irrelevant to determining potential benefits to the waste-generating community, or the potential for a robust demand to emerge for a new entrant.[6] These economic aspects of "need" must account for the *location* of landfill capacity too.

Additionally, current tipping fees (i.e., "prices charged") are not necessarily indicative of whether a new entrant may be economically beneficial to the state or region, nor what that new entrant might charge. A principle of economics is that market prices are determined by the intersection of supply and demand curves.[7] Adding a new commercial landfill effectively shifts the supply curve for waste disposal outwards by the amount of the new entrant's capacity, and this shift reduces the equilibrium price for waste disposal services, as long as the new entrant can provide services to some waste generators at lower cost than any of the existing landfills. Even if all the landfills have the same costs, the relevant determinant of cost from the perspective of the waste-disposing customer is the sum of the cost of transportation plus the tipping fee. Thus, if the new entrant has operating costs for conducting the activity

[4] It can be found in PPR's 2020 Class V application.

[5] For example, Subsection (10)(a)(i) requires "information on the source, quantity, and price charged for treating, storing, and disposing of potential nonhazardous solid […] waste in the state and regionally."

[6] By "community," we mean all of the various entities that have waste disposal needs, including commercial businesses, industries, and residents of the state or region.

[7] This is true even in a monopolistic situation if the market is not price-regulated or publicly-owned. In the latter cases, the price is usually determined by the provider's cost plus a return on capital. A cost-of-service pricing mindset may remain in MSW circles because it would have been the typical way that publicly-owned landfills have been priced. However, pricing by the growing ranks of commercial landfills is driven by the standard equilibrium concepts of market theory.

of landfilling that are roughly similar to those of competing landfills, if it is located "well,"[8] it will almost certainly be a lower cost provider for waste generators that will find it less costly to transport the waste to (either because it is closer or it can be reached by a cheaper mode of transport such as rail) than any of the competitors – again, regardless of the capacity at the competitors. The primary question is whether the waste generators that will find the new landfill to have a lower transportation cost will produce a sufficient demand for the new landfill to achieve scale, and thus be able to offer tipping fees that can match those charged by the competitors. If so, it does not matter what the tipping fees are, either at the existing landfills or at the new landfill—there will be benefits to the region's cost of living and cost of doing business in the form of lower total-cost-of-disposal for some.

If the new entrant also contributes to a reduction in existing market concentration, its entrance may also reduce the ability of the existing supplier(s) to charge a premium on top of their costs and drive even larger market price reduction than that merely due to the supply curve's shift by the capacity of the new entrant. That is, if the incumbents continue to charge such a premium, the new entrant will be the lower total-cost landfill for a wider swath of the existing landfill's potential customers. In order to retain as many of those customers as possible, their profit-maximizing action will be to lower their tipping fees to the point where they can still make a return on their investment. Thus, there will be economic benefits to some of the competing landfill's existing customers even if they do not shift their wastes to the new landfill. Assuming landfills can offer discounts to their tipping fees to specific potential customers without revealing the discounts to the public, one may not be able to observe these benefits, but it is quite reasonable to expect such discounts will occur in the parts of the region where the new entrant's potential market under current pricing overlaps with the current customer base of the existing competitor(s). These economic benefits are shifts from the profits of the current landfills to their customers, not shifts of profits from the existing landfill company to the new entrant company. They benefit the state/region's economy silently.

1.3. Organization of the Report

In Section 2 of this Needs Assessment report, we provide economic analyses that evaluate the areal extent of PPL's competitiveness against the competitors that it faces in the state and regionally, and the waste volumes that exist in that area. Because each waste form that PPL would be able to accept with a Class V permit will be subject to different transportation cost considerations, and will require consideration of a different set of existing competitors, our analyses are conducted separately for two specific waste forms that PPR considers an important component of achieving scale. In each separate analysis, we identify the existing and proposed commercial landfills that would be natural competitors for that specific waste form and waste generating locations. We include competing landfills both at a local and at a regional level, considering the broadest region that could reasonably be expected to offer a cheaper disposal alternative to the PPL landfill with a Class V permit. This addresses the informational requirement of Subsection (10)(a)(iii).[9] We also discuss the quantities of each waste form within the wasteshed area for which we determine PPL will likely be the lowest total-cost-of-disposal commercial landfill alternative. We provide estimates of quantities generated in recent years and assess their likely trends into the future. This

[8] By located "well," we mean that it is not very close physically to any of the existing competitors yet is in a location where there are economic activities in need of landfilling services.

[9] "(iii) a review of other existing and proposed commercial nonhazardous solid … waste facilities regionally and nationally that would compete for the treatment, storage, or disposal of the nonhazardous solid … waste.

addresses the informational requirement of Subsection (10)(a)(i).[10] However, these are provided not just because they are required under Subsection (10)(a), but because they are the essential inputs to the economic market analysis that is required under Subsection (10)(a)(ii), which is "*a market analysis of the need for a commercial facility given existing and potential generation of nonhazardous solid … waste in the state and regionally*."[11]

We conclude each waste form's market analysis with a description of the public benefits that will ensue from PPL being able to provide those particular landfill services, including approximate quantitative estimates of those benefits that are financial in nature. This concluding discussion is provided for each waste form to satisfy the informational requirements of Subsection (10)(b), which—for nonhazardous waste permit applications—is to include:

(i) *the need in the state for the additional capacity for the management of nonhazardous solid … waste;*

(ii) *the energy and resources recoverable by the proposed facility;*

(iii) *the reduction of nonhazardous solid … waste management methods, which are less suitable for the environment, that would be made possible by the proposed facility.*[12]

That this report does not quantitatively analyze the market for other waste forms does not imply that PPL would not also be able to benefit generators of those wastes in certain areas of the state or region. The third part of Section 2 of this report identifies some of the additional waste forms that could add to PPL's total demand and thus further improve its cost-effectiveness, and concludes the section with a discussion of the potential magnitude of macroeconomic benefits to the economy of Utah due to the economic activity associated with operating PPL, and which are additional to the waste management cost-savings obtained by its customers. This section provides supplemental information of relevance to the requirement of Subsection (10)(b) to describe the public benefits that would be gained by approving PPL's application for a nonhazardous waste Class V permit.

Section 3 of this report addresses the questions raised in Subsection (11) of the statute. This section summarizes and synthesizes the results of the analyses reported in Section 2 in terms of their implications for a determination that industry, businesses, and residents of Utah will benefit economically from the presence of a Class V landfill located at Promontory Point, UT. It also summarizes the reasons why expanded reliance on PPL by communities in northern Utah and southeastern Idaho can be expected to have beneficial environmental effects that outweigh the potential for adverse environmental effects.

[10] "(i) information on the source, quantity, and price charged for treating, storing, and disposing of potential nonhazardous solid … waste in the state and regionally".

[11] In contrast, the availability of sufficient capacity at the existing commercial landfills to meet the total regional demand for waste disposal is not relevant to the determination of whether there is a need for a new commercial landfill at a different location in the region. While such capacity estimates are provided elsewhere in the Director's record, they are not emphasized in our market analysis because they have no bearing on the evaluation of economic need for an additional landfill – locational benefits of that new facility is the primary determinant of the need for it.

[12] Again, the ellipses in this quoted text has, for clarity, removed mentions of hazardous waste, which are not relevant to PPL's Class V permit application.

Table 1 summarizes where in this report information is found that responds to each of the requirements of Section 19-6-108 for a Needs Assessment.

Table 1. Where to Find Responses to Each Requirement of 19-6-108 Within This Needs Assessment Report

Subsections of 19-6-108	Information Required by Subsection	Locations Addressed in Report
10(a)(i)	Source, quantity, and price charged for disposing of potential nonhazardous solid waste in the state and regionally	2.1.3 (for MSW) 2.2.3 (for excavated soils) 2.3.2 (for other waste forms)
10(a)(ii)	Market analysis of the need for a commercial facility given existing and potential generation of nonhazardous solid waste in the state and regionally	2.1.2, 2.1.3, 2.1.4 (for MSW) 2.2.2, 2.2.3 (for excavated soils)
10(a)(iii)	Review of other commercial solid waste facilities regionally and nationally that would compete for disposal	2.1.1 (for MSW) 2.2.1 (for excavated soils)
10(b)(i)	State's need for the additional capacity for management of nonhazardous solid waste	2.1.4 (for MSW) 2.2.4 (for excavated soils)
10(b)(ii)	Energy and resources recoverable by the proposed facility	2.4
10(b)(iii)	Reduction of nonhazardous solid waste management methods that are less suitable for the environment that would be made possible by the proposed facility	2.1.2 (for MSW) 3.1
10(b)(iv)	*N/A—relevant only for a hazardous waste permit, which PPR does not seek*	
10(c)	Compliance history of owner or operator	Provided in PPR's 2020 Class V permit application
11(a)	Probable beneficial environmental effect outweighs probable adverse environmental effect	3.1
11(b)	There is a need for the facility to serve industry in the state	3.2

2. Economic Analyses of the Market Benefits of a New Commercial Class V Landfill at the PPL Site

This section of the report contains summaries of the two detailed market analyses that NERA has conducted and related economic impact information that, as a whole, cover the informational requirements of Utah Code § 19-6-108(10) subsections (a) and (b). Section 2.1 of the report provides an overview and key results of the full market analysis that NERA has conducted of commercial landfill competition for MSW in the region surrounding the PPL location. Section 2.2 provides an overview and key results of the full market analysis that NERA has conducted of commercial landfill competition for excavated soils generated in northern California. These sections focus on the insights from the analysis to address the specific informational requirements of a Needs Assessment while the full documentation of the calculations and data used to derive the results is provided in four appendices (which are provided in Volume II of this report). Section 2.3 discusses market potential beyond the two major waste forms for which robust market analyses have been completed, and addresses additional dimensions of the public benefits that PPL will bring to Utah, which are macroeconomic and fiscal benefits due to incremental jobs, revenues, and expenditures that PPL can bring into the state if it has a Class V permit.

As noted in Section 1 of the report, Subsection 19-6-108(10)(c) requires submission of information of the compliance history of the PPR leadership. This information is being provided by PPR as part of its 2020 Class V application. NERA has no knowledge of PPR compliance history.

2.1. Market Analysis of Potential Demand for PPL's MSW Disposal Services

MSW comprises both residentially generated wastes that are collected by or on behalf of public entities such as municipalities and counties and commercially-generated wastes that are collected under private contract. Historically, MSW was disposed at publicly-owned landfills, and that continues to be the common practice today. However, in 1991 the USEPA promulgated new criteria for the design, operations, monitoring and closure of new nonhazardous landfills. The heightened cost of meeting these requirements led to a shift in the construction of new landfills since 1991 to much larger landfills that could benefit from economies of scale to cover the heightened capital and operating costs without as much increase in disposal cost per ton as would be associated with building another smaller landfill such as individual towns and counties typically own. Due to their larger size, these post-1991 landfills have been built in more remote locations and are often referred to as "regional" landfills.[13]

To transport the MSW to these more distant disposal locations, transfer stations have been constructed within the more densely populated areas. Once collected from the residential and commercial entities, much of the MSW is consolidated at a local transfer station, where it is then loaded into larger trucks that then transfer the MSW in larger volumes over the longer hauling distance to the regional landfill.[14]

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[13] USEPA, *Waste Transfer Stations: A Manual for Decision-Making*, EPA530-R-02-002, Office of Solid Waste and Emergency Management, June 2002 (available at: https://www.epa.gov/sites/production/files/2016-03/documents/r02002.pdf).

[14] In some regions, the consolidated MSW is placed on rail cars rather than waste transfer trucks and taken to a regional landfill that has rail access. Known as "waste-by-rail," the distance to a community's MSW landfill can be very large. While waste-by-rail may ultimately become the dominant model, it was initially tried and did not succeed in northern Utah. That is, several communities in the Salt Lake City area did adopt waste-by-rail in the 1990s¸ sending their MSW by rail to the relatively distant ECDC landfill in Carbon County. However, due largely to logistics difficulty with the rail route to ECDC and the rail company's desire not to provide tariffs that would continue to make it cost-effective, by 2006 MSW-by-rail was shifted to trucking to other regional landfills that had by then been permitted within trucking distance. Soon thereafter, the truck-to-rail

Transfer stations have been built even in communities that continue to use their pre-1991 landfills, but their presence reflects the gradual process of transitioning the bulk of MSW disposal away from smaller, local landfills towards regional landfills as the pre-1991 landfills reach their capacity.

Some regional landfills are owned by public entities, although given their size, the ownership tends to be consortia of multiple public waste management entities. An example in the Salt Lake region is the Bayview Landfill, owned by a consortium of northern Utah waste management districts called NUERA. However, many regional landfills have been developed under private ownership, referred to in Section 19-6-108 as "commercial" landfills, as the complexity of coordinating the disposal needs of many different waste-generating communities may be more suited to a private business model. To reach economic scale, however, a commercial regional landfill must have flexibility to accept wastes from many different types of entities—including commercial as well as public—and to be able to extend their service area outside of their state's boundaries—particularly if the commercial landfill (like PPL) is located relatively close to its state borders. In Utah, this requires a Class V permit, and it is for this reason that PPL is seeking approval for a Class V permit.

PPL does have a Class I permit, but this permit limits its sources of wastes to only those received under contract with an in-state government entity. Although PPL seeks a Class V permit in order to achieve cost-effective scale in its operations, it does also view MSW as one of its key sources of waste disposal demand under a Class V permit as well.[15] *It is for this reason that NERA has developed a quantitative analysis of PPL's potential market for MSW.* Before proceeding to a description of that analysis, however, we note that the Class V designation would also provide two key business enhancements to PPL with respect to its MSW market focus:

- PPL would be able to accept MSW directly from commercial collectors even before they can expect to obtain contracts for the residential MSW disposal needs of the same communities; and

- PPL would be able to accept MSW from communities in other states, particularly from southeastern Idaho, which is as close to its site as the center of Salt Lake City.

Our analysis of PPL's economic wasteshed for MSW therefore takes into consideration these additional potential sources of MSW disposal demand.[16]

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transfer stations in the area were closed and dismantled (see https://utahrails.net/industries/trash-by-train.php for more details). The immediate beneficiary of this shift to MSW-by-truck was the Wasatch Regional Landfill in Tooele County (see, for example, Weber County's Contract For Solid Waste Transportation And Disposal with ECDC Environmental, L.C., Third Amendment, March 1, 2005). However, other regional landfills within trucking distance of the southern Wasatch Front's transfer stations have since started receiving trucked-in MSW from relatively distant transfer stations (e.g., Intermountain Regional Landfill and Tekoi Landfill, both on the southern side of the Great Salt Lake), reinforcing the Wasatch Front's reliance on regional trucking of MSW rather than regional MSW-by-Rail.

[15] For example, PPL's Class I Permit Application stated its "Purpose and Need" to be: "*The need for the landfill results from the expanding waste disposal requirements of the rapidly growing population in northern Utah. Many of the existing landfills along the Wasatch Front are nearing closure or are under scrutiny due to encroachment of expanding urban areas. The proposed landfill would provide an alternative disposal option for the municipalities and counties of Utah, while offering the advantages of low operational cost, long-term capacity, and relatively low transportation costs*." (*Promontory Landfill LLC Class I Landfill Permit Application*, August 2008, available via E-Z Records Search on DEQ.utah.gov under record number DSHW-2011-006047.)

[16] This market analysis is for MSW only and does not include Construction and Demolition (C&D) waste.

2.1.1. Description of Commercial Competitors to PPL for MSW

One of the first steps in a market analysis—which is also an informational requirement under Subsection 19-6-108(10)(a)(iii)—is to evaluate the relevant potential commercial competitors to PPL. For this section, we focus specifically on the potential commercial competitors for MSW.

Our initial list included all of the privately-owned Class V landfills within Utah.[17] This initial list includes the ECDC Landfill owned by Republic, which also owns Wasatch Regional Landfill. The ECDC business model for at least the past 13 years has been to take almost solely industrial wastes,[18] while Wasatch Regional has taken almost solely MSW wastes.[19] Nevertheless, ECDC is large enough to take substantial volumes of MSW if it were to choose to move back into that market, and so we decided to retain ECDC in analysis of potential commercial competitors to PPL, to err on the side of inclusiveness.

We also researched whether there are non-privately owned landfills in Utah known to be accepting large volumes of residential MSW from cities not within their jurisdiction. This led us to add the Tekoi Landfill on tribal land in Tooele County to our list. Tekoi Landfill is operated by Waste Management but appears still to be owned by the Skull Valley Band of Goshute Indian Community.[20] It was not initially on our list of competitors because, being on a federally recognized Indian Reservation, it is not regulated by the State of Utah and thus is not listed in DWMRC databases of existing Utah landfills with various Class permits. We decided to err on the side of inclusiveness because there is evidence it may be operating on a commercial model by competing for contracts to dispose MSW as regional communities start to close their landfills.[21]

Additionally, because of PPL's proximity to Idaho, and because our market analysis was to evaluate whether PPL could be competitive for MSW from any of the southern Idaho region, we developed a

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[17] There are two Class V landfills in Utah that were not included on this list, for the following reasons. (1) Payson City Landfill is not privately-owned. It also stated in its 2015 permit renewal application that "the Payson Landfill is used for waste disposal for the south Utah County area and does not compete for regional or out-of-state business." It is not clear why it has a Class V permit, but this might be because it also considers its market to include commercial waste haulers in its local area, which it states lack a nearby alternative landfill (Section 1.9.1 of Payson City Landfill's permit application, available at: https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/payson-city-landfill/DSHW-2015-005874.pdf). (2) Mountain View Landfill is privately-owned by Waste Management but does not accept MSW. Its fact sheet states that it "is approved as a Class VI unlined inert construction and demolition (C&D) landfill that includes a portion of the site as a Class V Asbestos Mono-fill (available at: https://www.wmsolutions.com/pdf/factsheet/Mountain_View_Landfill_Fact_Sheet.pdf). It also would not be a commercial competitor with PPL for regional MSW.

[18] According to its annual tonnage reports, it has disposed of less than 20,000 tons per year of MSW since 2007, while taking up to 600,000 tons per year of industrial waste during the same period. (See ECDC Environmental Annual Solid Waste Reports for the years 2007 through 2019 (available at: http://eqedocs.utah.gov/).

[19] According to its annual tonnage reports, it has disposed of about 530,000 tons of MSW since 2007, while taking less than 45,000 per year of industrial waste during the same period. (See Wasatch Regional Landfill Annual Solid Waste Reports for the years 2007 through 2019 (available at: http://eqedocs.utah.gov/).

[20] Per the 2010 USEPA Title V Permit, No. V-SV-00001-2010.00, for the Tekoi Landfill (available at: https://www.epa.gov/sites/production/files/documents/WM-TekoiLandfillFinalInitialSOBV-SV-00001-2010.00.pdf).

[21] Specifically, it is our understanding that Tekoi bid for and won the contract to dispose about half of the MSW generated in the Wasatch Integrated Waste Management District (WIWMD) that WIWMD initiated in 2020 to handle the incremental waste disposal needs created by the closure of its waste-to-energy facility. (Personal communication, Brett Snelgrove, Vice President of Operations, PPR.)

complete list of existing Idaho landfills. Many of these landfills are owned by individual counties, and there is one regional landfill owned by a consortium of counties called Milner Butte in Cassia County in southern Idaho and very preliminary discussions of another.[22] The only commercially-owned regional landfill that we identified in Idaho is Simco Road Regional Landfill, in Elmore County (in the Boise area).

Table 2 provides our final list of potential commercial competitors to PPL in both Utah and Idaho that we have included in our market analysis for commercial MSW disposal services.[23]

Table 2. Existing and Proposed Commercial Landfills Potentially Competing with PPL for MSW Disposal Services

Landfill	Location	Owner	Permit Type
Promontory Point Landfill	Box Elder Co., UT	PPR	Applicant for UT Class V
ECDC Environmental Landfill	Carbon Co., UT	Republic Services	UT Class V
Intermountain Regional Landfill	Tooele Co., UT	ROC Fund Landfill Holdings, LLC	UT Class V
Wasatch Regional Landfill	Tooele Co., UT	Republic	UT Class V
Tekoi Landfill	Tooele Co., UT	Skull Valley Band of Goshute Indian Community (op. by Waste Management)	Not subject to state permitting (tribal land)
Simco Road Regional Landfill	Elmore Co., ID	Idaho Regional Waste Services, LLC	ID commercial Subtitle D permit

2.1.2. Approach and Projected Economic Region of MSW Demand for PPL

The technical approach NERA used to assess the area of wasteshed over which PPL appears to have a competitive advantage over its commercial competitors for MSW landfilling services is based on travel cost analysis, which is a standard tool that economists use to assess the market region of businesses in a range of applications, including antitrust legal proceedings (which need to determine changes in local market concentrations likely to occur under a merger) and assessing economic damages from environmental contamination.[24] Specifically, our analysis in the case of landfills works from the

[22] The consortium of seven counties in south central Idaho owning Milner Butte is called South Idaho Solid Waste (available at: http://sisw.org/index.html). There are early-stage discussions among counties in southeastern Idaho and southwestern Wyoming of possibly organizing their own publicly-owned regional landfill to address their pressing needs to transition away from their small and environmentally less-suitable county landfills that are filling up rapidly in that area (see https://www.hjnews.com/montpelier/regional-landfill-plans-in-the-works/article_7cc15bf2-b909-5669-bcd6-ed93ba0c4468.html). Our market analysis in this section evaluates how a Class V permit for PPL would serve those needs for cost-effective regional landfill capacity in addition to the needs of communities in northern Utah.

[23] Based on sources of information identified in **Appendix A**, we estimate the remaining years for each of the existing landfills in the table to be: ECDC Environmental—1,407 years; Intermountain Regional—39 years; Wasatch Regional—400 years; Tekoi—263 years; Simco Road Regional—78 years. As discussed in Section 1.2 and will be further discussed in Section 3.1.1, an evaluation of the need for additional capacity should be based on the equitable and efficient geographic distribution of capacity and not on the sum of years of capacity across an entire region. However, we provide these estimates for completeness.

[24] An example of the latter is assessing the damages to tourism when oil spills contaminate popular beach destinations.

presumption that MSW, if it is not automatically to be sent to the local publicly-owned landfill, will be sent to the landfill that offers the lowest total-cost-of-disposal.

Total-cost-of-disposal is the sum of the tipping fee plus the cost to transport the waste to the landfill. Transportation cost varies dramatically across the competing landfills when considered from any single waste origin, and thus is a critical determinant of the physical region over which each landfill can potentially be competitive. Given that the action of landfilling MSW, once it arrives at a landfill gate, is a very similar physical process for every large modern landfill, the minimum tipping fees that the competing commercial landfills can offer (assuming they are operating at a reasonable scale overall) will probably not differ very much.[25] Thus, it is feasible to develop estimates of the *relative* total-cost-of-disposal based on the transportation cost from a given "origin" location.

The landfill with the lowest transportation cost is likely to be the primary contender for wastes generated in that location. We recognize, however, that this is not a precise predictor of where that waste will actually go. In particular, if the *amount* of difference in the transportation cost is small relative to the next-closest landfill destination(s), uncertainties in outcomes of tipping fee negotiations may result in the more-distant landfill(s) actually offering a lower total-cost-of-disposal. This creates uncertainty on the precise borders of a landfill's competitive region, but the uncertainty operates in both directions – towards a larger as well as a smaller potential region. Thus, an analysis that considers transportation costs alone can be very helpful in identifying the regional extent of each landfill's market.

Simply knowing the regional area over which a landfill is the top competitor does not determine the magnitude of its potential MSW demand. The actual potential demand will also depend on the quantity of MSW that is produced across that region. We take this into account as well in our analysis, but first focus on identifying the region over which PPL would provide lowest-cost transportation.

To define the region over which PPL would be the lowest-transportation cost destination, we used a standard software tool used for route planning in the trucking industry called PC*Miler.[26] The specific details of how we used PC*Miler are documented in **Appendix A**. Briefly, we identified a number of locations throughout the Wasatch Front that could serve as indicators of the starting point of loaded MSW transfer trucks and used the software to calculate both the distance and the travel time from that "origin" to each of the competing landfills in **Table 2.** For most of our MSW origin locations, we used the network of transfer stations in the area. We also added a few origination locations in areas not presently served with transfer stations, in order to get a reasonable coverage of the potential market in those areas. Our final set of locations that we analyzed as MSW route origins are shown on the map of **Figure 1**, along with the locations of the commercial landfills included in our market analysis (which were first identified in **Table 2**).

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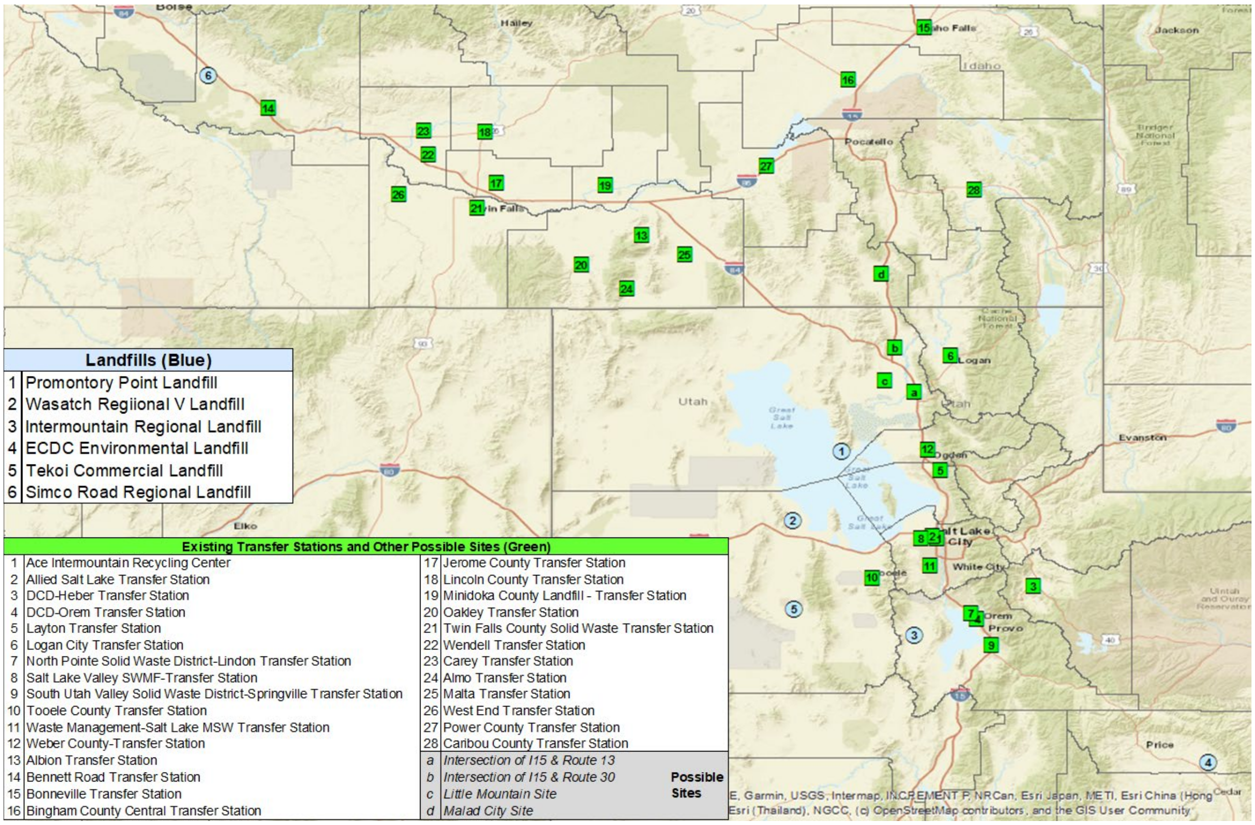
[25] Regardless of what is posted, tipping fees are subject to negotiation, with the owners free to offer any disposal cost per ton it wishes on a customer by customer basis. In a highly competitive situation, it is reasonable to expect that negotiated fees (which are rarely publicly announced) will tend to be driven down towards the landfill's operating cost per ton. In practice, landfill owners will also consider which of the types of wastes it can attract provides the highest profitability and may choose not to negotiate to its minimum level for each waste form. Nevertheless, all large commercial landfills face a similar cost structure underlying these waste-mix prioritization decisions when considering what prices to offer.

[26] PC*Miler (available at: https://www.pcmiler.com/about/).

Figure 1. Locations of Route Origins and Landfill Destinations



For each origin-destination pair in the figure, we computed distance and time, letting PC*Miler determine the actual route between them (assuming a heavy duty waste transfer truck). We considered a range of starting times from 4 a.m. until 5 p.m., because the software accounts for current average levels congestion on each route as a function of time of day to compute travel time along each optimal origin-destination route. (It makes no difference to distance, however, as the best route seems not to vary with time of day.) The results did not vary enormously, but we present here results based on an 8 a.m. starting time, which had the longest travel times in almost all cases.

There are a number of ways to consider the results. **Figure 2** maps the area over which PPL offers the least travel time of any of the commercial competitors. **Figure 3** maps the area over which PPL offers the shortest route (in miles travelled). These results indicate that, as expected, the wasteshed of PPL for MSW specifically is in the northern part of the Wasatch Front. It also shows that PPL will be a competitive commercial landfill well north into southeastern Idaho. The approximate area over which PPL appears to be competitive is somewhat larger if based on distance rather than likely travel time. This in turn reflects the fact that a greater portion of the route into PPL is on lower-grade roadway than appears to be the case for the other regional landfills.

Figure 2. Differences of Travel Time to PPL Versus Next Closest Competing Landfill (8 a.m. Departure from Origin)

(Numbers in black above each origin marker indicate the estimated difference in minutes, with negative values indicating that PPL has the shortest travel time. Blue shaded zone is the <u>approximate</u> area over which PPL is the lowest travel-time destination.)

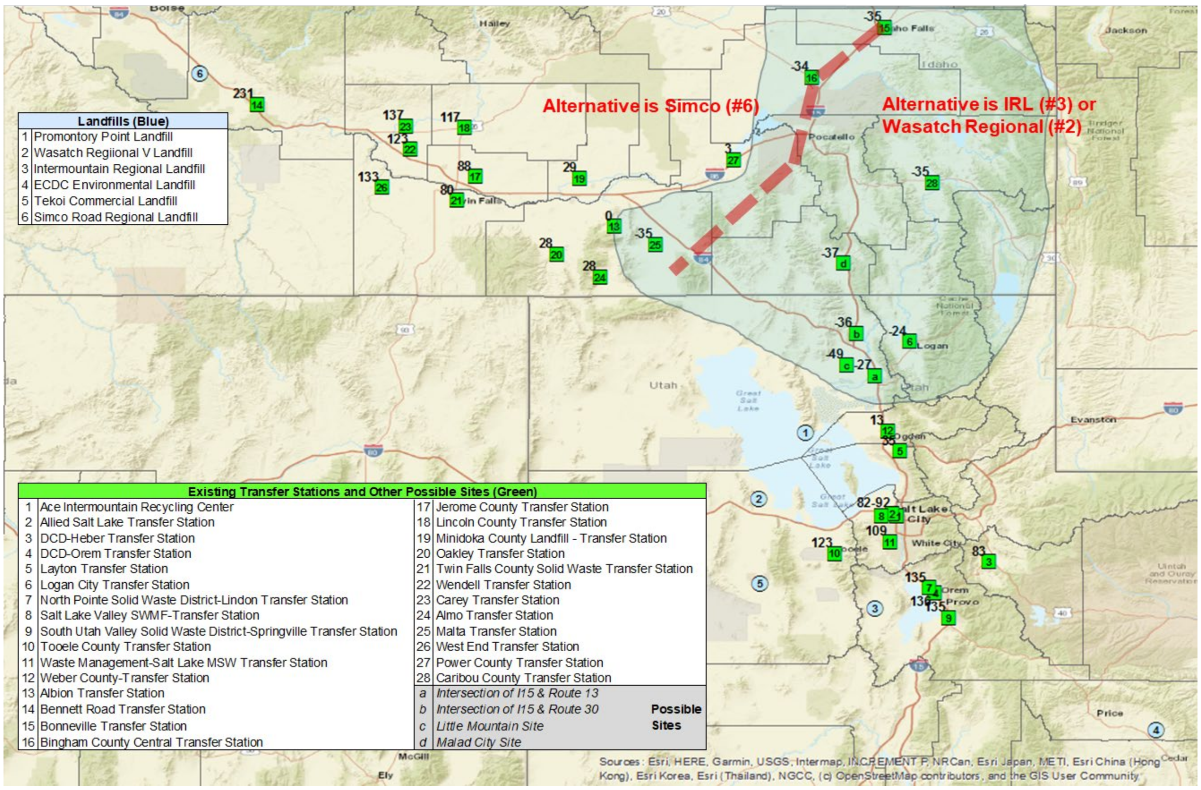
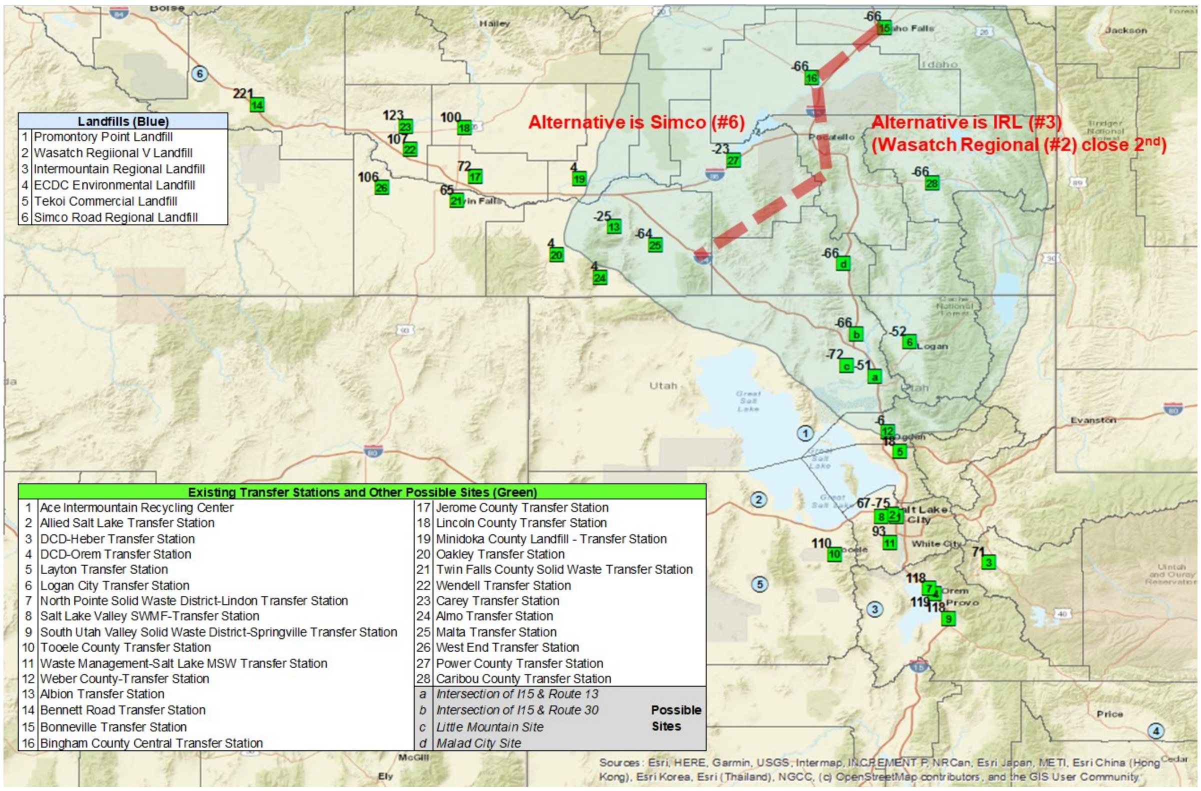


Figure 3. Differences in Trucking Distance to PPL Versus Next Closest Competing Landfill

(Numbers in black above each origin marker indicate the difference in miles, with negative values indicating that PPL has the shortest route. Blue shaded zone is the approximate area over which PPL is the lowest travel-distance destination.)



We do not know whether waste haulers will be more concerned with distance or likely travel time when estimating their travel cost. We understand that most haulers provide bids based on distance, but this does not mean they do not consider likely travel time as well. We thus cannot refine the assessment of the region more than to say that it appears PPL could be competitive on the basis of the travel cost portion of total-cost-of-disposal over a region of northern Utah that extends as far south as Weber County. To the extent that PPL further upgrades the road along the Promontory Point peninsula, this will become even more likely. We also note that there is concern that the more rapid growth in the southern portions of the Wasatch Front will increase congestion on I-15 south of Ogden more than to its north.[27] If such shifts in

[27] See, for example, the estimates of increasing road congestion in the Wasatch Front Central Corridor (WFCC) Study 2050, Wasatch Front Regional Council, May 2017 (technical report available at: http://wfccstudy.org//wp-content/uploads/2017/09/Data-and-Modeling-Technical-Memorandum-FINAL-041817.pdf) and the West Davis Corridor Project, Technical Report 7, 2040 Travel Demand Model Report, Utah Department of Transportation, September 2016 (available at: https://westdavis.udot.utah.gov/wp-content/uploads/2019/10/TM07_Base_Travel_Demand_Model.pdf). The WFCC study (Figures 74-76) indicates increasing travel times by 2050 compared to 2014 over various subsegments of I-15 located between Kaysville and Lehi. Stated as average miles per hour, decreases for some subsegments and times of day are as much as -24%. The West Davis Corridor report projects changes in average miles per hour on I-15 more to the north, from Centerville to S. Ogden. It projects a reduction in average miles per hour by 2040 compared to 2011 of about -5% (Table 16). We are unaware of projections of congestion north of Ogden, on the route to PPL, which one might take to be an indication of less concern with growing congestion in that most northern part of the Wasatch Front.

relative amounts of congestion do occur, PPL's likelihood of being competitive for wastes from the Weber County area will also increase over our analysis results, which are based on current traffic congestion.

Finally, this analysis has demonstrated the importance of PPL as a regional MSW option to Idaho communities. Idaho has only one commercial regional landfill option, and it is poorly located to support southeastern Idaho communities.[28] Thus, PPL provides a far superior commercial regional landfilling option for the southeastern area of Idaho. While these benefits of PPL will accrue outside of Utah, they should not be ignored when evaluating the market potential for PPL to succeed if its Class V permit application is approved. It should also be recognized that this region of Idaho, while not densely populated, appears to have very limited landfill options without PPL. Its existing publicly-owned landfills also appear to be nearing capacity and many are unlined. This suggests a situation in which substantial progress might be achieved in "*the reduction of nonhazardous solid … waste management methods, which are less suitable for the environment, that would be made possible by the proposed facility,*"—as Subsection 108(10)(b)(iii) requires be considered in the Class V permit application decision.

The market analysis above focuses solely on how well PPL can serve communities *compared to* existing commercial landfills. However, the choice between landfills may not always be based on such knife-edge cost considerations. The quality of relationships of the landfill with its community and customers may also play a role in decision making by local waste haulers when deciding which landfill to patronize, as long as the travel time is reasonably acceptable. One important factor in determining the acceptability of a given landfill from one's starting point is whether one can use the same truck to make more than one round trip per day. Roughly speaking, two trips per day are unlikely to be feasible if the one-way travel time exceeds about 2.5 hours. Thus, we also present (in **Figure 4**) the approximate zone around PPL that can be reached in 2.5 hours or less. **Figure 4** shows that (under current traffic loads), PPL's location does allow for two roundtrips per day to areas as far south as Salt Lake City, and the south end of the Great Salt Lake.[29] While it is clear that most of the other commercial landfills in Utah (i.e., Wasatch Regional, Tekoi, and Intermountain Regional) would have even shorter travel times, if the waste hauler needs no more than two round-trips per day and has strong qualitative reasons for not patronizing these closer landfills, PPL might gain some market share even farther south than Ogden. This should not be considered a likely prospect, but the possibility of being an acceptable MSW destination in this broader area is a fact that should be noted.

