King County
Department of
Natural Resources and Parks
Solid Waste Division

AIR QUALITY TECHNICAL MEMORANDUM FACTORIA RECYCLING AND TRANSFER STATION REPLACEMENT PROJECT

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REPLACEMENT PROJECT

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Executive Summary

This technical memorandum (TM) evaluates the construction and operation effects of the Factoria Recycling and Transfer Station (RTS) Replacement Project on air quality associated with construction and operations activities. The key findings are presented below:

On-Site Vehicular, Dust, and Odor Emissions

Construction

- Temporary air quality impacts could include construction machinery exhaust emissions, primarily from particulate matter (PM_{10} and $PM_{2.5}$) and small amounts of carbon monoxide (CO) and oxides of nitrogen. Construction activities may cause odors, in particular during paving operations using tar and asphalt. These types of odors would be short-term and unlikely to impact adjacent uses.

Operation:

- Based on traffic modeling forecasts for the years 2010, 2014, and 2042, the proposed project would not be anticipated to substantially impact air quality due to increased vehicular emissions.

- Operational improvements would be provided for enhanced compaction of solid waste to reduce the number of facility transfer hauler trips to and from the site, resulting in the potential for lower emissions.

- The proposed facility improvements would be enclosed wherever possible and incorporate a dust suppression and misting system which would be coupled with a mechanical exhaust ventilation system.

GHG and Climate Change

The emissions for the project were calculated using *King County Department of Development and Environmental Services SEPA GHG Emissions Worksheet Version 1.7 December, 26, 2007 (Introduction Revised March 2011) (*King County 2011*).* The new emissions resulting from the construction and operation of Factoria RTS using this worksheet method would be approximately 2,100 metric tons of carbon dioxide equivalents ($MTCO_2e$) per year, a level that falls under the official threshold for reporting.

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1.0 Air Quality

1.1 Introduction

The Puget Sound Clean Air Agency (PSCAA) has primary jurisdiction over air quality in King County to implement requirements promulgated by the U. S. Environmental Protection Agency (EPA) and the State of Washington Department of Ecology (Ecology). These agencies have established ambient air quality standards for a group of air pollutants, commonly referred to as criteria pollutants (Table 1-1).

Criteria pollutants that are relevant to municipal solid waste transfer stations include the following:

- Inhalable particulate matter or PM_{10} (particles less than 10 millionths of a meter in mean mass diameter) and fine particulate matter or $PM_{2.5}$ (particles less than 2.5 millionths of a meter in mean mass diameter), which results primarily from fugitive dust produced when trucks and equipment operate on paved surfaces, and particulate emissions from engines.
- Sulfur dioxide (SO_2), nitrogen oxides (NO_x) and carbon monoxide (CO), which are present in the exhaust from transfer station-related vehicles and equipment.
- Ozone (O_3), which is produced in the atmosphere when NO_x and hydrocarbons react in the presence of sunlight. As noted above, NO_x emissions are present in the exhaust from transfer station-related vehicles and equipment. Hydrocarbon emissions are present in the same exhaust stream as well.

The Factoria Recycling and Transfer Station (RTS) Replacement Project is located within an area designated by the EPA as an attainment area for all pollutants. This designation is given to areas within which the ambient standards have been met over a period of time. Parts of King County are maintenance areas for CO and PM_{10}, which means they had been designated as nonattainment within the last 20 years, but have been re-classified as attainment. Applicable ambient air quality standards are included in Table 1-1.