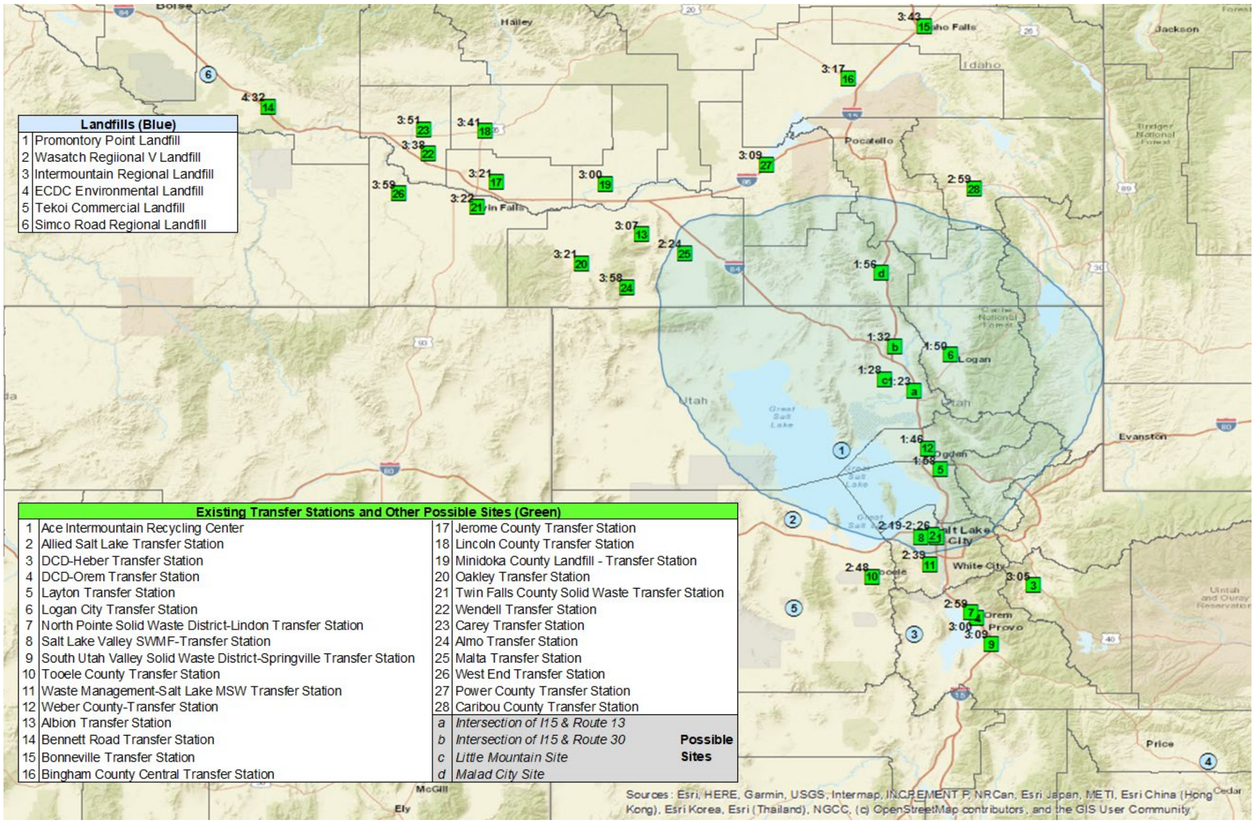
Finally, we comment on the position of the ECDC regional landfill. Although it has been included in our analysis as a potential destination for the Wasatch Front's MSW, it never comes close to being a cost-effective competitor to PPL. Wasatch Regional Landfill and Intermountain Regional Landfill are approximately equally well situated to compete for wastes in the areas from Salt Lake City to the north, whether in the area south of Ogden where they appear to approximately tie for least travel-cost, or in the

[28] This should not be taken to mean that the Simco landfill is poorly situated with respect of Idaho overall, as it is close to the most densely populated portion of Idaho (i.e., the Boise area).

[29] Of course, PPL may still be competitive in areas outside of this 2-trips per day zone if the next closest competitor is even farther away, and that is the basis for our initial analysis.

areas north of Ogden, where they appear to tie for second-place compared to PPL as the least travel-cost option.[30]

Figure 4. Area Within 2.5 Hours Travel Time from PPL



2.1.3. Potential Size and Trends in MSW Quantities in PPL's Economic Region for MSW

Based on the results presented above, we conclude that PPL will have the ability to be the least total-cost-of-disposal provider of commercial MSW landfilling to support MSW disposal needs from Weber County, Utah north into southeastern Idaho as far as Pocatello or even Idaho Falls. We will call this region the estimated "**economic wasteshed**" for PPL, which indicates some of the *needs* that PPL can directly serve. (We turn later in this section to other economic benefits that PPL's presence as a Class V landfill can provide beyond directly serving disposal needs.)

To quantify the potential direct benefits, we first estimate the tons of MSW that are generated in this economic wasteshed and potential future trends in those tons. We do this by county. We also divide the projected tons into commercial MSW and residential MSW. Our estimate does *not* include commercial

[30] The prospect that ECDC could be more competitive by reverting to waste-by-rail was not analyzed because all of the prior truck-to-rail transfer stations have been dismantled since 2006 (see https://utahrails.net/industries/trash-by-train.php).

MSW that industrial facilities in the region dispose in their own company-owned landfills along with their non-MSW nonhazardous wastes. **Table 3** presents our estimates of the tons produced in 2020, the basis for which is documented in **Appendix A**. **Table 3** shows that we estimate that about 520,000 tons of MSW waste was generated across this region in 2020, about 400,000 tons of which were produced in the Utah counties.[31]

Table 3. Estimates of Current Commercial and Residential MSW in PPL's Economic Wasteshed (tons per year, 2020)

State	County	Total MSW	Commercial MSW	Residential MSW
UT	Box Elder County	36,000	20,000	17,000
UT	Weber County	289,000	156,000	133,000
UT	Cache County	76,000	41,000	35,000
ID	Oneida County	4,000	2,000	2,000
ID	Franklin County	11,000	6,000	5,000
ID	Bear Lake County	5,000	3,000	2,000
ID	Power County	6,000	3,000	3,000
ID	Bannock County	68,000	37,000	31,000
ID	Caribou County	6,000	3,000	3,000
ID	Cassia County	19,000	10,000	9,000
	Total	518,000	280,000	238,000
	Utah (Total)	401,000	216,000	184,000
	Idaho (Total)	117,000	63,000	54,000

Source: NERA calculations using DWMRC data for Utah County MSW, U.S. Census data, and other sources, as documented in ***Appendix A****.*

The usefulness of estimating the commercial tons separately is because all of these counties have publicly-owned landfills that their residential MSW is committed to, at least for the next several years. Although many of those landfills may be reaching their end of life, it is unlikely that much of the residential MSW demand will immediately shift to PPL. However, *commercial* haulers of MSW can switch their landfill destination much more quickly and have a strong business incentive to do so if a lower total-cost-of-disposal option becomes available. **Table 3** shows that our market analysis indicates that about 280,000 tons were likely collected by commercial haulers that we estimate to comprise PPL's economic wasteshed, about 220,000 of which was from businesses, industry, and apartment buildings in counties of northern Utah. Much of this commercial MSW was likely disposed at the publicly-owned landfills or their transfer stations because they were the least-cost option in those northern Utah counties in 2020. However, our analysis shows that PPL could be able to offer an even lower cost disposal service (and would have a business incentive to do so), and thus produce benefits to businesses and industry within Utah in the near-term, *as required be estimated under Subsection 108(10)(a) and (10)(b)(i)*. Although this commercial MSW represents the more likely near-term demand for MSW disposal at PPL, *it is also precisely the portion of the region's MSW landfill needs that PPL cannot serve until its Class V*

[31] As stated above, our analysis of MSW does not include C&D, and these estimates of tons of MSW generated do not include C&D.

permit is granted. We thus estimate that about 400,000 tons per year of residential and commercial MSW are currently being generated in the counties in Utah within PPL's economic wasteshed.

Within the residential MSW category, the southeastern Idaho counties have the smallest and oldest publicly-owned landfills, and the least convenient alternative commercial options. Box Elder County has a landfill that is estimated to have about 36 years of remaining capacity,[32] but its proximity to PPL, combined with the strong support that Box Elder has for PPL, makes it also a strong candidate for a relatively prompt shift to disposing its residential MSW at PPL. Weber County has already shifted its residential MSW to a commercial landfill.[33] The Weber County contract expires in 2026, which can be viewed as the timeline for PPL to potentially gain this part of the residential MSW demand. Cache County will likely be among the last of the residential MSW demand to shift to PPL, as it opened a new county-owned landfill (the North Valley Landfill) in 2017[34] and is estimated to have almost 83 more years of capacity.[35]

In terms of timelines that may present near-term opportunities for PPL to grow its residential MSW demand, a relevant point is that WIWMD (which operates the Layton transfer station) already sends about 120,000 tons per year to a commercial landfill (apparently to Tekoi), with a contract that it can choose to recompete in 2021.[36] Although the Layton transfer station itself was too close to the borderline of our estimate of PPL's economic wasteshed for us to include it this part of our analysis, it is not impossible that PPL might be able to make a winning offer for the WIWMD tons when it is recompeted.

Subsection 10(a)(ii) requires information about needs based not just on existing waste generation but also "*potential generation,*" which we interpret as seeking information on how evidence of trends in waste generation may affect the future need. There are two key assumptions that will affect future MSW generation relative to those currently observed. The first is population growth, and the second is waste generation per person. For population growth in the Utah counties of interest, we rely on the county-specific long-term demographics forecast of the Gardner Institute at University of Utah.[37] For population growth in the Idaho counties of interest, we rely on the estimated annual rate of population growth in southeastern Idaho through 2030.[38] (It is 0.5% per year.) We use the same growth rate for later years, as no longer-term forecast for that specific subregion of Idaho appears to exist. The resulting population projections that we use for estimating MSW waste generation are shown in **Table 4**.

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[32] Little Mountain Landfill 2019 Annual Report, Division of Waste Management and Radiation Control, April 23, 2020 (available at: http://eqedocs.utah.gov/).

[33] It presently has a contract with Republic to dispose its MSW at Wasatch Regional Landfill.

[34] HJ News, "North Valley Landfill to open in late fall", September 16, 2017 (available at: https://www.hjnews.com/allaccess/north-valley-landfill-to-open-in-late-fall/article_2fbfba33-33a3-56af-8a9f-2de8e0f0659e.html).

[35] City of Logan 2019 Annual Solid Waste Facilities Reports, Division of Waste Management and Radiation Control, March 5, 2020 (available at: http://eqedocs.utah.gov/).

[36] Personal communication, Ann Garner, Chief Operating Officer, PPR.

[37] Kem C. Gardner Policy Institute, Utah's Long-term *Demographic and Economic Projections*, University of Utah, Salt Lake City, UT, July 1, 2017 (available at: https://gardner.utah.edu/wp-content/uploads/Kem-C.-Gardner-County-Detail-Document.pdf).

[38] Idaho Department of Labor, *Population Projections* (available at: https://lmi.idaho.gov/population-projections).

Table 4. Population by County Through 2050

State	County	2020	2030	2040	2050
UT	Box Elder County	57,000	64,000	71,000	77,470
UT	Weber County	264,000	303,000	331,000	356,810
UT	Cache County	130,000	159,000	185,000	204,110
ID	Oneida County	5,000	4,000	4,000	4,150
ID	Franklin County	14,000	12,000	12,000	12,710
ID	Bear Lake County	6,000	5,000	5,000	5,450
ID	Power County	8,000	6,000	7,000	7,170
ID	Bannock County	88,000	73,000	77,000	80,660
ID	Caribou County	7,000	6,000	6,000	6,380
ID	Cassia County	24,000	20,000	21,000	21,650
	Total	603,000	652,000	719,000	776,560

Source: US Census for 2020; NERA calculations based on sources described in text for 2030-2050.

In our research, we did not find any projections of future trends in MSW generation per person, but have reviewed the long-term historical patterns as documented by USEPA, and presented below in **Figure 5**.[39] These USEPA data show that per-person waste generation rose rapidly from 1960 through 1990, then remained stable for the next 27 years in the ballpark of 4.5 lb./person/day. Our analysis of current wastes produced in the northern Utah counties in 2018 indicates those areas are generating at a rate of between 4.23 lb./person/day (simple average) and 4.88 lb./person/day (population-weighted average)—broadly consistent with the U.S. national average estimated by USEPA over the past three decades.

[39] USEPA, *Advancing Sustainable Materials Management: 2017 Fact Sheet*, November 2019 (available at: https://www.epa.gov/sites/production/files/2019-11/documents/2017_facts_and_figures_fact_sheet_final.pdf).

Figure 5. Historical Trends in MSW Generation per Person in U.S.[40]

Based on the above, we could justifiably assume that the next three decades will generate MSW at the same rates as the past three decades for our future projections of MSW from the PPL economic wasteshed. However, current pressures towards more sustainable lifestyles and rising disposal costs suggest it would be appropriate to consider the role of uncertainty in future MSW generation rates per person. To address the uncertainty about the trends over three decades into the future, we have projected MSW generation for 3 alternative "what-if" trend assumptions: one in which current MSW generation remains the same as in 2020, one in which it declines by 0.5% per year (which results in a 14% decline by 2050) and an even more optimistic decline of 1% per year (which results in a 26% decline by 2050). We apply these assumptions to commercial and residential wastes alike, recognizing that in light of these broad uncertainties, there is no sound basis for such disaggregation. **Figure 6** presents the results of our three "what-if" MSW projections through 2050. It shows that if the past 30 years is predictive of the next 30 years in waste-generating behaviors, the volumes of potential MSW demand for PPL will gradually increase. However, even if there is a very rapid and sustained declining trend in waste-generating behaviors (an outcome not supported by any empirical evidence), the overall tons in this market will remain close to 500,000 tons per year, as is occurring today.

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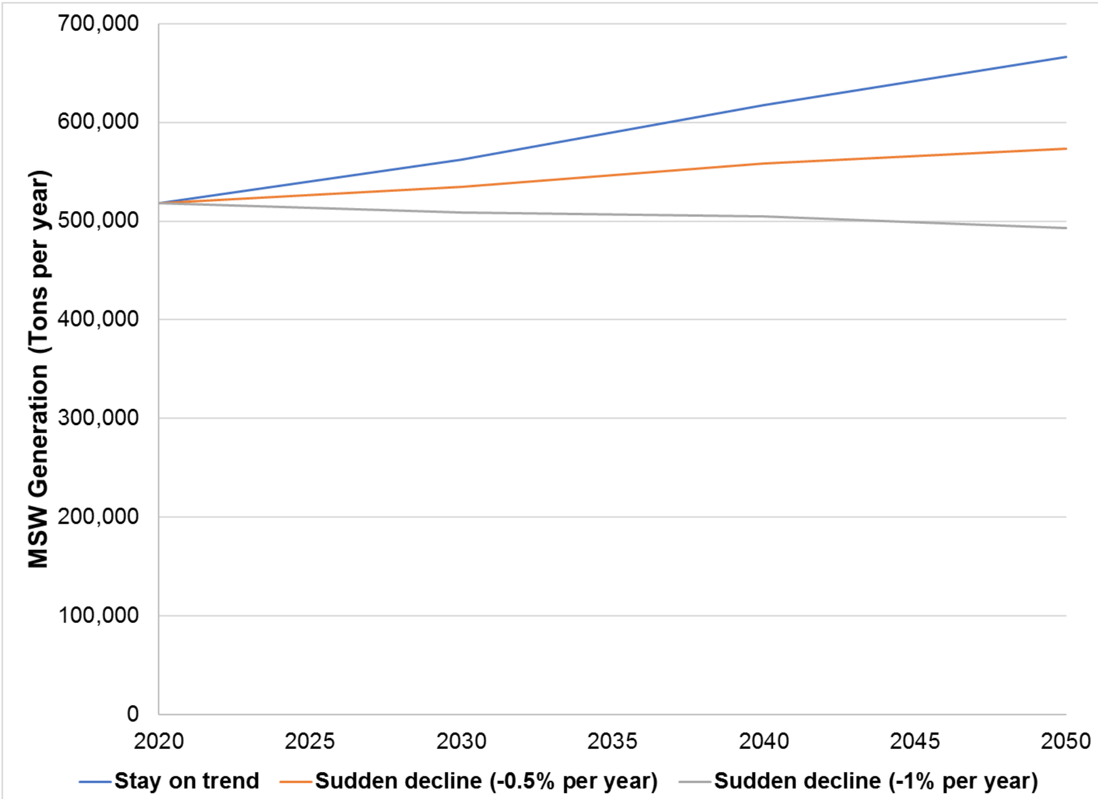
[40] USEPA, *Advancing Sustainable Materials Management: 2017 Fact Sheet*, November 2019, Figure 1, pg.2 (available at: https://www.epa.gov/sites/production/files/2019-11/documents/2017_facts_and_figures_fact_sheet_final.pdf).

Figure 6. Three "What-If" Projections for MSW Wastes (tons per year) in PPL's Economic Wasteshed



Source: NERA calculations as explained in text.

2.1.4. Potential Public Benefit to MSW Waste Generators from PPL

The estimates provided above on MSW sources and quantities—both existing and potential—address requirements of Subsection 108(10)(a)(ii) and 108(10)(a)(iii) and are based on a robust market analysis. They thus demonstrate existence of a market for PPL's MSW disposal services in the but-for world in which PPL will have a Class V permit that allows it to serve that market. Another attribute of demonstrating need under Subsections 108(10)(a)(ii) and (10)(b)(i) is to assess the public benefit to Utah of PPL serving that market.

There are several dimensions to the financial benefit that PPL's MSW competitive disposal services can generate for Utahns: (1) direct reductions in cost of living and cost of doing business for those relying on PPL's services; (2) indirect cost reductions for businesses and residents that do not rely on PPL's services but benefit from tipping fee reductions by other landfills to retain their current customer base when PPL has entered the market; and (3) economic benefits from increased demand for Utah's landfill services from outside of the region. We address each of these in turn below.

Direct Savings to MSW Generators Using PPL

Direct reductions in costs of living and doing business to those who can utilize PPL instead of one of the more distant existing competing commercial landfills can be estimated by multiplying the tons of waste that PPL would dispose of by the difference in the transportation cost to get to PPL versus to the commercial landfill with the next-lowest transportation cost. As we noted in the market region analysis, MSW haulers may focus on distance or on travel time when comparing transportation costs. The estimated dollar savings of PPL over the next closest competitive commercial landfill differs accordingly. We thus present estimates of the aggregate direct savings of future PPL MSW customers using estimates of the cost per mile and of the cost per hour of using a waste transfer truck in **Table 5**. Because transporters generally quote prices in dollars per mile, we believe that is the more appropriate value.

We estimate that the direct benefits to the entire region (which cannot be expected to be attained in the near-term after PPL opens, for the transitional reasons explained earlier) would be about $2.7 million per year, about $1.5 million of which would accrue to Utahn businesses and households. In the lower cost case, the estimates are $1.1 million per year and $0.6 million, respectively. The lower estimate reflects our findings that the travel time difference between PPL and its commercial competitors is smaller than the travel distance difference. As noted above, road upgrades into PPL in the future could increase the travel time difference and raise the value of the lower estimate.

Near-term benefits, as discussed above, are associated with demand from commercial MSW haulers. Based on current MSW generation levels, we estimate this source of public benefit would be about $1.4 million per year, about $800,000 of which would be for businesses in Utah. The savings could be $600,000 per year and $300,000, respectively, if they calculate their costs on a per hour of travel time basis. In both cases, the projected benefits will rise with time if assuming the "Stay on trend" MSW generation rates per person and will remain stable (in real dollars) if assuming the "Sudden and rapid decline" for the future of MSW generation rates per person.

Table 5. Estimated Potential Cost Reductions PPL Can Provide to MSW Market

	Total MSW Cost Savings ($)	Commercial MSW Cost Savings ($)	Residential MSW Cost Savings ($)
$/mile Approach			
Total	$2,650,000	$1,431,000	$1,219,000
Utah	$1,469,000	$793,000	$676,000
Idaho	$1,181,000	$638,000	$543,000
$/hr. Approach			
Total	$1,106,000	$597,000	$509,000
Utah	$579,000	$313,000	$266,000
Idaho	$527,000	$285,000	$243,000

*Source: NERA calculations documented in **Appendix A**, based on MSW tons in Table 3 and market-based estimates of cost per mile and cost per ton documented in **Appendix C**.*

Indirect Savings to MSW Generators in the Region Not Using PPL

In Section 1, it was explained how consumers and businesses may also see reductions in their waste disposal costs if PPL's Class V permit is approved, even if they do not directly shift to use of PPL. The mere presence of an additional competitor in the regional landfill market can cause other commercial landfills to reduce their negotiated tipping fees simply to avoid having current customers shift to the new landfill. Such competitive price pressures will be strongest in the outer portions of the region that we estimate to be PPL's economic wasteshed. In areas well beyond that zone, PPL's presence will have less potential to influence current pricing decisions, although (as noted earlier) PPL might gain some market share even outside the market zone that we have identified based solely on transportation cost differentials of competitors as a result of more qualitative considerations on the part of the commercial haulers.

We understand from PPR that the possibility of significant cost-reduction benefits accruing to consumers and businesses even if PPL does not win every competition for wastes is already in evidence. Under its Class I permit, PPL already can accept contracts with Utah government entities to dispose their MSW. In 2018, Weber County used a lower-cost offer by PPL to invoke a section in its decades-old contract with Republic/Wasatch Regional Landfill allowing it to change providers for a 10% reduction in price.[41] Republic matched PPR's price rather than lose the contract. As a result, PPL's competitive presence saved Weber County about $2.81/ton, or about $560,000 per year, in the County's waste management costs.[42]

Economic Benefits to Utah of Imported MSW from Idaho

There are two ways in which the state will benefit from imported waste disposal, even if the direct economic savings are accrued by waste generators out of state. First, by increasing the volume being disposed at PPL, imported MSW from Idaho (or any other states) will help reduce PPL's average cost per ton that it landfills, and this cost reduction can be passed along to in-state customers as well as to the out-of-state generators. Thus, these out-of-state wastes will *synergistically* allow PPL to provide the public benefits to the northern Utah region of having *well-located* capacity of state-of-the-art regional landfilling services for in-state MSW disposal services.

The second way that Utahns will gain economic benefits if PPL attracts a larger quantity of out-of-state wastes for disposal at its facility comes from the increase in economic activity that will derive from the incremental jobs, expenditures on goods and services associated with the waste disposal activities at the PPL site—*paid for by Idaho MSW generators*. Each increment in waste management revenues that will be attracted to the state as a result of PPL's Class V permit will translate into a range of fiscal and macroeconomic benefits to the County and to the State more generally. The fiscal and macroeconomic benefits of such imported wastes are discussed in more depth in Section 2.3.

2.2. Market Analysis of Potential Demand for PPL's Services to Dispose Excavated Soils from Northern California

NERA also has conducted a detailed quantitative analysis of the disposal market for large quantities of soils that are generated during cleanup of sites that have been contaminated in the past by industrial, manufacturing, and other activities or accidental events. Examples of the types of cleanup sites that create a demand for landfill disposal of excavated soils include: sites that must be remediated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); brownfields sites

[41] Weber County, "Contract For Solid Waste Transportation And Disposal" with ECDC Environmental, L.C., Fifth Amendment, Section Two, December 18, 2012.

[42] Personal communication, Brett Snelgrove, Vice President of Operations, PPR.

that were contaminated by past uses and which need to be cleaned up before they can be redeveloped for a new, higher value use; and a variety of other such parcels of land that have not been formally incorporated into the USEPA Brownfields program. Each site's cleanup involves different actions tailored to its specific types of prior-use residues, hydrogeologic conditions, and desired future use. Some contamination can be treated at the site, with or without actually excavating the surface soils. However, the preferred remediation path often involves offsite landfilling of some portion of the soils. In some cases, the quantity of soils to be landfilled elsewhere can be very large.[43] The excavated soils are sent to either nonhazardous solid waste landfills or RCRA subtitle C hazardous waste disposal facilities, depending on their level of contamination.

Cleanup sites are spread across the U.S., including many that are located in Utah. For this market analysis, however, we focus on a specific area generating a substantial demand for disposal of excavated soils that has particular interest for PPL: *excavated soils generated in northern California*. We focus on this region because of a unique market opportunity created by California law. In California, chemical concentrations in cleanup soils that are considered nonhazardous under both the federal RCRA statute and under Utah's corresponding solid waste management laws are deemed hazardous by the State of California.[44] While in California, these soils must be handled as hazardous waste and if disposed in the state, only in a Subtitle C hazardous waste facility. In other states, a large fraction of these soils can be classified as nonhazardous—and *would* be so classified if they had been generated at a cleanup site in those states. The portions of these soils that are hazardous only under California law are called "Non-RCRA," or herein as "excavated" soils. They can be disposed in Utah at Class V nonhazardous waste landfills.

In this section, we examine PPL's competitiveness as a supplier of landfilling services for California's excavated soils. Our market analysis applies the same principles that we used in the MSW market analysis (see Section 2.1) to identify whether PPL might be the lowest total-cost-of-disposal landfill destination, accounting for the full set of potential commercial competitors. A detailed documentation of the calculations and assumptions underlying this analysis is provided in **Appendix B**, while this section focuses on summarizing the key informational elements of the analysis that are required to be provided to the Director of DWMRC under Subsection 108(10)(a) and (b).

2.2.1. Description of Commercial Competitors to PPL for Excavated Soils

One might wonder how a landfill as far from California as PPL could possibly have a combination of tipping fees and transportation costs to compete with the many other landfills between California and Utah. This is because of the ways that the excavated soils must be handled in California, in western states surrounding California, and due to the available options for transportation.

- An important aspect of the situation is that rail shipment can be much cheaper on a $/ton basis than transport by truck. This market analysis accounts for transportation costs by both rail and by truck, and the fact that landfills in Utah are linked to California's main urban centers by direct rail

[43] As one recent example, remediation of a CERCLA site in California at NASA's Santa Susana Field Laboratory was estimated to require offside landfilling of between 176,500 and 870,000 cu. yd. of soil, depending on the future use for the site that is ultimately selected. (NASA, *Final Supplemental Environmental Impact Statement for Soil Cleanup Activities at Santa Susana Field Laboratory*, July 24, 2020 (available at: https://www.nasa.gov/sites/default/files/atoms/files/final_seis_for_soil_cleanup_activities_at_ssfl.pdf).

[44] These excavated soils are assigned a California Waste Code (CWC) of 611.

lines becomes an important element of its potential cost advantage. It also incorporates other potential commercial competitors throughout the western states east of Utah that have rail access.

- Another important aspect is that many of the surrounding western states have chosen to respect the hazardous waste classification that California makes, even if the same soils would be deemed nonhazardous if generated in their own jurisdictions. The states of Oregon, Idaho, and Nevada include such reciprocity in their state statutes, and thus landfills in those states can only accept excavated soils if they are permitted as RCRA Subtitle C hazardous waste facilities.[45]

Thus, we have identified the set of relevant landfills within and outside of the immediate region that could be commercial competitors to PPL for California's excavated soils. We constructed an initial list of *candidate* competitors by identifying:

- Every existing commercial hazardous waste landfill operating in California, Washington, Oregon, Nevada and Idaho, of which there are five.[46]

- Every existing and proposed Class V nonhazardous solid waste landfill in Utah, of which we found seven (including PPL as proposed).

- Every existing nonhazardous solid waste landfill in Arizona that reported accepting more than 100,000 tons per year in the most recent data set from 2018, of which we found seven.

This produced a list of over 20 *candidate* competitors that we then researched to better understand which were not likely to accept large volumes of excavated soils from California. The long list and the basis for each elimination is documented in **Appendix B**. In brief, for landfills that are relatively distant from California (e.g., in Utah and western reaches of Arizona), those without reasonably convenient rail access were excluded, as it was clear these would be dominated in terms of transportation costs by other potential competitors in those areas with better rail access. **Table 6** provides our final list of 12 potential competitors that we have included in our full market analysis of total-cost-of-disposal for excavated soils. We believe that our final list is probably over-inclusive in that we have included all of the nonhazardous landfills in Arizona that are situated very close to the California border.[47]

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[45] Nevada Code 444.8565(2)(b) (available at: https://www.leg.state.nv.us/NAC/NAC-444.html#NAC444Sec8565; Oregon Code 340-093-0040(2)(b) (available at https://secure.sos.state.or.us/oard/viewSingleRule.action;JSESSIONID_OARD=yUMURvNON-_2MdVYUcfaEXO1BOsjahnLpqNQmOn0uNallKj9zqlc!-406728407?ruleVrsnRsn=71088); Idaho Code 39-4424 combined with the definition of "manifested waste" at Section 39-4403(13) (available at https://legislature.idaho.gov/statutesrules/idstat/Title39/T39CH44/SECT39-4403/ and https://legislature.idaho.gov/statutesrules/idstat/Title39/T39CH44/SECT39-4424/). The state of Washington, like California, has its own more-stringent criteria for determining whether a waste must be handled as hazardous (see, for example, WA Department of Ecology's summary of Washington's state solid waste rules available at: https://fortress.wa.gov/ecy/publications/publications/96401.pdf). We have interpreted this to mean that it too would not accept imports of California's excavated soils except for disposal in a landfill permitted under RCRA Subtitle C.

[46] Exhibit A-3, USEPA, National Capacity Assessment Report, December 17, 2019 (available at: https://www.epa.gov/sites/production/files/2019-12/documents/final_2019_capacity_assessment_report_20191217v1.pdf).

[47] As discussed in Section 1.2 and will be further discussed in Section 3.1.1, an evaluation of the need for additional capacity should be based on the equitable and efficient geographic distribution of capacity and not on the sum of years of capacity across an entire region. Thus, we evaluate the need for PPL with respect to disposal of excavated soils based on whether it can be the lowest total-cost-of-disposal landfill for such soils. However, for completeness, we provide the following estimates of remaining years of capacity. As referenced in Section 2.1.1, the remaining years of capacity for ECDC Environmental is 1,407 years. For the Arizona sites: Butterfield Station Landfill—42 years; La Paz County Landfill—71 years; Copper Mountain Landfill—48 years; Lake Havasu Landfill—7 years; South Yuma County Landfill—123 years. The Arizona landfill life years

Table 6. Existing and Proposed Commercial Landfills Potentially Competing with PPL for Excavated Soil Disposal Services

Landfill	Location	Owner	Permit Type
Clean Harbors-Buttonwillow	Kern Co., CA	Clean Harbors	RCRA Subtitle C
Kettleman Hills Waste Facility	Kings Co., CA	Waste Management	RCRA Subtitle C
Promontory Point Landfill	Box Elder Co., UT	Promontory Point Resources, LLC	Applicant for UT Non-Haz Class V
ECDC Environmental Landfill	Carbon Co., UT	Republic Services	UT Non-Haz Class V
US Ecology Nevada	Nye Co., NV	US Ecology	RCRA Subtitle C
US Ecology Idaho Site B	Owyhee Co., ID	US Ecology	RCRA Subtitle C
Chemical Waste Management of the NW	Gilliam Co., OR	Waste Management	RCRA Subtitle C
Butterfield Station Landfill	Maricopa Co., AZ	Waste Management	AZ Non-Haz Permit
La Paz County Landfill	La Paz Co., AZ	La Paz County (op. by Republic Services)	AZ Non-Haz Permit
Copper Mountain Landfill	Yuma Co, AZ	Republic Services	AZ Non-Haz Permit
Lake Havasu Landfill	Mohave Co., AZ	Lake Havasu City (op. by Republic Services)	AZ Non-Haz Permit
South Yuma County Landfill	Yuma Co., AZ	South Yuma County	AZ Non-Haz Permit

Figure 7 provides a map of the locations of the landfills (in blue and green markers) in **Table 6** and the current rail network across the region, including both Union Pacific (UP) and BNSF lines. The locations of rail-to-truck intermodal facilities are also shown (yellow markers). As is apparent in this figure, neither of the two California facilities has rail access; indeed, there is not even a reasonable intermodal facility that could be used to shorten the necessary trucking distance for wastes originating in either of the major population centers of the Bay Area or Los Angeles. Our research into the individual landfills determined that only three of the sites (Chemical Waste Management of the NW in Oregon, ECDC in Utah, and PPL) have an on-site rail spur.[48] These are shown as blue markers on the map. Most remaining sites in the final list are reasonably close to a rail spur that the landfills either identify as providing them with rail access (these include Butterfield Station, La Paz County, and Copper Mountain landfills in

are estimated from a 2020 USEPA database of MSW landfills available at: https://www.epa.gov/lmop/landfill-technical-data (downloading the spreadsheet at the link labelled Landfill-level data only (XLSX) (August 2020)). NERA estimate the remaining years for each Arizona landfill as follows: {("design capacity" minus "waste in place")/"annual acceptance rate per year"}. For the RCRA Subtitle C facilities in Table 6, the remaining year estimates are: Clean Harbors-Buttonwillow (CA)—17 years; Kettleman Hills Waste Facility (CA)—10 years; US Ecology Nevada (NV)—45 years; US Ecology Idaho Site B (ID)—69 years; Chemical Waste Management of the NW (OR)—43 years. These are derived from data in Exhibit A-3 (at p. 37) of USEPA, *National Capacity Assessment Report Pursuant to CERCLA Section 104(c)(9)*, December 17, 2019 (available at: https://www.epa.gov/sites/production/files/2019-12/documents/final_2019_capacity_assessment_report_20191217v1.pdf). The same table also indicates that, as of December 2019, the RCRA Subtitle C permits of all but the Idaho site were expired, and that their permit renewals were still "in progress."

[48] The PPL site is within about 220 yards of the UP rail main line. Although there is no physical rail spur directly onto the site at the present moment, PPR informs us that it has signed agreements with the adjacent property owner and UP and intends to break ground on building that rail spur as soon as it receives its Class V permit approval. **Appendix D** provides evidence of the agreements and a map of the facility showing the proximity of the current rail line to the site, provided to NERA by PPR. NERA notes that UP's website already lists Promontory Point as a rail stop for which it quotes rail tariffs from various origins such as California. NERA has used these rail tariff quotes in its transportation cost analysis.

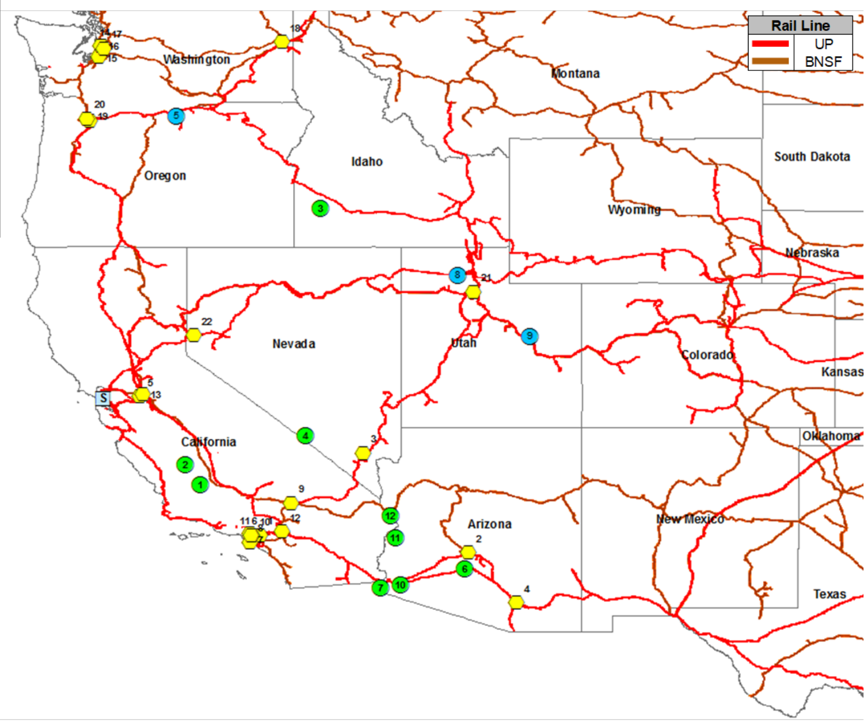
Arizona, and US Ecology Idaho Site B in Idaho), or there is a nearby rail siding that we have assumed, conservatively, could readily be contracted if needed (Lake Havasu Landfill in Arizona).[49]

For the remaining landfills (US Ecology, NV and South Yuma County Landfill, AZ) we developed cost estimates for rail shipment from the waste origin to nearby intermodal facilities and trucking from there to the site, as well as direct trucking without use of rail. We have used only the least-cost of each possible routing in the total-cost-of-disposal estimates that are presented below. **Appendix B** provides the costs we estimated for all the alternative routes considered for those sites.

Figure 7. Map of Landfills Analyzed as Potential Competitors for Excavated Soils with Overlay of Existing Rail Network.

Landfills	
1	Clean Harbors - Buttonwillow (CHB, CA)
2	Kettleman Hills Waste Facility (KHF, CA)
3	US Ecology Idaho Site B (USEI, ID)
4	US Ecology Nevada (USEN, NV)
5	Chem. Waste Manag't of the NW (CWMNW, OR)
6	Butterfield Station Landfill (BSL, AZ)
7	South Yuma County Landfill (SYCL, AZ)
8	Promontory Point Landfill (PPL, UT)
9	ECDC Environmental Landfill (ECDC, UT)
10	Copper Mountain Landfill (CML, AZ)
11	La Paz County Landfill (LPCL, AZ)
12	Lake Havasu Landfill (LHL, AZ)

Intermodal Facilities (*)	
S	Oakland (UP)
1	City of Industry (UP)
2	Phoenix (BNSF)
3	Las Vegas (UP)
4	Tucson (UP)
5	Lathrop (UP)
6	LA East Washington Blvd (UP)
7	LATC (UP)
8	ICTF (UP)
9	Barstow (BNSF)
10	Commerce (BNSF)
11	Los Angeles (BNSF)
12	San Bernardino (BNSF)
13	Stockton (BNSF)
14	Seattle (UP)
15	Tacoma (UP)
16	Seattle International Gateway (BNSF)
17	South Seattle (BNSF)
18	Spokane (BNSF)
19	Brooklyn (UP)
20	Portland (BNSF)
21	Salt Lake City (UP)
22	Sparks (UP)



(*) Only Intermodal Facilities 1 through 4 form part of the analysis

2.2.2. Approach and Projected Competitiveness of PPL for Excavated Soils from Northern California

Another insight that can be obtained from **Figure 7** is that if PPL will have a market demand for excavated soils based on total-cost-of-disposal, this will most likely be for soils generated in northern California. As we will show in a later section, a very large fraction of all excavated soils has been generated from the counties surrounding the San Francisco Bay. We therefore have limited our market

[49] We are skeptical that the Lake Havasu Landfill should be viewed as a competitor, due to the lack of evidence that it has attempted to obtain excavated soil disposal contracts from California or that it currently has access to the nearby rail siding, and also because it is an unlined facility serving the local communities that would fairly rapidly reach capacity if it were to start disposing large volumes of excavated soils. However, we have left it in our analysis due to its strategic position along the California border. We also have found no evidence that the Copper Mountain Landfill has received waste by rail in recent years, although it does appear to have access to a rail siding already and appears to operate under a commercial model.

analysis to excavated soils originating in San Francisco Bay area. As the map shows with the grey icon, our analysis has simplified this question down to the relative cost of soils starting their route from the Oakland rail depot. Although soils from these counties will come from individual areas and will not necessarily be transported to this starting location before being taken to any landfill, it serves as a reasonable basis for assessing the relative transportation costs to the various competing landfills, which are far more differentiated by their distance from the Bay Area generally than they are by their exact origin within the Bay Area. Additionally, except for the two California landfills, at least one route to every other landfill in the analysis starts by rail from the Bay Area.

The total-cost-of-disposal (which we report in $/ton) from this starting point to each landfill is based on the sum of the transportation costs of the specific selected route, the likely tipping fees at the site (which depend on the destination state and whether the landfill is a RCRA Subtitle C hazardous waste facility or a Subtitle D non-hazardous waste facility), and government disposal fees (to state, county and local governments, where applicable). Transportation costs are based on listed rail tariffs for the portion of each route that is by rail (if any), trucking costs for the portion of the route that is by truck (if any), and estimated cost for transloading soil from rail car to truck for those routes that involve either an off-site rail siding or use of an intermodal facility.

Each specific cost component has to be estimated through detailed research and calculations, all of which are explained in detail and documented in **Appendices B and C**. Importantly, our analysis does not simply assume a lower cost per mile by rail compared to by truck, but uses listed rail tariffs for each specific rail route, and uses the PC*Miler software (also used in the MSW market analysis) to estimate the distances and travel times for each specific trucking route. Which type of transport is more costly per ton is an outcome of this detailed market analysis and not an assumption.

Nevertheless, our analysis has required us to make a number of assumptions that are subject to uncertainty. We have flagged those uncertainties, and we provide quantitative sensitivity analyses of how each one affects the evidence that PPL appears to be the lowest-cost landfill destination for excavated soils from northern California.

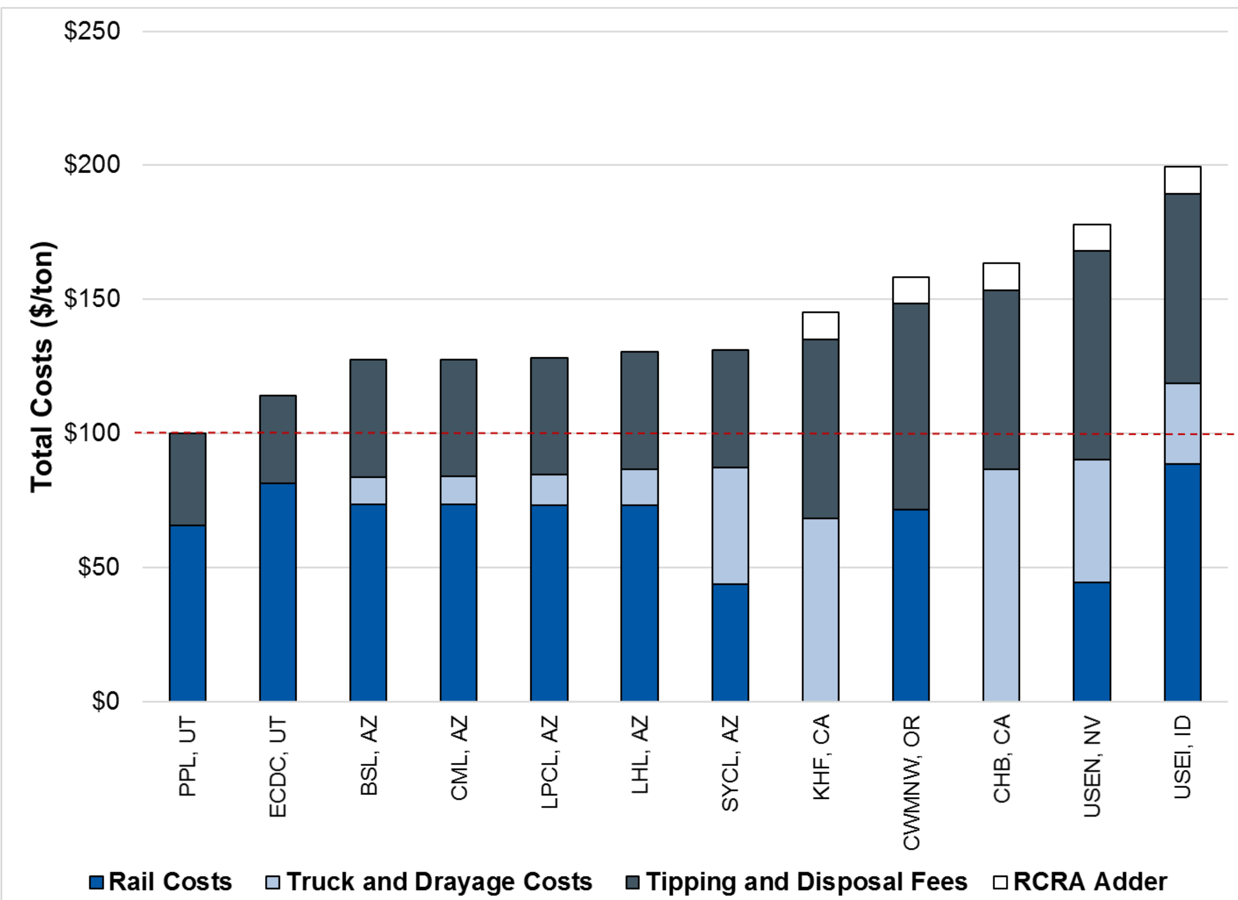
Table 7 presents the results of the total-cost-of-disposal when using our base case assumptions. They project that PPL's costs would be the lowest, with ECDC a reasonably close second. The difference in the estimated total cost of this next closest competitor is about 14%, or $14/ton. The various nonhazardous landfills in Arizona appear to be very similar to each other in competitiveness, but about 30% more costly than PPL. Kettleman Hills Landfill in CA is projected to outcompete all of the other hazardous waste disposal options, despite having no ability to rely on rail transport. However, it appears to be substantially more costly than any of the out-of-state nonhazardous options, with costs projected to be 45% (or $45/ton) higher than the cost estimated for PPL.

Figure 8 provides information on the breakdown of the components of the total cost estimates reported in **Table 7**. (**Appendix B** provides the specific numerical values for each component.) It shows that PPL is lowest cost because its transportation costs (rail plus trucking) are lower than those for the other non-hazardous landfills and because total disposal costs are lower. With respect to ECDC, our research has indicated a slightly lower total disposal cost, but this is more than offset by a larger estimated rail tariff than PPL's. Both landfills, however, are projected to have a substantial advantage over any of the non-Utah options.

Table 7. Summary of Total Costs of Disposing Excavated Soils from Northern California at Each Potential Landfill Destination (Using Base Case Assumptions)

Landfill	Total Cost ($/ton)	Difference from PPL (%)	Rank Order
Promontory Point Landfill, UT	$100	-	1
ECDC Environmental Landfill, UT	$114	14%	2
Butterfield Station Landfill, AZ	$127	28%	3
Copper Mountain Landfill, AZ	$128	28%	4
La Paz County Landfill, AZ	$128	28%	5
Lake Havasu Landfill, AZ	$130	30%	6
South Yuma County Landfill, AZ	$131	31%	7
Kettleman Hills Facility, CA	$145	45%	8
Chemical Waste Management of the NW, OR	$158	58%	9
Clean Harbors-Buttonwillow, CA	$163	63%	10
US Ecology Nevada, NV	$178	78%	11
US Ecology Idaho Site B, ID	$199	100%	12

Figure 8. Illustration of Component Costs Contributing to Results in Base Case



As mentioned above, NERA has conducted sensitivity analyses to alterative assumptions that are uncertain, considering the effect of a significantly different value for each assumption on a "what if" basis. In each case, the sensitivity analysis has been conducted in the direction of uncertainty from the base case assumption that would be likely to disfavor PPL over its competitors. **Table 8** summarizes the rankings across each alternative "what if" assumption on key uncertainties in the market analysis. Although the underlying $/ton costs change when the assumptions are varied, the table shows that the rankings hardly ever change. Importantly, PPL remains in the most competitive position in each case. **Appendix B** explains what each assumption is that is changed, the basis for the alternative assumption values, and provides the detailed $/ton estimates that make up these rankings.

Thus, on the basis of a robust market analysis, NERA concludes that the PPL site has a clear market available to it from a demand for disposal of excavated soils generated in northern California. This analysis confirms that, indeed, it is possible for a Utah landfill to be less costly than the more local options in California and landfills in other states that are physically closer to the waste source than Utah. This result should not be a surprise given the evidence that ECDC Environmental has been receiving such soils since at least 1996.[50] That PPL might be somewhat less costly for Northern California soils than ECDC should not be a surprise either, given its location on the same rail line but closer to the origination point, and without the weight limit that applies to ECDC's final track segment.[51]

Of course, ECDC may still receive a share of the overall market as relationships with the remediation project managers may vary and actual total costs (including negotiating successes with the rail carrier) may differ. Thus, presence of PPL in the market for excavated soils could end up increasing the total soils imported into Utah by the two sites combined, and that larger "pie" of waste management demand will translate into economic benefits to the entire state, as is further discussed in Section 2.3.

Given PPL's clear cost advantage for soils from northern California, we made a cursory evaluation of PPL's market position for soils coming from southern California, using the Port of Los Angeles rail terminal as the origin. We estimated base case total-cost-of-disposal to Butterfield Station Landfill, Buttonwillow Landfill, and PPL, which would be the lowest cost of the alternative destinations in Arizona, California, and Utah. As we anticipated, the Arizona and California landfills become less costly to transport to as they are closer to Los Angeles than to the Bay Area. However, cost to transport soils to PPL did not increase, apparently reflecting the existence of a different rail route from Los Angeles into the Salt Lake City area (see **Figure 7**), and the fact that fuel surcharges for rail (which are distance related) are a very small cost component. We found that PPL was still about $4/ton less costly (in terms of total-cost-of-disposal) than the next lowest-cost destination (Butterfield Station Landfill). We thus conclude that PPL could also compete for excavated soils generated in southern California, and there is a reasonable prospect that it could win some fraction of that market demand as well.

[50] See High Country News, "Utah takes waste that Arizona rejected." (available at: https://www.hcn.org/issues/98/3034); Las Vegas Sun, "Tainted dirt from SF Bay on way to Utah landfill." (available at: https://lasvegassun.com/news/1996/dec/17/tainted-dirt-from-sf-bay-on-way-to-utah-landfill/); Final Remedial Action Plan for Taylor Yard Parcel G-2 Los Angeles, California (available at: https://eng2.lacity.org/techdocs/emg/docs/taylor_yard/Appendix%20C.pdf); Site Clean-up Plan for 5701 Hollis Street, Emeryville, CA (available at: http://www.emeryville.org/DocumentCenter/View/1882/Summary-Fact-Sheet?bidId=).

[51] This analysis has assumed an on-site rail spur at PPL. The reasonableness of this assumption is based on information from PPR that it is ready to start construction of such a spur immediately (see **Appendix D**) and intends to start work as soon as its application for a Class V permit is approved.

Table 8. Ranking of Landfills by Total Cost Under Multiple Sensitivity Cases

Landfill	Base Case	Alternate Trucking Cost	RCRA Adder Removed	MSW Disposal Differentials Removed	Tariff Uncertainty	Tariff Multiplier Increased	Transloading Costs Decreased
Promontory Point Landfill, UT	1	1	1	1	1	1	1
ECDC Environmental Landfill, UT	2	2	2	2	2 (near tie with 1)	2	2
Butterfield Station Landfill, AZ	3	3	3	3	3	3	3
Copper Mountain Landfill, AZ	4	4	4	4	4	4	4
La Paz County Landfill, AZ	5	5	5	5	7	6	5
Lake Havasu Landfill, AZ	6	7	6	6	5	7	6
South Yuma County Landfill, AZ*	7	6	7	9	6	5	7
Kettleman Hills Facility, CA	8	8	8	8	8	8	8
Chem. Waste Mgmt of the NW, OR	9	9	9	7	9	9	9
Clean Harbors-Buttonwillow, CA	10	10	10	11	10	10	10
US Ecology Nevada, NV**	11	11	11	10	11	11	11
US Ecology Idaho Site B, ID	12	12	12	12	12	12	12

* Route with Minimum Cost across the three routes analyzed – Rail transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill
** Route with Minimum Cost across the two routes analyzed – Rail transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill

2.2.3. Potential Size and Trends in Excavated Soils Generation in California

As required under Subsection 108(10)(a)(i), this section of the report provides information on potential quantity and trends in the generation of excavated soils requiring landfill disposal. **Table 9** summarizes the total tons of soil listed as CWC 611 that has been generated in California from 1995 through 2017 from California's Hazardous Waste Tracking System (HWTS).[52] It shows a fairly stable average rate of annual waste generation of about 500,000 tons per year. It also shows that the fraction of waste disposed out of the state has been increasing with time, particularly since 2010, with recent tons disposed outside of California averaging well over 200,000. Overall, it indicates that the recent excavated soils export market size has been more than 200,000 tons, and that there is room for those exports to more than double if options outside of California continue to become lower cost compared to either of the two hazardous waste disposal facilities in California.[53] The competitive advantage that PPL will have once granted a Class V permit would help enhance growth in the exports to Utah of these soils.

DTSC's table does not disaggregate the total volumes by location within California. County-by-county annual CWC 611 tons can be obtained from the HWTS online query system.[54] NERA extracted county-level data for the most recent complete year, 2019, and found that the nine counties surrounding the San Francisco Bay (where Oakland is located) accounted for 51% of the excavated soil generation in that year.[55] These data also indicate that the relatively higher annual CWC 611 soils generation that occurred in 2015-2017 (per DTSC's table) have continued through 2019.

Based on this more detailed and more recent evidence, a reasonable approximation of the full market demand for excavated soil disposal from just counties around the San Francisco Bay appears to have an average in the range of 250,000 to 350,000 tons per year. Given that PPL also appears from our detailed market analysis to be the lowest cost landfill available for disposing these soils, once PPL can enter this market it is reasonable to expect it can gain a significant share of this market. How much of this market PPL might be able to attract will depend on its marketing efforts, but it does not appear unreasonable for PPL to expect to attract an incremental 100,000 to 200,000 tons of excavated soils into Utah's landfills.[56] Unlike the case for residential MSW in Utah, it is perfectly reasonable to expect PPL's market potential for attracting these excavated soils to be realized within the first few years of PPL's opening.

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[52] A portion of the data in this table was summarized in figures in a 2018 California Department of Toxic Substances Control (DTSC) slide deck (available at: https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/04/CommDialogue_ContaminatedSoilOverview_Final.pdf). DTSC provided the table presented in this report upon inquiry by NERA in September 2020.

[53] Additionally, there is substantial community pressure in California to close those facilities over environmental justice considerations (see, for example, https://greenaction.org/wp-content/uploads/2020/06/Clean-Harbors-Closure_PRESSRELEASE_CCVGA_June242020-1.pdf). Even if such pressures fail to achieve their closure, they might cause a decline in demand for these sites' landfilling services.

[54] Hazardous Waste Tracking System, Department of Toxic Substances Control (available at https://hwts.dtsc.ca.gov/).

[55] Using the HWTS online data site (https://hwts.dtsc.ca.gov/), we found that these nine Bay Area counties (San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Solano, Marin, Napa and Sonoma) reported having generated 424,000 tons out of about 824,000 tons statewide in 2019. Inclusion of the next ring of counties in northern California that are close to the UP rail line from Oakland to Utah (i.e., San Joaquin, Yolo, and Sacramento) raises the percentage to 54%. However, the large majority of these northern California soils were from the densely populated counties closest to Oakland.

[56] The reasonableness of this estimate is heightened by our finding that PPL can probably make competitive bids for a portion of the soils excavated in southern California, which comprise another 150,000 to 250,000 tons per year of the current market.

Table 9. California Generation of Excavated Soils from 1995 through 2017

Calendar Year	Total California Generated Excavated Soil (CWC 611) (tons)	Excavated Soil Disposed Out of State		Excavated Soil Disposed in CA (all destinations)		CA Destinations			
		Total Amount Disposed OOS (tons)	Amount of Disposed HW Soil as a Percent of Total	Total Amount Disposed in CA (tons)	Amount of Disposed HW Soil as a Percent of Total	Clean Harbors, Buttonwillow, CA (tons)	Chem Waste Management-Kettleman City, CA (tons)	Other / Municipal or Older/ Westmoreland (tons)	Western Environmental *Mecca, CA (tons)
1995	257,267	184,976	71.9%	73,552	28.6%	17,552	38,730	3,196	-
1996	262,040	179,737	68.6%	83,078	31.7%	9,076	50,793	8,867	-
1997	205,350	89,434	43.6%	115,916	56.4%	22,692	57,348	22,131	-
1998	292,493	126,585	43.3%	165,909	56.7%	21,585	112,499	4,222	-
1999	407,692	191,335	46.9%	216,357	53.1%	31,003	160,696	1,157	-
2000	618,825	183,055	29.6%	435,770	70.4%	28,947	355,553	26,107	-
2001	769,247	262,032	34.1%	507,215	65.9%	22,802	443,887	1,187	-
2002	449,258	161,331	35.9%	287,927	64.1%	22,881	247,516	-	-
2003	518,775	186,498	35.9%	332,277	64.1%	32,028	284,766	46	23
2004	575,121	168,614	29.3%	406,507	70.7%	112,454	254,004	-	0
2005	472,912	210,892	44.6%	262,020	55.4%	78,125	160,660	-	262.46
2006	446,072	98,479	22.1%	347,593	77.9%	65,585	239,648	-	18,790
2007	673,281	174,740	26.0%	498,541	74.0%	96,868	394,411	-	2,205
2008	817,730	301,593	36.9%	516,137	63.1%	206,349	303,870	-	4,210
2009	567,889	135,918	23.9%	431,971	76.1%	96,982	229,996	-	103,620
2010	437,159	210,456	48.1%	226,703	51.9%	120,814	66,748	-	38,429
2011	392,046	257,404	65.7%	134,642	34.3%	116,973	6,240	-	10,614
2012	370,019	189,804	51.3%	180,215	48.7%	179,133	345	-	-
2013	312,995	193,042	61.7%	119,953	38.3%	118,730	208	-	-
2014	421,168	273,815	65.0%	147,352	35.0%	142,901	1,939	-	-
2015	575,002	292,998	51.0%	282,004	49.0%	221,225	59,631	-	-
2016	646,363	274,942	43.0%	371,421	57.0%	201,105	170,037	-	-
2017	728,586	449,554	61.7%	279,032	38.3%	n/a	n/a	n/a	n/a
Avg. (1997-2016)	498,470	199,148	41.9%	299,321	58.1%	96,959	177,500	2,742	8,908
Avg. (2002-2016	511,719	208,702	42.7%	303,017	57.3%	120,810	161,335	3	11,877
Avg. (2007-2016)	521,365	230,471	47.3%	290,894	52.7%	150,108	123,342	-	15,908
Avg. (2012-2016)	465,109	244,920	54.4%	220,189	45.6%	172,619	46,432	-	-
Avg. (2014-2016)	547,511	280,585	53.0%	266,926	47.0%	188,411	77,202	-	-

Source: California Department of Hazardous Waste and Toxic Substances (data provided to NERA via email September 30, 2020 from Daniel Knight, Headquarters Public Records Act Coordinator, Department of Toxic Substances Control).

*Notes: Tonnage amounts are adjusted to remove "phantom tons" from manifests greater than 130 tons (manifest errors); Unknown EPA IDs assigned to state according to state EPA ID prefixes and /or State Abbreviations; Tonnage from Unknown or Blank EPA ID numbers is shown as California tons; * HW Tonnage Shipped to Western Environmental LLC, Mecca, CA (2003-2011). DTSC stopped disposal at this facility in 2011; 2017 HWTS data complete, November 2018; update of California destinations not requested.*

We also consider whether such large quantities of soils will continue to be excavated for landfilling in the future. To evaluate this, we consider the inventory of contaminated sites in California that have been cleaned up so far (and thus presumably account for the cumulative 11.2 million tons from 1995-2017 in the table above) and compare that to the number of sites listed as contaminated but not yet cleaned up. We combine data on contaminated sites tracked by California DTSC and the State Water Resources Control Board (SWRCB). We also use data from USEPA to determine the number in the California data set that are designated as federal CERCLA and brownfields sites, as the California data do not provide that disaggregation. The distinction is important because the latter probably generate larger amounts of excavated soil.

Using the data to assess numbers of listed sites (of each type) already cleaned up, those yet to be cleaned up, and the rate at which new sites are being added to the lists, we estimate that another 6 million to 13 million tons of excavated soils can be expected to be generated over the next ten years, which would imply an average of 600,000 to 1,300,000 per year. We also estimate that about half of these tons will be generated in northern California where our analysis finds PPL has a clear cost advantage over other regional competitors. These estimates are consistent with, but range somewhat higher than the recent years' generation levels. We did *not* estimate these values based on extrapolation of apparent recent trends in the data in **Table 9** but used the detailed bottom-up calculation described above. These bottom-up estimates give confidence that the recent market demand for disposal of excavated soils will continue, and perhaps even to continue to grow over the next decade. **Appendix B** documents how we derived our bottom-up estimates from the available data.

As the past indicates, however, the specific quantity each year will tend to fluctuate rather than increase monotonically, even if there is an overall upward trend. In conclusion, our analysis projects that the present robust market for disposal of excavated soils is likely to continue well into the future. It is not a short-term phenomenon that has peaked.

2.2.4. Potential Public Benefit of PPL Facility for Disposing Excavated Soils

Subsection 108(10)(b) requires information on the State's need for the additional capacity for management of nonhazardous solid waste. As we explained in Section 1, economists interpret "need" for capacity, in part, in terms of how well located the capacity is, meaning whether it is distributed across space to minimize inequities in the total costs of disposal borne by all communities. Even if there is sufficient capacity to meet all demand when a broad geographic area is considered in the aggregate, *additional* capacity can be beneficial to the local economy ("economically efficient") if it is better located with respect to some of the individual communities within that area and can serve their needs better by being lower cost. Our market analysis of excavated soils shows that PPL will clearly provide for the needs of a major customer base – those who generate such soils in northern California. Hence, location of the landfill capacity matters. We explain how better serving out-of-state customers drives economic benefits *within* Utah.

<u>Public Benefits to the State of Utah from Importing Soils from California</u>

There are two ways in which the state will benefit from imported waste disposal, even if the direct economic savings are accrued by waste generators out of state. First, by increasing the demand for PPL, they will help reduce PPL's average cost per ton that it landfills, and this cost reduction can be passed along to in-state customers as well as to the out-of-state generators. The large incremental demand that PPL appears positioned to attract from out-of-state types of wastes once it has a Class V permit (such as excavated soils) can be an important factor in PPL being able to operate at scale—which can then allow PPL to provide in-state tipping fees comparable to other regional commercial competitors. Thus, these out-of-state wastes will *synergistically* allow PPL to provide the public benefits to the northern Utah region of having *well-located* capacity of state-of-the-art regional landfilling services that we demonstrated in Section 2.1 for in-state MSW disposal services. It is our understanding from communications with PPR that regional landfills require (very approximately) 250,000 tons per year to achieve cost-effective scale and thus market-competitive tipping fees.[57] With out-of-state excavated soils alone providing potential demand to PPL of 250,000 to 350,000 tons per year—and sufficient competitiveness to be able to command as much as 100,000 to 200,000 tons per year of that potential demand in the near term (as we have estimated in Section 2.2.3)—PPL also will be able to provide cost-effective tipping fees to its potential *near-term* customer base within Utah (e.g., a portion of the approximately 200,000 tons per year of commercial MSW that we estimated is currently being collected in northern Utah within PPL's economic wasteshed).

Thus, we conclude that the out-of-state wastes allowed by granting a Class V permit to PPL are a key component of a strategy for meeting the need known to exist in the northern region of Utah for cost-effective access to state-of-the-art regional landfill capacity.

The second way that Utahns will gain economic benefits if PPL attracts a larger quantity of out-of-state wastes for disposal at its facility comes from the increase in economic activity that will derive from the incremental jobs, expenditures on goods and services associated with the waste disposal activities at the PPL site—*paid for by Californians* in the case of the excavated soils from that state. Each increment in waste management revenues that will be attracted to the state as a result of PPL's Class V permit will translate into a range of fiscal and macroeconomic benefits to the County and to the State more generally. The fiscal and macroeconomic benefits are discussed in more depth in Section 2.3.

Direct Savings to California Waste Generators Using PPL

For completeness, it is also appropriate to estimate the economic benefit that PPL's Class V permit would provide to Californians. Our market analysis shows that the presence of a Class V landfill at the PPL site would provide a total-cost-of-disposal reduction to California customers that already export their soils that could range from about \$14/ton to \$28/ton.[58] Using the 2017 soil quantity provided by DTSC (**Table 9**), and assuming 51% of it was from the San Francisco Bay Area, we estimate the benefits to Californians could range from \$3 million to \$6 million per year for those who already export their soils. We estimate that the economic benefits that PPL could provide to those who currently continue to dispose such soils inside California, should they start to see the lower cost option that PPL represents and add to the quantity

[57] Personal communication, Will Spears, Chief Financial Officer, PPR.

[58] We base this on our estimate of the \$/ton differential of \$14 compared to disposal at the ECDC site to \$28 compared to disposal at the Butterfield Station Landfill. 450,000 tons were exported out-of-state in 2017.

being exported, could be as much as $6 million per year more.[59] The latter number may be an overstatement because some of those soils not already being exported may have contaminant levels that would render them RCRA-hazardous, and thus not possible to dispose at PPL. Nevertheless, our analysis suggests that PPL's entry into Class V status could produce several millions of dollars of savings to consumers outside of Utah, in addition to providing economic benefits to the State of Utah that are explained below.

2.3. Macroeconomic Benefits to the State of Utah from All Waste Streams

2.3.1. Macroeconomic Benefits for Incremental Wastes Disposal Revenues in Utah

At several junctures, this report has noted that public benefits to Utah from the proposed facility will come from two sources. The first is reductions in the total-cost-of-disposal for customers who would find PPL to be a more cost-effective landfill, plus cost reductions for customers of landfills that would lower their tipping fees when PPL's presence creates a new competitive pressure on them (which we call an indirect cost reduction). We have provided estimates of the dollar values of those customer cost reductions for both of the specific waste forms that we have analyzed (in Sections 2.1.4 and 2.2.4). This section now addresses the second source of economic benefits to the state from the proposed facility: an increase in economic activity within the state for each incremental ton of waste that is disposed of in-state rather than outside of the state. We call these "macroeconomic" benefits because they are gained by a wider range of players than landfill customers alone.

The benefits of heightened economic activity start with "direct" benefits to those who gain jobs as a result of the new business and new revenues to other businesses whose goods and services are purchased by the new facility to conduct its operations. Examples of the latter include the landfill's purchases of fuel, water, power, equipment repairs, supplies, and professional and administrative services. The additional jobs create direct benefits that are concentrated in the areas close to the facility. The direct benefits due to non-labor expenditures will be divided among businesses in the local area, in other parts of the state, and outside the state, and so they are not as locally concentrated. How much of those direct benefits remain within the state varies with the products or services being purchased. Utility, fuel, and equipment repair expenditures will benefit businesses close to the facility, and probably remain entirely within the state if not entirely within the county of the facility. In contrast, expenditures on certain kinds of professional services, such as highly specialized engineering studies, are more likely to be sourced from out-of-state (although not universally). Thus, a large fraction of the direct macroeconomic benefits will be concentrated in and around the local area of the facility.

The economic benefits of the incremental activity of a new facility do not end there, however. As local businesses purchase more of their own supplies and/or hire more workers to serve their heightened demand, "indirect" benefits also start to emanate from the region around the facility. This phenomenon is called a "multiplier effect." The regional extent of the indirect multiplier effect will be more broadly spread than the direct effect, but much of it will still accrue within the state.

[59] This is based on our estimate that Kettleman Hills Landfill would cost about $45/ton more than disposal at PPL, which is the lower-cost in-state landfill for northern California excavated soils disposal. 279,000 tons were disposed at one of the two California landfills.

A third tier of economic benefits then is layered onto the direct and indirect benefits, which is called the "induced" benefit. Induced benefits occur when the households earning new income from both direct and indirect jobs spend a portion of that new income. This additional "induced" spending will also occur both locally (e.g., on housing and food) and outside of the region (e.g., on vacation travel). The average magnitude of this effect is also summarized as numerical multipliers that are compiled by economists using economy-wide historical economic data on financial flows between different sectors and regions of the economy.

An additional manifestation of macroeconomic benefits comes in the form of increased government revenues. These include personal income taxes on the new labor income, corporate income taxes on the new facility's profits as well as added profits of local businesses experiencing direct, indirect and induced demand increases. In the case of landfill services at PPL, there also will be host fee revenues to Box Elder County ($2 per ton disposed), as well as additional state disposal fee revenues ($0.21 per ton disposed).

The operation of PPL will provide net benefits to Utah to the extent that wastes disposed at PPL are incremental to amounts that would be disposed in the state without the presence of PPL. Such incremental waste management revenues will come primarily from the *imported* wastes. This is one reason why the Director of DWMRC should not dismiss imported wastes that will occur under a Class V permit as if they would produce no public benefit to Utah. The direct disposal cost savings gained by customers from whom PPL imports wastes do accrue primarily out-of-state, but the flip side of their direct savings is that a part of their waste management expenditures are now appearing as new business revenue in Utah (rather than in California, Arizona, or wherever else they would send their wastes if PPL were not to be available to them). These new revenues from incremental imported wastes then engender the direct, indirect, and induced macroeconomic benefits to Utahns described above.

We have used a standard economic database called IMPLAN to develop rough estimates of the benefits to Utah from a given potential increment in waste disposal at PPL due to wastes imported into Utah for disposal in-state.[60] It is not within the requirements of the Needs Assessment to provide a full business plan for PPL, but only to demonstrate that public benefits will be gained in Utah if PPL is able to operate under a Class V permit. We therefore estimate the amount of macroeconomic benefit to Utah for each increment of 100,000 tons of imported waste that PPL might obtain, and do not provide a specific projection of exactly how many incremental tons will be imported in each year after the Class V permit is granted. The following benefits are only for the activity of disposing the wastes, and do not include the additional economic benefits that will occur from the activity of finishing construction of the site infrastructure that will occur before disposal operations can start.

[60] IMPLAN is a proprietary model and data base containing a social accounting matrix, also commonly referred to as an input-output model (https://implan.com/). It is frequently used by economists for estimating local and regional employment and economic output benefits of specific development projects, such as a new waste management landfill. The IMPLAN database is also incorporated into more detailed macroeconomic models that impacts of major policy changes that can affect multiple sectors of the economy.

Based on our market analysis, we estimate that each 100,000 tons of imported excavated soils will produce $3.2 million revenues for PPL.[61] Using IMPLAN data sets for which NERA holds licenses, we project that each $3.2 million increment in waste management services revenues in the state can be expected to produce an additional 30 to 40 direct, indirect, and induced jobs *in Utah.*[62] The large majority of such incremental jobs will be for people residing in or close to Box Elder County. Our analysis also projects that each 100,000 ton increment of imported wastes produces a direct output increase of $3.2 million in Box Elder County plus additional indirect and induced output by Utah businesses of $2.3 million to $2.9 million. In total, once PPL is operating, each increment of 100,000 tons that the site imports into the state will benefit the economy of Utah by about 30 to 40 additional jobs and about $5.5 million to $6.1 million dollars of annual output.

Note again that the above values are estimates of the benefit for each 100,000 ton increment in disposals within Utah, which is a generic quantity that readers can use to assess the range of benefits under varying actual amounts of incremental waste imports, and not a projection of how much incremental imports PPL will actually attract to the state, once operating. For example, if PPL were to attract 300,000 tons per year (as seems possible based on NERA's analyses of the California soils and Idaho MSW markets), the above values should be multiplied by three. Thus a 300,000 ton per year rate of incremental imports by PPL would imply about 90 to 120 additional jobs and $16.6 million to $18.3 million per year of economic output for Utah. Although our analysis does not disaggregate these macroeconomic effects to the county level, one can have confidence that as much as half of these public benefits would be experienced in or very close to Box Elder County.

The economic benefits to Utah stated above are based on quantities of incremental imports of waste. However, Box Elder County's benefits are tied to *all* wastes disposed at PPL and not just the incremental imported wastes. For example, if commercial MSW wastes that are presently disposed in Cache County are shifted to PPL, that will provide financial benefits to Box Elder County in addition to those estimated above for just incremental imported tons. (It will not, however, result in net macroeconomic gains to Utah as a whole, as these other sources financial benefit to Box Elder County will entail a shift in those waste management expenditures from other areas of the state.) Thus, for every 100,000 tons disposed at PPL, even if a portion of those tons come from in-state customers that would otherwise dispose their wastes at another Utah landfill, Box Elder County will gain even greater jobs and output than estimated above. It would also gain $200,000 in new county government revenues, in addition to potential

[61] This assumes PPL's average tipping fee for imported wastes is $32/ton, which is the tipping fee that we used in our analysis of PPL's ability to be the lowest total-cost-of-disposal landfill in the west for importing excavated soils from California (see Appendix B). To the extent that PPL's actual average price per ton deviates from $32 by some percentage ("X"), our estimates of the macroeconomic benefits would be changed by the same X%. This is because the IMPLAN macroeconomic impacts are based on linear multipliers against total incremental revenues.

[62] PPL's revenues were assigned to the economic sector called "waste management and remediation services.," It covers the 3-digit NAICS code 562 and is the most disaggregated option for solid waste landfills (NAICS code 562212) in IMPLAN or any other available input-output dataset. NERA maintains IMPLAN licenses for national data sets for 2008 and 2018, and a data set specifically for Utah for 2008. By using the Utah-specific IMPLAN multipliers, we count only those macroeconomic benefits that can be expected to occur *in Utah.* We did, however notice a decline in the national multipliers for this sector in 2018 compared to in 2008. Without having IMPLAN data for all years between 2008 and 2018, we do not know if this reflects a structural change or inter-annual variance, nor whether the national average change also occurred in Utah or reflects changes that occurred only elsewhere in the U.S. We have reflected this uncertainty by providing ranges for our Utah-specific macroeconomic impact estimates in which the lower values assume that Utah experienced the same proportional declines in its state-specific multipliers as occurred in the national data. The upper values use our available Utah-specific multipliers as-is.

increases in county revenues from property and other taxes due to the heightened personal and corporate income occurring in its borders.

The breadth of benefits from increased economic activity is why these impacts are often called macroeconomic impacts. We emphasize again that any such macroeconomic estimates of public benefits of the new landfill are separate from and in addition to the reductions in cost of living and cost of doing business for Utahns that we estimated in prior sections. The latter forms of economic benefit are more difficult to estimate in macroeconomic terms because they affect the regional competitiveness of Utah businesses rather than directly produce new revenues within the state. It is reasonable, however, to anticipate that they too will help attract new businesses into the northern Wasatch Front region and further increase the public benefits to Utah of PPL having a Class V permit.

2.3.2. Potential Incremental Waste Streams Beyond MSW and Excavated Soils from California

As discussed in the preceding section, the macroeconomic benefits to the state, and to Box Elder County more specifically, will depend on the total quantities of disposal that occur at PPL under a Class V permit. The detailed market analyses presented in the report (Sections 2.1 and 2.2) provide some indications of potential demand for PPL's disposal services from two waste forms: MSW within Utah and Idaho and excavated soils from California. These are clearly important potential sources of demand; combined, we estimate would reasonably be expected to account for 200,000 to 300,000 tons per year in the first several years of PPL operating,[63] perhaps increasing to 600,000 to 800,000 tons per year over a longer period of transition of the PPL wasteshed to regional landfilling.[64]

These quantities alone appear sufficient to allow PPL to operate at a cost-effective scale. However, they should not be viewed as PPL's entire potential demand. Although we have not quantified PPL's potential demand for any other wastes, in this section we outline what some of PPL's other waste sources may be:

- *Other non-commercial wastes being disposed in the northern Wasatch Front*. Some facilities rely on their own non-commercial landfills to dispose of their own nonhazardous wastes. In Utah, these landfills are designated as Classes II, III, and IV. It is plausible that some of the entities operating disposal facilities may prefer to stop managing their own wastes—especially when waste management is not an activity that is core to its business or economic functions. It is possible some of these landfills exist due to lack of nearby access to a commercial landfill that meets the current highest standards for environmental protection and would consider outsourcing its waste disposal activities if one were to open. DEQ data indicate that 72 such landfills were

[63] We base this range on about 100,000–200,000 tons of California excavated soils out of a projected generation statewide over the next decade of 600,000 to 1,200,000 per year, of which half is projected to come from northern California (per Section 2.2.3) plus about 100,000 tons of commercial MSW out of the estimated 280,000 tons per year in PPL's wasteshed today (see **Table 3**).

[64] We base this range on the MSW demand increasing to include all of the commercial MSW in PPL's wasteshed, plus all of the residential MSW in the wasteshed excepting Cache County (which has a new landfill with about 80 years of remaining capacity), which implies 480,000 tons per year. To this we add excavated soils from California of 150,000 to 300,000 tons per year, which assumes PPL's excavated soils market share rises slightly over time, with longer-term presence in that market.

operating in 2018,[65] three of which are in Box Elder County near PPL.[66] While the total volume of wastes associated with such sites is small, it is also plausible that the local counties, such as Box Elder County, may find that having modern landfilling services in their territory will improve their economic development opportunities.

- *Industrial wastes by rail from more distant locations*. PPL's direct rail access will create an easy route for delivery of industrial wastes from a much larger region than that which can be reached by truck. **Figure 7** (in Section 2.2) provides a map that shows that easy rail access to PPL from the west, from the east across all of southern Wyoming, and from the north through eastern Idaho and western Montana. PPL's ability to attract a significant share of the industrial wastes produced to its west may be relatively constrained as there are several other rail-served regional landfills in that direction.[67] With regards to competition for the north-south route, there is a rail-served regional landfill (Simco Road Regional Landfill) near Boise, ID. It is not positioned directly on the same line, but there is a split in the UP line near Fort Hall, ID, with one line going to Boise and the other to Salt Lake City. As they are about equidistant from the split, PPL and Simco Road Landfill may share the market for waste-by-rail from the more northern destinations while PPL would likely be the top contender for wastes originating south of Fort Hall.[68] We have not found evidence of any rail-served regional landfills along the east-west route to PPL from Wyoming. We have not made estimates of how many industrial facilities might be able to transport their wastes for disposal by rail along the above routes.

- *MSW by rail from southern Wyoming and northeastern Idaho.* As noted in Section 2.2 (and evidenced in **Appendix D**), PPL is committed to developing a UP rail spur onto the PPL site as soon as it receives Class V permit approval. Although the rail spur is not planned specifically with transport of MSW in mind, over the long run it could create even quicker and cheaper travel costs for MSW originating in areas along rail lines in Idaho and Wyoming that provide direct access to PPL. The development of truck-to-rail transfer stations in these more rural areas may not be as costly or difficult to manage as were the truck-to-rail transfer stations in the Wasatch Front areas that were abandoned in favor of transfer trucking in about 2006. Use of waste-by-rail from these out-of-state locations to PPL would also avoid the logistic difficulties of having to run the trains through a separate rail company, Utah Central.[69] While such an expansion of PPL's accessibility would not likely occur immediately after completion of the rail spur, it points out that PPL's current market position with respect to the more distant out-of-state MSW markets to its north and east is likely to improve with time, even though use of waste-by-rail

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[65] See table titled "*2018 Non-Hazardous Solid Waste Disposal for Utah*" at https://deq.utah.gov/waste-management-and-radiation-control/disposal-facilities-recyclers-and-disposal-volumes-solid-waste-program.

[66] *2019 Utah Solid Waste Landfill Inventory*, available at: https://documents.deq.utah.gov/waste-management-and-radiation-control/solid-waste/DSHW-2019-015530.pdf.

[67] These are: Lockwood Regional Landfill in Sparks, NV (along the UP route from the San Francisco Bay Area) and Apex Landfill in Las Vegas, NV (along the UP route from the Los Angeles area).

[68] Using UP's posted tariffs to each destination from Idaho Falls, ID, we find that the cost of the transportation of containerized wastes would be about $3/ton more to PPL, which leaves plenty of room for negotiations with the rail and for differences in tipping fees offered to affect which landfill can win from bid to bid.

[69] See https://utahrails.net/industries/trash-by-train.php.

remains unlikely to return in the MSW market towards regional landfills to the south of the Wasatch Front.

- *Excavated soils from brownfield and other sites in the Wasatch Range.* We have identified specific regulatory conditions in California that position PPL—despite its long distance—to be a least-cost destination for soils excavated from brownfield and other former industrial sites in California. However, there are also brownfields and similar industrial sites in the Wasatch Range, where population growth is placing pressure for their redevelopment to a cleaner state for higher-value uses. Some of these sites are directly within trucking distance of PPL, or relatively accessible to PPL given its rail access. USEPA data indicates that there are 24 already-designated brownfield and six already-listed CERCLA sites that are yet to be cleaned up in the northern Wasatch Range.[70] The same estimation method described in Section 2.2.3 (and documented in **Appendix B**) projects about 2 million to 5 million tons of soils could be excavated over the next ten years in the northern Wasatch Range, although this estimated is based on fewer data points and thus is a more uncertain estimate. PPL would, of course, have to compete for this market with the other regional landfills in northern Utah that we included in our MSW market analysis (Section 2.1).[71]

- *Automobile shredder residue (ASR)*. When automobiles reach the end of their useful lives, the modern process for disposing of them involves a highly mechanized shredding, sorting, and recycling process. Many valuable recyclable materials are obtained from this process, so that it is a profitable business throughout the U.S. However, approximately 25% of the vehicle materials remain with no market value and are presently landfilled. The quantity landfilled in the U.S. is about 5 million tons per year.[72] Although these wastes are generated throughout the U.S., using similar formulas, we estimate that about 500,000 tons per year are generated in California.[73] California's generation of ASR is of interest to PPL because of California's more rigid regulations for characterizing wastes. Although California allows ASR to be used as alternative cover at five in-state nonhazardous landfills, the pre-disposal treatment requirements in California are more extensive (and thus costly) than the federal RCRA and Utah requirements.[74] It is also possible that the California landfills may eventually not be able to serve the total ASR produced in that state, yet the shredding companies need to reliably move the wastes to disposal in order to keep their shredding activities (and associated business revenue driver) operating without bottlenecks in disposal of the process's wastes. As with excavated soils from California, these circumstances suggests an additional demand by California waste generators for sending their ASR wastes to states that do not require as much pre-treatment,

[70] These are existing sites in the counties of Salt Lake, Davis, Morgan, Summit, Weber, Cache, Rich and Box Elder.

[71] These would include the competitors from our MSW market analysis (see Table 2), which focused on trucked waste markets, rather than those of our California soils market analysis, which included only regional landfills in Utah with rail access.

[72] Argonne National Laboratory, *End-of-Life Vehicle Recycling: The State of the Art of Resource Recovery from Shredder Residue*, ANL/ESD/07-8, September 25, 2006, pp. 7. Available at https://publications.anl.gov/anlpubs/2007/02/58559.pdf .

[73] Based on a DTSC estimate of 1.2 million vehicles scrapped in California in 2017 (https://hal.archives-ouvertes.fr/hal-02190787/document) which is about 10% of the number of scrapped vehicles in the Argonne Lab estimate of 5 million tons per year.

[74] See, for example, https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/07/CTMSR_Workshop-Presentation.pdf.

particularly if they can use low-cost rail transport to a facility that has direct rail access, such as PPL.

- *Excavated soils from wildfire cleanups*. Wildfires have been trending upwards in California and throughout the U.S. generally. In California alone, cleanup of burned areas has produced millions of tons of excavated soils in recent years not included in the estimates of CWC 611 soils used in our market analysis. DTSC extended an emergency waiver allowing these wildfire soils to be landfilled in a few of California's solid waste landfills, however, the volumes landfilled in California during 2018 and 2019 were so large that they placed stresses on the capacity of local landfills designed to support the MSW needs of communities.[75] The quantity of wildfire cleanup soils disposed in California landfills from the 2018 fires was over 3.6 million tons[76] as a result of 1,975,086 acres burned across the state.[77] Given that the 2020 wildfires in California burned 5,202,336 acres (or 2.6 times more area), the amount of wildfire soils that need to be landfilled in the coming year may rise to as much as *10 million tons*. Based on the stresses experienced in the past two years, waste management marketing professionals operating in California expect the California landfills to be less accommodating of the new and heightened demand to deplete their MSW airspace in the coming year, creating demand for longer-distance transportation to larger regional landfills.[78] Given that rail transport over very long distances can be less costly than trucking to nearer landfills not served by rail, PPL would be a natural contender for some of these wildfire soils, especially once it is already actively importing excavated CWC 611 soils from California. If recent levels of wildfire continue in future years, as many climatologists predict, the potential demand for out-of-state disposal of California wildfire soils could be 1 million to 10 million tons per year.

2.4. Energy and Recoverable Resources

Subsection 19-6-108(10)(b)(ii) requires information on the energy and recoverable resources as part of the description of the public benefits of the proposed facility. The following points address this information requirement:

- PPR has set aside five acres of the PPL site to install a solar microgrid to meet the majority of the facility's power needs. PPL will thus have a much larger percentage of renewable power than that sold to the public by Utah utilities.[79] The location of these acres allows for the capacity of the solar energy system to be expanded over time. In fact, the available area on the site is so large that PPL will be able to consider whether to expand its solar capacity well beyond its own needs

[75] See, for example, "Waste from Camp Fire, millions of tons of it, could end up in Shasta County landfill," Redding *Record Searchlight*, April 26, 2019 (available at: https://www.redding.com/story/news/2019/04/26/waste-debris-camp-fire-wildfire-shasta-county-landfill-calrecycle/3575147002/).