Table 1-1. Ambient Air Quality Standards Applicable in the Puget Sound Region

Pollutant	National Primary	National Secondary	Puget Sound
Inhalable Particulate Matter (PM_{10})			
Annual average (µg/m³)	-	-	50[a]
24-hour average (µg/m³)	150[b]	150[b]	150[b]
Fine Particulate Matter ($PM_{2.5}$)			
Annual arithmetic mean (µg/m³)	15.0[c]	15.0[c]	-
24-hour average (µg/m³)	35[d]	35[d]	-
Sulfur Dioxide (SO_2)			
Annual average (ppm)	0.03[e]	–	0.02[e]
24-hour average (ppm)	0.14[f]	–	0.10[f]
3-hour average (ppm)	–	0.50[f]	
1-hour average (ppm)	–	–	0.25[g]
1-hour average (ppm)	–	–	0.40[f]
1-hour average (ppb)	75[h]	–	–
Carbon Monoxide (CO)			
8-hour average (ppm)	9[f]	–	9[f]
1-hour average (ppm)	35[f]	–	35[f]
Ozone (O_3)			
8-hour average (ppm)	0.075[i]	0.075[i]	-
1-hour (Daily Maximum) average (ppm)			0.12[j]
Nitrogen Dioxide (NO_2)			
Annual average (ppm)	0.053[e]	0.053[e]	0.05[e]
1-hour average (ppb)	100[k]	–	–
Lead (Pb)			
Rolling 3-month average (µg/m³)	0.15[e]	0.15[e]	-

µg/m³ = micrograms per cubic meter
ppm = parts per million
ppb = parts per billion
PM_{10} = particles smaller than 10 micrometers in mass-mean diameter
$PM_{2.5}$ = particles smaller than 2.5 micrometers in mass-mean diameter
[a] The 3-year average of annual arithmetic mean concentrations at each monitor within an area is not to be above this level.
[b] Not to be exceeded more than once per year on average over 3 years (USEPA). Not to be above this level on more than three days over 3 years with daily sampling (Ecology).
[c] To attain this standard, the 3-year average of the weighted annual $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³ (USEPA). The 3-year average from a community-oriented monitor is not to be above this level (Ecology).
[d] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (USEPA). The 3-year average of the annual 98th percentile for each population-oriented monitor within an area is not to be above this level (Ecology).
[e] Not to be exceeded.
[f] Not to be exceeded more than once per year.
[g] Not to be exceeded more than twice in a consecutive 7–day period.
[h] To attain this standard, the 3-year average of the 99th percentile of the daily 1-hour average at each monitor within an area must not exceed 75 ppb.
[i] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.
[j] Not to be above this level on more than 1 day in a calendar year.
[k] To attain this standard, the 3-year average of the 98th percentile of the daily 1-hour average at each monitor within an area must not exceed 100 ppb.

1.2 Truck Traffic Impacts

Trucks bringing waste to the Factoria Recycling and Transfer Station (RTS) Replacement Project travel on paved public roads en route to the facility. In addition, a number of other vehicles use these same public roads including business and residential self-haul customers. Based on minor traffic changes identified in the Transportation Impact Analysis (TIA), a qualitative analysis of air quality impacts was conducted for the traffic on the public roads near Factoria RTS.

TIA Approach and Results

Approach

As detailed in the Factoria RTS TIA (HDR, 2011), the traffic impact due to the Factoria RTS was analyzed for the weekday EVENING peak hour at each of the study intersections. Although the peak traffic associated with King County transfer stations does not occur during the weekday evening peak hour, the total volume on the local street system will likely be higher during the weekday evening peak hour than during an hour when demand is highest for a transfer station, which is typically on a weekend.

The study area for the TIA encompasses the major intersections providing access to the site. To the degree there would be any impact to air quality as a result of traffic increases near Factoria RTS, the intersections nearest the facility would be impacted the most.

2014 Results

As depicted in Tables 3-1 and 4-5 of the TIA, the Level of Service (LOS) in 2014 with or without the project is predicted to be at LOS C or better for all intersections in the study area, which is the same or better than under existing (2010) conditions. According to the Highway Capacity Manual, intersections with LOS C or better are generally described as having free flowing to stable traffic with no delay or acceptable delays.