[76] See https://www.calrecycle.ca.gov/newsroom/2019/11nov/21 (accessed October 23, 2020).

[77] See https://en.wikipedia.org/wiki/2018_California_wildfires (accessed October 23, 2020).

[78] Personal communication, Chris Brady, California Manager, PPR.

[79] About 12% of total net electricity generation in Utah in July 2020 came from non-hydroelectric renewable sources per data from the *Electric Power Monthly* publication published by the Energy Information Administration, available at: https://www.eia.gov/state/?sid=UT#tabs-4.

and sell the solar power into Utah's electricity supply grid, thus helping decarbonize the power used by Utahns at large.

- PPR will install a gas-collection system to capture the methane that will, later in time, start to be generated by the landfill. In the future, when enough gas is generated, the methane will be cleaned and used as a transportation fuel.

- Because of the size of the PPL site, it will provide an opportunity to segregate waste, stockpile inert materials for beneficial reuse,[80] and implement other waste-processing technologies to recover embodied energy.

- PPR is willing to partner with municipalities and facilitate discussions about the feasibility of diverting and recovering organics, recyclables, and other inert and reusable materials at the landfill.

[80] An example of beneficial reuse can be applied to discarded wallboard (drywall), which can be reprocessed into new wallboard or for other uses of gypsum, such as in soil amendments. If market conditions do not make such beneficial reuse advantageous over a given period of time, the ability to stockpile it (rather than landfill it) on the PPL site would preserve the option to reuse it in the future when market conditions may have changed. The same benefits of stockpiling could be applied to other recyclables (e.g., aluminum, iron, paper, plastics) that frequently experience periods of low pricing that can be weathered if a large stockpiling opportunity is available.

3. Reasons for a Positive Determination Under Subsection 19-6-108(11)

Subsection 19-6-108(11) requires that before approving a Class V permit application, the Director of DWMRC must make two additional determinations:

a. That the probable beneficial environmental effect of the facility to the state outweighs the probable adverse environmental effect; and

b. *That there is a need for the facility to serve industry within the state.*

In this section of the report, we provide information that supports making each of these two additional determinations.

3.1. Subsection 19-6-108(11)(a): PPL's Probable Beneficial Environmental Effects to the State Outweigh Probable Adverse Environmental Effects

3.1.1. Net Beneficial Environmental Effects Result from Transitions to Regional Landfills

As is thoroughly documented in PPR's Class V application, PPL has been designed, constructed, and will be operated consistent with the high standards required of modern landfilling practices. Since 1991 under RCRA, the State of Utah has developed robust requirements to ensure that all new landfills that they permit are environmentally sound. By ensuring that new, state-of-the-art landfills that are *readily accessible* to communities and businesses throughout the state, DWMRC can ensure that transition to these more environmentally beneficial waste management operations proceeds at a reasonable pace throughout in all parts of Utah.

As we explained in the beginning of Section 2.1, the superior design and operational standards required of new landfills has created higher capital investment requirements. This has rendered smaller scale landfills built to meet local waste management needs economically non-viable. Much larger scale landfills—built to serve waste management needs over a broader region—have thus become the only cost-effective model for meeting the modern standards of environmental protection. These are referred to as regional landfills. Permitted as a Class V landfill, PPL would be an example of such a regional landfill.

This need to rely on regional-scale landfills such as PPL to transition to more environmentally-sound management of wastes presents a challenge for less densely populated areas of the state. The lower density of waste generation in these areas forces the wasteshed necessary to achieve cost-effective scale to be very large. Without careful consideration of the needs of such counties, the result is that they must either send their wastes very long distances (incurring high transportation costs) to regional landfills built to serve more densely populated areas or continue to use their own local landfills as long as possible. The former choice increases the cost of living in those less densely populated counties—which in turn hinders their economic development objectives. The latter choice prevents those areas from benefiting from the more environmentally sound management of their wastes, and they continue to incur the greater risks of adverse environmental outcomes from their older, environmentally inferior existing landfills. Overall, these areas experience a slower transition to the net environmental benefits intended by the higher standards now demanded of new landfills.

While the southern portion of the Wasatch Front is already supplied with substantial capacity of regional landfills (both commercial and publicly-owned), our market analysis shows that communities in the northern portion of the Wasatch Front would have to absorb unfairly high total-cost-of-disposal to avail themselves of that capacity. They have thus far largely continued to rely on their existing inferior landfills.

In one case (Cache County), Logan City completed a new landfill for the County in 2017 (North Valley Landfill) to replace its pre-1990 landfill that was reaching its capacity. The decision to self-build was made despite hundreds of years of landfill capacity already available among the commercial regional landfills in the southern portion of the Wasatch Front.[81] This decision provides direct empirical evidence that the large amount of existing regional landfill capacity does not serve the needs of the northern counties in the region. If it had been an available alternative at the time when Cache County had to make its decision, PPL would have provided higher probable beneficial environmental effect[82] without creating an offsetting probable adverse environmental effect. However, approval of PPL's Class V permit now will enable it to promptly start[83] providing such probable beneficial environmental effects to other communities and businesses in northern Utah that continue to rely on older inferior landfills, many of which are unlined. (For example, Box Elder County's Little Mountain Landfill is unlined.[84])

Although this determination by the Director is intended to address only net environmental effects within the state, he might also give some weight to how the facility can provide net environmental benefits to neighboring communities. As the market analysis of Section 2.1 demonstrates, the wasteshed for MSW that PPL can serve as a regional landfill extends well into southeastern Idaho. That is, the neighboring communities and businesses within Idaho are also lacking economical access to regional landfill capacity. With a Class V permit, PPL could provide net improvements in environmental benefits to communities

[81] For example, the Wasatch Regional Landfill, which opened in 2006, estimated in its 2009 permit application that it had 280 years of capacity (https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/wasatch-regional-landfill/DSHW-2010-001867.pdf). Intermountain Regional Landfill, which had started operating by 2012 when Logan City submitted its own permit application, estimated in its 2010 permit application that it would have about 50 years of capacity. (https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/roc/DSHW-2011-002487.pdf).

[82] This new landfill does meet current standards and has a composite liner as does PPL. However, PPL would have offered even less risk of adverse environment effect despite both having liners. For example, the bottom of the North Valley Landfill is only 10.3 feet above groundwater, compared to greater than 50 feet in the case of PPL, and there are drinking water sources 3.25 to 4.5 miles of it (albeit not downgradient), compared to greater than 10 miles in the case of PPL. (See the 2010 North Valley permit application p. 8 and Drawing 5 of Appendix A, available at: https://documents.deq.utah.gov/waste-management-and-radiation-control/facilities/logan-city/DSHW-2012-002050.pdf.)

[83] As explained in Section 2, the Class V permit will allow PPL to achieve an overall demand to reach cost-effective scale that is unlikely to be attained in a reasonable amount of time if PPL has to rely solely on the relatively low density of MSW in northern Utah. Thus, PPL's ability to accept out-of-state wastes is a key to being able to provide the northern Utah counties economical access to modern regional landfilling services.

[84] 1995 Request for exemption from liner, leachate control, and groundwater monitoring.

neighboring Utah in southeastern Idaho. (At a minimum, we have determined that the landfills currently used by Bear Lake, Franklin, and Caribou counties are unlined.[85])

3.1.2. Reasons Ensuring That PPL Will Have No Probable Adverse Environmental Effects to the State

To substantiate that PPL would create minimal (i.e., improbable) adverse environmental effects to the state, we conclude Section 3.1 with some details of how PPL will provide environmentally sound waste management consistent with current highest standards for nonhazardous solid wastes.

Regarding design, PPL has been constructed in accordance with design already approved by the Director and includes composite liners, leachate collection systems, groundwater monitoring, explosive gas monitoring, litter controls, and stormwater run-on or run-off controls. PPL does not need to be changed to become a Class V facility.

Regarding location, the Director approved the relocation of the landfill in 2017 and agreed that it is suitable. The site meets all siting and all the location standards in R315-302-1 applicable to both Class I and Class V landfills.

Regarding other regulatory oversight, PPL will secure air quality and stormwater permits for operation of the landfill, all of which are in place to protect the environment. The Utah legislature has delegated responsibility for land-use planning and regulation to the state's counties and cities.[86] The Box Elder County Commission approved Ordinance 422 modifying the zoning in a way that would allow PPL to operate as a Class V facility. The County also issued a conditional use permit to PPR. Therefore, the County has determined that there are no zoning restrictions and believes that the land disturbances at the site are acceptable.

Regarding Plan of Operations, the Director has approved PPL's Plan of Operations that provides for ongoing monitoring and procedures to ensure environmental protection. The Plan of Operations for the 2020 Class V Permit Application is essentially the same as the Plan of Operations approved by the Director and integrated in the Class I Permit.

Additional beneficial features. The minor land-use impacts from PPL would be offset with the following integrated features, planned actions, and other potentially feasible and environmentally beneficial activities:

- By using solar panels, PPL will be primarily powered by a 100% renewable source of energy.

- PPR will install a gas-collection system and, when landfill gas volumes are adequate, will collect, clean, and use the landfill gas as a transportation fuel.

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[85] News Examiner 9-12-19 (available at: https://www.hjnews.com/montpelier/regional-landfill-plans-in-the-works/article_7cc15bf2-b909-5669-bcd6-ed93ba0c4468.html); DJC Oregon 10-30-03 (http://djcoregon.com/news/2003/10/30/franklin-county-landfill-gets-green-light-from-state/).

[86] Utah Code Title 17 (Counties), Chapter 27a (County Land Use, Development, and Management Act).

- The operating plan for Box Elder County's conditional use permit includes minimizing dust on access roads and preventing dust from leaving the site.

- PPR is willing to partner with municipalities and facilitate discussions about the feasibility of diverting and recovering organics, recyclables, and other inert and reusable materials at the landfill.

- PPR has already cleaned up earlier illegal dumps at the site and topsoil that might contain lead contamination from lead bullets and shot.

- PPL's large size will reduce the need for other future landfills and the potential land-use conflicts they might introduce.

- Given the size of the property, its remote location, and its proximity to rail, the PPL site might be suitable for diverting inert materials and making them available for reuse.

- Compared to other existing landfills, the route for transporting waste from some communities to PPL would be on less-congested freeways than if using regional landfills in on the south side of the Great Salt Lake.

- Decreased travel time for MSW from within its economic wasteshed will have benefits in terms of reduced emissions—of both greenhouse gases, and the criteria pollutants that contribute to the Wasatch Front's nonattainment status for fine particulate matter and ozone.[87]

3.2. Subsection 19-6-108(11)(b): PPL Will Serve the Needs of Utah Industry

The Director must make a specific and separate determination that a Class V permit for PPL will serve the needs of Utah industry. We define "Utah industry" from an economic perspective, which includes needs of businesses, state and local governments, and residents of Utah. The analyses provided in this report, as a whole, allow the Director to confidently make such a determination in the affirmative. It has explained, quantitatively analyzed, and documented in detail all the key components demonstrating this need:

- The PPL facility is located in a portion of the state where businesses and communities will be able to attain more cost-effective disposal of their MSW than if they need to rely on the commercial regional landfills that are concentrated in the southern Wasatch Front.
    - The analysis of Section 2.1 estimates that as much as $1.5 million per year of direct savings could be attained in the near term from PPL's availability to cost-effectively serve the commercial MSW disposal needs along the northern Wasatch Front, combined with the cost savings to residential MSW due to the additional competitive pressures created by PPL.[88]

[87] Utah's nonattainment designations can be reviewed at: https://www3.epa.gov/airquality/greenbook/mapnpoll.html.

[88] See total savings estimate for Utah in **Table 5**.

    - These reductions in the cost of doing business will result from a combination of reliance on PPL instead of other current landfills and from the competitive pressure that PPL will place on tipping fees that the southern regional landfills can charge in portions of the Wasatch Front at the outer portions of the economic wasteshed for trucked waste that is identified in Section 2.1.

- The PPL facility's location also can serve the needs of communities in the northern Wasatch Front counties by providing a nonhazardous waste management option that is more suitable for the environment than older inferior landfills in that area and more cost-effective than the other existing regional landfill alternatives that are their only current alternatives.

    - In cases where the current local landfill does not meet the same environmental standards as PPL (e.g., Box Elder County), PPL's presence will speed the transition away from waste management methods that are less protective of health and the environment by reducing the cost of making that transition.

    - In cases where the communities already have made the transition to a relatively distant regional landfill (e.g., Weber County), the competitive pressure of PPL's presence will immediately help drive cost-of-living reductions.

    - In cases where the communities already have built a new local landfill (e.g., Cache County), the ability of PPL to serve the commercial MSW disposal needs of that area will help maintain a long life for that landfill.

    - By enabling improvements in the area's environmental management profile without increasing their cost of living, PPL's presence will make it easier for communities in the northern part of the state to attract new industrial and other business facilities and thereby better attain their local economic development goals.

- The PPL facility is positioned to gain market share for Utah of imported wastes, such as excavated soils from California (as evaluated in Section 2.2) and commercial and residential MSW from Idaho (as evaluated in Section 2.1). Utah businesses and communities benefit economically from imports in several ways.

    - Importation of wastes to PPL will synergistically serve the needs of Utah by increasing the cost-effectiveness of PPL and thus driving down the tipping fees it can offer to Utah businesses and communities.

    - Incremental imported wastes also create macroeconomic benefits to Utah by increasing in-state revenues of the waste management services sector, paid for by businesses and communities outside of the state. The net increases in revenues have multiplier effects that increase jobs and output across the state as well as within the local area of the facility.

    - As explained in Section 2.3, each 100,000 tons per year of incremental imported waste is projected to add about $5.5 million to $6.1 million per year to Utah's total economic output and create dozens of in-state jobs.[89] These also imply fiscal benefits to the state from increased personal and corporate income taxes, sales taxes, and could also potentially lead to property value increases that can raise property tax revenues. Counties will also benefit from increased sales tax revenues and potential property value increases that can raise property tax revenues.

- A Class V permit for PPL also will establish a cost-effective regional landfill option for Utah's neighboring rural communities in southeastern Idaho, enabling them also to speed their transition to nonhazardous waste management methods that are more suitable to the environment. Although these environmental benefits are not formally within Utah's borders, Utah's profile as a positive force for environmental improvement will be enhanced by its willingness to support the needs of close neighbors in evaluating the need for new regional landfill capacity in the Wasatch Front area. This provides an environmental amenity dimension to the benefits to Utah of enabling PPL to import MSW from Idaho, in addition to the financial and fiscal benefits to Utahns of reducing PPL's average cost-per-ton of disposal services and macroeconomic gains.

- Whether imported or from in-state, Box Elder County will gain $2 in host fees for each ton disposed at PPL. In the short run, this could imply new county government income in the hundreds of thousands of dollars per year and could increase well above $1 million per year in the longer run.

- The above estimates of macroeconomic and fiscal benefits that PPL will provide to the state are separate from and in addition to the reductions in cost of living and cost of doing business for Utahns described at the top of Section 3.2. Those other forms of economic benefit will have their own multiplier effects. These are more difficult to estimate quantitatively because they affect the regional competitiveness of Utah businesses, which indirectly rather than directly generates new revenues within the state. It is reasonable, however, to anticipate that those reductions in cost of living and cost of doing business will help attract new businesses into the northern Wasatch Front region and further increase the economic benefits to Utah of PPL having a Class V permit.

All of the above ways that PPL will serve the needs of Utah industry, businesses, residents from an economic and financial perspective are gained while improving net environmental effects by helping reduce the cost and thus speed the transition to the state-of-the-art waste management practices of regional landfills that are considered more protective of health and the environment.

[89] We use 100,000 tons as a generic increment of imported tons. We do not provide a specific projection of the total tons that PPL will import, but the analyses of Section 2 indicate it could be several hundreds of thousands of tons per year, based on a market potential estimate of 100,000 to 200,00 for excavated soils from California and about 100,000 tons of MSW in PPL's wasteshed in southeastern Idaho. As Section 2.3.2 explains, there are additional potential sources of imported wastes that our analysis has not quantified.

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Promontory Point Landfill
Class V Permit Needs Assessment Report
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Information furnished by others, upon which all or portions of this report are based, is believed to be reliable, but has not been independently verified, unless otherwise expressly indicated. Public information and industry and statistical data are from sources we deem to be reliable; however, we make no representation as to the accuracy or completeness of such information. The findings contained in this report may contain predictions based on current data and historical trends. Any such predictions are subject to inherent risks and uncertainties. NERA Economic Consulting accepts no responsibility for actual results or future events.

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All decisions in connection with the implementation or use of advice or recommendations contained in this report are the sole responsibility of the client. This report does not represent investment advice nor does it provide an opinion regarding the fairness of any transaction to any and all parties.

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APPENDIX A. MUNICIPAL SOLID WASTE STREAM ANALYSIS

1. Types of Waste and Waste Origin

For this analysis we assume the type of waste is Municipal Solid Waste (MSW) originating in northern Utah and Southeastern Idaho.

2. Landfills and Transfer Stations Considered in the Analysis

The list and locations of six landfills and 32 transfer stations considered in the analysis are presented in **Figure A-1**. The six landfills include Promontory Point Landfill (PPL), and five other commercial landfills that are deemed competitor landfills to PPL in Utah and Idaho. We narrowed the selection of landfills to first consider all commercial landfills in Utah regulated by Utah Department of Environmental Quality (DEQ) that include and are north of, ECDC Environmental landfill. This resulted in four landfills – PPL, Wasatch Regional landfill, Intermountain Regional landfill, and ECDC Environmental landfill. To this list, we added Tekoi commercial landfill, which was not considered in a previous market study on PPL as it is not regulated by the state's DEQ due to its location on Indian Reservation in Toole County, but is nevertheless considered a commercial landfill relevant to the market analysis due to size, location and market activity. Simco Road Regional landfill in Idaho is included for similar reasons, as commercial landfills in southeastern Idaho are considered in the market assessment.

This analysis does not focus on publicly-owned landfills as we assume that they do not compete with PPL to serve other communities for municipal solid waste (MSW) disposal. The list of transfer stations includes existing transfer stations in Utah and southeastern Idaho. This list also includes four hypothetical transfer stations (labeled a through d in **Figure A-1**) located in central points of relevance in metropolitan areas for which PPL would be positioned (geographically) to provide services at a lower cost than any of the existing landfills.

3. Remaining Capacity of PPL's Competitor Landfills

The remaining capacity of PPL's competitor landfills, represented as the number of remaining operating years, is specified in **Table A-1**. For the three landfills in Utah that are regulated by the DEQ, these numbers are taken from annual landfill reports. The remaining capacity for Tekoi Commercial and Simco Road Regional Landfills are estimated using other publicly available documents. Tekoi Commercial Landfill's capacity is estimated based on information obtained from the facility's 2009 Environmental Assessment.[1] The assessment report states the landfill's capacity to receive to be 52.8 million tons, while the daily waste acceptance rate is stated to be approximately 850 tons. Assuming five working days per week, we estimate the remaining capacity for Tekoi Commercial Landfill to be 263 years.[2] A similar calculation is performed for the Simco Road Regional Landfill (SRRL). SRRL's Tier 1 operating permit application in 2018[3] specifies the landfill's total design capacity to be 15 million tons, of which

[1] Tekoi Landfill Facility, Draft Environmental Assessment, Utah Division of Solid and Hazardous Waste, June 18, 2009 (available at: http://eqedocs.utah.gov/).

[2] Annual waste acceptance rate: 850*5*52 = 221,000 tons; Remaining capacity: 58,200,000/221,000 = 263 years.

[3] Simco Road Regional Landfill Tier 1 Operating Permit Application (available at: https://www.deq.idaho.gov/media/60182752/idaho-waste-systems-simco-road-landfill-mayfield-t1-application-0419.pdf).

approximately 12.6 million tons are available to receive waste. Assuming an annual waste acceptance rate of 160,268 tons based on USEPA data[4], we estimate the landfill's capacity to receive to be 78 years.[5]

Table A-1: Remaining Capacity of PPL's Competitor Landfills

Landfill	Report Year	Remaining Capacity (Years)
Intermountain Regional Landfill	2019	39[6]
Wasatch Regional Landfill	2019	400[7]
ECDC Environmental Landfill	2019	1407[8]
Tekoi Commercial Landfill	2009	263
SIMCO Road Regional Landfill	2018	78

4. Calculating Travel Times and Distances from Transfer Stations to Landfills

To compute the travel times and distances from each of the transfer stations to the six landfills, the study used PC*Miler,[9] a commercial truck routing software that outputs point-to-point routes, mileage and travel times across all highway networks in North America. PC*Miler's Practical Route option (the route option used for this analysis) considers a wide range of realistic determinants of truck routing, including point-to-point distance, road quality, terrain, urban/rural classifications, truck-restricted roads, and designated principal and secondary through routes. For instance, the analysis' use of double 28-foot trailers to transport waste, restricts routes to favor the U.S. federally designated national highway network and state-designated extensions (additional highways and supporting roads any distance off the interstate as determined by individual states), which incorporates roads that permit 53-foot trailers or double trailers.

PC*Miler also accounts for predictive traffic data, based on time-varying (varying by time of day, day of the week and day of the year) average historic traffic patterns that determine travel speeds on the roads used by the chosen route. Because travel times and cost-minimizing routes can vary based on each trip's departure time, the analysis considers three different departure times for each trip – 4 AM, 8 AM and 1 PM.

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[4] Landfill Technical Data, Landfill Methane Outreach Program (LMOP) (available at https://www.epa.gov/lmop/landfill-technical-data).

[5] Remaining capacity: (15,000,000 – 2,424,592)/160,258 = 78 years.

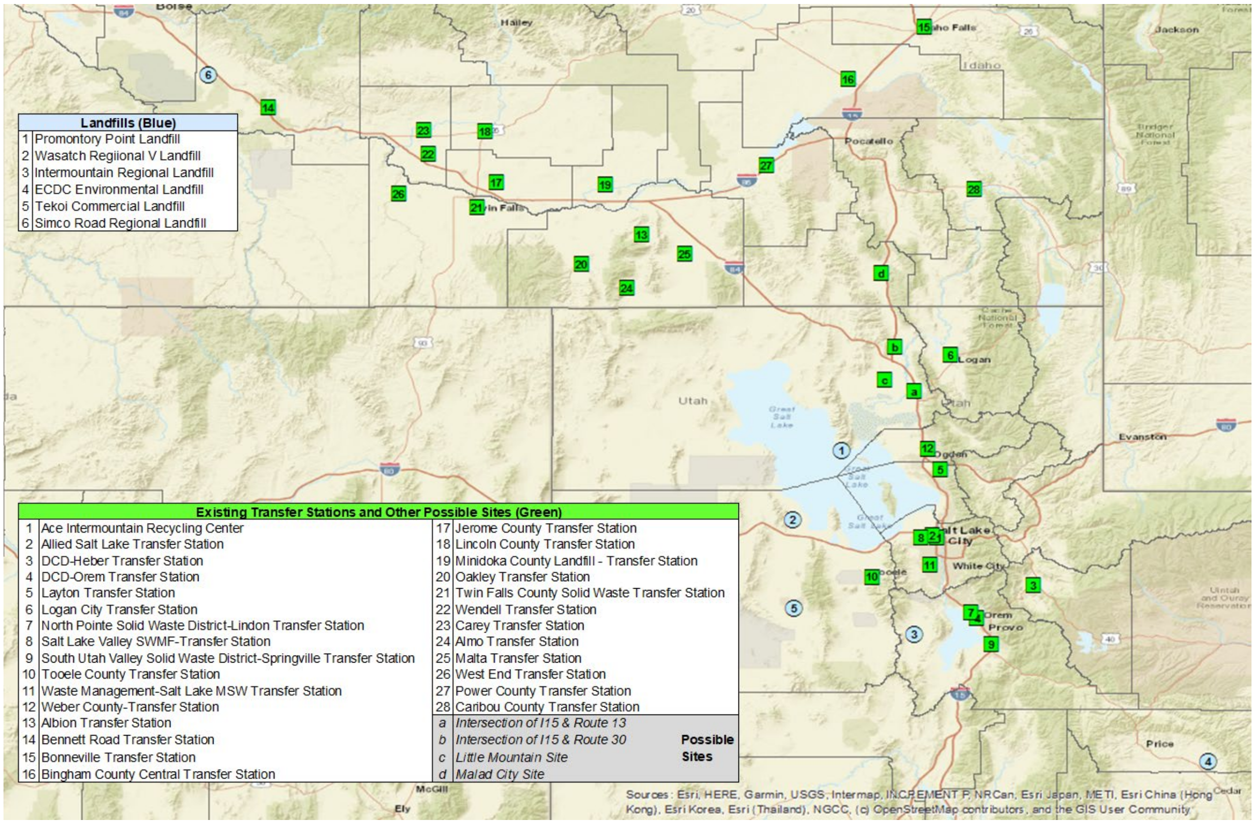
[6] Intermountain Regional Landfill 2019 Annual Report, Division of Waste Management and Radiation Control, February 26, 2020 (available at: http://eqedocs.utah.gov/).

[7] Wasatch Regional Landfill 2019 Annual Report, Division of Waste Management and Radiation Control, February 26, 2020 (available at: http://eqedocs.utah.gov/).

[8] ECDC Environmental Landfill 2019 Annual Report, Division of Waste Management and Radiation Control, February 26, 2020 (available at: http://eqedocs.utah.gov/).

[9] PC Miler Version 33 User Guide (available at: https://www.pcmiler.com/user-guides/pcmiler33/support.pcmiler.com/en/support/solutions/19000100718.html).

Figure A-1: Transfer Stations and Landfills Considered in Analysis



Overall, this analysis finds that different departure times do not contribute to meaningful changes in the rank ordering of landfills with respect to travel time and distance from each transfer station; they however provide sensitivity checks for robustness in our computation. Travel distances from transfer stations to landfills are displayed in **Table A-8**; travel times for different departure times, in **Table A-9** through **Table A-11**.

The second labeled column of **Table A-8** through **Table A-11** shows the difference in PPL's metric from the best metric of PPL's competitors. Transfer stations with negative values in this column (indicated in parentheses) represent ones that PPL has the distance or travel time advantage over its competitors. For instance, **Table A-8** indicates that PPL is the closest landfill to Logan City Transfer Station, and is 51.9 miles closer to the transfer station than the second best option, Intermountain Regional Landfill (IRL). **Table A-9** on the other hand, indicates that PPL is the closest to Logan City Transfer Station with respect to driving time, at a 24 minute advantage over the next closest landfill, Wasatch Regional Landfill, if both trips (from Logan City to the two landfills) started at 4 AM.

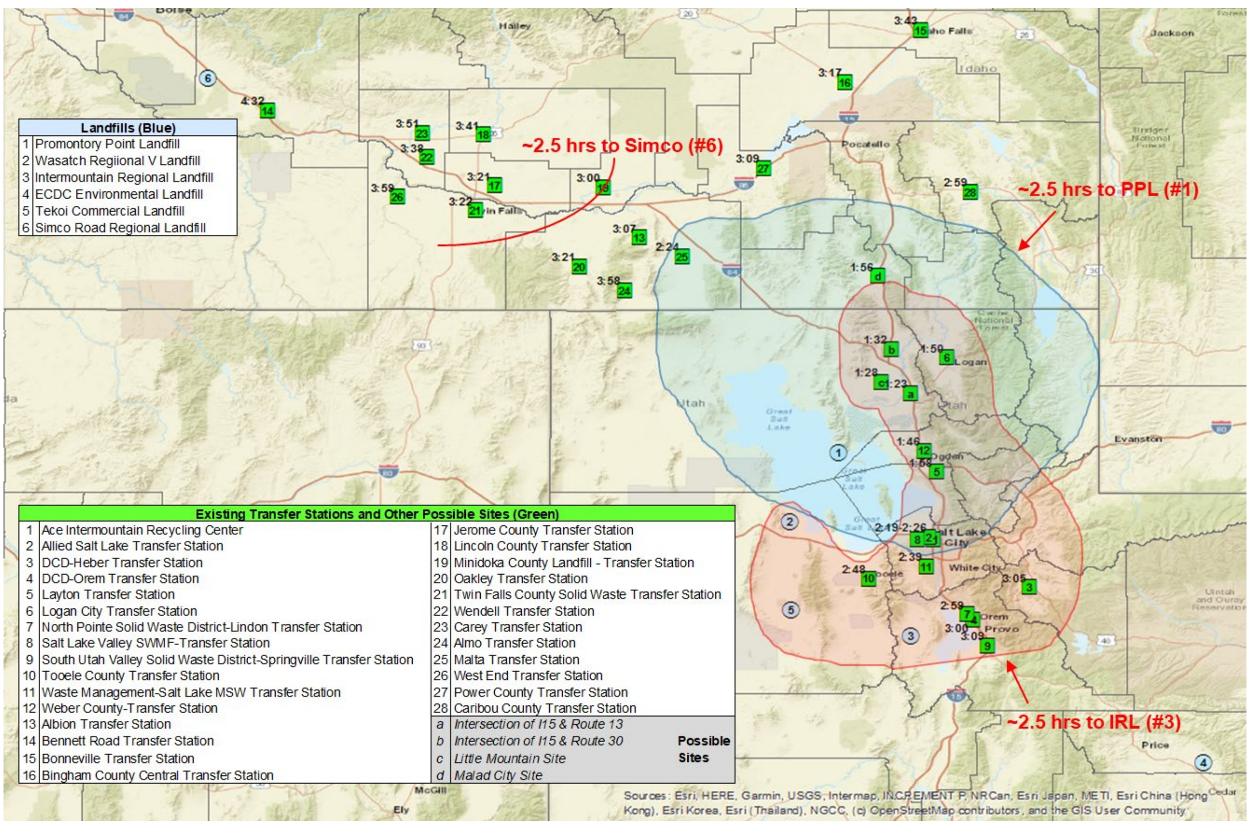
Because the departure times (4 AM, 8 AM and 1 PM) do not affect the results of the market analysis, we henceforth demonstrate the report's findings only using results that assume an 8AM departure time (stated in **Table A-10**).

5. Market Analysis

4.1 Outlining PPL's Competition for MSW Based on Trucking Time

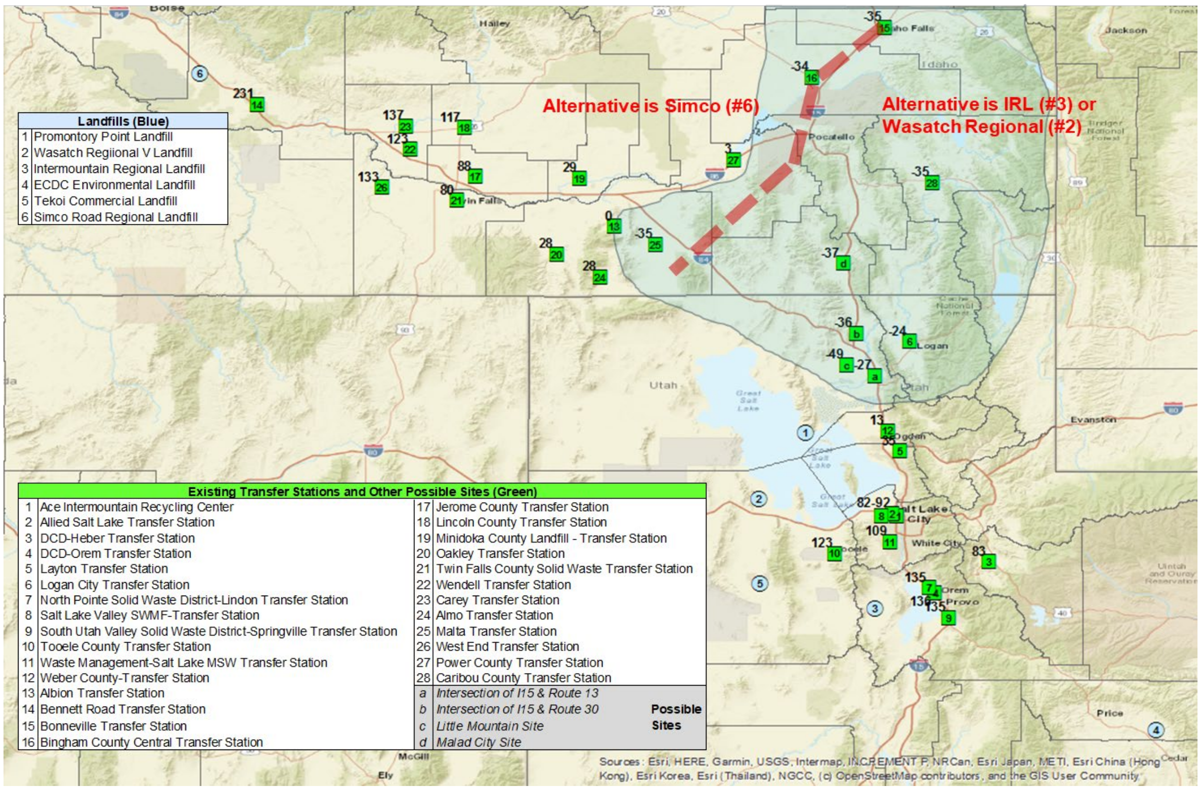
To understand the competing dynamics among landfills for each transfer station, we identify transfer stations that are within a 2.5-hour trucking range from the landfills, which we assume to be the maximum conceivable range, when taking two roundtrips from each landfill. In **Figure A-2**, we first display the travel times to each transfer station from PPL (in black, above green labels). Based on these travel times, the shaded blue region outlines the transfer stations that PPL can serve within a 2.5-hour trucking range, assuming a departure time of 8 AM. The red shaded region indicates the 2.5-hour travel time zone for IRL, which also has significant overlap with the 2.5-hour travel time zones of Wasatch Regional Landfill and Tekoi Commercial Landfill (not shown in the figure). Overlap between the red and blue shaded areas illustrates the existence of a competing regional landfill for every transfer station within PPL's 2.5-hour travel time zone. In contrast, transfer stations that are within the 2.5-hour travel time zone of Simco Road Regional Landfill shows no competition among commercial landfills in southeastern Idaho or Utah.

Figure A-2: 2.5-hour Travel Time Zones



We compare the distance and travel time results for each transfer station - landfill pair, to understand PPL's market – an approximate zone of transfer stations for which PPL could potentially out-compete its competitors. For these transfer stations, we also identify PPL's closest competitors, and their potential markets based on travel distance, in the absence of PPL.

Figure A-3: Approximate Zone of PPL's Market Based on Travel Time (Minutes)



4.2 Characterizing PPL's Market Based on Trucking Time

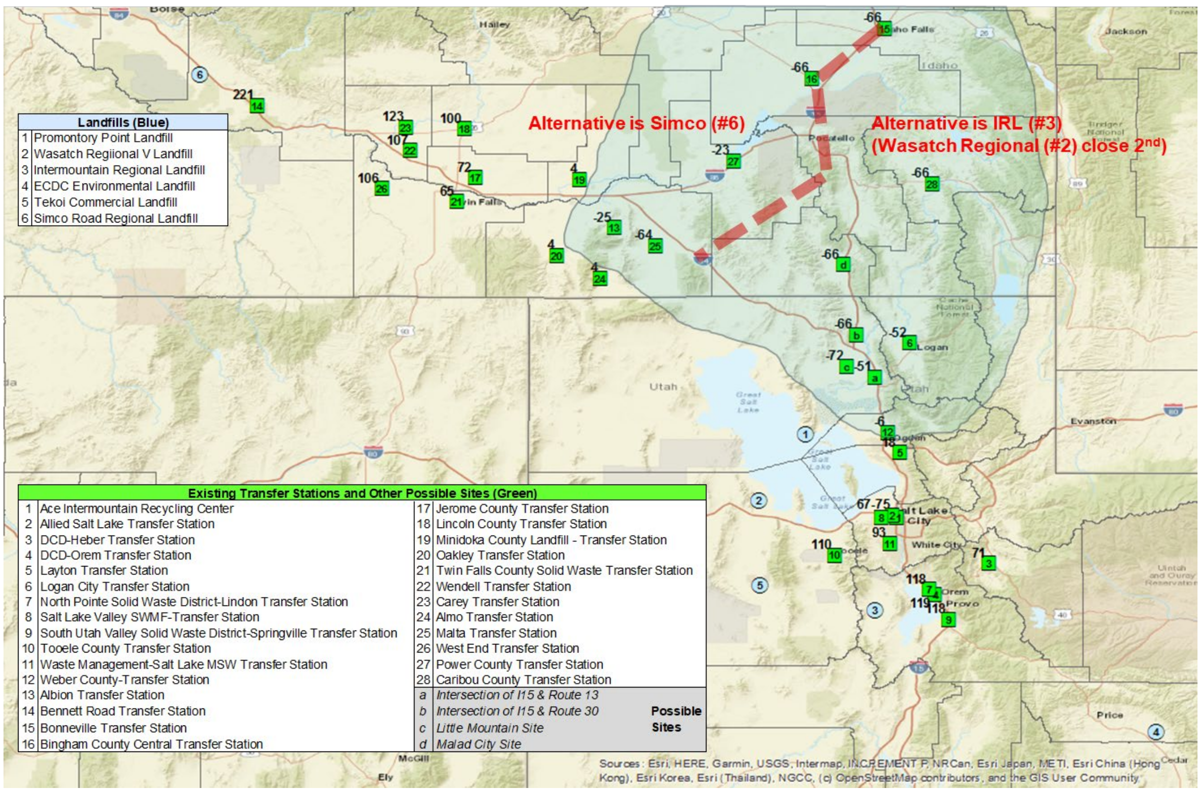
Figure A-3 shows for each transfer station, the difference in travel time between PPL and its highest ranked competitor (in black, above green labels). Transfer stations with negative values represent ones that PPL has a travel time advantage over its competitors. For instance, the -24 value above Logan City Transfer Station (transfer station #6), indicates that PPL is the closest landfill to Logan City Transfer Station, and is 24 minutes closer via truck to the transfer station than the next best competitor (which in this case is IRL). Based on these differences, we can outline the approximate zone of PPL's market, indicated by the blue shaded region on the map. Based on our analysis, PPL's market includes six existing transfer stations in Idaho and the Logan City Transfer Station in Utah. PPL's market also includes the four hypothetical transfer stations that could reduce costs by disposing its MSW at PPL rather than any of the existing commercial landfills.

We note that the blue shaded region includes not only includes the transfer stations that PPL has a clear advantage over its competitors, but also includes transfer stations for which PPL comes close to being the closest landfill, such as Albion Transfer Station (#13) and Power County Transfer Station (#27). We include these transfer stations, to acknowledge the outcomes of other cost elements that could determine PPL as the least-cost landfill (such as a lower tipping fee relative to competing landfills).

4.3 Identifying PPL's Closest Competitors based on Trucking Time

Travel time results also outline PPL's closest competitors within this zone. The map shows that in the absence of PPL, Simco Road Regional Landfill out-competes all other landfills to the North-West of the red dashed line, while IRL and Wasatch Regional Landfill are close competitors for the South-East region of PPL's market zone. While results indicate that PPL and its close competitors have a clearly defined market based on trucking time, the respective markets for Tekoi Commercial Landfill and ECDC Environmental Landfill on the other hand are difficult to outline, as these landfills seem to lose out to IRL and Wasatch Regional Landfill.

Figure A-4: Approximate Zone of PPL's Market Based on Travel Distance (Miles)



4.4 Characterizing PPL's Market Based on Trucking Distance

Basing the same market analysis on travel distance instead of travel time results in similar market analysis **Figure A-4** illustrates the difference in travel distance between PPL and its highest ranked competitor. Without consideration of time-varying traffic or road-specific speed limits that affect travel time, the approximate zone of PPL's market expands relative to the that based on travel time. The respective markets for PPL's closest competitors in the absence of PPL remains largely the same, with the small difference of IRL having a slight advantage over its close competitor, Wasatch Regional Landfill.

6. Transportation Cost Savings for Residential and Commercial MSW

In this section we report the cost savings in Utah and Idaho that arise from trucking MSW to PPL.

5.1 Trucking Costs per Ton of MSW

We first compute the round-trip \$/ton trucking costs. **Appendix C** provides two metrics to measure transportation costs – \$/mile and \$/hour. This naturally leads to two metrics that measure \$/ton costs of trucking MSW. The \$/ton metric based on the \$/mile transportation cost is simply:

$$Distance\ (Miles)\ from\ Transfer\ Station\ to\ PPL\ \times \$2.07/mile$$

where the \$2.07/mile estimate is obtained from **Appendix C** and the distance from **Table A-8**. Similarly, the metric based on the \$/hour approach is defined as follows:

$$Travel\ Time\ (Hours)\ from\ Transfer\ Station\ to\ PPL\ \times \$114/hour$$

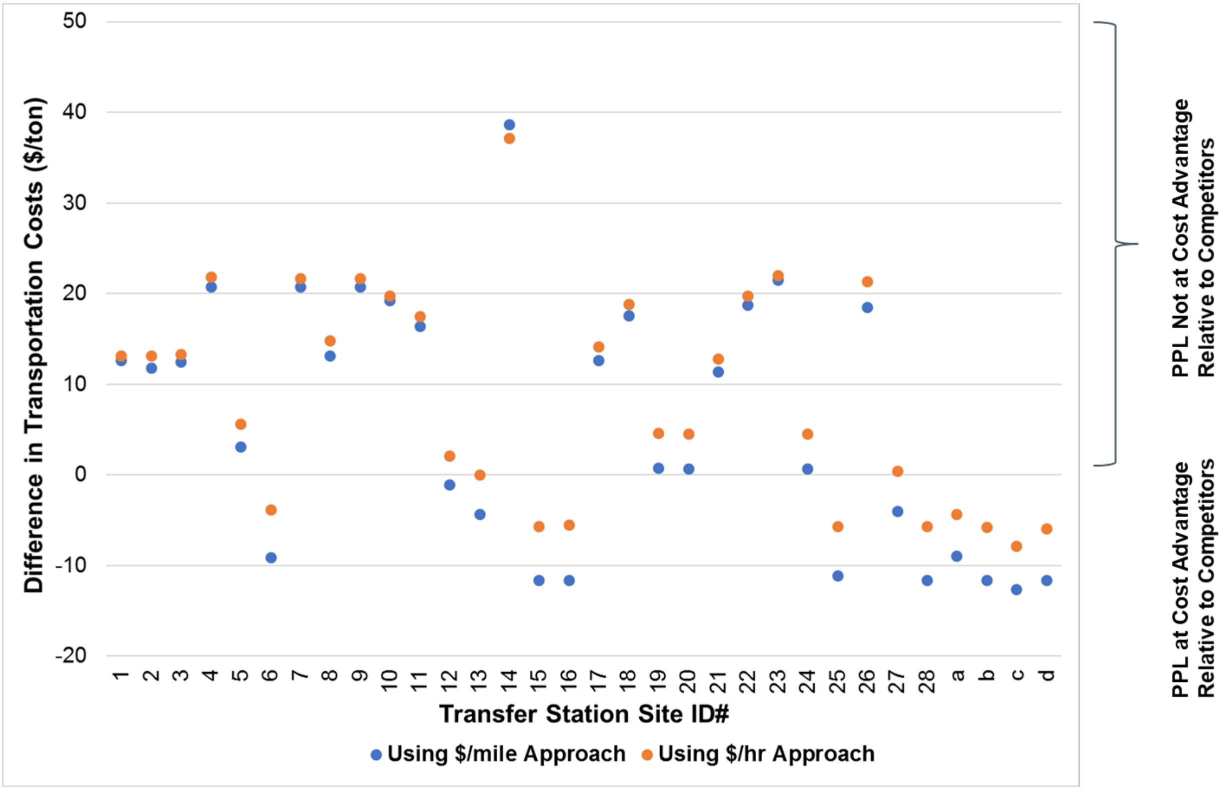
where the \$114/hour estimate is taken from **Appendix C** and the travel time from **Table A-10**.

5.2 Difference in Trucking Costs Between PPL and Closest Competitor

The costs savings from trucking MSW from each transfer station to PPL can be expressed as the difference between trucking costs to PPL, and trucking costs to PPL's least-cost competitor. The difference in trucking costs becomes a negative number for transfer stations for which PPL outcompetes its competitors, to indicate the reduction in trucking cost by trucking MSW to PPL. On the other hand, in the case PPL does not have a distance or travel time advantage to the transfer stations, the trucking cost differential is expressed as a non-negative number, indicating the absence of a cost reduction associated with hauling MSW to PPL. The magnitude of the cost differential communicates by how much PPL is at an advantage, or disadvantage with respect to trucking costs, compared to its most competitive competitor.

Figure A-5 visualizes the two trucking cost differential metrics across transfer stations. Transfer stations associated with negative \$/ton cost differential metrics (data points below the red dotted line) are the transfer stations for which PPL has a trucking cost advantage over its competitors. Transfer stations associated with positive \$/ton cost differential metrics (data points above the red dotted line) are the ones for which PPL's least-cost competitor has a comparative advantage with respect to trucking costs.

Figure A-5: Transportation Cost Savings ($/ton) Relative to PPL



5.3 Annual Cost Savings in Utah and Idaho

For each transfer station, we estimate the annual total cost savings generated from trucking MSW to PPL as follows:

$$Annual\ Cost\ Savings = Annual\ MSW\ Generation\ (ton) \times Cost\ Savings\ Via\ PPL\ (\$/ton),$$

for which MSW generation numbers are based on the approximation of 2020 MSW generation numbers by county.

Based on the trucking cost differential metrics defined previously (**Figure A-5**), we specify the list of counties in northern Utah and southeastern Idaho, for which PPL is determined the least-cost landfill. For each county, we also specify the transfer station that can best serve the county's MSW. We chose the transfer stations that likely best represents the county's population centroid. The list of counties and associated transfer stations, and cost savings that arise by trucking their MSW to PPL instead of to PPL's least-cost competitor is specified in **Table A-2**. **Table A-3** states the population estimates for these counties for the years 2018 and 2020.

Table A-2: Cost Savings of Counties That Benefit From PPL

County	Transfer Station	Cost Savings ($/mile Approach) ($/ton)	Cost Savings ($/hr Approach) ($/ton)
Box Elder County, UT	Little Mountain Site	$13	$8
Weber County, UT	Weber County-Transfer Station	$1	N/A
Cache County, UT	Logan City Transfer Station	$9	$4
Oneida County, ID	Malad City Site	$12	$6
Franklin County, ID	Malad City Site	$12	$6
Bear Lake County, ID	Caribou County Transfer Station	$12	$6
Power County, ID	Power County Transfer Station	$4	N/A
Bannock County, ID	Caribou County Transfer Station	$12	$6
Caribou County, ID	Caribou County Transfer Station	$12	$6
Cassia County, ID	Albion Transfer Station	$4	$0

Table A-3: Population Estimates in Counties That Benefit From PPL[10]

County	Population Estimates (2018)	Population Estimates (2020)
Box Elder County, UT	54,906	56,739
Weber County, UT	255,697	263,536
Cache County, UT	126,400	130,061
Oneida County, ID	4,462	4,559
Franklin County, ID	13,704	14,003
Bear Lake County, ID	6,044	6,143
Power County, ID	7,700	7,660
Bannock County, ID	86,674	88,357
Caribou County, ID	7,037	7,175
Cassia County, ID	23,791	24,138

For the three counties in Utah, we were able to obtain data regarding annual MSW generation in 2018[11], which is specified in **Table A-4**. MSW generation in 2020 is estimated by scaling up the 2018 MSW generation number by population growth between 2018 and 2020.

[10] Population Estimates (2018) (available at https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html). The population estimates for 2020 for the Utah and Idaho counties were computed by applying a compound annual growth rate calculated based on the change between the 2010 and 2019 U.S. Census population estimates for the different counties and applying this to its 2019 population estimate.

[11] Estimates obtained by PPR market research in spreadsheet provided to NERA by Brett Snelgrove, Vice President of Operations, PPR.

Table A-4: MSW Generation Estimate in Utah

County	MSW Generation Estimates (tons)
Box Elder County, UT	35,000
Weber County, UT	280,000
Cache County, UT	74,000

Due to difficulty obtaining county specific MSW generation data for Idaho, MSW generation numbers for counties in Idaho were estimated based on the average per capita MSW generation (in 2018) across the three Utah counties stated in **Table A-4**. This value amounted to 4.23 lbs of MSW per capita daily. Multiplying 2020 county population to average per capital MSW generation provided a proxy for total MSW generation for Idaho. The estimated generation of MSW in 2020 across all relevant counties is presented in **Table A-5**. **Table A-5** also provides estimates on residential and commercial MSW generated for each county, based on the average share of residential and commercial MSW generated across states.[12]

Table A-5: Estimated Total MSW Generation in 2020

County	Total MSW (tons)	Commercial MSW (tons)	Residential MSW (tons)
Box Elder County, UT	36,169	19,531	16,638
Weber County, UT	288,584	155,835	132,748
Cache County, UT	76,144	41,118	35,026
Oneida County, ID	3,522	1,902	1,620
Franklin County, ID	10,820	5,843	4,977
Bear Lake County, ID	4,746	2,563	2,183
Power County, ID	5,919	3,196	2,723
Bannock County, ID	68,269	36,865	31,404
Caribou County, ID	5,544	2,994	2,550
Cassia County, ID	18,650	10,071	8,579

Total cost savings for each county is then obtained by multiplying total MSW generation in 2020 (**Table A-6**) with the cost savings that arise from trucking MSW to PPL (**Table A-2**). Total cost savings obtained via the $/mile approach is stated in **Table A-6**; cost savings obtained via the $/hour approach is stated in **Table A-7**.

[12] MSW Residential/Commercial Percentage Allocation, U.S. Environmental Protection Agency, Office of Resource Conservation and Recovery, July 2013 (available at: https://www.epa.gov/sites/production/files/2016-01/documents/rev_10-24-14_msw_residential_commercial_memorandum_7-30-13_508_fnl.pdf).

Table A-6: Cost Savings for MSW Trucking ($/mile Approach)

County	Total MSW Cost Savings ($)	Commercial MSW Cost Savings ($)	Residential MSW Cost Savings ($)
Box Elder County, UT	$457,373	$246,981	$210,392
Weber County, UT	$318,871	$172,190	$146,681
Cache County, UT	$693,111	$374,280	$318,831
Utah (Total)	**$1,469,355**	**$793,452**	**$675,903**
Oneida County, ID	$40,834	$22,050	$18,783
Franklin County, ID	$125,434	$67,735	$57,700
Bear Lake County, ID	$55,022	$29,712	$25,310
Power County, ID	$23,564	$12,724	$10,839
Bannock County, ID	$791,453	$427,385	$364,068
Caribou County, ID	$64,273	$34,708	$29,566
Cassia County, ID	$80,467	$43,452	$37,015
Idaho (Total)	**$1,181,047**	**$637,765**	**$543,282**
Total	**$2,650,402**	**$1,431,217**	**$1,219,185**

Table A-7: Cost Savings for MSW Trucking ($/hour Approach)

County	Total MSW Cost Savings ($)	Commercial MSW Cost Savings ($)	Residential MSW Cost Savings ($)
Box Elder County, UT	$284,933	$153,864	$131,069
Weber County, UT	$0	$0	$0
Cache County, UT	$293,804	$158,654	$135,150
Utah (Total)	**$578,737**	**$312,518**	**$266,219**
Oneida County, ID	$20,952	$11,314	$9,638
Franklin County, ID	$64,362	$34,755	$29,606
Bear Lake County, ID	$26,706	$14,421	$12,285
Power County, ID	$0	$0	$0
Bannock County, ID	$384,152	$207,442	$176,710
Caribou County, ID	$31,197	$16,846	$14,351
Cassia County, ID	$0	$0	$0
Idaho (Total)	**$527,369**	**$284,779**	**$242,590**
Total	**$1,106,106**	**$597,297**	**$508,809**

Table A-8: Travel Distance (Miles) From Transfer Stations to Landfills

		Transfer Station	Difference in Miles (PPL vs. Next Best Competitor)	Landfills in UT					Landfills in ID
				1	2	3	4	5	6
				Promontory Point Landfill	Wasatch Regional Class V Landfill	Intermountain Regional Landfill	ECDC Environmental Landfill	Tekoi Commercial Landfill	SIMCO Road Regional Landfill
UT	1	Ace Intermountain Recycling Center	72	118	51	46	141	74	325
	2	Allied Salt Lake Transfer Station	67	120	55	53	144	78	327
	3	DCD-Heber Transfer Station	71	161	96	90	147	119	368
	4	DCD-Orem Transfer Station	119	152	87	34	105	109	359
	5	Layton Transfer Station	18	94	78	76	167	101	301
	6	Logan City Transfer Station	(52)	79	133	131	222	155	273
	7	North Pointe Solid Waste District-Lindon	118	150	84	31	110	107	357
	8	Salt Lake Valley SWMF-Transfer Station	75	123	48	50	145	70	330
	9	South Utah Valley Solid Waste District	118	164	98	45	93	121	371
	10	Tooele County Transfer Station	110	147	45	37	169	48	354
	11	Waste Management-Salt Lake MSW	93	131	59	38	133	81	338
	12	Weber County-Transfer Station	(6)	80	89	87	178	112	287
ID	13	Albion Transfer Station	(25)	148	235	233	324	258	172
	14	Bennett Road Transfer Station	221	256	343	341	432	365	35
	15	Bonneville Transfer Station	(66)	198	267	264	355	289	267
	16	Bingham County Central Transfer Station	(66)	173	242	239	330	264	242
	17	Jerome County Transfer Station	72	182	269	267	358	292	110
	18	Lincoln County Transfer Station	100	202	289	287	378	312	101
	19	Minidoka County Landfill - Transfer Station	4	154	241	239	330	264	150
	20	Oakley Transfer Station	4	170	257	255	346	280	166
	21	Twin Falls County Solid Waste	65	181	268	266	357	290	116
	22	Wendell Transfer Station	107	200	288	286	377	310	94
	23	Carey Transfer Station	123	211	298	296	387	320	88
	24	Almo Transfer Station	4	192	279	277	368	302	188
	25	Malta Transfer Station	(64)	117	205	202	294	227	181
	26	West End Transfer Station	106	205	273	290	381	295	99
	27	Power County Transfer Station	(23)	170	245	242	334	267	193
	28	Caribou County Transfer Station	(66)	153	221	219	310	243	271
Other	a	Intersection of I15 & Route 13	(51)	57	110	108	199	133	265
	b	Intersection of I15 & Route 30	(66)	62	130	128	219	152	256
	c	Little Mountain Site	(72)	53	127	125	216	149	265
	d	Malad City Site	(66)	91	159	157	248	181	278

Table A-9: Travel Times (Minutes) From Transfer Stations and Landfills – Departure Time (4 AM)

		Transfer Station	Difference in Minutes (PPL vs. Next Best Competitor)	Landfills in UT					Landfills in ID
				1	2	3	4	5	6
				Promontory Point Landfill	Wasatch Regional Class V Landfill	Intermountain Regional Landfill	ECDC Environmental Landfill	Tekoi Commercial Landfill	SIMCO Road Regional Landfill
UT	1	Ace Intermountain Recycling Center	72	118	51	46	141	74	325
	2	Allied Salt Lake Transfer Station	67	120	55	53	144	78	327
	3	DCD-Heber Transfer Station	71	161	96	90	147	119	368
	4	DCD-Orem Transfer Station	119	152	87	34	105	109	359
	5	Layton Transfer Station	18	94	78	76	167	101	301
	6	Logan City Transfer Station	(52)	79	133	131	222	155	273
	7	North Pointe Solid Waste District-Lindon	118	150	84	31	110	107	357
	8	Salt Lake Valley SWMF-Transfer Station	75	123	48	50	145	70	330
	9	South Utah Valley Solid Waste District	118	164	98	45	93	121	371
	10	Tooele County Transfer Station	110	147	45	37	169	48	354
	11	Waste Management-Salt Lake MSW	93	131	59	38	133	81	338
	12	Weber County-Transfer Station	(6)	80	89	87	178	112	287
ID	13	Albion Transfer Station	(25)	148	235	233	324	258	172
	14	Bennett Road Transfer Station	221	256	343	341	432	365	35
	15	Bonneville Transfer Station	(66)	198	267	264	355	289	267
	16	Bingham County Central Transfer Station	(66)	173	242	239	330	264	242
	17	Jerome County Transfer Station	72	182	269	267	358	292	110
	18	Lincoln County Transfer Station	100	202	289	287	378	312	101
	19	Minidoka County Landfill - Transfer Station	4	154	241	239	330	264	150
	20	Oakley Transfer Station	4	170	257	255	346	280	166
	21	Twin Falls County Solid Waste	65	181	268	266	357	290	116
	22	Wendell Transfer Station	107	200	288	286	377	310	94
	23	Carey Transfer Station	123	211	298	296	387	320	88
	24	Almo Transfer Station	4	192	279	277	368	302	188
	25	Malta Transfer Station	(64)	117	205	202	294	227	181
	26	West End Transfer Station	106	205	273	290	381	295	99
	27	Power County Transfer Station	(23)	170	245	242	334	267	193
	28	Caribou County Transfer Station	(66)	153	221	219	310	243	271
Other	a	Intersection of I15 & Route 13	(51)	57	110	108	199	133	265
	b	Intersection of I15 & Route 30	(66)	62	130	128	219	152	256
	c	Little Mountain Site	(72)	53	127	125	216	149	265
	d	Malad City Site	(66)	91	159	157	248	181	278

Table A-10: Travel Times (Minutes) From Transfer Stations to Landfills – Departure Time (8 AM)

		Transfer Station	Difference in Minutes (PPL vs. Next Best Competitor)	Landfills in UT					Landfills in ID
				1	2	3	4	5	6
				Promontory Point Landfill	Wasatch Regional Class V Landfill	Intermountain Regional Landfill	ECDC Environmental Landfill	Tekoi Commercial Landfill	SIMCO Road Regional Landfill
UT	1	Ace Intermountain Recycling Center	82	139	57	63	143	73	304
	2	Allied Salt Lake Transfer Station	82	144	62	66	150	78	309
	3	DCD-Heber Transfer Station	83	185	105	102	153	122	350
	4	DCD-Orem Transfer Station	136	180	98	44	110	115	345
	5	Layton Transfer Station	35	118	83	87	171	100	284
	6	Logan City Transfer Station	(24)	110	134	136	221	150	262
	7	North Pointe Solid Waste District-Lindon	135	179	98	44	117	115	344
	8	Salt Lake Valley SWMF-Transfer Station	92	146	54	67	150	70	311
	9	South Utah Valley Solid Waste District	135	189	108	54	99	125	354
	10	Tooele County Transfer Station	123	168	54	45	175	58	333
	11	Waste Management-Salt Lake MSW	109	159	72	50	143	88	325
	12	Weber County-Transfer Station	13	106	93	97	181	110	271
ID	13	Albion Transfer Station	0	187	243	245	329	260	187
	14	Bennett Road Transfer Station	231	272	327	329	414	344	41
	15	Bonneville Transfer Station	(35)	223	258	260	344	274	259
	16	Bingham County Central Transfer Station	(34)	197	231	233	317	247	232
	17	Jerome County Transfer Station	88	201	257	259	344	274	113
	18	Lincoln County Transfer Station	117	221	277	279	363	293	104
	19	Minidoka County Landfill - Transfer Station	29	180	236	238	322	252	151
	20	Oakley Transfer Station	28	201	257	259	343	273	173
	21	Twin Falls County Solid Waste	80	202	258	260	344	274	122
	22	Wendell Transfer Station	123	218	274	276	360	291	95
	23	Carey Transfer Station	137	231	287	289	374	304	94
	24	Almo Transfer Station	28	238	294	296	380	310	210
	25	Malta Transfer Station	(35)	144	201	202	287	217	179
	26	West End Transfer Station	133	239	266	296	381	282	106
	27	Power County Transfer Station	3	189	233	235	319	249	186
	28	Caribou County Transfer Station	(35)	179	214	216	300	230	262
Other	a	Intersection of I15 & Route 13	(27)	83	110	113	197	126	251
	b	Intersection of I15 & Route 30	(36)	92	128	131	215	145	245
	c	Little Mountain Site	(49)	88	137	139	223	153	264
	d	Malad City Site	(37)	116	153	153	236	171	267

Table A-11: Travel Times (Minutes) From Transfer Stations to Landfills – Departure Time (1 PM)

		Transfer Station	Difference in Minutes (PPL vs. Next Best Competitor)	Landfills in UT					Landfills in ID
				1	2	3	4	5	6
				Promontory Point Landfill	Wasatch Regional Class V Landfill	Intermountain Regional Landfill	ECDC Environmental Landfill	Tekoi Commercial Landfill	SIMCO Road Regional Landfill
UT	1	Ace Intermountain Recycling Center	82	139	57	63	142	74	304
	2	Allied Salt Lake Transfer Station	81	144	63	66	150	79	309
	3	DCD-Heber Transfer Station	83	185	105	102	157	122	350
	4	DCD-Orem Transfer Station	127	170	90	43	110	107	336
	5	Layton Transfer Station	36	118	82	84	168	98	283
	6	Logan City Transfer Station	(24)	109	133	136	220	150	262
	7	North Pointe Solid Waste District-Lindon	127	170	90	43	117	106	335
	8	Salt Lake Valley SWMF-Transfer Station	91	146	55	66	148	72	311
	9	South Utah Valley Solid Waste District	128	181	100	53	99	117	346
	10	Tooele County Transfer Station	124	168	54	44	173	59	333
	11	Waste Management-Salt Lake MSW	107	156	68	49	141	85	321
	12	Weber County-Transfer Station	16	106	90	93	177	107	271
ID	13	Albion Transfer Station	0	187	244	252	336	261	187
	14	Bennett Road Transfer Station	230	271	329	340	425	345	41
	15	Bonneville Transfer Station	(36)	223	259	269	354	276	260
	16	Bingham County Central Transfer Station	(35)	196	231	239	324	249	233
	17	Jerome County Transfer Station	87	201	258	269	353	275	114
	18	Lincoln County Transfer Station	116	220	278	290	375	294	104
	19	Minidoka County Landfill - Transfer Station	28	179	236	245	329	254	151
	20	Oakley Transfer Station	27	200	258	268	352	274	173
	21	Twin Falls County Solid Waste	76	201	258	269	353	275	125
	22	Wendell Transfer Station	122	217	275	287	371	292	95
	23	Carey Transfer Station	137	231	289	302	386	305	94
	24	Almo Transfer Station	27	237	295	308	392	311	210
	25	Malta Transfer Station	(36)	144	201	206	290	218	180
	26	West End Transfer Station	133	239	270	310	394	286	106
	27	Power County Transfer Station	2	189	234	242	326	251	187
	28	Caribou County Transfer Station	(36)	178	214	220	304	231	263
Other	a	Intersection of I15 & Route 13	(25)	83	108	110	194	125	251
	b	Intersection of I15 & Route 30	(34)	92	126	129	213	143	244
	c	Little Mountain Site	(48)	88	136	139	223	153	264
	d	Malad City Site	(35)	119	154	157	241	170	268

APPENDIX B. CALIFORNIA EXCAVATED SOIL WASTE STREAM ANALYSIS

1. Type of Waste and Waste Origin

For this analysis we assume the type of waste is soils excavated from sites in California. California has more stringent waste classification requirements, so that almost all excavated soils, which are assigned a California Waste Code (CWC) of 611, must be taken to a RCRA Subtitle C waste landfill. Utah, like most other states, use the same waste classifications required under RCRA.

For purposes of comparing transportation costs to alternative competing landfill destinations, all of the routes we analyze start in the same location, for which we use Oakland, CA when considering soils excavated in northern California

2. Landfills Considered in the Analysis

To identify the relevant landfills, we began with a list of all Class V landfills in Utah, as well as those landfills in California, Nevada, Arizona, Oregon, and Idaho that might compete with Class V landfills in Utah and that could accept excavated soil from cleanups in California.

For Utah, we considered all Class V landfills listed by Utah's Department of Environmental Quality.[13]

In California, excavated soils must be taken to a RCRA Subtitle C waste landfill. Similarly, Nevada, Oregon, and Idaho designate wastes brought into the state as RCRA Subtitle C waste if it was designated as such in its state of origin. California's excavated soils therefore must be disposed in facilities permitted under RCRA Subtitle C in those states as well.[14] Thus, we considered all commercial RCRA Subtitle C landfill facilities in the United States,[15] and selected those sites that might compete with Class V landfills in Utah for waste originating in Oakland, CA.

Arizona, like Utah, does not automatically require excavated soils imported into the state from California to be disposed in RCRA Subtitle C landfills just because California does. To identify Arizona landfills that might complete with Class V landfills in Utah, we considered all large solid waste landfills (those taking more than 100,000 tons of waste per year) per the U.S. EPA's most recent Landfill Methane

[13] Solid Waste Facilities Permits and Permitting, Utah Department of Environmental Quality, Division of Waste Management and Radiation Control (available at: https://deq.utah.gov/waste-management-and-radiation-control/solid-waste-facilities-permits-and-permitting).

[14] For Nevada see Nevada code at NAC 444.8565(2)(b) (available at https://www.leg.state.nv.us/NAC/NAC-444.html#NAC444Sec8565), for Oregon see Oregon code at OAR 340-093-0040(2)(b) (available at https://secure.sos.state.or.us/oard/viewSingleRule.action;JSESSIONID_OARD=yUMURvNON-_2MdVYUcfaEXO1BOsjahnLpqNQmOn0uNallKj9zqlc!-406728407?ruleVrsnRsn=71088), for Idaho see Idaho code Section 39-4424 combined with the definition of "manifested waste" at Section 39-4403(13) (available at https://legislature.idaho.gov/statutesrules/idstat/Title39/T39CH44/SECT39-4403/) and https://legislature.idaho.gov/statutesrules/idstat/Title39/T39CH44/SECT39-4424/).

[15] Exhibit A-3, USEPA, National Capacity Assessment Report, December 17, 2019 (available at: https://www.epa.gov/sites/production/files/2019-12/documents/final_2019_capacity_assessment_report_20191217v1.pdf).

Outreach Program (LMOP) database.[16] Landfills that were clearly dominated by other options were eliminated from consideration.

Table B-1 lists the landfills included in the analysis, as well as the landfills that passed our initial screening but were excluded from the analysis, along with the reason for their exclusion.[17]

For each of the twelve landfills included in the analysis, we evaluated one or more methods of shipping excavated soil from Oakland, CA to the landfill. These methods were rail shipping to the landfill (either to a rail spur leading to the landfill property itself, or to a rail siding near the landfill), trucking directly to the landfill, and/or intermodal shipping, in which waste is sent from Oakland by rail to an intermodal terminal, and then trucked from the intermodal terminal to the landfill.

Figure B-1 presents each of the twelve landfills in our analysis on a map. Landfills with (or assumed to have, in the case of Promontory Point Landfill) a rail spur leading to the landfill property itself are represented in blue, while all other landfills are represented in green. The Union Pacific (UP) and BNSF rail lines are also presented, as well as the intermodal terminals operated by these railroads.

3. Rail Shipping Costs

3.1 Direct Rail to the Landfill

Eight of the twelve landfills in our analysis either have a rail spur leading directly to the property itself (Chemical Waste Management of the Northwest, ECDC Environmental Landfill, and Promontory Point Landfill) or a nearby rail siding (US Ecology Idaho Site B, Butterfield Station Landfill, Copper Mountain Landfill, La Paz County Landfill, and Lake Havasu Landfill). For these sites, we calculate the cost of shipping excavated soil by rail directly from Oakland.

For each rail-served site, we start with the public tariffs quoted by Union Pacific for a rail-owned gondola car transporting general waste and scrap (Standard Transportation Commodity Code 40291) between Oakland, CA and the Union Pacific stop nearest to the landfill. The public tariffs provided by Union Pacific are based on historic traffic and examining rail-owned gondola cars transporting generic waste gave us the most complete and comparable information across landfills. All of these tariffs are for manifest shipping – we did not consider any efficiencies that might result at those sites that could accept unit trains.

Two landfills capable of receiving waste directly by rail are served by BNSF lines rather than Union Pacific lines.[18] The La Paz County Landfill would receive waste by rail from Oakland via a BNSF line to

[16] Landfill Technical Data, USEPA Landfill Methane Outreach Program (available at https://www.epa.gov/lmop/landfill-technical-data).

[17] We consider it unlikely that the Lake Havasu Landfill would accept excavated soil from California, as it is relatively small, municipal owned, and unlined (see https://www.lhcaz.gov/docs/default-source/bids-and-rfps/addendum-1-to-rfp-7-20-2018.pdf?sfvrsn=1f1be27c_2). However, the Lake Havasu Landfill can be viewed as a proxy for the proposed Franconia Landfill (see http://docs.azgs.az.gov/OnlineAccessMineFiles/S-Z/SelfbentoniteMohave311a.pdf), which would have been located a few miles from the Lake Havasu Landfill and would have competed for these soils (see https://p2infohouse.org/ref/35/34509.pdf). The Franconia Landfill site was fully permitted, but never opened.

[18] BNSF does not directly serve Oakland, but it does serve nearby Richmond, CA. We do not assume any additional costs related to this for these trips.

Cadiz, CA, and then a short line railroad (the Arizona & California Railroad, or ARZC, owned by Genesee & Wyoming) to just outside of Parker, AZ. The Lake Havasu Landfill would be served by a BNSF rail siding at Franconia, AZ (although it appears that the Lake Havasu Landfill does not currently accept waste by rail). We were unable to obtain public tariffs from BNSF for these trips, so we set the base tariffs to equal the base tariff quoted by Union Pacific for the Tucson station group.

Gondolas are commonly used to transport loose bulk materials such as soil. There are other rail shipping options, such as containers of soil loaded onto flatcars. The public tariffs quoted for rail-owned flatcars to the landfills were higher than those for rail-owned gondolas in some cases, and lower in others. We assume no difference in rail shipping costs between gondolas and other types of rail cars.

These "base tariffs" were then adjusted to account for the fact that the rail cars would be transporting excavated soil regarded as RCRA Subtitle C wastes in California. According to Union Pacific, rail-owned equipment cannot be used to ship this type of material, so private gondolas would be used. Further, it typically costs more to ship RCRA Subtitle C waste materials by rail than non-hazardous materials.[19]

Tariff information for private gondolas shipping excavated soils from cleanups (STCC 4029101) was incomplete, and in some cases the tariffs were unrealistically high (nearly 50% higher than the tariff for a rail-owned gondola transporting generic waste). Thus, we created an adjustment factor for the rail tariffs based on the difference in the quoted tariffs between a rail-owned gondola transporting generic waste and a private gondola transporting excavated soil from cleanups, travelling from Los Angeles to the Promontory Point landfill site. This adjustment factor increased the estimated cost of rail shipping by 6%.[20]

These tariffs reflect the cost of a round trip from Oakland to the landfill and back. Union Pacific (and other railroads) have a "one free empty" rule under which an empty private railcar can be returned to its origin free of charge, provided Union Pacific received line haul revenue on the trip immediately preceding the free move.[21]

Each rail trip also has an associated fuel surcharge. This surcharge is the same whether the car is rail-owned or private. We add this cost to the total cost of moving the gondola from Oakland to the landfill. For BNSF rail trips, we calculate the fuel surcharge using the Union Pacific supplied rate of $0.07 per mile, and calculate total miles between Oakland, CA and the landfill rail siding using the rail mileage calculator provided by BNSF.[22]

[19] Personal email communications with John M. Behrendt at Union Pacific, September 30 and October 5, 2020.

[20] The equivalent increase in tariff from Oakland to Butterfield Station was 11%. We consider this alternative adjustment factor in a sensitivity analysis.

[21] Rule 50-G, Tariff UP 6004-C, Union Pacific (available at: http://c02.my.uprr.com/wtp/pricedocs/UP6004BOOK.pdf).

[22] BNSF 6003 Rail Miles Inquiry, BNSF Railway (available at: http://bnsf.com/bnsf.was6/RailMiles/RMCentralController).

We assume that the private gondolas used by the landfills are leased at a cost of $500 per month, and that each gondola makes two round trips per month (for a total leasing cost per trip of $250).[23]

We assume each gondola has an empty weight of 74,000 pounds, with a maximum gross rail weight of 286,000 pounds. On tracks with a weight limit of at least 286,000 pounds, each gondola could carry a maximum load of 216,000 pounds (106 tons).[24] On tracks with a weight limit of 268,000 pounds, each gondola could carry a maximum load of 198,000 pounds (97 tons). The lower track weight limits apply to two landfills in our analysis: the ECDC Environmental Landfill and Chemical Waste Management of the Northwest, Oregon. **Figure B-2** presents the weight limits on the Union Pacific tracks in the Western US, including the 268,000-pound weight limit on the tracks leading to ECDC and CWM Oregon.[25]

3.2 Intermodal Rail

Two of the twelve landfills on our analysis (the South Yuma County Landfill and US Ecology Nevada) are not directly served by rail, but could conceivably receive waste from Oakland via intermodal rail, with waste shipped from Oakland to an intermodal terminal, and then trucked to the landfill from there. The Union Pacific and BNSF intermodal terminals that are close to the landfills in our analysis are presented in **Figure B-1**.

For the rail component of these intermodal trips, we use the public tariffs quoted by Union Pacific for a private container transporting excavated soils from cleanups (STCC 4029101) between Oakland, CA and an intermodal terminal close to the landfill. For the South Yuma County Landfill and US Ecology Nevada, we considered four intermodal terminals, in City of Industry (Los Angeles), Las Vegas, Phoenix, and Tucson. The Phoenix intermodal terminal is operated by BNSF. We were unable to obtain a public tariff from BNSF for this trip, so we use the public tariff quoted by Union Pacific for shipping a container to Tucson. We assume there are at least eight containers in the shipment in order to obtain the lowest quoted tariff.

These tariffs reflect the cost of a round trip from Oakland to land landfill and back. Just as with private railcars, Union Pacific will return an empty shipping container that previously carried RCRA Subtitle C waste to its origin free of charge, provided Union Pacific received line haul revenue on the trip immediately preceding the free move.[26]

Each rail trip also has an associated fuel surcharge per car. We assume the waste is shipped in 20 foot containers, each carrying 23 tons of soil due to trucking weight restrictions,[27] and that each rail car carries

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[23] Current full service leasing costs for a 286,000 pound gross rail load gondolas are around $350. See Railway Age, "2020 Guide to Equipment Leasing: Patience is A Virtue", June 3, 2020 (available at: https://www.railwayage.com/financeleasing/2020-guide-to-equipment-leasing-patience-is-a-virtue/).

[24] For example, a 66 foot mill gondola has an empty weight of about 74,000 pounds (37 tons), and a maximum load of about 106 tons (Gondolas, Ways of Shipping Equipment, BNSF Railway (available at: https://bnsf.com/ship-with-bnsf/ways-of-shipping/equipment/pdf/Gondolas.pdf). Some gondolas can carry loads as high as 117 tons (See GBX, 29' Ore Gondola (available at: https://www.gbrx.com/manufacturing/north-america-rail/gondolas/29-ore-gondola/).

[25] Also see Allowable Gross Weight Shipments, Union Pacific (available at: https://www.up.com/aboutup/reference/maps/allowable_gross_weight/index.htm).

[26] Rule 60-C, Tariff UP 6004-C, Union Pacific (available at: http://c02.my.uprr.com/wtp/pricedocs/UP6004BOOK.pdf).

[27] Trucking weight restrictions are explained in more detail below.

four containers. We calculate the fuel surcharge per container and add this to the cost of shipping the container.

We assume that the private containers used by the landfills are leased at a cost of $100 per month, and that each container makes two round trips per month (for a total leasing cost per trip of $50).[28]

The estimated rail shipping costs for both direct rail and intermodal rail are presented in **Table B-2**.

4. Trucking and Drayage Costs

4.1 Trucking

Two of the twelve landfills on our analysis (Clean Harbors Buttonwillow and Kettleman Hills) cannot be reached by rail from Oakland in a practical way. For these landfills, we calculate the cost of trucking waste directly from Oakland to the landfill. We also calculate the direct trucking costs from Oakland to those landfills close to the California-Nevada and California-Arizona borders (US Ecology Nevada, South Yuma, Copper Mountain, La Paz, and Lake Havasu), and the trucking costs for the intermodal trips described in the previous section. Finally, we also calculate the trucking costs for the intermodal trips between the rail siding and the landfill for those landfills that can receive waste at a nearby rail siding.

For each truck trip we assume a tractor-trailer carrying a 20 foot container is used. We assume the empty weight for a tractor-trailer, including the container, is 34,000 pounds.[29] The maximum gross vehicle weight on federal highways is 80,000 pounds.[30] This allows for a total cargo weight of 46,000 pounds, or 23 tons. Thus, we assume each container contains 23 tons of excavated soil.

The driving time and distance between each origin and destination were calculated using PC*Miler, for a departure time of 8am. We estimated the trucking cost to be $1.96 per mile or $108 per hour for trips originating in states where excavated soil from cleanups is treated as non-hazardous (Arizona), and $3.90 per mile or $215 per hour for trips originating in states where excavated soil from cleanups is treated as RCRA Subtitle C wastes (California, Nevada, and Idaho). Details on the trucking cost calculations are presented in **Appendix C**.

The estimated direct and intermodal trucking driving distances, times, and the associated costs per mile and per hour, along with details on each origin and destination, are presented in **Table B-3**.

4.2 Drayage

Among landfills that can accept waste by rail, landfills with a rail spur on property are likely to be much more efficient than unloading waste materials than landfills that unload at a rail siding alongside a highway – for example, the ECDC Environmental Landfill has a rotary car un-loader that can unload and

[28] Cargo Container HQ, Cargo Container Rental (available at: https://www.cargocontainerhq.com/cargo-container-rental.php).

[29] See for example Terry Bryant, "How Much Does a Semi-Truck Weigh?"(available at: https://www.terrybryant.com/how-much-does-semi-truck-weigh).

[30] See 23 CFR § 658.17 – Weight, Title 23. Highways, Electronic Code of Federal Regulations (available at https://www.law.cornell.edu/cfr/text/23/658.17).

clean 80-90 gondolas in 24 hours,[31] while Chemical Waste Management of the Northwest in Oregon has a large private rail yard.[32] In contrast, unloading at a rail siding involves staging equipment at a location outside the landfill, unloading in a relatively restricted space, traffic control, and weight limits on the trucks that must use public highways to reach the landfill. The unloading process could be streamlined by using flatcars with containers rather than gondolas, but highway weight restrictions would limit the total amount of soil in each container to 23 tons, as explained above. Assuming four 20 foot containers carried on each flatcar and the same rail tariff per car, this would raise the rail shipping cost per ton by 13% (assuming the same rail tariff and with 92 tons instead of 106 tons per car). For those landfills served by an off-site rail siding rather than a rail spur we assume an additional cost of unloading of $10 per ton.[33]

For intermodal trips, Union Pacific provides one free loading of an intermodal container at the origin, and one free unloading of an intermodal container at the destination.[34] For shipments through an intermodal terminal, we assume an additional cost of $10 per ton, primarily due to long average wait times for loading and unloading at intermodal terminals.[35]

5. Estimated Disposal Fees

Total disposal fees at each landfill are the sum of three components: (1) each landfill's base tipping fee, (2) additional fees for disposing of RCRA subtitle C waste, and (3) state, county, and local disposal fees.

Landfill tipping fees are proprietary. Thus, we estimate each landfill's base tipping fee as the average tipping fee for municipal solid waste in that landfill's state. These state-specific averages were compiled in a recent report by the Environmental Research & Education Foundation.[36]

For RCRA subtitle C waste landfills (landfills in states where excavated soil from cleanups is treated as RCRA subtitle C wastes), we assume an additional disposal fee of $10 per ton (hereafter referred to as the "RCRA adder"). In our sensitivity analyses we examine the effect of removing this additional fee.

Finally, we include a variety of state, county, and local disposal fees as described by various sources.[37] It is not always clear if these disposal fees are included in the base tipping fee. We address this uncertainty in our sensitivity analyses.

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[31] See Waste by Rail Inc. (available at: http://wbrinc.com/ecdc/).

[32] See Chemical Waste Management of the Northwest (available at: https://www.wmsolutions.com/pdf/factsheet/CWM_Arlington.pdf).

[33] We also perform a sensitivity analysis reducing this cost to $5 per ton.

[34] See Union Pacific Flip Policy, Union Pacific (available at https://www.up.com/customers/premium/intmap/flip-policy/index.htm).

[35] See Material Handling and Logistics, "Truck Driver Wait Times Cost Big Bucks," (available at: https://www.mhlnews.com/transportation-distribution/article/22055790/truck-driver-wait-times-cost-big-bucks).

[36] Environmental Research & Education Foundation, "Analysis of MSW Landfill Tipping Fees – April 2019." Revised March 4, 2020 (available at: https://erefdn.org/product/analysis-msw-landfill-tipping-fees-2/).

[37] For California, state disposal fees are based on the relevant Non-RCRA waste category per DTSC (See https://dtsc.ca.gov/disposal-fee/); For Idaho, state disposal fees are based on category (c) for manifested remediation wastes as defined in the 2019 Idaho Code (See https://law.justia.com/codes/idaho/2019/title-39/chapter-44/section-39-4427/); For Nevada, state disposal fees are for the relevant Non-RCRA waste category per NDEP (See https://ndep.nv.gov/uploads/land-waste-hwm-docs/RCRA_Permit_Fee_Summary-2019_New_Logo.pdf); For Oregon, state disposal fees are based on the new

The estimated disposal fees for each landfill in our analysis are presented in **Table B-4**.

6. Total Disposal Costs

The total disposal costs per ton at each landfill are calculated as the sum of the rail shipping costs, trucking costs, and disposal fees. In our base scenario we calculate trucking costs on a per mile basis, assume a cost of $10 per ton for unloading outside of the landfill, and assume a RCRA adder of $10 per ton in states where excavated soil from cleanups is treated as RCRA subtitle C wastes. In cases where we considered more than one method of transporting waste to the landfill, we present the lowest cost alternative.

The total disposal costs per ton, along with the difference in costs from Promontory Point Landfill, are presented in **Table B-5**. Promontory Point Landfill emerges as the lowest cost site for the disposal of excavated soil from cleanups originating in Oakland, CA. ECDC Environmental Landfill is a close second, with the Arizona sites following.

Table B-6 and **Figure B-3** present the total disposal costs for each landfill disaggregated into rail, trucking, and disposal fee costs. **Table B-7** presents the rank ordering by cost for all trips considered for each landfill, while **Table B-8** presents the total disposal costs for these trips disaggregated into rail, trucking, and disposal fee costs.