Also as shown in Tables 3-1 and 4-5 of the TIA, a measure known as V/C ratio, which relates prevailing traffic volumes to the estimated capacity of an intersection, is predicted to be the same or better with or without the project in 2014 than under 2010 conditions, due to only minor increases in the number of vehicle trips added when considering the Factoria RTS project improvements.

A comparison of the 2014 With Project and 2014 Without Project LOS and V/C values are virtually identical, indicating that whether the project improvements are made or not, little to no impact will be felt by the traffic nearby the Factoria RTS.

2042 Results

As depicted in Table 5-4 of the TIA, the LOS in 2042 with or without the project is predicted to be at LOS D and E for two of the intersections in the study area. According to the Highway Capacity Manual, intersections with LOS D are approaching unstable traffic flow and tolerable delay, while intersections with LOS E have unstable traffic flow and intolerable delay.

Also as shown in Table 5-4 of the TIA, the V/C ratio is predicted to be approximately the same in 2042 with or without the project, although two of the intersections indicate a V/C ratio greater than 1.0, which is generally considered to be the level of acceptability.

A comparison of the 2042 With Project and 2042 Without Project LOS and V/C values are virtually identical. While LOS and V/C indicate some intersections might experience traffic impacts which are not acceptable, the project improvements are not predicted to be the cause.

Traffic Impacts on Air Quality

Impacts to local or regional air quality can be expected to mirror the impacts shown in the traffic analysis. As described in the TIA and summarized above, the traffic impact due to project improvements is anticipated to be minor at some intersections and negligible at others.

Due to improvements in engine design, more stringent emission controls, and cleaner fuels, emissions from motor vehicles have been greatly reduced during the last 30 years. The United States Environmental Protection Agency (EPA) expects that, with continued advances in all of these categories, emissions will continue to decrease for many of the pollutants from motor vehicles, even as people drive more miles every year (http://www.epa.gov/otaq/invntory/overview/results/index.htm)

The Factoria Recycling and Transfer Station (RTS) Replacement Project is located within an area designated by the EPA as an attainment area for all pollutants. Given the minor changes to truck traffic as a result of proposed project improvements and associated minor changes to air quality, along with expected improvements in emissions from motor vehicles, it is anticipated that the project improvements will not cause or contribute to a violation of Ambient Air Quality Standards.

1.3 Transfer Station Construction and Operation

Project Emissions

The 1993 Environmental Impact Statement (EIS) for the Factoria RTS (Bellevue 1993), which is incorporated herein by reference, discusses air quality. In general, emissions during construction of any project (including solid waste transfer stations) would result from the combustion of fossil fuels. These emissions would be released in the exhaust of heavy equipment used in demolition and site preparation. In addition, small electric power generators, heaters (where needed), and other fuel-burning equipment as well as fugitive dust sources could contribute to emissions during construction. Construction emissions generally are mitigated by implementation of Best Management Practices (BMPs). The discussion in the 1993 EIS, in particular, is detailed and identified the following mitigation measures for reducing fugitive dust air emissions that would affect adjacent properties[1].

- Treating the construction site with water or chemical stabilizers to limit dust generation
- Covering or wetting truck loads of earth and cleaning vehicle tires and undercarriages before vehicles leave the site
- Sweeping streets adjacent to the construction site
- Installing paved exit aprons or exit aprons covered with riprap
- Maintaining construction machinery in good working order.

Since the 1993 EIS was completed, EPA has taken several actions to reduce emissions from diesel engines, including specifically diesel engines used in construction. These actions include the Tier 2 and 3 Nonroad Diesel Rule (1998) and the Clean Air Nonroad Diesel Rule (2004) (http://www.epa.gov/cleandiesel/documents/420f04034.htm). These actions and other actions related to on-road vehicles and fuels (e.g. Ultra Low Sulfur Diesel Rule) directly and indirectly have led to the reduction of emissions from all diesel-burning equipment. The 1993 EIS concluded that construction air quality impacts would not be significant, even prior to the existence of the actions listed. Given this, construction impacts are not expected to be significant.