Note that while our analysis assumes the origin of the waste is Oakland, Promontory Point Landfill would also be cost competitive for waste originating in Southern California. For example, undertaking a similar cost calculation as described above, but assuming the Port of Los Angeles is the origin, produces disposal costs of $100 per ton for Promontory Point Landfill, $104 per ton for Butterfield Station Landfill, and $123 per ton for the Clean Harbors – Buttonwillow site. For Southern California waste, Promontory Point Landfill and the Arizona landfills are nearly equal in cost, and would likely split the market, with the winner depending on who has the stronger marketing presence. Disposal in California under this scenario would still be more costly than shipping the waste out of state. Cleanup soils have been shipped from Southern California to landfills in Utah in the past.[38]

permitted operating disposal administrative fees per metric ton of waste disposed of at a RCRA Subtitle C landfill per the Oregon DEQ (See https://www.oregon.gov/deq/Hazards-and-Cleanup/Documents/hwfeefactsheet2019.pdf); For Arizona, state disposal fees are based on the charge per ton of solid wastes received at landfills regulated by the department per 2018 Arizona Revised Statutes (See https://law.justia.com/codes/arizona/2018/title-49/section-49-836/). For Utah, state disposal fees are based on the charge per ton of solid waste for disposal, treatment and incineration (See https://documents.deq.utah.gov/admin/2020-fee-schedule.pdf); For King and Kern counties in California where the Kettleman and Buttonwillow facilities are located respectively, the county disposal fees equals 10% of the tipping fees (based on 10% of the revenue earned on RCRA Subtitle C materials being collected as tax) (See https://www.countyofkings.com/home/showdocument?id=20505 and https://www.kerncounty.com/Home/ShowDocument?id=2352); For Box Elder County where PPL is located, a county disposal fees is charged "for material disposed in Municipal Solid Waste Facility" (See http://media.rainpos.com/65/chapter_3_8_solid_waste_zone.pdf); Local disposal fees for the ECDC Environmental Landfill per Personal communication, Ann Garner, Chief Operating Officer, PPR.

[38] See for example https://www.wbrinc.com/transportation/.

7. Sensitivity Analyses

We undertook six different sensitivity analyses to address key uncertainties in our analysis. These sensitivity analyses were:

- Calculating trucking costs on a per hour rather than a per mile basis.
- Eliminating the additional RCRA adder of $10 per ton in states where excavated soil from cleanups is treated as RCRA Subtitle C wastes.
- Setting the base tipping fees for each state to be equal to the base tipping fee in Utah.
- Assuming that ECDC Environmental Landfill is able to negotiate the same rail shipping costs as Promontory Point Landfill, and that the La Paz County Landfill faces rail switching costs due to the use of a short railroad.[39]
- Assuming that the increase in the base rail tariffs for shipping RCRA Subtitle C wastes are 11% rather than 6%.
- Assuming that the additional cost to unloading outside of a landfill is $5 per ton rather than $10 per ton.

The effect of each of these sensitivity analyses on the rankings of the landfills by cost is presented in **Table B-9**. Detailed results of each of these sensitivity analyses are presented in **Figure B-4** through **Figure B-9** in each of these figures, the left-hand bar shows the total cost per ton in the base case, while the right-hand bar shows the total cost per ton with an assumption changed. The rank orderings of landfills by cost and disaggregated costs for each sensitivity analysis are also presented in tables. These results show:

- Calculating trucking costs on a per hour rather than a per mile basis does not alter the ranking of the top five landfills in terms of cost. The results of this sensitivity analysis are presented in **Figure B-4** and **Table B-10**, **Table B-11**.
- Eliminating the additional RCRA adder of $10 per ton in states where excavated soil from cleanups is treated as RCRA subtitle C wastes does not alter the rankings of the landfills by cost. The results of this sensitivity analysis are presented in **Figure B-5** and **Table B-12**, **Table B-13**.
- Setting the base tipping fees for each state to be equal to the base tipping fee in Utah does not alter the rankings of the top six landfills by cost. The results of this sensitivity analysis are presented in **Figure B-6** and **Table B-14** and **Table B-15**.
- Assuming that ECDC Environmental Landfill is able to negotiate the same rail shipping costs as Promontory Point Landfill does not alter the rankings of the landfills by cost, but it does bring ECDC Environmental Landfill to near-parity with Promontory Point Landfill. La Paz County Landfill falls in the rankings due to the additional rail switching costs. The results of this sensitivity analysis are presented in **Figure B-7** and **Table B-16**, **Table B-17**.
- Assuming that the increase in the base rail tariffs for shipping RCRA Subtitle C wastes are 11% rather than 6% does not alter the rankings of the top four landfills by cost. The results of this sensitivity analysis are presented in **Figure B-8**, and **Table B-18**, **Table B-19**.

[39] ARZC lists a tariff of $525 for an inter-terminal switch (a switch between railroads). We assume this switching tariff only applies on the trip to the landfill, and the return trip is free of charge. See General Tariff 70067, Demurrage Accessorial and Switching Tariff, Genesee & Wyoming Railroad Services, Inc., September 9, 2020 (available at: https://www.gwrr.com/download.axd/f55ed16e9bb5428e8f6b8ac77ed4594c.pdf?d=GENERAL%20TARIFF%2070067%20ISSUED%2009-08-2020%20EFFECTIVE%2010-01-2020) for ARZC tariffs.

- Assuming that the additional cost to unloading outside of a landfill is $5 per ton rather than $10 per ton does not alter the rankings of the landfills by cost. The results of this sensitivity analysis are presented in **Figure B-9** and **Table B-20**, **Table B-21**.

Table B-1: Initial List of Landfills Considered in the Excavated Soil Waste Stream Analysis

Site ID#	Facility Name	State	County	Address	Reason for Exclusion
			Landfills Included in the Analysis		
1	Clean Harbors - Buttonwillow	CA	Kern	2500 Lokern Rd, Buttonwillow, CA 93206	N/A
2	Kettleman Hills Waste Facility	CA	Kings	35251 Old, Skyline Rd, Kettleman City, CA 93239	N/A
3	US Ecology Idaho Site B	ID	Owyhee	20400 Lemley Rd, Grand View, ID 83624	N/A
4	US Ecology Nevada	NV	Nye	Hwy 95, 11 Miles S of, Beatty, NV 89003	N/A
5	Chem. Waste Manag't of the NW	OR	Gilliam	17629 Cedar Springs Ln, Arlington, OR 97812	N/A
6	Butterfield Station Landfill	AZ	Maricopa	40404 99th Ave, Maricopa, AZ 85139	N/A
7	South Yuma County Landfill	AZ	Yuma	19536 South Avenue 1E, Yuma, AZ 85365	N/A
8	Promontory Point Landfill	UT	Box Elder	N/A	N/A
9	ECDC Environmental Landfill	UT	Carbon	1111 West, UT-123, East Carbon, UT 84520	N/A
10	Copper Mountain Landfill	AZ	Yuma	34853 East County 12th Street, Welton, AZ 85356	N/A
11	La Paz County Landfill	AZ	La Paz	26999 Highway 95, Mile Post 128, Parker, AZ 85344	N/A
12	Lake Havasu Landfill	AZ	Mohave	3251 East Chenoweth Drive, Lake Havasu City, AZ 86404	N/A
			Landfills Excluded from the Analysis		
13	Wasatch Regional Landfill	UT	Tooele	8833 North Rowley Road, Granstville, Utah 84029	No rail access
14	ROC Intermountain Landfill	UT	Utah	800 South Allen Ranch Road, Fairfield, Utah 84013	No rail access
15	Tekoi Commercial Landfill	UT	Tooele	99 Skull Valley Rd, Dugway, UT 84022	No rail access
16	Mountain View Landfill	UT	Salt Lake	6976 W California Ave, Salt Lake City, UT 84104	No rail access, landfill is unlined
17	Payson City Landfill	UT	Utah	6211 W 10400 S, Payson, UT 84651	No rail access, municipal owned
18	Northwest Regional Landfill	AZ	Maricopa	19401 W Deer Valley Rd, Surprise, AZ 85387	No rail access, close to Butterfield Station Landfill
19	Southwest Regional Landfill	AZ	Maricopa	24427 AZ-85, Buckeye, AZ 85326	No rail access, website states does not take "dirt or construction debris"
20	Los Reales Landfill	AZ	Pima	7161 S Craycroft Rd, Tucson, AZ 85756	No rail access, community focused, further than Butterfield Station Landfill, appears to accept only clean soil
21	Marana Regional Landfill	AZ	Pima	14508 W Avra Valley Rd, Marana, AZ 85653	FAQ sheet says it does not accept out of state waste

Figure B-1: Landfills Used and Intermodal Facilities Considered in the Excavated Soil Waste Stream Analysis

Landfills	
1	Clean Harbors - Buttonwillow (CHB, CA)
2	Kettleman Hills Waste Facility (KHF, CA)
3	US Ecology Idaho Site B (USEI, ID)
4	US Ecology Nevada (USEN, NV)
5	Chem. Waste Manag't of the NW (CWMNW, OR)
6	Butterfield Station Landfill (BSL, AZ)
7	South Yuma County Landfill (SYCL, AZ)
8	Promontory Point Landfill (PPL, UT)
9	ECDC Environmental Landfill (ECDC, UT)
10	Copper Mountain Landfill (CML, AZ)
11	La Paz County Landfill (LPCL, AZ)
12	Lake Havasu Landfill (LHL, AZ)

Intermodal Facilities (*)	
S	Oakland (UP)
1	City of Industry (UP)
2	Phoenix (BNSF)
3	Las Vegas (UP)
4	Tucson (UP)
5	Lathrop (UP)
6	LA East Washington Blvd (UP)
7	LATC (UP)
8	ICTF (UP)
9	Barstow (BNSF)
10	Commerce (BNSF)
11	Los Angeles (BNSF)
12	San Bernardino (BNSF)
13	Stockton (BNSF)
14	Seattle (UP)
15	Tacoma (UP)
16	Seattle International Gateway (BNSF)
17	South Seattle (BNSF)
18	Spokane (BNSF)
19	Brooklyn (UP)
20	Portland (BNSF)
21	Salt Lake City (UP)
22	Sparks (UP)

(*) Only Intermodal Facilities 1 through 4 form part of the analysis

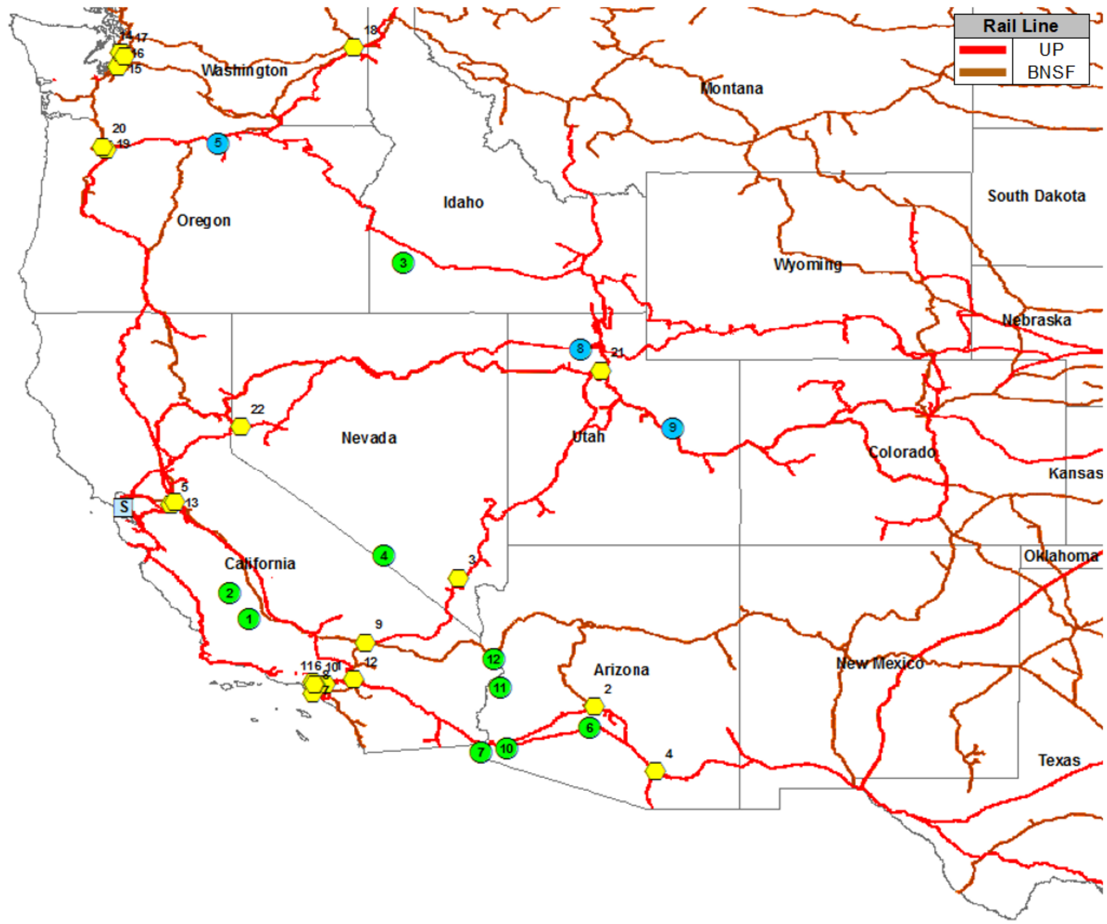

Figure B-2: Union Pacific Track Weight Limits

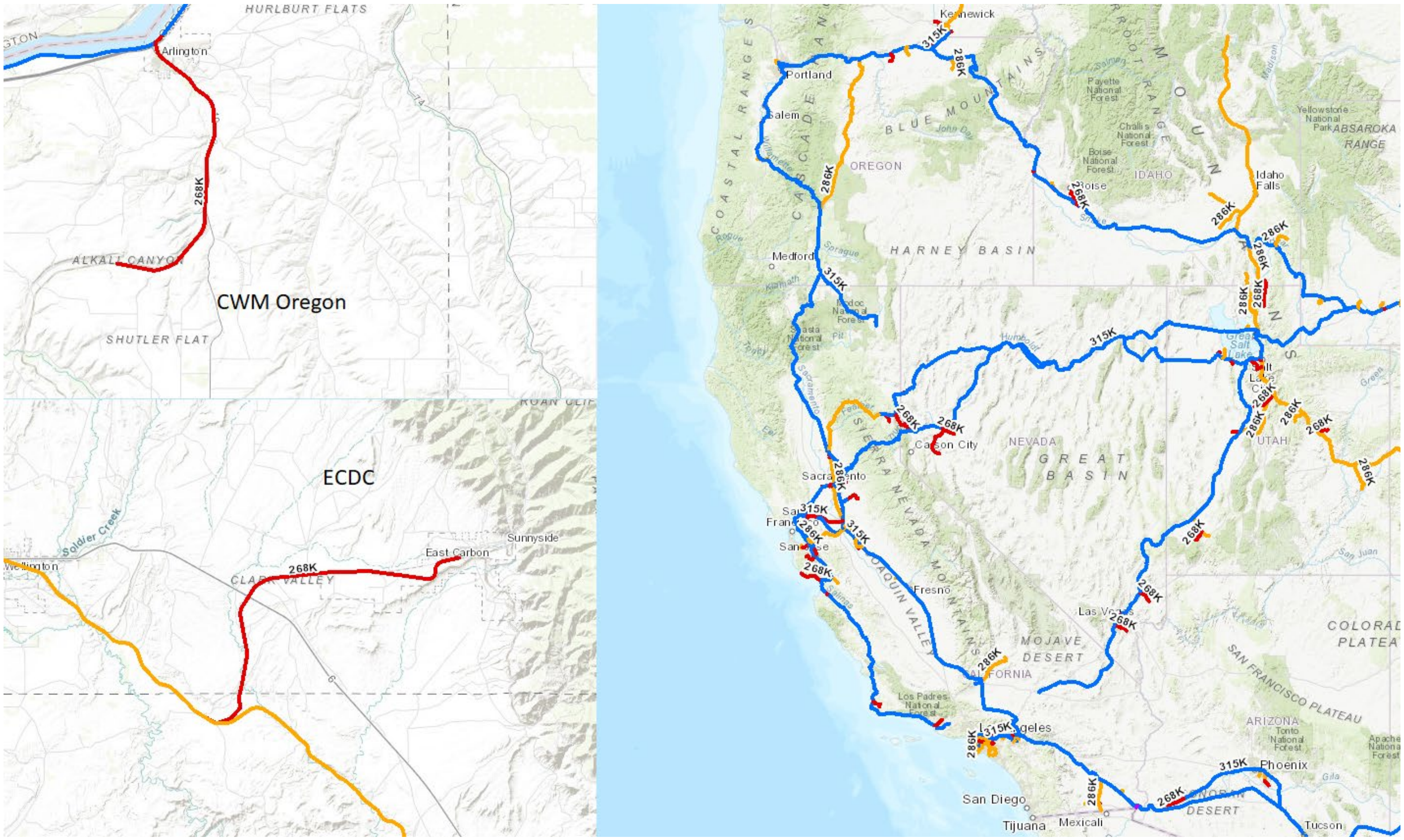

Table B-2: Estimated Rail Shipping Costs (Base Case)

Type of Equipment	Landfill	UP Station	UP Station Group	Base Tariff	Adjusted Tariff	Fuel Surcharge	Leasing Cost	Total Cost	Total Tons	Rail Costs ($/Ton)
Gondola	Promontory Point Landfill	Promontory Point, UT	UT – Salt Lake	$6,298	$6,651	$52	$250	$6,953	105.95	$65.62
Gondola	ECDC Environmental Landfill	Sunnyside, UT	CO – Grand Jct	$7,168	$7,569	$67	$250	$7,886	96.95	$81.35
Gondola	US Ecology Idaho Site B	Orchard, ID	ID – Boise	$8,561	$9,040	$78	$250	$9,368	105.95	$88.42
Gondola	Chem. Waste Manag't of the NW	Arlington, OR	WA – Wallula	$6,276	$6,627	$60	$250	$6,937	96.95	$71.56
Gondola	Butterfield Station Landfill	Maricopa, AZ	AZ – Tucson	$7,075	$7,471	$58	$250	$7,779	105.95	$73.42
Gondola	Copper Mountain Landfill	Mohawk, AZ	AZ – Tucson	$7,075	$7,471	$50	$250	$7,771	105.95	$73.35
Gondola	La Paz County Landfill	N/A (BNSF line)	N/A (BNSF line)	$7,075	$7,471	$44	$250	$7,765	105.95	$73.29
Gondola	Lake Havasu Landfill	N/A (BNSF line)	N/A (BNSF line)	$7,075	$7,471	$45	$250	$7,766	105.95	$73.30
Private Container	South Yuma County Landfill	City of Industry, CA	CA – LA Basin	$677	$677	$9	$50	$736	23	$31.98
Private Container	South Yuma County Landfill	Phoenix, AZ	AZ – Phoenix	$936	$936	$16	$50	$1,002	23	$43.58
Private Container	South Yuma County Landfill	Wilmot, AZ	AZ – Tucson	$957	$936	$16	$50	$1,002	23	$43.58
Private Container	US Ecology Nevada	Valley, NV	NV – Las Vegas	$957	$957	$11	$50	$1,018	23	$44.26

Table B-3: Estimated Trucking Costs (Base Case)

Origin	Transportation Mode	Destination	Site ID #	Distance (Miles)	Time (HH:MM)	Cost ($/ton) (Per Mile)	Cost ($/ton) (Per Hour)
Oakland	Truck	Clean Harbors - Buttonwillow	1	255	4:51	$87	$90
Oakland	Truck	Kettleman Hills Waste Facility	2	202	3:50	$68	$72
Rail Siding	Intermodal	US Ecology Idaho Site B	3	60	1:06	$30	$31
Oakland	Truck	US Ecology Nevada	4	553	9:16	$188	$173
Las Vegas	Intermodal	US Ecology Nevada	4	106	1:43	$46	$42
Rail Siding	Intermodal	Butterfield Station Landfill	6	2	0:04	$10	$11
Oakland	Truck	South Yuma County Landfill	7	656	12:55	$222	$241
City of Industry	Intermodal	South Yuma County Landfill	7	268	5:11	$101	$107
Tucson	Intermodal	South Yuma County Landfill	7	265	4:13	$55	$50
Las Vegas	Intermodal	South Yuma County Landfill	7	319	5:49	$118	$118
Phoenix	Intermodal	South Yuma County Landfill	7	198	3:23	$44	$42
Oakland	Truck	Copper Mountain Landfill	10	679	13:08	$230	$245
Rail Siding	Intermodal	Copper Mountain Landfill	10	3	0:07	$11	$11
Oakland	Truck	La Paz County Landfill	11	634	12:21	$215	$230
Rail Siding	Intermodal	La Paz County Landfill	11	8	0:09	$11	$11
Oakland	Truck	Lake Havasu Landfill	12	583	10:56	$198	$204
Rail Siding	Intermodal	Lake Havasu Landfill	12	20	0:24	$13	$14

Table B-4: Estimated Disposal Fees

Landfill	MSW Tipping Fees ($/ton)	RCRA Adder	State Disposal Fees ($/ton)	County Disposal Fees ($/ton)	Local Disposal Fees ($/ton)
Promontory Point Landfill, UT	$32		$0.21	$2.00	
ECDC Environmental Landfill, UT	$32		$0.21		$0.50
Clean Harbors-Buttonwillow, CA	$56	$10	$5.72	$5.56	
Kettleman Hills Facility, CA	$56	$10	$5.72	$5.56	
US Ecology Idaho Site B, ID	$69	$10	$2.00		
US Ecology Nevada, NV	$71	$10	$3.50		
Chemical Waste Management of the NW, OR	$74	$10	$5.50		
Butterfield Station Landfill, AZ	$43		$0.25		
South Yuma County Landfill, AZ	$43		$0.25		
Copper Mountain Landfill, AZ	$43		$0.25		
La Paz County Landfill, AZ	$43		$0.25		
Lake Havasu Landfill, AZ	$43		$0.25		

Table B-5: Total Disposal Costs per Ton and Differences from Promontory Point Landfill (Base Case)

Landfill	Total Cost ($/ton)	Difference from PPL (%)	Rank Order
Promontory Point Landfill, UT	$100	-	1
ECDC Environmental Landfill, UT	$114	14%	2
Butterfield Station Landfill, AZ	$127	28%	3
Copper Mountain Landfill, AZ	$128	28%	4
La Paz County Landfill, AZ	$128	28%	5
Lake Havasu Landfill, AZ	$130	30%	6
South Yuma County Landfill, AZ*	$131	31%	7
Kettleman Hills Facility, CA	$145	45%	8
Chemical Waste Management of the NW, OR	$158	58%	9
Clean Harbors-Buttonwillow, CA	$163	63%	10
US Ecology Nevada, NV**	$178	78%	11
US Ecology Idaho Site B, ID	$199	100%	12

* Route with Minimum Cost across the three routes analyzed – Rail transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill.

** Route with Minimum Cost across the two routes analyzed – Rail transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill.

Table B-6: Disaggregated Disposal Costs per Ton (Base Case)

Landfill	Rail Costs ($/ton)	Truck and Drayage Costs ($/ton)	Tipping and Disposal Fees ($/ton)*	Total Cost ($/ton)
Promontory Point Landfill, UT	$66	$0	$34	$100
ECDC Environmental Landfill, UT	$81	$0	$33	$114
Butterfield Station Landfill, AZ	$73	$10	$44	$127
Copper Mountain Landfill, AZ	$73	$11	$44	$128
La Paz County Landfill, AZ	$73	$11	$44	$128
Lake Havasu Landfill, AZ	$73	$13	$44	$130
South Yuma County Landfill, AZ**	$44	$44	$44	$131
Kettleman Hills Facility, CA	$0	$68	$77	$145
Chemical Waste Management of the NW, OR	$72	$0	$87	$158
Clean Harbors-Buttonwillow, CA	$0	$87	$77	$163
US Ecology Nevada, NV***	$44	$46	$88	$178
US Ecology Idaho Site B, ID	$88	$30	$81	$199

* Includes Tipping Fees, RCRA adder, state, county, and local disposal fees.
** Route with Minimum Cost across the three routes analyzed – Rail transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill.
*** Route with Minimum Cost across the two routes analyzed – Rail transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill.

Figure B-3: Disaggregated Disposal Costs per Ton (Base Case)

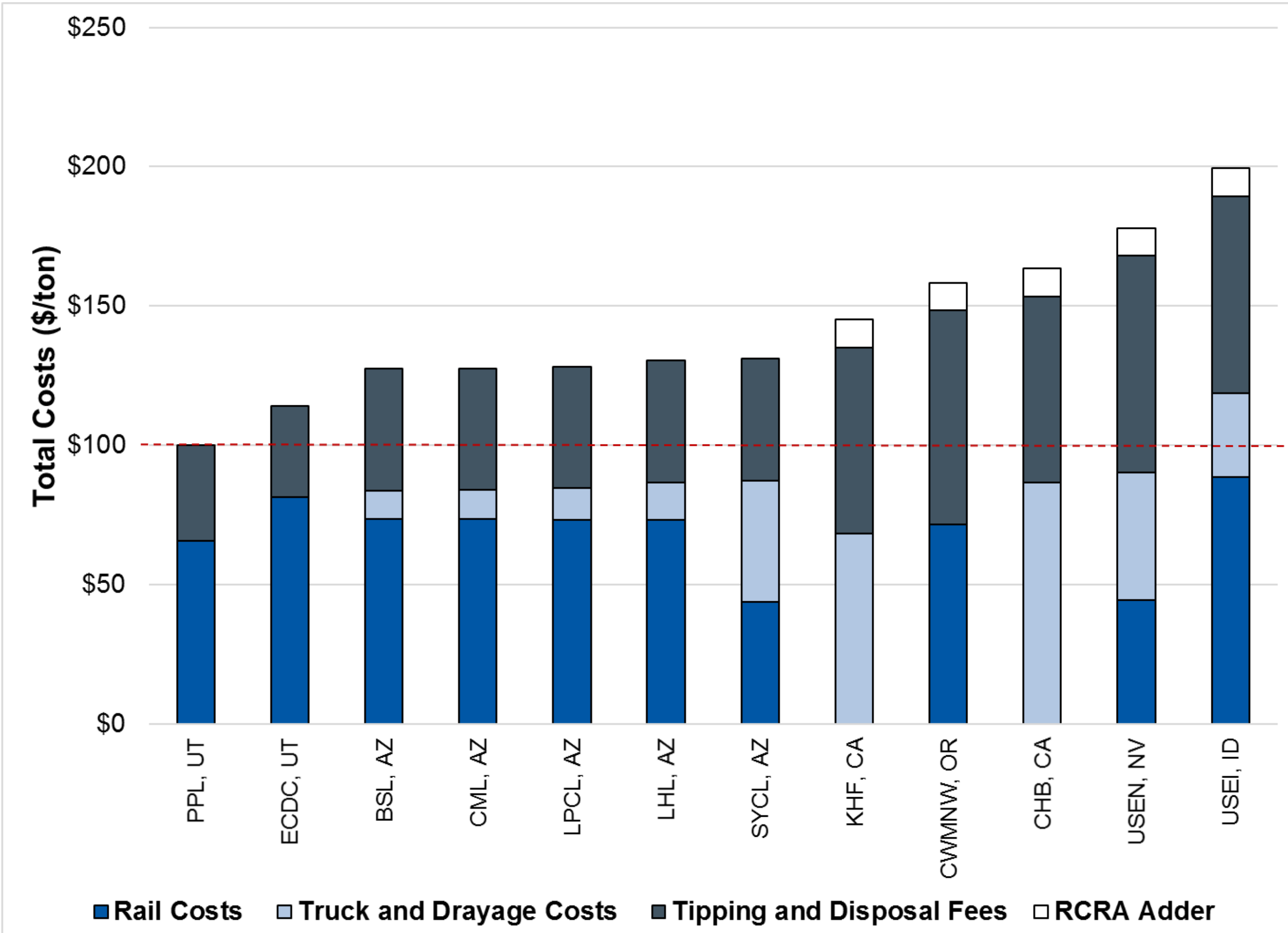

Table B-7: Rank Order by Cost, Base Case

Landfill	Mode of Transport	Difference from PPL ($/ton)	Rank Order
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$0	1
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$14	2
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$27	3
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	4
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	5
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$30	6
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$31	7
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$42	8
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$45	9
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$58	10
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$63	11
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$77	12
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$78	13
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$100	14
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$106	15
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$141	16
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$159	17
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$166	18
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$174	19
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$175	20

Table B-8: Disaggregated Disposal Costs per Ton, All Trips Considered (Base Case)

Landfill	Mode of Transport	Rail Costs ($/ton)	Truck and Drayage Costs ($/ton)	Tipping and Disposal Fees ($/ton)	Total Cost ($/ton)
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$66	$0	$34	$100
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$81	$0	$33	$114
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$0	$90	$77	$167
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$0	$72	$77	$148
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$88	$31	$81	$200
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$0	$173	$88	$261
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$42	$88	$174
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$72	$0	$87	$158
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$241	$44	$285
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$32	$107	$44	$182
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$118	$44	$206
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$44	$50	$44	$137
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$44	$42	$44	$129
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$0	$245	$44	$289
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
La Paz Landfill, AZ	Direct Truck Transfer to Landfill	$0	$230	$44	$274
La Paz Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$0	$204	$44	$248
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$14	$44	$131

Table B-9: Sensitivities of Cost-per-ton Ranking to Changes in Assumptions

Landfill	Base Case	Alternate Trucking Cost	RCRA Adder Removed	MSW Disposal Differentials Removed	Tariff Uncertainity	Tariff Multiplier Increased	Transloading Costs Decreased
Promontory Point Landfill, UT	1	1	1	1	1	1	1
ECDC Environmental Landfill, UT	2	2	2	2	2 (near tie with 1)	2	2
Butterfield Station Landfill, AZ	3	3	3	3	3	3	3
Copper Mountain Landfill, AZ	4	4	4	4	4	4	4
La Paz County Landfill, AZ	5	5	5	5	7	6	5
Lake Havasu Landfill, AZ	6	7	6	6	5	7	6
South Yuma County Landfill, AZ*	7	6	7	9	6	5	7
Kettleman Hills Facility, CA	8	8	8	8	8	8	8
Chemical Waste Management of the NW, OR	9	9	9	7	9	9	9
Clean Harbors-Buttonwillow, CA	10	10	10	11	10	10	10
US Ecology Nevada, NV**	11	11	11	10	11	11	11
US Ecology Idaho Site B, ID	12	12	12	12	12	12	12

* Route with Minimum Cost across the three routes analyzed – Rail transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill.
** Route with Minimum Cost across the two routes analyzed – Rail transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill.

Figure B-4: Disaggregated Disposal Costs per Ton (Trucking Costs Calculated on a per Hour Basis)

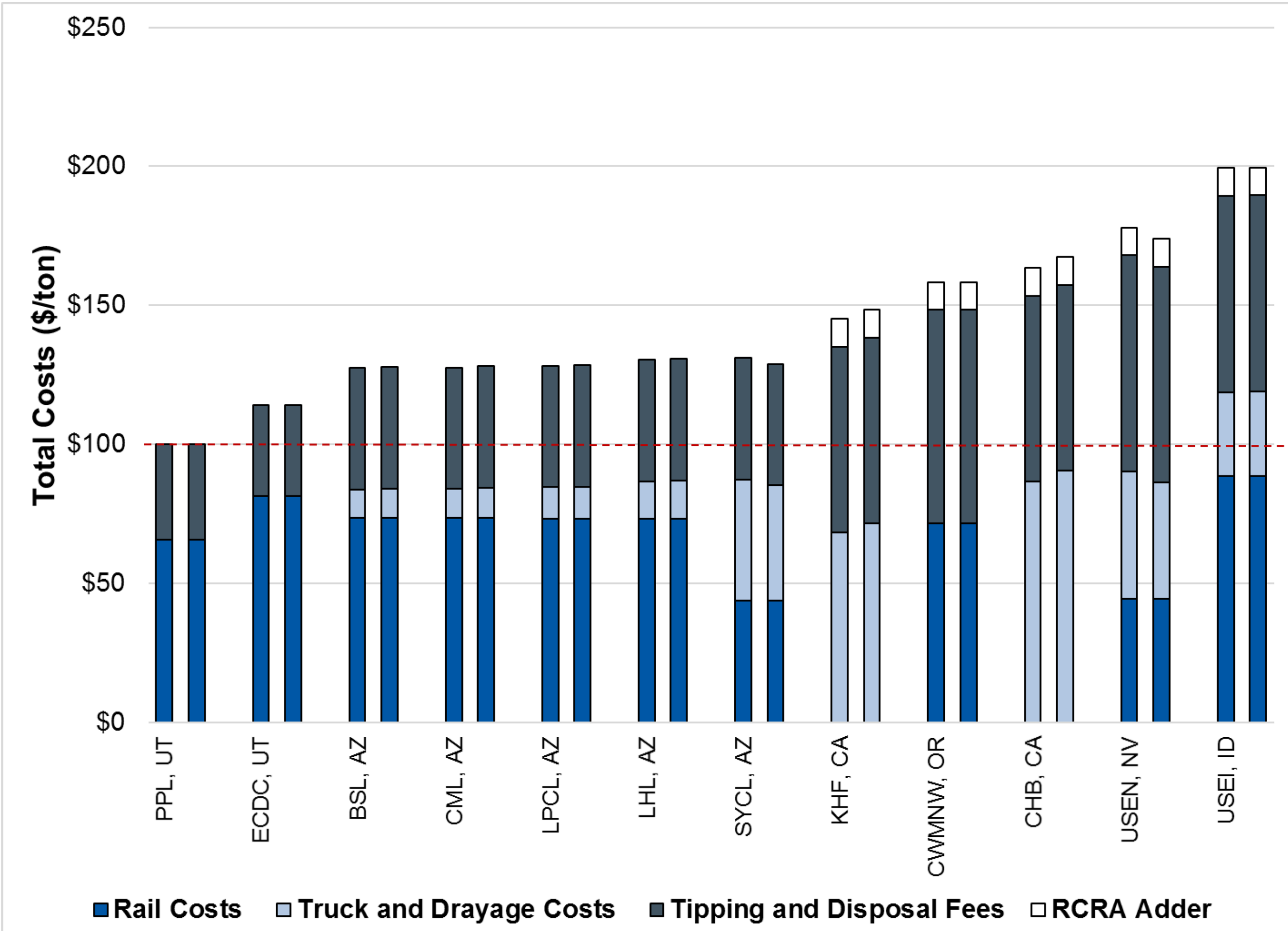

Table B-10: Rank Order by Cost, Trucking Costs Calculated on a per Hour Basis

Landfill	Mode of Transport	Difference from PPL ($/ton)	Rank Order
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$0	1
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$14	2
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	3
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	4
La Paz Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	5
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$29	6
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$31	7
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$37	8
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$48	9
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$58	10
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$67	11
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$74	12
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$82	13
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$100	14
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$106	15
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$148	16
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$161	17
La Paz Landfill, AZ	Direct Truck Transfer to Landfill	$174	18
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$185	19
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$189	20

Table B-11: Disaggregated Costs, Trucking Costs Calculated on a per Hour Basis

Landfill	Mode of Transport	Rail Costs ($/ton)	Truck and Drayage Costs ($/ton)	Tipping and Disposal Fees ($/ton)	Total Cost ($/ton)
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$66	$0	$34	$100
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$81	$0	$33	$114
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$0	$90	$77	$167
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$0	$72	$77	$148
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$88	$31	$81	$200
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$0	$173	$88	$261
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$42	$88	$174
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$72	$0	$87	$158
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$241	$44	$285
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$32	$107	$44	$182
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$118	$44	$206
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$44	$50	$44	$137
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$44	$42	$44	$129
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$0	$245	$44	$289
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
La Paz Landfill, AZ	Direct Truck Transfer to Landfill	$0	$230	$44	$274
La Paz Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$0	$204	$44	$248
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$14	$44	$131

Figure B-5: Disaggregated Disposal Costs per Ton (Eliminating RCRA Adder)

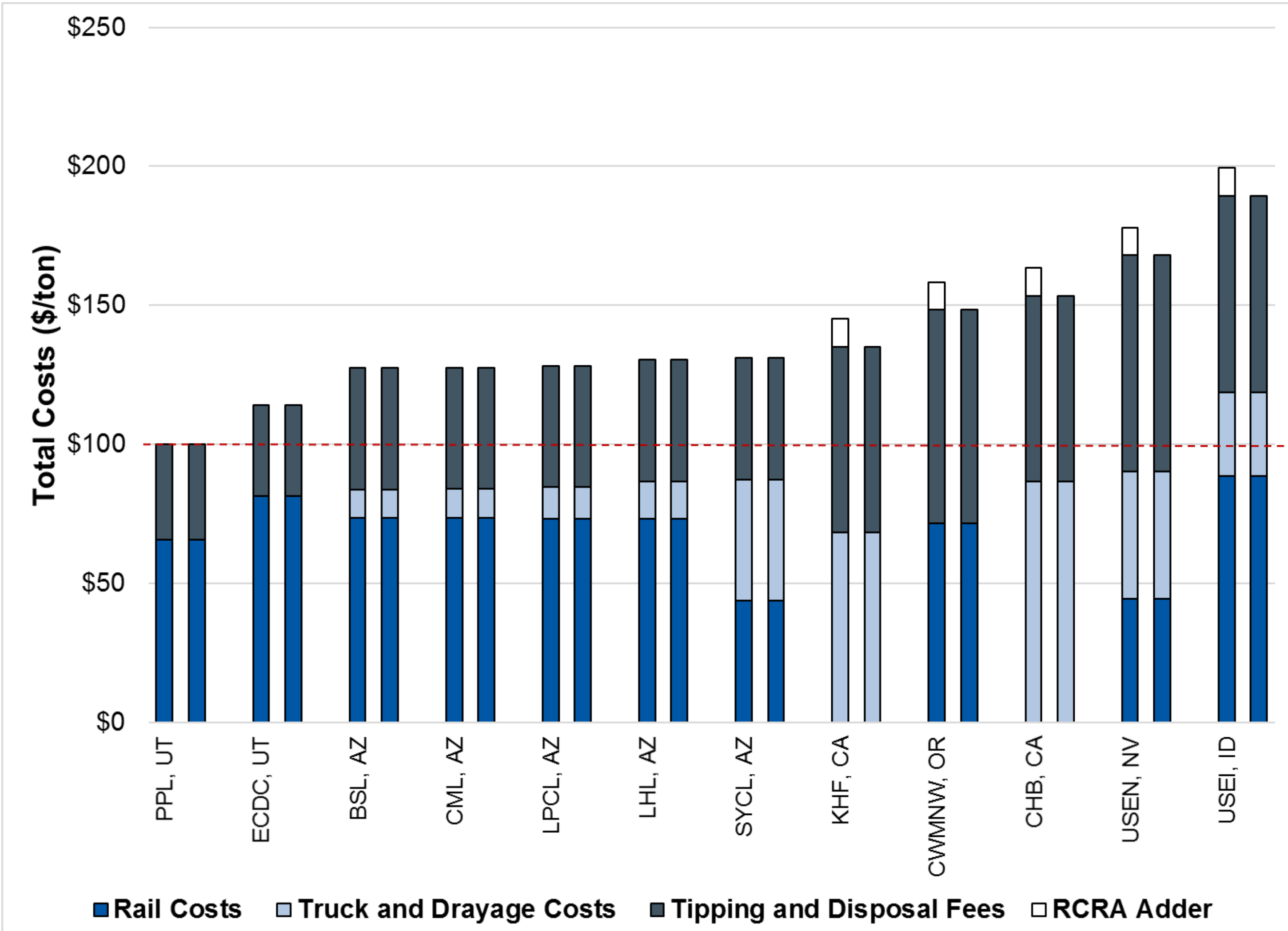

Table B-12: Rank Order by Cost, Eliminating RCRA Adder

Landfill	Mode of Transport	Difference from PPL ($/ton)	Rank Order
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$0	1
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$14	2
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$27	3
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	4
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	5
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$30	6
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$31	7
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$35	8
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$42	9
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$48	10
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$53	11
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$68	12
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$77	13
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$90	14
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$106	15
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$141	16
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$159	17
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$165	18
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$166	19
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$174	20

Table B-13: Disaggregated Costs, Eliminating RCRA Adder

Landfill	Mode of Transport	Rail Costs ($/ton)	Truck and Drayage Costs ($/ton)	Tipping and Disposal Fees ($/ton)	Total Cost ($/ton)
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$66	$0	$34	$100
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$81	$0	$33	$114
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$0	$87	$67	$153
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$0	$68	$67	$135
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$88	$30	$71	$189
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$0	$188	$78	$265
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$46	$78	$168
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$72	$0	$77	$148
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$10	$44	$127
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$222	$44	$266
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$32	$101	$44	$176
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$118	$44	$206
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$44	$55	$44	$142
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$44	$44	$44	$131
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$0	$230	$44	$274
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$215	$44	$259
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$0	$198	$44	$241
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$13	$44	$130

Figure B-6: Disaggregated Disposal Costs per Ton (Setting All Base Tipping Fees Equal to that in Utah)

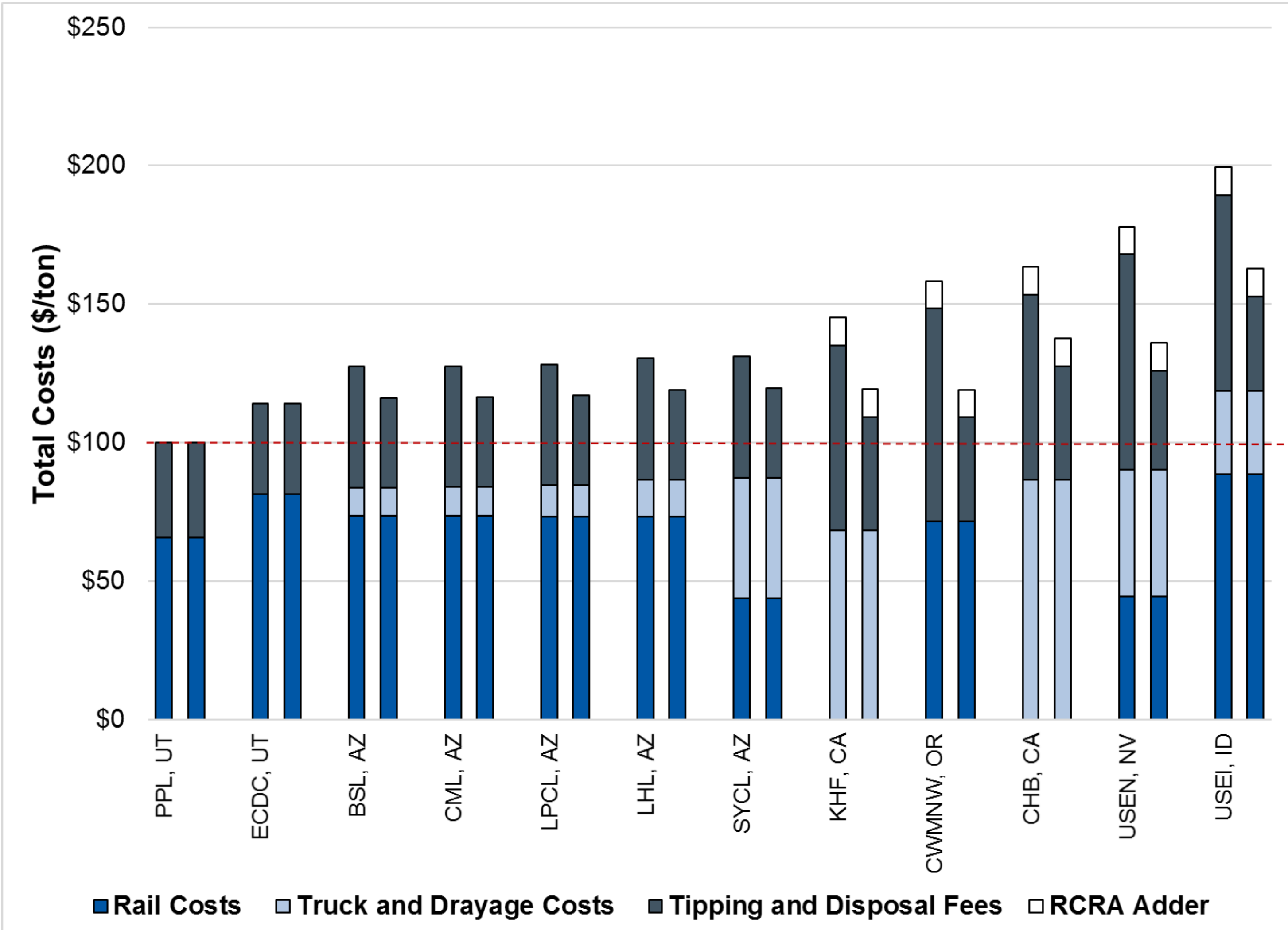

Table B-14: Rank Order by Cost, Setting All Base Tipping Fees Equal to that in Utah

Landfill	Mode of Transport	Difference from PPL ($/ton)	Rank Order
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$0	1
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$14	2
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$16	3
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$16	4
LaPaz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$17	5
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$19	6
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$19	7
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$19	8
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$20	9
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$31	10
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$36	11
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$38	12
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$63	13
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$65	14
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$95	15
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$130	16
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$133	17
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$148	18
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$155	19
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$163	20

Table B-15: Disaggregated Costs, Setting All Base Tipping Fees Equal to that in Utah

Landfill	Mode of Transport	Rail Costs ($/ton)	Truck and Drayage Costs ($/ton)	Tipping and Disposal Fees ($/ton)	Total Cost ($/ton)
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$66	$0	$34	$100
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$81	$0	$33	$114
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$0	$87	$51	$138
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$0	$68	$51	$119
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$88	$30	$44	$163
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$0	$188	$46	$233
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$46	$46	$136
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$72	$0	$48	$119
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$10	$32	$116
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$222	$32	$255
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$32	$101	$32	$165
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$118	$32	$195
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$44	$55	$32	$131
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$44	$44	$32	$120
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$0	$230	$32	$263
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$32	$116
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$215	$32	$247
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$32	$117
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$0	$198	$32	$230
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$13	$32	$119

Figure B-7: Disaggregated Disposal Costs per Ton (Setting Rail Tariff for ECDC Equal to That for PPL, Including Switching Costs in LPCL's Rail Tariff)

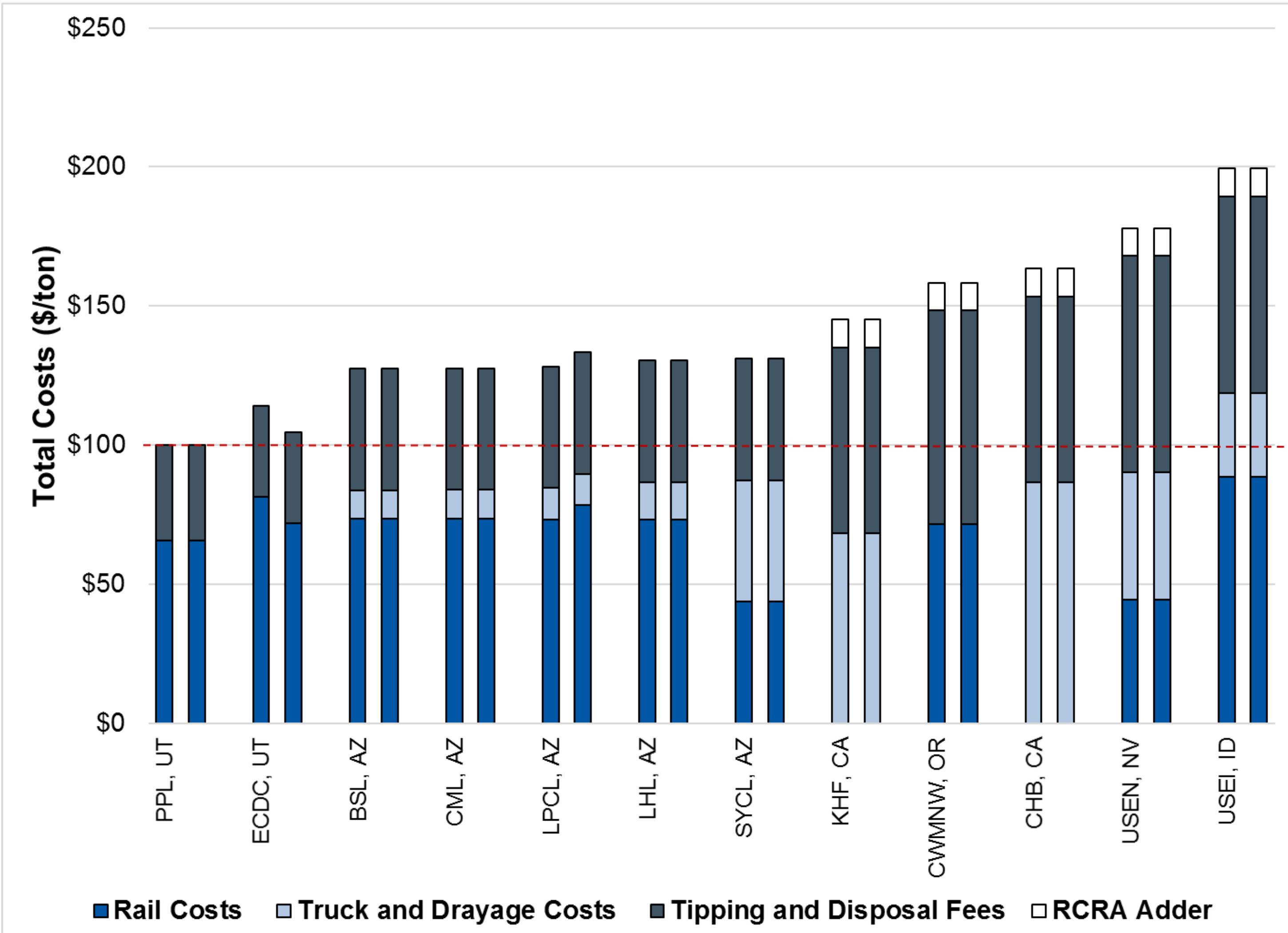

Table B-16: Rank Order by Cost, Setting Rail Tariff for ECDC Equal to That for PPL, Including Switching Costs in LPCL's Rail Tariff

Landfill	Mode of Transport	Difference from PPL ($/ton)	Rank Order
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$0	1
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$5	2
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$27	3
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	4
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$30	5
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$31	6
LaPaz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$33	7
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$42	8
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$45	9
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$58	10
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$63	11
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$77	12
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$78	13
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$100	14
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$106	15
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$141	16
LaPaz County Landfill, AZ	Direct Truck Transfer to Landfill	$159	17
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$166	18
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$174	19
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$175	20

Table B-17: Disaggregated Costs, Setting Rail Tariff for ECDC Equal to That for PPL, Including Switching Costs in LPCL's Rail Tariff

Landfill	Mode of Transport	Rail Costs ($/ton)	Truck and Drayage Costs ($/ton)	Tipping and Disposal Fees ($/ton)	Total Cost ($/ton)
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$66	$0	$34	$100
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$72	$0	$33	$105
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$0	$87	$77	$163
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$0	$68	$77	$145
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$88	$30	$81	$199
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$0	$188	$88	$275
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$46	$88	$178
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$72	$0	$87	$158
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$10	$44	$127
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$222	$44	$266
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$32	$101	$44	$176
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$118	$44	$206
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$44	$55	$44	$142
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$44	$44	$44	$131
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$0	$230	$44	$274
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$11	$44	$128
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$215	$44	$259
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$78	$11	$44	$133
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$0	$198	$44	$241
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$13	$44	$130

Figure B-8: Disaggregated Disposal Costs per Ton (Increased Rail Tariff for Shipping RCRA Subtitle C Wastes)

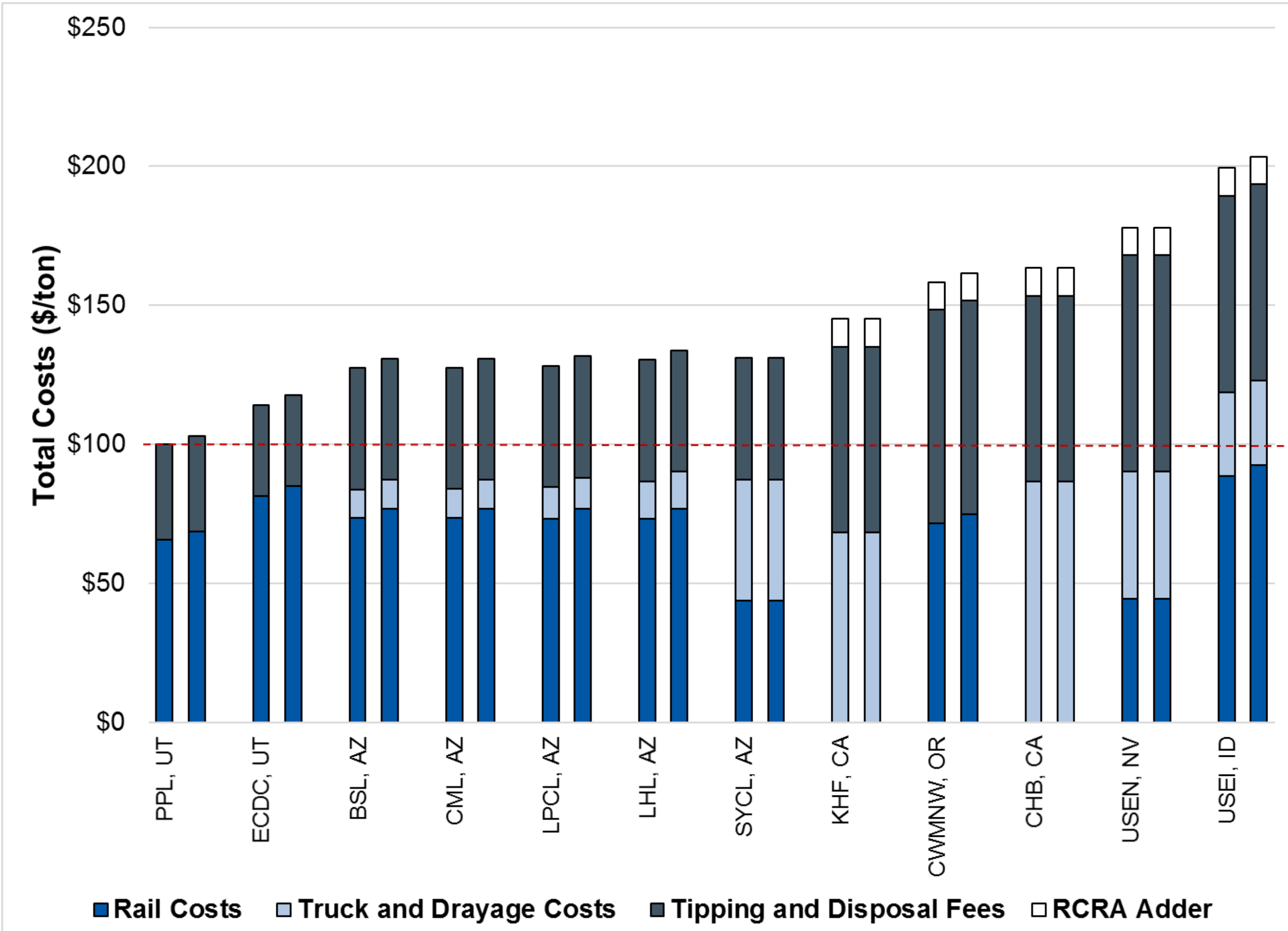

Table B-18: Rank Order by Cost, Increased Rail Tariff for Shipping RCRA Subtitle C Wastes

Landfill	Mode of Transport	Difference from PPL ($/ton)	Rank Order
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$0	1
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$15	2
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	3
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$28	4
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$28	5
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$29	6
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$31	7
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$39	8
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$42	9
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$59	10
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$60	11
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$74	12
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$75	13
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$101	14
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$103	15
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$138	16
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$156	17
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$163	18
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$171	19
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$172	20

Table B-19: Disaggregated Costs, Increased Rail Tariff for Shipping RCRA Subtitle C Wastes

Landfill	Mode of Transport	Rail Costs ($/ton)	Truck and Drayage Costs ($/ton)	Tipping and Disposal Fees ($/ton)	Total Cost ($/ton)
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$69	$0	$34	$103
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$85	$0	$33	$118
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$0	$87	$77	$163
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$0	$68	$77	$145
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$92	$30	$81	$204
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$0	$188	$88	$275
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$46	$88	$178
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$75	$0	$87	$162
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$77	$10	$44	$131
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$222	$44	$266
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$32	$101	$44	$176
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$118	$44	$206
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$44	$55	$44	$142
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$44	$44	$44	$131
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$0	$230	$44	$274
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$77	$11	$44	$131
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$215	$44	$259
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$77	$11	$44	$132
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$0	$198	$44	$241
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$77	$13	$44	$134

Figure B-9: Disaggregated Disposal Costs per Ton (Reducing Transloading Costs Outside of Landfills)

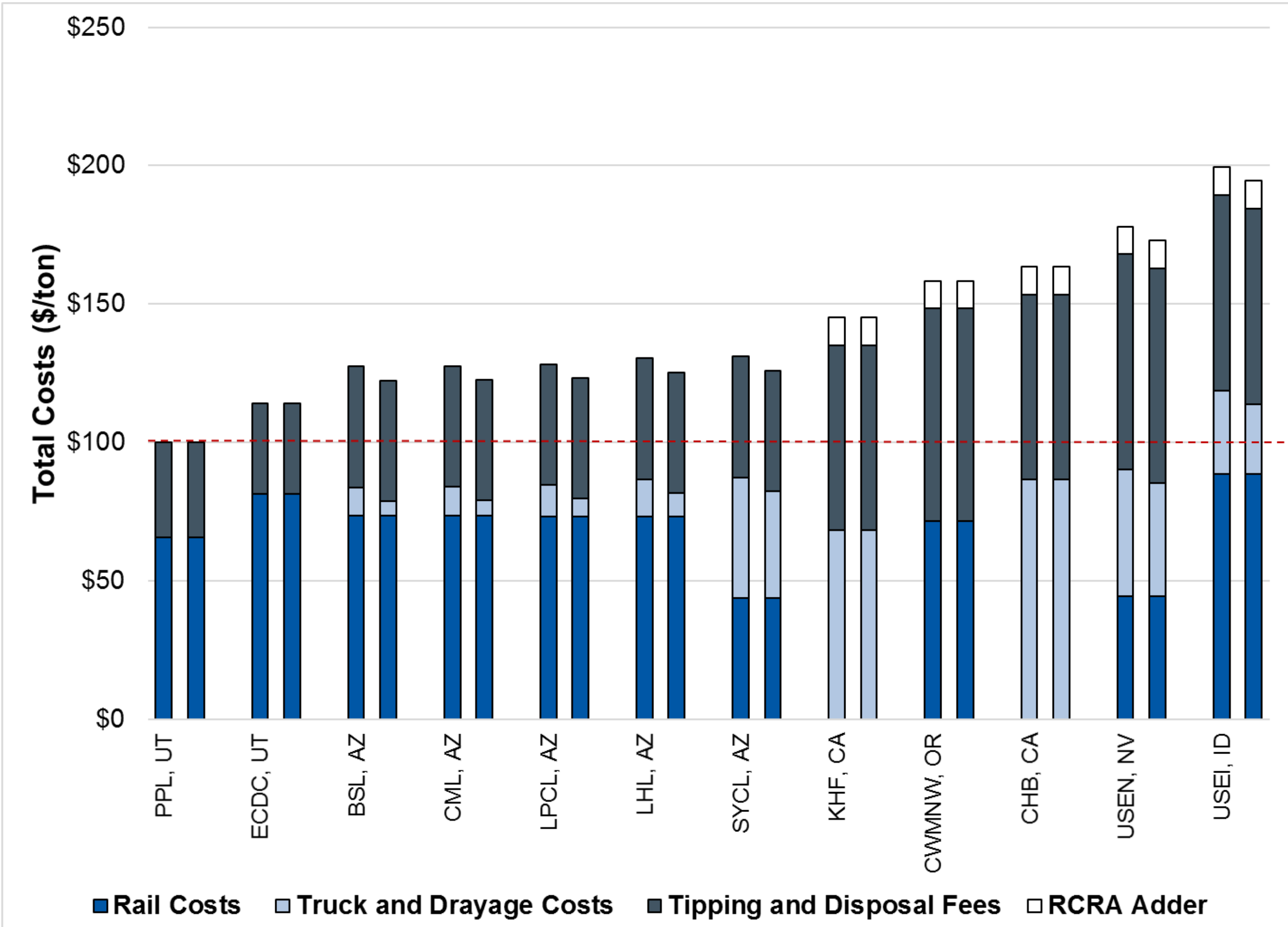

Table B-20: Rank Order by Cost, Reducing Transloading Costs Outside of Landfills

Landfill	Mode of Transport	Difference from PPL ($/ton)	Rank Order
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$0	1
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$14	2
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$22	3
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$23	4
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$23	5
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$25	6
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$26	7
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$37	8
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$45	9
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$58	10
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$63	11
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$72	12
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$73	13
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$95	14
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$101	15
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$141	16
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$159	17
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$166	18
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$174	19
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$175	20

Table B-21: Disaggregated Costs, Reducing Transloading Costs Outside of Landfills

Landfill	Mode of Transport	Rail Costs ($/ton)	Truck and Drayage Costs ($/ton)	Tipping and Disposal Fees ($/ton)	Total Cost ($/ton)
Promontory Point Landfill, UT	Direct Rail Transfer to Landfill	$66	$0	$34	$100
ECDC Environmental Landfill, UT	Direct Rail Transfer to Landfill	$81	$0	$33	$114
Clean Harbors-Buttonwillow, CA	Direct Truck Transfer to Landfill	$0	$87	$77	$163
Kettleman Hills Facility, CA	Direct Truck Transfer to Landfill	$0	$68	$77	$145
US Ecology Idaho Site B, ID	Rail Transfer to Private Rail Transfer Facility Followed by Truck Transfer to Landfill	$88	$25	$81	$194
US Ecology Nevada, NV	Direct Truck Transfer to Landfill	$0	$188	$88	$275
US Ecology Nevada, NV	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$41	$88	$173
Chemical Waste Management of the NW, OR	Direct Rail Transfer to Landfill	$72	$0	$87	$158
Butterfield Station Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$5	$44	$122
South Yuma County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$222	$44	$266
South Yuma County Landfill, AZ	Rail Transfer to City of Industry Intermodal Facility Followed by Truck Transfer to Landfill	$32	$96	$44	$171
South Yuma County Landfill, AZ	Rail Transfer to Las Vegas Intermodal Facility Followed by Truck Transfer to Landfill	$44	$113	$44	$201
South Yuma County Landfill, AZ	Rail Transfer to Tucson Intermodal Facility Followed by Truck Transfer to Landfill	$44	$50	$44	$137
South Yuma County Landfill, AZ	Rail Transfer to Phoenix Intermodal Facility Followed by Truck Transfer to Landfill	$44	$39	$44	$126
Copper Mountain Landfill, AZ	Direct Truck Transfer to Landfill	$0	$230	$44	$274
Copper Mountain Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$6	$44	$123
La Paz County Landfill, AZ	Direct Truck Transfer to Landfill	$0	$215	$44	$259
La Paz County Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$6	$44	$123
Lake Havasu Landfill, AZ	Direct Truck Transfer to Landfill	$0	$198	$44	$241
Lake Havasu Landfill, AZ	Rail Transfer to Rail Siding Followed by Truck Transfer to Landfill	$73	$8	$44	$125

8. Potential Size and Trends in Excavated Cleanup Soils in California and Northern Utah

In order to derive estimates of the tons of excavated soil from cleanups in California that can be expected to be generated over the next ten years, we used estimates from the DTSC for the tons of excavated soil generated from soil clean-up during the 1995-2017 period.[40] This was supplemented with data on cleanup sites tracked by the California DTSC[41] and the California SWRCB[42] along with data from the USEPA[43] to determine the number of sites in California that are designated as federal brownfield and CERCLA sites. The inputs to the estimation process from these datasets included the number of sites of each type – federal brownfields, CERCLA sites and others that are already cleaned up, those yet to be cleaned up and the rate at which new sites are being added to the list.

The first step in the estimation process was to determine the average tons of excavated soil per generated per site for each of the site types.

- For CERCLA sites, this was based on estimates of the tons of excavated soil cleaned up from a random sample of 10 CERCLA sites where cleanup was completed (and that were listed as being deleted from the NPL per the USEPA database). An average per site soil cleanup estimate of 27,460 tons was obtained. There were a total of 11 CERCLA sites per the USEPA database which were listed as already having been cleaned up during the 1995-2017 period.[44]
- For brownfield sites, we developed two estimates – a low and high estimate that were based on assumptions relating to the depth of soil excavation at a brownfield site. The low estimate assumed that 1 foot of soil would be excavated per acre of the cleanup site while the high estimate assumed that 3 feet of soil would be excavated per acre of the cleanup site. The number of acres of soil cleaned up across all federal brownfield sites per the USEPA database (which are already cleaned up and where soil was one of the media of concern) during the 1995-2017 period amounted to about 270 acres. This acreage estimate corresponds to a total of 65 federal brownfield sites. Using this acreage estimate and the different assumptions relating to the depth of soil excavation, we obtain low and high estimates of the average amount of soil cleaned up per brownfield site of about 10,050 tons and 30,160 tons respectively.
- For all other cleanup sites, an estimate of the number of sites (which are already cleaned up and where soil is one of the media of concern) during the 1995-2017 period is first obtained by subtracting the number of CERCLA and federal brownfield sites which are already cleaned up from the total number of such cleanup sites listed in the DTSC and SWRCB databases.[45] This

[40] Data provided by Daniel Knight, Headquarters Public Records Act Coordinator, Department of Toxic Substances Control upon inquiry by NERA in September 2020.

[41] ENVIROSTOR, Department of Toxic Substances Control (available at: https://www.envirostor.dtsc.ca.gov/public/).

[42] GEOTRACKER, State Water Resources Control Board (available at: https://geotracker.waterboards.ca.gov/).

[43] USEPA, "Cleanups in My Community" (available at https://www.epa.gov/cleanups/cleanups-my-community).

[44] These correspond to CERCLA sites where remediation action is complete and that have been removed from the National Priorities List (NPL).

[45] These correspond to cleanup sites per the DTSC's ENVIROSTOR database and cleanup program sites per the SWRCB's GEOTRACKER database which have a completed or case closed status.

yielded a total of 4,523 sites. An estimate of the total tons of soil cleaned up from these other sites is obtained by subtracting the total estimates obtained for CERCLA and brownfield sites as described above from the cumulative 11.2 million tons of excavated soil from 1995-2017 generated from site cleanup in California. This when divided by the number of other cleanup sites, yields average per site soil cleanup estimates of about 1,970 to 2,270 tons (based on differing assumptions relating to the feet of soil excavated per cleanup site).

Table B-22 presents a summary of the range of estimates of tons of soil cleaned up per site developed for the three different types of sites for California.

Table B-22: Estimates of the Quantity of Soil Excavated per Site in California (tons)

Type of Site	Soil excavated per site (tons)
CERCLA	27,460
Brownfield	10,050 – 30,160
Other Cleanup Sites	1,970 – 2,270

The second step in the estimation process was to develop projections of the future generation of cleanup-related excavated soils. Based on the USEPA database, there are 194 and 27 federal brownfield and CERCLA sites respectively that are yet to be cleaned up.[46] Further, there are a total of 1,585 other such cleanup sites per the DTSC and SWRCB databases (obtained by subtracting the federal brownfield and CERCLA sites that are yet to be cleaned up per the USEPA database from the total number of all such cleanup sites in the DTSC and SWRCB databases).[47] Per the USEPA, DTSC and SWRCB databases it was estimated that on average 5 federal brownfield sites and 100 other cleanup sites were added per year based on historical data. Applying these estimates and the tons per site estimates presented in **Table B-22** to the number of sites that are yet to be cleaned up yields a range of projections for soil excavation at future cleanup sites. The estimates in this range vary depending on the assumptions relating to the feet of soil excavated per acre at a brownfield site and considerations relating to the growth in the number of cleanup sites added over time:

- Assuming that 1 feet of soil is excavated per acre at a federal brownfield site and that the future tons of soils generated are solely based on current estimates of sites that are yet to be cleaned up yields an estimate of about 6.2 million tons of excavated soils (3.3 million tons in Northern California and 2.9 million tons in Southern California).
- Assuming that 3 feet of soil is excavated per acre at a federal brownfield site and that the future tons of soils generated are solely based on current estimates of sites that are yet to be cleaned up yields an estimate of about 9.4 million tons of excavated soils (5.4 million tons in Northern California and 4.0 million tons in Southern California).

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[46] These correspond to federal brownfield sites where cleanup is identified to be required but has not yet started and CERCLA sites that are on the NPL where remediation action has not yet started, or the site is proposed.

[47] These correspond to cleanup sites per the DTSC's ENVIROSTOR database which are accorded an active status (it is assumed that half of these sites have not undergone cleanup) and cleanup program sites per the SWRCB's GEOTRACKER database with an active status and that are currently undergoing site assessment and interim remedial action.

- Assuming that 1 feet of soil is excavated per acre at a federal brownfield site and that the future tons of soils generated are based on current estimates of sites that are yet to be cleaned up and estimates of the average number of sites added over time (based on historical data) yields an estimate of about 8.9 million tons of excavated soils (4.8 million tons in Northern California and 4.1 million tons in Southern California).
- Assuming that 3 feet of soil is excavated per acre at a federal brownfield site and that the future tons of soils generated are based on current estimates of sites that are yet to be cleaned up and estimates of the average number of sites added over time (based on historical data) yields an estimate of about 12.9 million tons of excavated soils (7.6 million tons in Northern California and 5.3 million tons in Southern California).

Table B-23 presents a summary of these estimates along with the fractions of the excavated soil amounts that are projected to come from Northern and Southern California.

Table B-23: Range of Estimates for the Future Generation of Excavated Soils in California

	Assuming 1 foot of soil is excavated per acre and using current estimates of sites	**Assuming 3 feet of soil is excavated per acre and using current estimates of sites**	**Assuming 1 foot of soil is excavated per acre and using current estimates, average rate of future additions of sites**	**Assuming 3 feet of soil is excavated per acre and using current estimates, average rate of future additions of sites**
Total	6,280,000	9,730,000	9,050,000	13,210,000
Northern California	3,350,000	5,590,000	4,910,000	7,810,000
Southern California	2,930,000	4,130,000	4,140,000	5,400,000
Northern California (%)	53%	58%	54%	59%
Southern California (%)	47%	42%	46%	41%

In order to derive estimates of the tons of excavated soil from cleanups in Northern Utah counties that can be expected to be generated over the next ten years, we used the same estimation process as described above using data from the USEPA to determine the number of sites in this region that are designated as federal brownfield and CERCLA sites.[48]

- For CERCLA sites, an average per site soil cleanup estimate of 163,720 tons was obtained based on excavated soil cleanup data from a random sample of 2 CERCLA sites in Northern Utah where cleanup was completed (and that were listed as being deleted from the NPL per the USEPA database). There were a total of 6 CERCLA sites per the USEPA database which were already cleaned up in Northern Utah.
- For federal brownfield sites, the number of acres of soil cleaned up across all federal brownfield sites per the USEPA database (which are already cleaned up and where soil was one of the media of concern) in Northern Utah amounted to about 73 acres. This acreage estimate corresponds to a

[48] This included sites in the counties of Salt Lake, Davis, Morgan, Summit, Weber, Cache, Rich and Box Elder.

total of 5 federal brownfield sites. Using this acreage estimate and the different assumptions relating to the depth of soil excavation, we obtain low and high estimates of the average amount of soil cleaned up per brownfield site of about 35,100 tons and 105,310 tons respectively.

Table B-24 presents a summary of the range of estimates of tons of soil cleaned up per site developed for the federal brownfield and CERCLA sites for Northern Utah.

Table B-24: Estimates of the Quantity of Soil Excavated per Site in Northern Utah (tons)

Type of Site	Soil excavated per site (tons)
CERCLA	27,460
Brownfield	10,050 – 30,160

As discussed previously, there are 24 and 6 federal brownfield and CERCLA sites respectively that are yet to be cleaned up in Northern Utah per the USEPA database. Using the same estimation method described above, the average tons per site estimates presented in **Table B-24**, and an average rate of 1 brownfield site added per year in Northern Utah based on historical data, we obtained a range of about 2 million to 5 million tons of soils that could be excavated over the next 10 years in Northern Utah. **Table B-25** presents a summary of the estimates of the excavated soil amounts that are projected to come from Northern Utah based on the four sets of assumptions described previously.

Table B-25: Range of Estimates for the Future Generation of Excavated Soils in Northern Utah

	Assuming 1 foot of soil is excavated per acre and using current estimates of sites	Assuming 3 feet of soil is excavated per acre and using current estimates of sites	Assuming 1 foot of soil is excavated per acre and using current estimates, average rate of future additions of sites	Assuming 3 feet of soil is excavated per acre and using current estimates, average rate of future additions of sites
Northern Utah	1,820,000	3,510,000	2,180,000	4,560,000

APPENDIX C. DERIVATION OF TRUCKING COSTS

1. Introduction

The estimates of trucking costs for the MSW and the excavated soil market analyses were developed using a bottom-up approach framework. This framework is based on a transportation cost calculator developed by the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC) of New Hampshire to calculate truck hauling costs from a transfer station to a disposal site.[49] The transportation cost calculator provides a structured list of cost categories that are to be included in a cost of trucking analysis, with specific focus on solid waste trucking. These cost categories include truck purchase costs, license and insurance costs, repair, maintenance and other overhead costs, tire replacement costs, fuel and lubrication costs, and labor costs.

The cost calculator does not provide any specific default values for each of these cost categories, but only serves as a robust framework for developing estimates of the trucking costs in a detailed bottom-up manner. We have carried out an independent literature search to develop estimates for each of the itemized cost categories outlined in the cost calculator framework, including a forward looking estimate of the fuel costs for the 2020-2030 period. **Table C-1** shows the total cost per mile ($/mile) and cost per hour ($/hr) estimates which are obtained when these input assumptions are aggregated in a manner that is consistent with how the calculator works. These estimates vary for the two market analyses based on the type of truck assumed for hauling wastes.[50] These estimates are employed to calculate trucking costs in the market analyses of the MSW and for the trucking of excavated soil when the trucking route is entirely within a state that consider the soils to be non-hazardous.

Table C-1: Trucking Cost Estimates

	$/mile	$/hr
MSW Market Analysis	$2.07	$114
Excavated Soil Market Analysis	$1.96	$108

2. Description of Input Assumptions

The specific input assumptions behind these total cost estimates, and our sources for them are documented below. Although these cost estimates represent the result of our independent research efforts, we note that they are generally consistent with other estimates that we have found in our research that we consider to be recent and reliable.[51] The input assumptions to calculate truck payload, truck

[49] Transportation Cost Calculator, Waste Transportation and Disposal, Upper Valley Lake Sunapee Regional Planning Commission (available at https://waste.uvlsrpc.org/waste-transportation-disposal/).

[50] A 28 foot double trailer is assumed to be the truck type employed for hauling wastes for the MSW market analysis while a flatbed semi-trailer is assumed to be the truck type employed for hauling wastes for the excavated soil market analysis.

[51] Freightwaves, "What is Total Cost per Mile for truckload carriers?" (available at https://www.freightwaves.com/news/understanding-total-operating-cost-per-mile). ("*Total operating expenses in trucking (excluding very specialized operating models), range from extremes of $1.16 to $3.05 per mile when you simply take the best and worst from each of the categories below. Realistically, no trucking company could achieve an average total operating cost*

purchase costs, vehicle fuel economy, and tire replacement costs were obtained from a report detailing a truck costing model for transportation managers developed by the Upper Great Plains Transportation Institute (hereafter referred to as the "UGPTI report").[52] The input assumptions relating to fuel prices were based on projections developed by the Energy Information Administration (EIA), released as part of its *Annual Energy Outlook 2020 (AEO 2020)* Reference case.[53]

- **Truck Payload –** Truck payload is a function of the tare (or the empty weight) of the tractor and trailer components of a truck and limits on gross vehicle weight (GVW). The tare weights of the tractor and trailer for the 28 foot double trailer truck type assumed for the MSW market analysis were assumed to be 13,900 lbs and 18,800 lbs respectively. The tare weights of the tractor and trailer for the flatbed semi-trailer truck type assumed for the excavated soil market analysis was assumed to be 13,900 lbs and 12,500 lbs respectively. But because we assume that the flatbed semi-trailer carries a single 20 foot container, which we assume can accommodate 46,000 lbs (23 tons) of net cargo, the payload for excavated soil is determined by the weight limit of the 20 foot intermodal container. The GVW for the truck types assumed for both analyses was assumed to be 80,000 lbs based on federal weight limit laws.[54]

- **Truck Purchase Costs** – Truck purchase costs are a function of purchase price, interest rate (to determine return on investment), estimated useful life, salvage value, and annual miles traveled. The estimated useful lives of the tractor and trailer components of the truck types for both analyses were assumed to be 5 and 10 years respectively. The purchase price of the tractor component for both truck types was assumed to be $84,739 (in 2002 dollars). The purchase price of the trailer component for a 28 foot double truck was assumed to be $39,220 (in 2002 dollars) while the trailer component for the flatbed semi-trailer truck was assumed to cost $18,550 (in 2002 dollars). The salvage price of the tractor and trailer components were assumed to be 30% of their respective purchase prices. An interest rate of 11% was assumed for calculating the return on capital investment and an annual mileage assumption of 100,000 miles was used.

- **Fuel and Lubricant Costs –** Fuel costs are a function of fuel prices and vehicle fuel efficiency. A fuel price of $3.10 per gallon (in 2019 dollars) was assumed which was based on the average 2020-2030 diesel (distillate fuel oil) delivered product price for the transportation sector from the AEO 2020. Vehicle fuel economy is a function of vehicle weight and speed. An average speed of 55 miles per hour was assumed for both truck types with the truck assumed to be loaded 50% of

---

per total mile of $1.16, nor would they survive at $3.05 per mile."); Santa Susana Field Laboratory Project, Transportation Feasibility Analysis, Volume 1, May 2017 (available at https://dtsc.ca.gov/wp-content/uploads/sites/31/2016/05/App_J_Transport_Feasibility_Analysis.pdf). (Appendix B: Cost Estimate Details, Using the "Nonhaz" cost/ton estimate of $40.8/ton, a truck payload assumption of 23 tons and a round trip miles traveled assumption of 480 miles, a cost per mile estimate of $1.96/mile is obtained for hauling "Nonhaz" waste by truck).

[52] "Truck Costing Model for Transportation Managers," Mark Berwick and Mohammad Farooq, Upper Great Plains Transportation Institute, North Dakota State University, August 2003. (available at https://www.ugpti.org/resources/reports/downloads/mpc03-152.pdf).

[53] U.S. Energy Information Administration, 2020. Annual Energy Outlook 2020, January 2020 (available at https://www.eia.gov/outlooks/aeo/).

[54] Compilation of Existing State Truck Size and Weight Limit Laws, Federal Highway Administration, U.S. Department of Transportation (available at https://ops.fhwa.dot.gov/freight/policy/rpt_congress/truck_sw_laws/app_a.htm#ca).

the time and empty the rest of the time during a round-trip. Average vehicle fuel economies of 6.13 and 6.85 miles per gallon were estimated for the 28 foot double and flatbed semi-trailer truck types respectively.[55] Lubricant costs are assumed to be 10% of fuel costs based on the UVLSRPC cost calculator framework.

- **Tire Replacement Costs** – Tire replacement costs are a function of the number of tires for the tractor and trailer components of the truck, the costs of each tire, and the estimated useful life of each tire. The 28 foot double truck type was assumed to have a total of 22 tires – 10 tractor tires and 12 trailer tires. The flatbed semi-trailer truck type was assumed to have a total of 18 tires – 10 tractor tires and 8 trailer tires. The costs associated with the replacement of each tractor and trailer tire was assumed to be $400 and $263 (in 2002 dollars) respectively. The useful life of each tractor and trailer tire was assumed to be 204,500 and 100,000 miles respectively.

The cost per mile estimates for the other cost categories such as repair, maintenance and overhead costs, truck insurance premium, permit and license costs, and labor costs were obtained directly from a report by the American Transportation Research Institute (ATRI) on the operational costs of trucking (hereafter referred to as the "ATRI report").[56]

We note, however that when the excavated soils are trucked within California, they must be handled as RCRA Subtitle C wastes. The above framework, and our associated input assumptions, are not appropriate for use in estimating the costs of trucking RCRA Subtitle C wastes, which require different driver certifications, truck maintenance and other administrative procedures.

For an estimate of the costs per mile to truck RCRA Subtitle C wastes, we rely on a report which evaluates the feasibility and cost of developing potential soil transport options from the Santa Susana Field Laboratory site to the regional transportation network.[57] This report that has consistent cost per mile estimates based on the authors' relatively recent contracting experience for trucking non-hazardous soils, also provides a cost per mile estimate for trucking of soils deemed to be RCRA Subtitle C wastes in California. Further, given the consistency of this report's non-hazardous solid waste trucking cost estimate with our own (as described previously), we consider that report's RCRA waste trucking cost estimate of $3.90/mile to be a reliable estimate.[58] This is the estimate we use for trucking from the source destination (Oakland) to the California RCRA Subtitle C waste landfills as well as trucking from intermodal container terminals in California. We also use it for the trucking of the excavated soils from a

[55] Estimates of vehicle fuel economy were calculated using coefficients developed for different truck configurations and trailer types by Knapton (1981) - For a 28 foot double truck the fuel consumption fixed and variable co-efficients are 0.12030 and 0.0008 (per thousand pounds) respectively while they are 0.10450 and 0.0009 (per thousand pounds) respectively for a flatbed trailer truck. The fixed and variable co-efficients are denoted in units of gallons per mile and gallons per mile per pound respectively; Knapton, D. (1981), Truck and Rail Fuel Effects of Truck Size and Weight Limits, U.S. Department of Transportation, Transportation Systems Center, Cambridge, Massachusetts.

[56] An Analysis of the Operational Costs of Trucking: 2019 Update, American Transportation Research Institute, November 2019 (available at https://truckingresearch.org/wp-content/uploads/2019/11/ATRI-Operational-Costs-of-Trucking-2019-1.pdf).

[57] Santa Susana Field Laboratory Project, Transportation Feasibility Analysis, Volume 1, May 2017 (available at https://dtsc.ca.gov/wp-content/uploads/sites/31/2016/05/App_J_Transport_Feasibility_Analysis.pdf).

[58] Using a cost/ton estimate of $105.40/ton, a truck payload assumption of 23 tons and a round trip miles traveled assumption of 620 miles, a cost per mile estimate of $3.9/mile is obtained for hauling RCRA Subtitle C wastes by truck.

rail siding to landfills in states that require these wastes to be treated as if they are RCRA Subtitle C wastes. This applies to the landfills in Oregon, Idaho and Nevada

3. Summary of Truck Payload and Trucking Cost Component Estimates

Table C-2 presents a summary of the payload for each assumed truck type for the two market analyses.

Table C-3 presents a summary of the cost estimates for each of the cost categories as outlined in the bottom-up cost framework for the MSW market analysis and **Table C-4** presents a similar summary for the excavated soil market analysis along with a listing of the sources for the assumptions behind each of the component costs.[59] These component cost estimates when aggregated yields the total cost per mile and total cost per estimates that are presented in **Table C-1**.