Emissions during operation of solid waste transfer stations would result from the combustion of fossil fuels. These emissions would be released in the exhaust of on-road mobile sources used to transport solid waste to the facility and non-road mobile sources used to process the waste at the facility. In addition, small electric power generators, heaters (where needed), and other fuel-burning equipment could contribute to emissions during operations. Measures

[1] These mitigation measures will be reevaluated and updated, if necessary, prior to construction.

to mitigate air quality impacts during operation that were identified during the 1993 study included the following[2]:

- Reducing vehicle idling and queuing
- Periodically washing down or sweeping container storage areas
- Installation of a tire washing station for commercial vehicles at the commercial vehicle exit.

Since the 1993 EIS was completed, EPA has taken several actions to reduce emissions from diesel engines, including specifically heavy-duty diesel trucks like those used to haul solid waste to the transfer station. These actions include the Highway Low Sulfur Diesel Rule (1993) and the 2004 Highway Diesel Rule (1997, implemented in 2004), the 2007 Clean Diesel Truck/Bus Rule (2000, implemented for 2007 model year), the Ultra Low Sulfur Diesel Rule (2000, reducing sulfur content to 15ppm by mid-2006) and the Diesel Retrofit Verification Program (2000) (http://www.epa.gov/cleandiesel/documents/420f04034.htm). These actions directly have led to the reduction of emissions from on-road vehicles like those used in the operation of the transfer station. The 1993 EIS concluded that post-construction air quality impacts would not be significant, even prior to the existence of the actions listed. Given this, post-construction impacts are not expected to be significant.

In general, making improvements to older transfer stations would improve traffic flow at these facilities, resulting in an overall improvement in air quality compared to existing conditions.

The following mitigation measures could be added as a supplement to the 1993 EIS measures to control impacts to air quality, odor, and GHG emissions:

- Spraying water, when necessary, during construction operations would reduce emissions of fugitive dust.
- Covering dirt, gravel, and debris piles as needed would reduce fugitive dust and wind-blown debris.
- Covering open-bodied trucks in accordance with RCW 46.61.655, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck) would reduce fugitive dust emissions.
- Conserving and reusing construction materials on-site would reduce exhaust emissions and traffic delays because additional materials would not need to be delivered to the site.

[2] These mitigation measures will be reevaluated and updated, if necessary, prior to construction.

- Preserve or replant trees that are removed during development as a means of maintaining carbon storage. Replanting all vegetation temporarily disturbed by construction activities with native vegetation within 1 year or growing season after construction was complete.

Greenhouse Gas Emissions and Climate Impacts

Larger metropolitan areas can experience a recognized urban heat island (UHI) effect, which occurs when natural land cover is replaced with pavement, buildings, and other infrastructure, and which can change the local climate. Factoria RTS would affect approximately 15 acres of land as a result of construction while the total acreage of the existing facility is approximately 8 acres. Given that UHI effects are a result of changes in land use, and that the change in the area impacted is a minor fraction of the wider urban area, it is not anticipated that Factoria RTS will have any discernible UHI impact.

Climate can be affected by many factors, including changes in atmospheric composition due to greenhouse gas (GHG) emissions. Other factors include variations in solar irradiance, volcanic activity, ocean circulation changes, and variations in Earth's orbital parameters. Concerns expressed in recent years are that mankind's emissions of GHGs may warm the climate, possibly affecting precipitation patterns as well. GHGs, and in particular carbon dioxide (CO_2), are emitted by a vast number of sources, both natural and man-made, in amounts ranging from trivial to massive. These emissions mix rapidly and uniformly in the atmosphere. They contribute equally to global concentrations no matter where they are emitted.