Table C-2: Summary of Truck Payload

	MSW Market Analysis	Excavated Soil Market Analysis
Truck Payload (Tons)	24	23

Table C-3: Summary of Trucking Cost Category Estimates for the MSW Market Analysis

	$/mile	$/hr	Source
Truck Purchase Costs	$0.33	$18	UGPTI Report
Fuel and Lubricant Costs	$0.56	$31	UGPTI Report, UVLSRPC Calculator
Repair, Maintenance and Overhead Costs	$0.20	$11	ATRI Report
License and Insurance Costs	$0.11	$6	ATRI Report
Tire Replacement Costs	$0.07	$4	UGPTI Report
Labor Costs	$0.79	$43	ATRI Report

[59] An inflation factor of 1.42 based on the consumer price index for all urban consumers from FRED economic data was used to convert the input assumptions obtained from the UGPTI report from year 2002 constant dollars to year 2019 constant dollars. Similarly, an inflation factor of 1.08 from the same source was used to convert the cost per mile estimates obtained from the ATRI report from year 2018 constant dollars to year 2019 constant dollars. (Fred Economic Data, Economic Research, Federal Reserve Bank of St. Louis (available at https://fred.stlouisfed.org/); The $/hr estimates for each of the cost categories are calculated by multiplying the corresponding $/mile estimates with the average speed of 55 miles per hour.

Table C-4: Summary of Trucking Cost Category Estimates for the Excavated Soil Market Analysis

	$/mile	$/hr	Source
Truck Purchase Costs	$0.29	$16	UGPTI Report
Fuel and Lubricant Costs	$0.51	$28	UGPTI Report, UVLSRPC Calculator
Repair, Maintenance and Overhead Costs	$0.20	$11	ATRI Report
License and Insurance Costs	$0.11	$6	ATRI Report
Tire Replacement Costs	$0.06	$3	UGPTI Report
Labor Costs	$0.79	$43	ATRI Report

4. Calculation Methodology

The formulas employed to calculate the truck payload and the cost per mile estimates for the truck purchase, fuel and lubricant, and tire replacement costs are documented below.

- **Truck Payload**

$$Tare\ Weight\ (lb) = Tractor\ Weight (lb) + Trailer\ Weight\ (lb)$$

$$Truck\ Payload\ (lb) = Gross\ Vehicle\ Limitation\ (lb) - Tare\ Weight\ (lb)$$

$$Gross\ Vehicle\ Weight\ (lb) = Tare\ Weight\ (lb) + Truck\ Payload\ (lb)$$

$$Truck\ Payload\ (tons) = Truck\ Payload\ (lb)/2000$$

- **Truck Purchase Costs**

$$Tractor\ Salvage\ Price\ (\$) = Salvage\ Percentage\ (\%) * \ Tractor\ Purchase\ Price\ (\$)$$

$$Trailer\ Salvage\ Price\ (\$) = Salvage\ Percentage\ (\%) * \ Trailer\ Purchase\ Price\ (\$)$$

$$Tractor\ Equipment\ Depreciation\ (\$) = \frac{Tractor\ Purchase\ Price\ (\$) - Tractor\ Salvage\ Price\ (\$)}{Estimated\ Useful\ Life\ (years)}$$

$$Trailer\ Equipment\ Depreciation\ (\$) = \frac{Trailer\ Purchase\ Price\ (\$) - Trailer\ Salvage\ Price\ (\$)}{Estimated\ Useful\ Life\ (years)}$$

$$Tractor\ Equipment\ Return\ on\ Investment\ (\$) = \left(\frac{Tractor\ Purchase\ Price\ (\$) - Tractor\ Salvage\ Price\ (\$)}{2} + Tractor\ Salvage\ Price\ (\$)\right) * Interest\ Rate\ \ (\%)$$

$$Trailer\ Equipment\ Return\ on\ Investment\ (\$) = \left(\frac{Trailer\ Purchase\ Price\ (\$) - Trailer\ Salvage\ Price\ (\$)}{2} + Trailer\ Salvage\ Price\ (\$)\right) * Interest\ Rate\ \ (\%)$$

$$Tractor\ Ownership\ Cost\ (\$) = Tractor\ Equipment\ Depreciation\ (\$) + Tractor\ Equipment\ Return\ on\ Investment\ (\$)$$

$$Tractor\ Ownership\ Cost\ (\$) = Tractor\ Equipment\ Depreciation\ (\$) + Tractor\ Equipment\ Return\ on\ Investment\ (\$)$$

$$Truck\ Purchase\ Cost\ (\$/mile) = \frac{Tractor\ Ownership\ Costs + Trailer\ Ownership\ Costs\ (\$)}{Annual\ Mileage\ (miles)}$$

- **Fuel and Lubricant Costs**

$$Fuel\ Economy\ (Loaded\ Truck)\ (mpg) = (\frac{1}{Fixed\ Coefficient + \left(\frac{Gross\ Vehicle\ Weight}{1000}\right) * Variable\ Coefficient})$$

$$Fuel\ Economy\ (Empty\ Truck)\ (mpg) = (\frac{1}{Fixed\ Coefficient + \left(\frac{Tare\ Weight}{1000}\right) * Variable\ Coefficient})$$

$$Fuel\ Cost\ (Loaded)\ (\$/mile) = (\frac{Fuel\ Price\ (\$\ per\ gallon)}{Fuel\ Economy\ (Loaded\ Truck)(mpg)})$$

$$Fuel\ Cost\ (Empty)\ (\$/mile) = (\frac{Fuel\ Price\ (\$\ per\ gallon)}{Fuel\ Economy\ (Empty\ Truck)(mpg)})$$

$$
\begin{aligned}
&Average\ Fuel\ Cost\ (\$/mile)\\
&\quad = Fuel\ Cost\ (Loaded)\left(\frac{\$}{mile}\right) * Time\ Loaded\ (\%)\\
&\quad + \ Fuel\ Cost\ (Empty)\left(\frac{\$}{mile}\right) * Time\ Empty\ (\%)
\end{aligned}
$$

$$Lubricant\ Cost\ (\$/mile) = 10\% * Average\ Fuel\ Cost\ (\$/mile)$$

$$Fuel\ and\ Lubricant\ Cost\ (\$/mile) = Average\ Fuel\ Cost\ (\$/mile) + Lubricant\ Cost\ (\frac{\$}{mile})$$

- **Tire Replacement Costs**

$$
\begin{aligned}
&Tractor\ Tire\ Cost\ per\ Useful\ Tire\ Mile\ \left(\frac{\$}{mile}\right)\\
&\quad = (\frac{Tractor\ Tire\ Replacemement\ Costs\ (\$)}{Useful\ Tractor\ Tire\ Life\ (miles)})
\end{aligned}
$$

$$
\begin{aligned}
&Trailer\ Tire\ Cost\ per\ Useful\ Tire\ Mile\ \left(\frac{\$}{mile}\right)\\
&\quad = (\frac{Trailer\ Tire\ Replacemement\ Costs\ (\$)}{Useful\ Trailer\ Tire\ Life\ (miles)})
\end{aligned}
$$

$$
\begin{aligned}
&Tractor\ Tire\ Replacement\ Cost\ \left(\frac{\$}{mile}\right)\\
&\quad = Tractor\ Tire\ Cost\ per\ Useful\ Tire\ Mile\ \left(\frac{\$}{mile}\right)\\
&\quad * Number\ of\ Tractor\ Tires
\end{aligned}
$$

$$
\begin{aligned}
&Trailer\ Tire\ Replacement\ Cost\ \left(\frac{\$}{mile}\right)\\
&\quad = Trailer\ Tire\ Cost\ per\ Useful\ Tire\ Mile\ \left(\frac{\$}{mile}\right)\\
&\quad * Number\ of\ Trailer\ Tires
\end{aligned}
$$

$$
\begin{aligned}
&Total\ Tire\ Replacement\ Cost\ (\$)\\
&\quad = Tractor\ Tire\ Replacement\ Cost\ (\$) + \ Trailer\ Tire\ Replacement\ Cost\ (\$)
\end{aligned}
$$

APPENDIX D. EVIDENCE RELATED TO PPL'S RAIL ACCESS PROVIDED TO NERA BY PPR

PPR RAIL SERVICES, LLC

October 12, 2020

PPR Landfill, LLC
Ann Garner, COO
298 24th Street, Suite 170
Ogden, UT 84401

RE: Rail Access

Dear Ms. Garner,

Pursuant to our discussions, this letter confirms that Union Pacific is completing the process for providing new rail service to Promontory Point, Utah.

On or about August 26, 2020, PPR Rail Services, LLC entered into an agreement with Union Pacific under which Union Pacific will complete a rail spur and associated signal work on PPR Rail Services, LLC's property. The time to complete a rail spur is typically 17 months. Union Pacific is approximately half-way through the process. Once the construction is complete, Union Pacific will make final inspection, and the rail line will be placed in service per Union Pacific protocols.

As the rail spur nears completion, the use agreement for the landfill will be executed on terms and conditions acceptable to PPR Landfill, LLC and PPR Rail Services, LLC.

We will keep you apprised of our progress.

Sincerely,

Dan Waldrip, CEO
PPR Rail Services, LLC

UNION PACIFIC RAILROAD
1400 Douglas Street Omaha, Nebraska 68179

Marketing & Sales – Network and Industrial Development

August 26, 2020

VIA EMAIL ONLY
PPR Rail Services, LLC
Dan Waldrip, CEO
298 24th Street, Suite 170
Ogden, UT 84401
Dan.waldrip@allosenv.com

Re: Request for a New Rail Service Location on Union Pacific at Promontory Point, Utah

Dear Ms. Garner:

Union Pacific ("UP") has reviewed PPR Rail Services, LLC's ("Company") proposal for a new rail service location at Promontory Point, Utah. Any track operated by UP must be covered by an Industry Track Agreement ("ITA") which includes terms for construction, maintenance and operation of the new tracks. Company will receive a draft version ITA following UP's acceptance of the 30% drawings for this project.

The Promontory Point, Utah proposal involves UP work associated with engineering design review, construction coordination, track inspection and project management activities ("Engineering Work"). Company must remit a payment of $24,450 for the Engineering Work to begin.

The Promontory Point, Utah proposal also involves the installation of signal equipment in conjunction with the proposed track. Before the final cost estimate of the signal work can be known, signal design plans must be completed. Company must remit a deposit of $125,000 for the design process to begin ("Signal Deposit"). You will receive credit for the Signal Deposit in the "Construction Cost; Payment" section of the ITA.

In the event Company is not progressing their design efforts, evidenced by inactivity for a period of twelve (12) months, UP reserves the right to require Company to return to the beginning of UP's track authorization process, including, without limitation, a fresh review of Company's proposed conceptual plan.

In the event Company decides not to proceed with track construction, upon written notification to UP concerning cancellation of the project, we will issue a refund to the entity that submitted the payment to UP as follows:

1. Engineering Work. The refund, if any will be based on the progress of your project up to *the time of written notice of cancellation. If 10% drawings have not been received via* the Engineering Document Exchange ("EDS") a full refund less a $500 administrative fee will be issued. If only the 10% drawing has been received after acceptance of this Agreement, a 75% refund will be issued. If a 30% drawing set has been received via EDS a 50% refund will be issued. If a construction drawing set has been received via EDS a 25% refund will be issued. If an Exhibit A has been marked as Accepted via EDS no refund will be issued.

2. Signal Deposit. The refund, if any, will be the Signal Deposit less any design expense incurred on the project up to the time of written notice of cancellation.

Please sign and return a copy of this Letter Agreement to NID_Track_Agreement@UP.com. This Letter Agreement will be accepted by UP upon receipt of the $149,450 payment. If you require formal billing, you may consider this letter as a formal bill.

ACKNOWLEDGEMENT: I HAVE READ AND UNDERSTAND UP'S REQUIREMENTS FOR (NEW/EXPANDED) SERVICE AS SET FORTH ABOVE:

PPR RAIL SERVICES, LLC

By: ____________________

Printed Name: Daniel Walrip

Title: CEO

Date: 28 Aug 2020

UNION PACIFIC RAILROAD COMPANY

Tammy Anderson
____

Tammy Anderson
Lead Manager – Industrial Development
Network, Economic and Industrial Development
Telephone (402) 544-2305
E-mail: tlanderson@up.com

Date: Sep 14, 2020

PROMONTORY POINT RESOURCES
MILEPOST 755.32, LAKESIDE SUBDIVISION
PROMONTORY POINT, BOX ELDER COUNTY, UTAH
OPTION 2

DISCLAIMER:

This design concept is for preliminary discussion purposes only. It does not constitute approval nor a guarantee to provide any level of service to this location. This concept is based on available aerial imagery and does not consider matters which could impact feasibility, including without limitation utilities, environmental conditions, permitting, and property issues. This design is concept is not intended to replace the ten percent level engineering design. Ultimate formal project design must meet Union Pacific's Technical Specifications for Construction of Industrial Tracks.

Railroad Right-of-way lines are approximate and are depicted from aerial imagery and/or available Railroad ROW Val Maps.

DEVELOPMENT CONCEPT

REV. #	BY	DATE	DESCRIPTION

PRELIMINARY
NOT FOR CONSTRUCTION

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STAMP

LEGEND:
EXISTING RAILROAD MAINLINE TRACKAGE
EXISTING RAILROAD SIDING TRACKAGE
EXISTING INDUSTRY OWNED TRACKAGE
PROPOSED RAILROAD OWNED TRACKAGE
PROPOSED INDUSTRY OWNED TRACKAGE
EXISTING UPRR ROW LINE
FIBER OPTIC CABLE F/O F/O
EXISTING PROPERTY LINE

DRAWN BY: HH
CHECKED BY: SM
FES NUMBER:
DATE: 7/17/2019
SHEET NUMBER 1 of 5

FOR USE IN AGREEMENT WITH: UNION PACIFIC RAILROAD
AND: PROMONTORY POINT RESOURCES

LOCATION & DESCRIPTION:
MILEPOST 755.32, LAKESIDE SUBDIVISION
PROMONTORY POINT, BOX ELDER COUNTY, UTAH
TRACKAGE TO SERVE: PROMONTORY POINT RESOURCES

SHEET TITLE: OPTION 2

Color table: Y:\Microstation\CADD Standard (All Agency)\UPRR - Layton Office\Workspace\Standards\Tables\Color\UPRR.tbl
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7/17/2019

NERA
ECONOMIC CONSULTING

NERA Economic Consulting
1255 23rd Street, NW
Suite 600
Washington, DC 20037
+1 202 466 9246

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION

CARLOS M. BRACERAS, P.E.
Executive Director

SHANE M. MARSHALL, P.E.
Deputy Director

March 6, 2017

Brett Snelgrove
Director of Business Development
Promontory Point Resources, LLC
32 East Exchange Place, Suite 100
Salt Lake City, Utah 84111-2712

Subject: Access Grant Application and Traffic Impact Study, Approval Request

Dear Mr. Snelgrove,

Based on your letter dated February 24, 2017, the Utah Department of Transportation (UDOT) will not require Promontory Point Resources, LLC (Promontory) to make improvements, at this time, to any of the state highways on Promontory's access route to their facility. This decision is based on the generated traffic volumes stated in the letter and that the trucks meet the weight limit requirements on state highways. However, UDOT is concerned about Promontory's trucks accessing the facility via I-84 (Exit 26), proceeding south on SR-83, then turning right from SR-83 to Golden Spike Drive (12000 North). Due to the 65 mph speed limit on SR-83 and Promontory's trucks slowing in the travel lane, there is a potential for front-to-rear crashes at the intersection of SR-83 and Golden Spike Drive. If front-to-rear crashes involving Promontory's trucks increase at this intersection, Promontory will be required to construct a right-turn deceleration lane on SR-83. Also, UDOT expects Promontory to meet the requirements of securing loads and preventing the materials being hauled to the landfill to litter and potentially damage the state highway system.

If you have any questions regarding this issue, please contact me at 801-620-1607 or dfristrup@utah.gov.

Sincerely,

Darin K. Fristrup, P.E.
Region Traffic Operations Engineer

CHICAGO GRADE LANDFILL, INC

STATEMENT OF COMPLIANCE - 08/14/2020

PERMIT TYPE	PERMIT ID	GOVERNING AGENCY	CURRENT STATUS (2020)	HISTORICAL STATUS (2018-2019)
IGP-Stormwater Discharge	3 40I027554 - 494194	CA State Water Resources Control Board	No pending or current violation	No Historical Violation
Waste Discharge Permit	3 400300001	CA Regional Water Quality Control Board-Region 3	No pending or current violation	No Historical Violation
Solid Waste Facility Operating Permit	40-AA-0008	CalRecycle	No pending or current violation	No Historical Violation
Title V Operating Permit-GHG Emissions-Flare	547-8	San Luis Obispo County Air Pollution Control District	No pending or current violation	Notice of Violation received in May 2018-Failure to re-calculate NMOC values for 2016 period (reported in 2017). Violation is attributable to previous landfill owner. Discovered & self-reported by Allos Env - Violation fully remedied on June 15, 2018.
Portable Genset Operating Permit	648-6	San Luis Obispo County Air Pollution Control District	No pending or current violation	No Historical Violation
Weights & Measures Operating Permit	TS0030	San Luis Obispo County Weights & Measures	No pending or current violation	No Historical Violation
Certified Unified Program Agency- HHW Handler & Waste Generator	FA 0002329	San Luis Obispo County Environmental Health Department	No pending or current violation	No Historical Violation
Conditional Use Permit (Land)	DRC 2003-00026	San Luis Obispo County Planning Commission & BOS	No pending or current violation	No Historical Violation
Designated Collection/Drop-Off Site for Electronic Waste	117058	San Luis Obispo County IWMA & CA Department of Toxic Substances Control	No pending or current violation	No Historical Violation
CA Diesel Off-Road Vehicle Regulation (DOORS)	3519	California Air Resources Board	No pending or current violation	No Historical Violation

I certify the status of compliance for the permits listed above are true and accurate as of 08/14/2020.

DFieguth

Dannette Fieguth, Chief Operating Officer

Traffic Impact Study

Promontory Point Resources, LLC

Landfill

Promontory Point, Box Elder County, Utah

March 8, 2017

Contents

Figures

Appendices

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1 Project Information

Promontory Point Resources, LLC (Promontory) is developing a new, non-hazardous solid waste facility on Promontory Point, Utah. The proposed location is the southwest portion of the Promontory peninsula (Township 6N, Range 6W, Sections 12, 24, and 25, and Township 6N, Range 5W, Sections 18, 19, and 30). The landfill is currently authorized by the Utah Division of Solid Waste and Radiation Control (DSWRC[1]) as a Class I facility. Promontory received a permit for the landfill from DSWRC in September 2011.[2] Promontory also received a conditional-use permit from Box Elder County in 2003.[3]

Through the 2016 Utah House Joint Resolution 20, Promontory received legislative approval to construct and operate a Class V landfill. Promontory is now working to secure a new conditional-use permit with Box Elder County and a new Class V nonhazardous solid waste permit from DSWRC. Pursuant to Utah Code 19-6-108(9)(g), “a traffic impact study is needed to evaluate the safety, operation, and condition of roadways serving the facility.” The referenced code requires the approval of the Utah Department of Transportation (UDOT) and the local highway authority (the Box Elder County Road Department) as part of the landfill’s solid waste operating plan. The remainder of this report provides information for the traffic impact study.

2 Haul Routes

The landfill would be served primarily by rail via an industrial rail spur constructed off Union Pacific Railroad’s Great Salt Lake causeway (Lucin Cutoff) at the southern tip of Promontory Point. However, some waste would be delivered by trucks from areas in northern Utah and surrounding states, where truck transport is more cost-effective or when the total tonnage is small.

The haul route to the landfill would be around the north side of the Bear River Bay of the Great Salt Lake (see Figure 1). Two approaches to this route, using Interstate 15 and Interstate 84, are described following the figure.

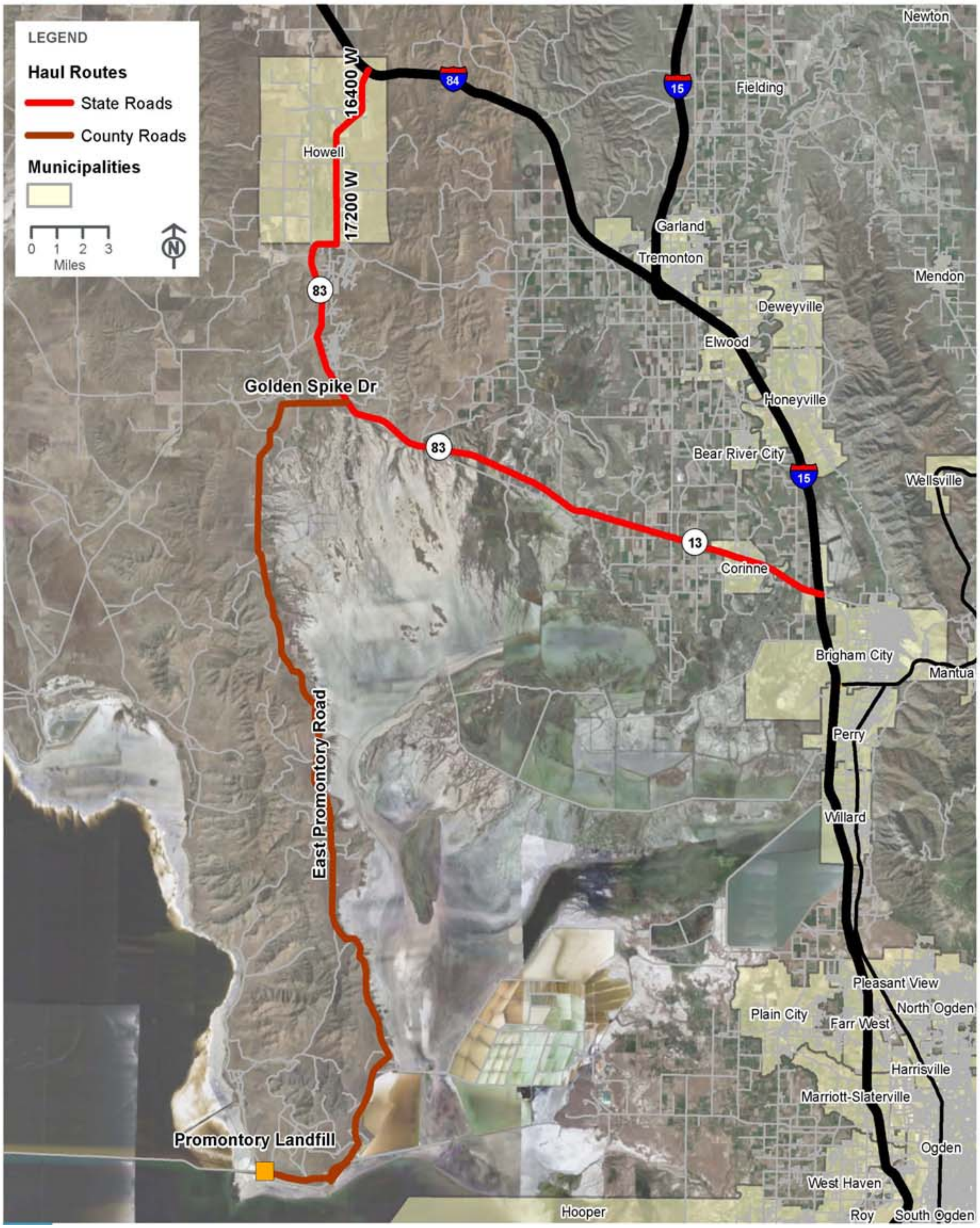
---

[1] Formerly the Utah Division of Solid and Hazardous Waste.

[2] Fact sheet: https://deq.utah.gov/businesses/I/IntermountainPower/PromontoryClassILandfill.htm

[3] Planning Commission Staff report found at: https://siterepository.s3.amazonaws.com/65/promontorylandfill1_19_2017attiv.pdf

Figure 1. Haul Routes



When coming from Interstate 15:

- Trucks would exit Interstate 15 at Promontory Road in Brigham City and turn onto State Route 13 (SR 13, Route 0013, or Promontory Road).
- Trucks would travel west for 3.5 miles on SR 13 to the town of Corrine.
- West of Corrine, trucks would stay heading west and northwest on SR 83 (Route 0083 or Iowa Springs Road/6800 West) for about 13 miles.
- Trucks would then pass the intersection of SR 83 and SR 102, which is southwest of Penrose, at which point SR 83 becomes Golden Spike Drive.
- At about 3.5 miles past the intersection, trucks would turn off SR 83 at Lampo Junction and head west on what is now Promontory Point Road (Route 1076, which ultimately runs west to the Golden Spike National Historic Site).

When coming from Interstate 84:

- Trucks would exit Interstate 84 at SR 83 (17200 West or Faust Valley Road).
- Trucks would travel south about 7 miles on SR 83 and make a right turn where SR 83 becomes Golden Spike Drive (12000 North) south of Howell.
- On Golden Spike Drive, trucks would continue west and south for about 7 miles on SR 83 to Lampo Junction and would turn right onto Promontory Point Road (Route 1076).

Accessing the landfill:

- After traveling about 2 miles on Route 1076, trucks would turn south onto East Promontory Road, a Box Elder County facility that is a Class B road and that runs for about 30 miles along the east and south sides of Promontory Point.

East Promontory Road is a rural road in an agricultural and ranching setting. The road is used primarily by residents and a few existing businesses on Promontory Point. It currently consists of a 22.3-mile paved section and a 14.9-mile graded gravel section.

An alternative to using existing roads would be to expand a maintenance road adjacent to rail tracks on Union Pacific Railroad's Great Salt Lake causeway. Because of the frequency with which Union Pacific uses the maintenance road, Union Pacific would require a completely separate road for waste haul trucks. Therefore, a new causeway would have to be constructed adjacent to the existing maintenance road. Because of settlement concerns, difficult regulatory permitting, and construction costs, this alternative is not feasible.

3 Traffic Volumes and Vehicles

Promontory's truck-haul customers would come from northern Utah, southern Idaho, and western Wyoming. The typical residential waste-collection vehicles would likely not deliver directly to the landfill. Promontory anticipates that most waste deliveries would be consolidated into larger truck-trailer combinations. Therefore, Promontory anticipates that a maximum of only about 20 to 30 trucks per day would access the landfill.

These trucks will be single-tractor units with 52-foot trailers. They would not exceed 8 feet 6 inches wide or an overall length of 65 feet. Waste would be hauled in enclosed trailers that would be enclosed with tarps and tied down. Truck and trailer weights would meet UDOT's bridge formula requirements.

4 Traffic Impacts

As mentioned, Pursuant to Utah Code 19-6-108(9)(g) "a traffic impact study is needed to evaluate the safety, operation, and condition of roadways serving the facility." The referenced code requires approval of UDOT and the local highway authority (the Box Elder County Road Department) as part of the landfill's solid waste operating plan.

4.1 Safety

4.1.1 General Safety Procedures

Drivers would be instructed to follow all traffic laws and Federal Motor Carrier Safety Regulations and UDOT's Motor Carrier rules.[4] These rules include requirements for trucking companies (insurance, maintenance records, and hazardous materials identification, for example) as well as for individual drivers (commercial licenses and drug and alcohol testing are required), for individual trips (pre-trip and post-trip inspections), and for maintaining emergency equipment (fire extinguishers, flares, and reflective cones).

Promontory would also weigh each haul vehicle at the landfill to check that it is not carrying more weight than the legal limit.

4.1.2 East Promontory Road Safety Improvements

Starting at Golden Spike Road in the north, East Promontory Road currently consists of a 22.3-mile paved section and a 14.9-mile graded gravel section. Promontory and Box Elder County are working on a phased roadway improvement plan that will upgrade East Promontory Road to a condition that will better accommodate haul trucks and anticipated traffic to and from the landfill. For more information about the phased roadway improvement plan, see Section 4.3.2, County Roadway.

[4] 40 Code of Federal Regulations Parts 300 to 399

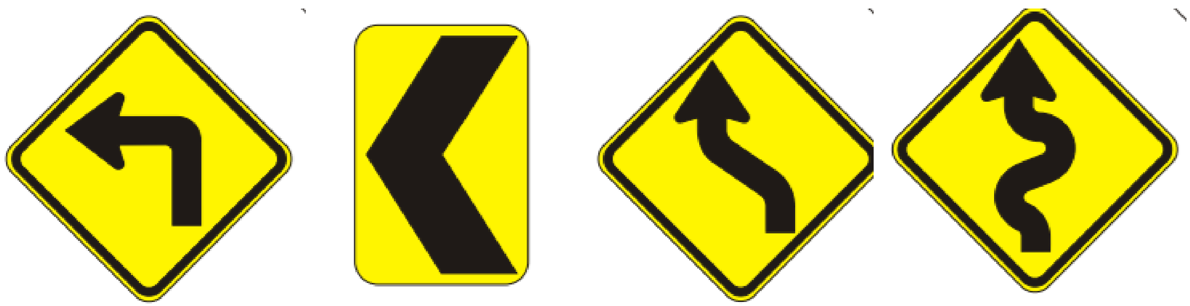
In order to maintain the safety and health of people using Box Elder County rights-of-way, Promontory would implement the following measures.

Pilot Cars. The existing East Promontory Road is narrow in some locations. To address the safety of approaching cars, pilot cars would be used to guide larger trucks and to alert other motorists of the presence of the waste-haul trucks. The pilot car and haul-truck would maintain constant radio contact. This would be a temporary safety measure used until critical road improvements are completed.

Speed Limits. Box Elder County could choose to post reduced speed limits or add advisory speed signs where sight distances and turning radii are substandard[5] compared to the roadway's overall posted speed limit (40 miles per hour).

Warning Signs. In addition to speed limits and advisory speed signs, additional warning signs could be incorporated along the roadway. These signs could include curve signs, turn direction chevrons, reverse curves, and/or winding road warning signs as prescribed by the *Manual on Uniform Traffic Control Devices*. See Figure 2 for examples of these warning signs.

Figure 2. Example Warning Signs



Traffic Signals. Temporary traffic lights could also be used to stop traffic in one direction and create a controlled one-way road. These would be used for short segments only so that the wait times for stopped vehicles are not too long.

Soil Stabilization and Dust Control. Over the 14.9-mile graded gravel section of East Promontory Road, Promontory will apply binding agents to stabilize and help maintain the integrity of the graded gravel road segment and to minimize the generation of dust. Promontory will periodically reapply binding agents according to the manufacturers' recommendations and based on the observed condition of the gravel road.

[5] Based on the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*.

4.2 Operations

From a traffic-operations standpoint, no impacts are anticipated. Promontory has coordinated with UDOT regarding impacts to traffic operations on and the conditions of state highways. Promontory sent a letter to UDOT[6] requesting approval to use state routes. The letter pointed out that the landfill would not generate much traffic nor would it lead to change in surrounding land uses that would generate any additional traffic. Of particular interest to UDOT was the existing left-turn lane off of SR 83, which is an important feature to maintain traffic flows on SR 83. Therefore, because the landfill would generate traffic volumes less than 100 average daily traffic (ADT), UDOT agreed that a detailed assessment of traffic operations was not required.[7] UDOT concluded that, given the low volume of expected traffic, the existing traffic-control devices and roadway features along state highways were appropriate, and no changes were required.[8] See Appendix A, Coordination, for relevant correspondence.

A minor amount of traffic currently uses East Promontory Road. There are no intersecting roads and no major land uses with access points along East Promontory Road. Box Elder County has not identified the need for permanent stop signs, traffic signals, or turn lanes on East Promontory Road.

4.3 Roadway Conditions

4.3.1 State Highways

Promontory has coordinated with UDOT regarding impacts to the conditions of and traffic operations on state highways. UDOT did not mention any pavement or structural deficiencies along the haul routes, and, because the landfill would not generate a significant increase in truck traffic, no improvements to state highways were required.

4.3.2 County Roadway

Improvements to East Promontory Road would be required. This Box Elder County road currently consists of a 22.3-mile paved section and a 14.9-mile graded gravel section. Neither Box Elder County nor Promontory is in a financial position to complete all anticipated improvements before the landfill is constructed. Therefore, Promontory is working with Box Elder County on a phased roadway improvement plan to spread the cost of roadway improvements over time. The general approach to the phased plan is described below.

Phase 0 – Road Improvement Planning. Box Elder County has completed a geotechnical evaluation for the surface and subsurface conditions along the entire length of East Promontory Road. This investigation resulted in preferred roadway cross-sections for various segment of the road. Box Elder County has also evaluated the existing horizontal curvature of the roadway to evaluate sight distances, speed limits, and the need for

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[6] Letter to Darin Fistrup, UDOT Region 1 Traffic Operations Engineer, February 24, 2017.

[7] The anticipated traffic is below a 100 ADT thresholds, which is referenced in UDOT's Administrative Rules (R930-6, Access Management), and a detailed application was not required.

[8] Email from Darin Fistrup, February 27, 2016, confirming that no improvements are required.

signs. The result of this current phase will be a definition of the necessary roadway improvements, a schedule, and the responsibilities of each party to complete the improvements.

Phase 1 – Short-Term Improvements. This phase would include an asphalt overlay on portions of the 22.3-mile segment that has existing pavement. These improvements would be required by Box Elder County before the start of landfill operations to reduce the deterioration of the existing pavement by haul trucks and improve the safety of the road. Phase 1 could also include minor grading, leveling, and the application of binding agents for soil stabilization and dust control along parts of the 14.9-mile graded gravel segment. Improvements in Phase 1 could also include some of the permanent safety improvements described in Section 4.1.2, East Promontory Road Safety Improvements.

Phase 2 – Mid-Term Improvements. Additional Improvements would be completed in the years that follow the start of landfill operations. These improvements would focus on the highest-priority improvements (grading and paving) to the gravel section of road as well as any improvements within the 22.3-mile paved section that were deferred from Phase 1. During Phase 2, Promontory would perform planned maintenance activities, the reapplication of binding agent, and spot repairs to any damaged Phase 1 improvements if the damages were caused by waste-hauling operations.

Phase 3 – Long Term. This long-term phase would occur over the course of landfill operation. The lower-priority roadway improvements would be completed, any damage to the improvements made in previous phases would be repaired, and roadway maintenance activities would continue.

5 Conclusions

The operation of Promontory's landfill will not induce truck traffic to an extent that will impact traffic patterns nor alter the conditions of State highways. Improvements to East Promontory Road are needed. Promontory is working with Box Elder County to define a phased improvement plan that will address safety and the conditions of this County road.

Appendix A. Coordination

February 14, 2017

Darin Fristrup
Region Traffic Operations Engineer
UDOT Region 1
166 West Southwell Street
Ogden, Utah 84404-4194

Subject: Access Grant Application and Traffic Impact Study, Approval Request

Dear Mr. Fristrup,

Promontory Point Resources LLC (Promontory) is developing a new, Class V non-hazardous solid waste facility on Promontory Point, Utah. This landfill will primarily be served by rail with an industrial rail spur constructed off Union Pacific Railroad's Great Salt Lake Causeway at the southern tip of Promontory Point. However, some waste would be delivered by trucks from areas in northern Utah and surrounding states, where truck transport is more cost effective or when the total tonnage is small. Pursuant to Utah Code (19-6-108(9)(g)) "a traffic impact study is needed to evaluate the safety, operation, and condition of roadways serving the facility". Referenced code requires approval of the Utah Department of Transportation (UDOT) and local highway authority (Box Elder County Road Department) as part of our solid waste operating plan.

The purpose of this letter is to request approval for the use of State Routes from UDOT pursuant to solid waste rules. During our pre-application meeting (phone conversation on October 18, 2016) you requested this letter summarizing the haul route, the type and amount of truck traffic that is expected to travel to the landfill, and to address the requirements of Administrative Rule 930 (Transportation, Preconstruction) specifically, Rule 930-6 (Access Management).

Haul Routes

The primary haul route to the landfill would be around the north side of the Bear River Bay of the Great Salt Lake (see attached exhibit), and is described as follows:

If utilizing Interstate 15:

- Trucks would exit interstate at Promontory Road in Brigham City and on to State Route 13 (SR 13, Route 0013, or Promontory Road).
- Travel west for 3.5 miles on SR 13 to the town of Corrine.
- West of Corrine, trucks would stay heading west and northwest on SR 83 (Route 0083 or Iowa Springs Road/6800 West) for about 13 miles.
- Trucks would then pass the intersection of SR 83 and SR 102, which is southwest of Penrose, at which point SR 83 becomes Golden Spike Drive.
- At about 3.5 miles past the intersection, trucks would turn off SR 83 at Lampo Junction and head west on what is now Promontory Point Road (Route 1076 that ultimately runs west to the Golden Spike National Historic Site).

When coming from Interstate 84:

- Trucks would exit I-84 at SR 83 (17200 West or Faust Valley Road).

- Trucks would travel south about 7 miles on SR 83 and make a right hand turn where SR 83 becomes Golden Spike Drive (12000 North) south of Howell, UT.
- On Golden Spike Drive, trucks would continue west and south for about 7 miles on SR 83 to Lampo Junction and turn right onto Promontory Point Road (Route 1076).

Accessing the landfill

- After traveling about 2 miles on Route 1076, trucks would turn south onto East Promontory Road, a Box Elder County facility which is identified as a Class B road and runs for about 30 miles along the east and south side of Promontory Point.

Anticipated Truck Traffic

As mentioned the landfill will primarily be served by rail. We are working with Union Pacific on the design or the rail spur. This spur would no cross and UDOT roads and no offsite rail improvements will be needed. We anticipate that a maximum of about 20-30 trucks per day would access the landfill. Promontory's truck-haul customers would come from northern Utah, southern Idaho and western Wyoming. Trucks will be single tractor units with 52' trailers. They will not exceed 8' 6" wide or the overall length of 65' bumper to bumper. Waste will be hauled in enclosed trailers that will be tarped and tied down. Weights will meet current bridge formula requirements.

Access Management

As described above, landfill customers will use existing roadways. Promontory is not requesting any new access points, driveways, or proposing modifications to existing state highway roadway elements. Please note that there is an existing left turn lane on SR-83, which you indicated was important for traffic flow on SR 83 and which you did not think would have to be modified. In addition, no modifications to the local roadway (Promontory Point Road) where it accesses the state highway (SR-83) are anticipated. The landfill is not expected to change surrounding land use type or intensities with no single family or apartments unit, and no lodging, large office, or retail is included. Therefore, the landfill would generate traffic volumes less than 100 average daily traffic (ADT).

Considering the information presented above, Application Level I thresholds, as defined in R390-6-8(4)(f)(i), are not exceeded. Therefore, we respectfully request that you provide written approval to satisfy solid waste regulations and so that we can include the approval in our solid waste permit application.

If you have any questions or concerns or require any additional information please let me know. I can be reached at (801) 940-4900 or brett@promontorypt.com. Or you can contact Terry Warner at HDR Engineering, 801-743-7812 or terry.warner@hdrinc.com.

We appreciate you and your staff's time spent reviewing this letter and providing your approval, if appropriate.

Sincerely,

Promontory Point Resources,

Jon Angin

CEO Promontory Point Resources

From:	Brett Snelgrove
To:	Warner, Terry; Ann Garner
Subject:	FW: Promontory Point Resources Landfill
Date:	Monday, February 27, 2017 9:35:53 AM

UDOT response below.

I will ask for a formal letter in letterhead. Anything else you think we need?

From: Darin Fristrup [mailto:dfristrup@utah.gov]
Sent: Monday, February 27, 2017 9:32 AM
To: Brett Snelgrove <brett@promontorypt.com>
Subject: Re: Promontory Point Resources Landfill

Mr. Snelgrove,
Based on your letter, UDOT will not require Promontory Point Resources, LLC to make improvements to any of the State highways if you adhere to the traffic volumes stated in the letter and the trucks meet the weight limit requirements on State highways. Also, UDOT expects Promontory Point Resources, LLC to meet the requirements of securing loads and preventing the materials being hauled to the landfill to litter and potentially damage the State highway system. If you have any other questions or concerns, let me know.

Sincerely,

Darin K. Fristrup, P.E.
Traffic Operations Engineer
Utah Department of Transportation
Region One
Office: 801-620-1607
Cell: 801-940-2239

On Fri, Feb 24, 2017 at 12:00 PM, Brett Snelgrove <brett@promontorypt.com> wrote:

> Dear Mr Fristrup
>
> As you may recall a few months back, myself and Terry Warner from HDR spoke with you on the phone regarding our landfill project out on Promontory Point in Box Elder County. As discussed one of the items for our class V application is to request approval for the use of State Routes from UDOT pursuant to solid waste rules.
>
> Please see attached letter stating the routes, anticipated traffic, and map of the route. Please confirm receipt of this email and let me know if you have any questions.
>
> Thank you for all your help.
>
> Sincerely,
>
> Brett Snelgrove | Director of Business Development
> Promontory Point Resources, LLC
> 32 East Exchange Place • Suite 100
> Salt Lake City, Utah 84111-2712
> Main- 435-414-9880

SANTA MARIA TRANSFER STATION, INC

STATEMENT OF COMPLIANCE - 08/14/2020

PERMIT TYPE	PERMIT ID	GOVERNING AGENCY	CURRENT STATUS (2020)	HISTORICAL STATUS (2018-2019)
IGP-Stormwater Discharge	3 40I027553	CA State Water Resources Control Board	No pending or current violation	No Historical Violation
Solid Waste Facility Operating Permit	40-AA-0022	CalRecycle	No pending or current violation	No Historical Violation
Weights & Measures Operating Permit	010069	San Luis Obispo County Weights & Measures	No pending or current violation	No Historical Violation
Certified Unified Program Agency- HHW Handler & Waste Generator	FA 0005260	San Luis Obispo County Environmental Health Department	No pending or current violation	No Historical Violation
CA Diesel Off-Road Vehicle Regulation (DOORS)	7147	California Air Resources Board	No pending or current violation	No Historical Violation

I certify the status of compliance for the permits listed above are true and accurate as of 08/14/2020.

DFieguth

Dannette Fieguth, Chief Operating Officer