Ecology provides guidance for including GHG emissions in SEPA reviews. The guidance states that "new" emissions that are expected to average 10,000 metric tons of carbon dioxide equivalent per year should be disclosed. Most projects are expected to be under this level of emissions, including warehouse facilities less than 119,000 square feet in area. The warehouse designation is the closest designation to a solid waste transfer facility in Ecology's screening tool.

The transfer station's potential contribution to global climate change would be through emission of GHGs, primarily CO_2. The net annual change in CO_2 emissions due to construction or operation of the Factoria RTS has not been quantified because the facility would process solid waste, which would continue to be produced and processed somewhere, whether at the proposed transfer station, at another transfer station, or at another solid waste handling facility. Regardless of where or how the solid waste was processed, CO_2 emissions would be emitted. Over time periods of a year or longer, it can be assumed that CO_2 is essentially evenly distributed throughout the atmosphere across the globe, and this is true for the CO_2 emissions resulting from processing of the solid waste that would be handled by the Factoria RTS, or by whatever facility handled the solid waste if Factoria RTS did not exist.

Therefore, there would be no discernible impact to the climate due to construction or operation of the Factoria RTS.

The Factoria RTS design is being developed in cooperation with KCSWD's Green Building Program. As part of that program, GHG emissions from County facilities are tracked when feasible. The emissions for Factoria RTS were calculated using *King County Department of Development and Environmental Services SEPA GHG Emissions Worksheet Version 1.7 12/26/07 (Introduction Revised March 2011) (*King County 2011*).* The new emissions resulting from the construction and operation of Factoria RTS using this worksheet method would be approximately 2,100 metric tons of carbon dioxide equivalents ($MTCO_2e$) per year, a level that falls under the official threshold for reporting. The emissions calculations use conservative assumptions for construction materials used, pavement area, and operations based on the number of employees for the building type. This facility is slightly different than traditional building types. While the estimate may be rough, it is sufficient for tracking and disclosure, although not required.

As part of King County's Green Building Program, the Factoria RTS would be built to Leadership in Energy and Environmental Design (LEED) standards. Energy efficient design would contribute to the long-term reduction in GHG emissions. In addition, the new facility would add recycling services that are not available at the existing facility. Increased recycling is a key carbon offset benefit that can outweigh the energy usage of this type of facility within a solid waste system.

The following design elements have been included in the Factoria RTS Project and they have the potential to achieve positive benefits on GHG emissions:

- Preserve or replant trees that are removed during development as a means of maintaining carbon storage.
- Replanting all vegetation temporarily disturbed by construction activities with native vegetation within one year or growing season after construction was complete.
- Employing an energy efficient design would contribute to the long-term reduction in GHG emissions.
- The new facility would add recycling services that are not available at the existing facility. Increased recycling is a key carbon offset benefit that can outweigh the energy usage of this type of facility within a solid waste system.

1.4 Odor

The discussion of odor in the 1993 EIS, in particular, is detailed and includes the following mitigation measures for reducing potential odors that would affect adjacent properties:

- Emptying the waste pit at the transfer station on a regular basis
- Restricting odorous waste loads
- Storing waste in trailers onsite rather than in the transfer building waste pit
- Emptying yard waste containers regularly
- Cleaning and deodorizing transfer trailers regularly
- Maintaining transfer trailer doors and seals

With implementation of these mitigation measures, the 1993 EIS concluded that odor impacts resulting from the operation of the Factoria transfer station are unlikely to be significant. This conclusion is supported by the fact that the Factoria facility has not received any odor complaints.

The following design elements have been included in the Factoria RTS Project and they have the potential to achieve positive benefits related to odor and dust suppression:

- The Transfer Building will be fully enclosed except for the entry/exit points, reducing off-site dust and odor impacts;
- The Transfer Building will incorporate a mechanical exhaust ventilation system for dust and odor control;
- There will be a misting system for dust and odor control in the Transfer Building;
- The hydraulic compactor system with the upgraded facility will eliminate the need to macerate the waste in the receiving pit, thereby reducing dust produced by the maceration process.

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2.0 References

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